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Commercial Bank Management

RAY De LUCIA
JOHN PETERS

Fourth Edition

Commercial Bank Management

HEAD OFFICE: 50 Waterloo Road NORTH RYDE NSW 2113
Tel: (02) 9936 6444 Fax: (02) 9888 2287
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Commercial Bank Management

by

R D DE LUCIA
BComm (Hons), MComm (UNSW), AAIB (Snr)
Head of Business Financing Products,
Commonwealth Bank of Australia

and

J PETERS
BComm (Hons), MComm (UNSW), AASA, CPA, AAIB (Snr)
Finance Director, Kimberley Securities Ltd

FOURTH EDITION

with a Foreword by
G J THOMPSON
Deputy Governor, Reserve Bank of Australia; Chief Executive (Designated), Australian Prudential Regulation Authority

and an Appendix of Questions and Answers by
KEVIN MSHANAHAN
BComm, Dip Ed, AAUQ, FASA, CPA, FAIB

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Foreword

G J THOMPSON

Deputy Governor, Reserve Bank of Australia, Chief Executive (Designate), Australian Prudential Regulation Authority

This book provides, in clear and accessible terms, a comprehensive exposition of the environment in which Australia's banks and other financial institutions operate today. And it reviews the main forces which continue to make for evolution in that environment—technological change as it affects product delivery and risk management techniques, competition from new players and the ebb and flow of official regulation.

One of the greatest challenges for educators, and their students, in the field of financial studies is to keep them up to date with a rapidly changing landscape. The authors here have done an admirable job of dealing with very current developments, such as capital requirements for banks' market risks and the real-time gross settlement system for high-value payments—both of which become effective in 1998. They also examine recent advances in the management of credit risk and loan pricing. And there is a brief account of the major changes in regulatory arrangements which will flow from the Wallis Committee's report—the formation of the Australian Prudential Regulation Authority, the increased responsibility of the Reserve Bank for payments system regulation and the expanded role of the Australian Securities Commission in consumer protection.

I am sure this new edition of a well-established text will be welcomed by both teachers and students.

24 March 1998

Preface

In this book, the authors discuss some major issues facing banks' managements. The work is largely based on the theme that management's role is to minimise banking risk (whether it be funding, operational, credit, interest rate and/or foreign exchange risk), while at the same time ensuring that the bank takes advantage of any opportunities.

In this fourth edition, all chapters have been revised and expanded or updated. Throughout the book, reference is made to the recent Wallis Inquiry into the Australian Financial System and its implications for various elements of the banking system. Chapters 4 and 5 have been rewritten to explain the capital adequacy requirements set by the Reserve Bank of Australia (based on the Basle Convention) in relation to market risk.

The authors wish to thank David Ferris and Brett Plummer, who were previous contributors to this book.

Most of all, however, the authors extend our love and thanks to Kerry and Samantha, as well as our families whose support and patience enabled us to endure the countless hours of research and revision. In appreciation of their support and love we dedicate this book.

The authors, of course, accept full responsibility for any errors or omissions. However, they do wish to point out that, as the financial markets are dynamic, elements within the text may become outmoded within a short period of time.

R D DE LUCIA
J PETERS

Sydney
May, 1998

Table of Contents

List of Figures and Tables

1

Introduction

The Changing Face of the Australian Financial System

[101] The Australian financial system has experienced a metamorphism. This change of form was brought about by a number of factors, notably:

- the Commonwealth Government's decision in 1983 to adopt a floating exchange rate system;
- the concomitant decision by the monetary authorities to adopt more market oriented policies in achieving their stated objectives;
- the impact of new technology on communication and data transmission which inexorably linked the Australian financial system to the international financial community and allowed specialist financial service providers to compete directly with traditional financial services organisations;
- a decade or more of world economic instability; and
- a sharper awareness by individuals of the impact of inflation on the real value of their investments.

Certainly, the Australian financial system, like those in other countries, has experienced continual change throughout the 20th century. However, in the past two decades that rate of change has visibly escalated, with the prospect that this trend will continue. As Australia enters a new millennium, the financial system will have to contend with the removal of the traditional distinction between banks and other financial service providers. This change is unique in the world and will be closely watched and analysed to gauge the benefits that will accrue to the rest of society.

[102] Until August 1981 when the Australian Bank Ltd commenced operations, only three Government-owned banks (two State and one Commonwealth) were effectively opened since Federation (a private trading bank opened its doors in the early 1900s, but failed a few years later). Between 1900 and World War II there were no formal mechanisms for the conduct of monetary policy nor the supervision of institutions within the financial system. Indeed, it was not until 1941 before bank licensing provisions were introduced, and 1945 before they became a permanent feature of banking legislation.

[103] The first major development after 1945 was the formation of the Reserve Bank of Australia as a separate entity from the Commonwealth Banking Corporation by enactment of the *Reserve Bank Act 1959*. Between 1945 and 1959 the Commonwealth Bank had acted as the central bank for the Australian financial system. Many of the supervisory powers and functions exercised between 1945 and 1959 by the Commonwealth Bank of Australia on the financial system were transferred to the newly created central bank.

The Reserve Bank (or "Granny" as she is affectionately known within the financial community) is empowered with, inter alia, the issue of Australian notes and the administration and implementation of overall stability of the financial system.

For much of its first 20 years the Reserve Bank fulfilled its primary objective through the imposition of restrictive controls on the banks. These controls included:

- limits on the interest rates banks could offer on deposits and charge on loans;
- limits on the maturity profile of bank deposits;
- restrictions on the level of bank lending; and
- liquidity ratios, which required banks to hold a certain percentage of their assets in specified securities.

Presently, controls relating to entry into the banking industry are contained in the:

- *Banking Act 1959;* and
- *Banking (Shareholdings) Act 1972.*

During the 1960s and early 1970s the Reserve Bank dictated the level of bank lending and even the principal sectors which would benefit from bank loans. This made the management of a bank a fairly straight forward exercise, since the asset side of the balance sheet was largely determined exogenously (that is, beyond the control of bank management). Asset restrictions and controls on the level of interest rates offered and charged by banks led bank managements to concentrate their energies on non-price forms of competition.

Some observers argued that these controls made bank managements complacent and fostered the development and growth of non-bank financial intermediaries.

The volume of lending provided by the banks fell way short of the demand for finance within the community and allowed peripheral financial organisations to establish profitable niches in the market. However, the banks themselves moved to establish their own or purchase existing non-bank financial organisations in an attempt to satisfy their customers' funding requirements. Indeed, the largest of the finance companies and merchant banks which proliferated during this period were invariably owned (either fully or partially) by the established banks.

[104] Campbell report. In part recognition of the rapid changes that were occurring within the financial system and the decreasing influence of the Reserve Bank in the growth of credit creation within the Australian financial system, the Commonwealth Government announced in January 1979 the establishment of the Committee of Inquiry into the Australian Financial System (known as the *Campbell Committee*, after its Chairman, Sir Keith Campbell). In announcing the inquiry the then Federal Treasurer, Mr Howard, said that:

> "The Committee had been asked to inquire into the operations and efficiency of the Australian financial system ... the last inquiry into the workings of the financial system had been the 1937 Royal Commission into Monetary and Banking Systems. In the forty years which had elapsed since that inquiry, there have been massive changes in both the domestic and international financial environment.
>
> The Government believed a clear case existed for a broad inquiry into the Australian financial system to ensure that its structure and operations adequately meet the current and future needs of the Australian economy.
>
> The Treasurer said that the objective of the Inquiry was not more regulation by the Government. Indeed, one of the important issues to be canvassed by the Inquiry would be whether present levels of regulation and government involvement were appropriate."[1]

Broadly, the terms of reference of the Inquiry were to:

- inquire into, report and make recommendations on the structure of the Australian financial system; and

1. Commonwealth Record 15-21 January 1979, pp 54-55.

- inquire into, report and make recommendations on the regulation and control of the financial system.

[105] The Committee delivered its recommendations in its final report in 1981. The basic philosophy of the Campbell Committee's recommendations was that the community would be best served by a deregulated financial system, that is, one subject to the discipline of the market with a minimum of government intervention and regulation.

The report espoused four recurring themes:

- market oriented intervention by the authorities is preferable on efficiency grounds to direct controls because it influences demand, supply and the cost of credit across the entire spectrum of the financial system;
- regulations imposed on the financial system should not be concentrated on particular types of institutions, but rather should apply equally to all institutions;
- there should be no legislative or administrative barriers to entry into the various forms of financial intermediation; and
- governments have a responsibility to ensure the stability and confidence of the financial system through the use of prudential guidelines on the operations of financial institutions.

[106] **Martin Committee.** With the election of the Labor Government in 1983, a new committee of inquiry (or the Review Group as it was formally known) was established to

> "report on the financial system . . . (having) regard to the Campbell Committee recommendations and (taking) account of the Government's economic and social objectives as well as of the need to improve the efficiency of the financial system".[2]

The *Martin Committee's* (after its Chairman, Mr Vic Martin) major recommendations were broadly consistent with those of the Campbell Committee, namely:

- the removal of bank interest rate and deposit maturity controls;
- the introduction of prudential provisions to ensure stability of the financial system; and

2. Commonwealth Record 23-29 May 1983, pp 699-700.

- the granting of between four and six new banking licences (this latter recommendation was somewhat at odds with the more open approach recommended by the Campbell Committee).

[107] The Commonwealth Government and Reserve Bank adopted most of the recommendations of the Martin Inquiry, with progressive announcements made to:

- float the Australian dollar;
- remove interest rate and deposit maturity restrictions on banks;
- permit the establishment of 16 new banks free of the previous shareholding restrictions imposed by the Banking (Shareholding) Act;
- introduce more market oriented policies for controlling the level of credit creation in the economy; and
- the introduction of prudential guidelines on banks as a means of protecting bank depositors' balances.

[108] In 1991 the Federal Government announced a parliamentary inquiry into the Australian banking industry. The terms of reference to the Committee in October 1991 called for an evaluation of the banking industry's importance, benefits, profitability and the effectiveness of competition; in essence an assessment of performance "post-deregulation".

The Report was tabled in Parliament on 27 November 1991. That report was heavily influenced by the failure of a number of non-bank financial institutions and the large bad debt experience of the major banks in the late 1980s and early 1990s. As such, it focussed its attention primarily on depositor protection and the need to avoid the possibility of *systemic risk* (the risk of major disruption to the Australian financial system caused by the insolvency of a financial institution) by clearly distinguishing banks from other financial service providers. This represented a move away from the philosophy of the "level playing field" established by the Campbell Report. The key recommendations of the 1991 Inquiry are summarised below.

[109] Competition. The Report, supported competition and deregulation as the best approach to an efficient and market responsive banking system. Profitability of the industry was not seen as excessive although there were criticisms of the manner in which banks responded to deregulation, particularly in an assessed link between desire to retain market share and poor lending. The Committee's view on bank responsibility for higher than market interest margins and prices was equivocal, although it concluded that retail interest margins had not changed significantly since deregulation.

The Committee recommendations in this area focussed on:

- seeking a definition of the term "bank" for inclusion in legislation;
- making further industry concentration more difficult;
- more widespread dissemination of information on margins and profitability;
- allowing foreign banks to establish branches in Australia;
- seeking assurances from regulators that there is appropriate separation of banking and funds management activities; and
- allowing banks to take some equity in non-bank financial institutions.

[110] Supervision. The bad debt experience of the banks during the latter half of the 1980s and early 1990s led the Committee to conclude that the system of prudential supervision had not worked well. Further, the Committee expressed concerns that the growth of financial conglomerates offered a new source for parent bank difficulty from subsidiaries engaged in funds management.

Recommendations included:

- The Reserve Bank should enhance its bank monitoring procedures and liaise more effectively with bank auditors;
- State-owned banks should be brought clearly within the control of the Reserve Bank;
- All credit co-operatives with assets in excess of $1 billion should be obliged to obtain a banking licence;
- Bank subsidiaries whose principal business is raising deposits and making loans should be absorbed into the parent within three years; and
- A Council of Financial Supervisors[3] should be established comprising "lead regulators" (Reserve Bank, Insurance and Superannuation Commission and Australian Securities Commission) and a second

3. Council of Financial Supervisors—Following its formation, the Council's stated aim was to enhance the quality of financial supervision and regulation in Australia by: facilitating exchanges of information bearing on the efficiency and health of the financial system; assisting each supervisor to be aware of, and to understand, developments in parts of the financial system outside his particular area of responsibility; identifying important issues and trends in the development of the financial system as a whole; and avoiding unintended gaps, duplication or inconsistencies in regulation.

Deputy Governor should be appointed at the Reserve Bank with specific responsibility for prudential supervision.

[111] Retail banking. The Committee's overall thrust in this area was that, whilst banks had made changes and were focussing on better service and dispute handling, the pace of change was not sufficient.

Recommendations included:

- a Prices Surveillance Authority review of credit card pricing as a precondition of banks being given authority to levy non-interest charges;
- dispute handling procedures and staff training in this area be intensified; and
- the Australian Law Reform Commission be requested to conduct a review of the law of the banker and customer.

In conclusion, it appears that the Committee was satisfied that the process of deregulation had and would be beneficial to the Australian economy, but that better monitoring systems needed to be introduced to ensure that the benefits of deregulation were passed on to the Australian community. It also sought to re-establish the distinction of banks and other financial service providers and the pre-eminent position of bank deposits in terms of security, when compared with funds lodged with other financial competitors.

[112] Wallis Inquiry. In June 1996, the Treasurer, Mr Costello, established the fourth Financial System inquiry in 20 years. The Inquiry was established with the following mission:

> "The Inquiry is charged with providing a stock take of the results arising from the financial deregulation of the Australian financial system since the early 1980s. The forces driving further change will be analysed, in particular, technological development. Recommendations will be made on the nature of the regulatory arrangements that will best ensure an efficient, responsive, competitive and flexible financial system to underpin stronger economic performance, consistent with financial stability, prudence, integrity and fairness.
>
> 1. The Inquiry will report on the results arising from the financial deregulation flowing from the *Inquiry into the Australian Financial System* ("Campbell Report") published in 1981. This will involve examining and reporting the consequences for:
>
> (a) the choice, quality and cost of financial services available to consumers and other users;
>
> (b) the efficiency of the financial system including its international and domestic competitiveness;

(c) the economic effects of deregulation growth, employment and savings;

(d) the evolution of financial institutions and products offered by them and the impact on the regulatory structure of the industry.

2. The Inquiry will identify the factors likely to drive further change including:

(a) technological and marketing advances;

(b) international competition and integration of financial markets;

(c) domestic competition in all its forms;

(d) consumer needs and demand.

3. The Inquiry will make recommendations on the regulatory arrangements and other matters affecting the operation of the financial system (including prudential and other regulations made by the Reserve Bank and other bodies) as will:

(a) best promote the most efficient and cost effective service for users, consistent with financial market stability, prudence, integrity and fairness;

(b) ensure that financial system providers are well placed to develop technology, services and markets and that the financial system regulatory regime is adaptable to such innovation;

(c) provide the best means for funding the direct costs of regulation;

(d) establish a consistent regulatory framework for similar financial functions, products or services which are offered by differing types of institutions."[4]

[113] The Committee was chaired by Mr Stan Wallis. In stark contrast to the three previous inquiries, the Wallis Inquiry did not limit itself to focussing on improving the existing financial system. Rather it tried to conjure a number of paradigms of what the Australian financial system would look like in the year 2010 and attempted to ascertain what reforms were required to facilitate a world's best financial system which would operate effectively within each of those paradigms.

The Inquiry noted that the financial system in Australia was undergoing considerable change, driven by technological advances and changing household preferences in the way they manage their money.

In particular, the Inquiry identified the following forces of change in the financial system:

- Households were broadening their range of financial asset holdings and venturing away from traditional fixed interest savings available from banks. Households were becoming aware of alternative forms of

4. Financial System Inquiry Discussion Paper, Appendix A, p 347.

investments and were more willing to consider investments offering potentially higher returns with commensurate added risk of capital loss, such as equity investment (either directly through the share market or indirectly, through unit trusts). Due to the proliferation of cheaper delivery channels and focussed marketing, households were also more aware and had a greater opportunity to seek value in choosing the appropriate financial product for their personal needs.

- Technological advances in the areas of data storage, systems processing, data delivery and communication had driven down the cost of providing financial services, making it easier for individuals and corporations to access markets and products, both domestically and internationally. Such advances had also made it easier for new competitors to establish a niche position in traditional banking markets, by offering such products as "direct banking", (involving the delivery of particular banking services by telephone) and "Internet" banking.

- Changes in government regulation and legislation had also had a profound effect on the financial system. In particular, the Inquiry noted that the introduction of compulsory superannuation and the departure of government as an owner of financial institutions had materially altered the financial landscape.

[114] The Inquiry noted that innovation in product design and modes of distribution had blurred the boundaries between financial instruments offered by institutions. Technological advances meant that entities which had previously not operated in the financial system could now offer financial products to consumers. These entities could even be located overseas and Australian consumers were now in a position to purchase certain financial services, such as investments, directly from overseas.

The result of this heightened competition was the increasing commoditisation of financial products (including home mortgages), where the importance of non-price factors was becoming negligible in framing consumers' decisions to choose between the products of different suppliers. The Inquiry saw a need for regulatory barriers to be relaxed, as they would inhibit the ability of the traditional providers of financial products (banks, life insurance companies, etc) to compete with these new entrants.

The Inquiry noted that one development of the increasing plethora of product being provided from a diverse range of suppliers was that consumers might choose to rely more on trusted names and brands, with the result that strong franchises might move to provide an array of product away from their traditional base. This might include banks offering health insurance, real estate services, trustee facilities, selling telephone and power services to their customer base, in addition to offering more traditional products, such as mutual funds, life insurance, shares, etc.

[115] A major development of the technological advances in the financial system was the increasing ease with which users (including households) could access markets directly and avoid having to go through an intermediary (bank, broker, etc). This has been most vividly reflected in the dramatic increase in the number of households which now directly hold listed shares. As such, the Committee noted that there had been a rapid increase in the proportion of financial sector assets taking the form of market claims (where the value of the asset will move in line with changes in market prices) rather than products offered from the balance sheets of financial intermediaries (deposits, loans, etc).

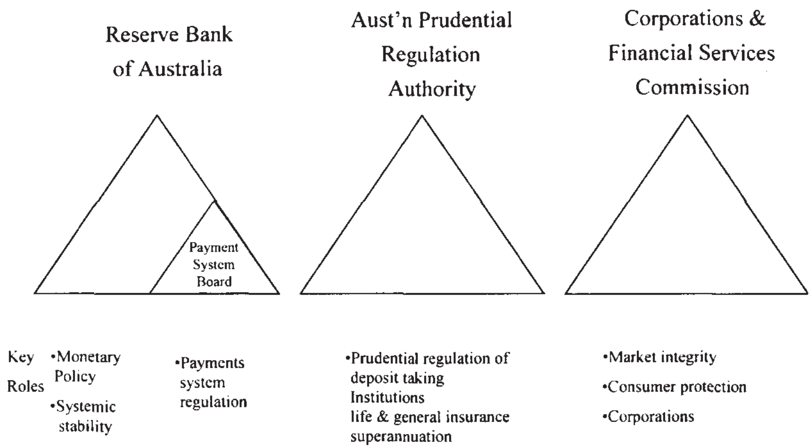
[116] The Wallis Inquiry re-affirmed the trend towards financial market deregulation and the creation of the "level playing field" which had been initiated by the Campbell Report. Moreover, the Wallis Inquiry went a step further and questioned the validity of continuing to distinguish between banks and other financial service providers. The Inquiry noted and accepted the need to avoid systemic risk. However, it did not accept that the prospect of systemic risk would be increased by removing the distinction between banks and other financial service organisations. Rather, it argued that systemic risk could be minimised by requiring that all deposit taking institutions were subject to the same prudential and regulatory standards as applied to banks. This "level playing field" approach would invigorate competition in the industry and materially improve the efficiency of the financial system, which the Committee had concluded was equivalent to the average of the world's best.

In September 1997, the Government announced that it would adopt most of the recommendations contained in the final report. Specifically, these were:

[117] **Rationalisation of the regulatory framework.** The Government decided to establish a new regulatory structure based on three agencies and integrating all the existing Commonwealth and State regulatory agencies into this troika. The new structure is illustrated in Figure 1.1.

Fig 1.1

Proposed regulatory framework[5]



- The role of the Reserve Bank of Australia will be focused on the objectives of monetary policy, overall financial system stability and regulation of the payments system. A key change was the transfer of the Reserve Bank's bank supervisory function to a new regulatory authority. As part of this change, a new Payments System Board would be appointed within the Reserve Bank with stronger supervisory powers to ensure safety, greater competition and efficiency in the payments system;

- The Australian Prudential Regulation Authority (APRA) would be established to prudentially supervise deposit taking institutions, life and general insurance companies and superannuation funds (thereby absorbing the roles of the Australian Superannuation and Insurance Commission, the Australian Financial Institutions Commission and part of the bank supervisory function of the Reserve Bank); and

- Australian Corporations and Financial Services Commission (ACFSC) will be established to cover market integrity, disclosure and other consumer protection issues (effectively replacing the Australian Securities Commission (ASC) and absorbing some of the consumer

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5. Source: Reprint of Financial System Inquiry Final Report Overview, Coopers & Lybrand, 1997, p25.

protection functions of the Australian Competition and Consumer Commission (ACCC)). The ACFSC will be responsible for:

— corporate regulation, securities and futures markets (currently performed by the ASC);

— market integrity and consumer protection functions in connection with banks, finance companies, merchant banks, building societies, credit unions, friendly societies, superannuation interests, retirement savings accounts, and general and life insurance products (but not including State and Territory consumer credit functions);

— consumer protection functions for the finance sector (currently performed by the ACCC and the Australian Payments System Council); and

— oversight of industry initiatives for consumer protection in the areas of new technology in the finance sector and ensuring they develop in a co-ordinated way.

The Government announced that it would also establish a Council of Financial Regulators who would be responsible for co-ordination of activities between the three regulators across a wide range of issues.

[118] Balancing prudential and competition goals. The Wallis Inquiry concluded that prudential regulation should be implemented with a view towards maintaining safety of the system, whilst being sufficiently flexible to respond to financial system developments. Prudential arrangements should also minimise adverse effects on competition, competitive neutrality and efficiency.

Consistent with this approach, the Government announced the establishment of a single licensing and prudential regime for all deposit taking institutions. Other institutions would be able to offer financial services, but would not be able to solicit for customer funds. This represented a major departure from previous reviews which had highlighted the importance of distinguishing banks from other financial service providers. It also represented the first instance in the world where such distinctions were effectively removed.

Noting this significant departure from conventional practice, the Inquiry proposed that prudential regulation of all licensed taking deposit institutions should be consistent with standards approved by the *Basle*

Committee[6] on banking supervision and should ensure that the risk of loss of depositors' funds is remote.

To encourage new entry and more efficient competition the Government also announced a number of administrative amendments. Specific amendments will include the following:

- Facilitate the establishment of non-operating bank holding companies and allow holding companies to own more than one bank or other licensed entities.
- Streamline the process of (bank and deposit taking) licence issue, transferring responsibility to the prudential regulator (APRA).
- Removal of prohibitions on mutual (insurance company) ownership of banks.
- Facilitate possible future participation of a wider range of entities in the deposit taking market and streamline the regulation of financial institution shareholdings with a single ceiling of 15 per cent, above which Government approvals must be obtained. A new "*Acquisitions Act*" will replace the existing spread of ownership legislation and rules in the *Banks (Shareholdings) Act 1972,* the *Banking Act 1959,* the *Insurance Acquisitions and Takeovers Act 1991* and the Financial Institutions Scheme (building societies and credit unions).
- The APRA would take responsibility for the prudential regulation of superannuation funds and retirement savings accounts.

The APRA will be granted power to impose varying conditions on the use of names under the common licence enabling a distinction to be retained between the identities of banks and non-banks, while facilitating the entry to the market of small non-bank deposit taking institutions. The existing requirements for the use of the name "bank" would be retained, including that the entity must have a minimum of $50 million in capital and hold an Exchange Settlement Account with the Reserve Bank.

[119] Maintaining protection of depositors. The Government announced that the existing depositor protection provisions of the *Banking Act* would be retained and extended to all licensed deposit takers. This would involve removing the hitherto pre-eminent status of bank deposits in terms of safety and establish a "level playing field" by extending to all regulated deposit taking institutions the priority over the assets of an institution now afforded only to bank depositors. Consistent

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6. Refer [430] for a comprehensive review of the Basle Committee's recommendations.

with this move, the Government agreed that the existing requirements of banks holding Non-Callable Deposits at the Reserve Bank would be abolished.

The APRA will be responsible for licensing regulated entities, conducting prudential regulation of licensed entities and providing for depositor and investor protection in the event of financial difficulties being experienced by regulated entities. Hence, the APRA (rather than the Reserve Bank) would be responsible for dealing with institutions which are unable to meet their obligations. The Reserve Bank would retain its existing role in providing liquidity support to financial institutions if such assistance is required.

[120] Promoting efficiency, competition and confidence in the payments system. The Inquiry believed entry to the Australian payments system had been made unnecessarily difficult. Whilst accepting the need to ensure integrity of the payments system, the Inquiry argued that the entry criteria should become clearer and open.

Accordingly, the Government agreed to establish the Payments System Board (PSB), as a specialist unit within the Reserve Bank. The PSB will be empowered to regulate clearing and settlements systems, identify entry guidelines, control risk in the financial system and promote efficiency and competition.

The Reserve Bank will have the power to ensure that clearing system bodies provide access to their facilities to third parties on reasonable terms.

To ensure that they continue to develop consumer confidence and do not undermine the safety of the financial system, the Government noted that the funds underlying general payments instruments such as electronic cash and stored value cards will be subject to prudential regulation.

[121] Promoting more effective disclosure and consumer protection. The Australian Corporation and Financial Services Commission (ACFSC) will be given comprehensive market integrity and consumer protection functions. In addition to the existing powers of the Australian Securities Commission, the ACFSC would be given the same general consumer protection laws to enforce as currently exist under the consumer protection provisions of the *Trade Practices Act.*

The *Trade Practices Act* will continue to have universal application administered by the Australian Competition and Consumer Commission.

However, the ACFSC will take responsibility for consumer protection issues arising within the financial system.

[122] The Government noted that it expected that all regulatory and legislative matters needed to effect the changes would be completed by July 1998. The changes would herald a major change in thinking about the financial system in Australia. Effectively, the changes would promote the creation of both highly diverse financial services organisations as well as specialist financial service providers. Undoubtedly, the Australian experiment will be viewed with great interest by banking regulators and governments throughout the world.

The management of banking or more correctly of financial services organisations has become increasingly complex, driven by change in consumer preferences, technological innovation and regulatory change. In the following chapters we analyse some of the major issues facing bank managements and the factors management should consider when developing their short-term and long-term strategies.

2

The Nature of Commercial Banking

Commercial Banking Functions

[201] The transition of an economy from subsistence to trading is built upon both comparative advantage and economies of scale increasing total production and economic wealth. With increasing wealth, and a medium by which to transfer it, the opportunity arises for consumers to alter their consumption pattern over time.

In order to facilitate this inter-period wealth transfer, financial institutions (especially banks) have developed and flourished as a medium by which wealth can be relatively safely stored in a readily accessible form—essentially a bank deposit. The liquidity of these deposits and their ultimate application have resulted in banks being viewed as a central cog in the payments and clearing system, which is essential for the efficient operation of a modern economy.

Banks and other financial institutions provide the function of *financial intermediation*—acting as the conduits through which the funds of many savers are channelled to borrowers who cannot raise money directly.

[202] Capital markets—the rationale for borrowing and lending. The transfer of consumption across different time periods initially invokes images of savings being stored to smooth consumption across "rainy days", that is, deferring of consumption. However, consumption can also be accelerated by borrowing.

The capacity to transfer consumption between periods means that, as productive opportunities arise, wealth can be transferred to those areas which add most to the economy's total wealth. Accordingly, the action of borrowing and lending, usually through capital markets, provides both borrowers and lenders the opportunity to increase their respective net present value.[1]

The impact of borrowing and lending on an economy's wealth is best demonstrated by using a simple, two period analysis, which assumes that whatever is not consumed today, which we will call period t_0, will be consumed in period t_1, the next period. By analysing both the present and future values of the individual's cash flows, we can demonstrate that they will benefit by either borrowing funds to boost their current income or lending funds to boost their future income.

To make the comparison between current income and future income, the standard compound interest, present value/future value formulae are employed, as outlined in equations 2.1 and 2.2:

$$PV = \frac{FV}{(1+\frac{i}{100})^n} \tag{2.1}$$

$$FV = \frac{i}{PV \times (1+100)^n} \tag{2.2}$$

Where	PV	—	present value
	FV	—	future value
	i	—	the annual effective rate of interest[2]
	n	—	the term of the investment expressed in years

[203] If we assume an individual has cash on hand of $25,000, an expectation of future receipts in one year's time of $30,000 and the interest rate is 10% pa, the following present consumption/future consumption possibilities are available:

$$\begin{aligned} PV &= \$25{,}000 + \$30{,}000/(1.1) \\ &= \$52{,}273 \end{aligned}$$

$$\begin{aligned} FV &= \$25{,}000 \text{ x } (1.1) + \$30{,}000 \\ &= \$57{,}500 \end{aligned}$$

Thus, in our simple example, the individual has three alternatives:

1. Increases in wealth or net present value of cash flows is simply the present value of all future cash flows, discounted by an agreed rate of interest. Appendix 2**A** illustrates more fully the methodology behind present and future value calculations.
2. For our purposes, we will ignore the impact of taxation on wealth accumulation.

- borrow his or her known future income now and thereby consume all his wealth today, valued at $52,273 in t_0 dollars;
- save his current income and thereby consume all his wealth in period t_1, valued at $57,000 in t_1 dollars; or
- consume some combination of current and future income.

From this example we can see that in an economy with capital markets, current consumption can be varied from $0 to $52,273 in period t_0 and from $0 to $57,500 in period t_1. This is illustrated in Figure 2.1.

[204] Capital markets allow us to borrow or lend to adjust consumption needs across time. Relative consumption patterns will be dependent upon the individual's relative utility from current consumption. This is depicted as the individual utility function in Figure 2.1. A utility function describes a locus of points within which the individual is indifferent between different consumption levels over time. For illustrative purposes, the person who is typically a saver is usually referred to as the *miser*, while a person who is a net borrower today (t_0) is referred to as the *prodigal.*

In Figure 2.1, the prodigal's utility curves are represented as PP and P'P', while those for the miser are MM and M'M'. Utility is greater on utility curves further from the origin (O), since the individual can consume more in both periods (that is, MM represents a higher utility to the miser than M'M').

Capital markets allow consumption transfers between misers and prodigals to occur which benefits both parties. For example, AA ($40,000 current consumption, $13,500 future consumption) would involve borrowing $15,000 from the capital market during period t_0 at 10% pa to augment current cash on hand. Future consumption would then be reduced from $30,000 to $13,500.

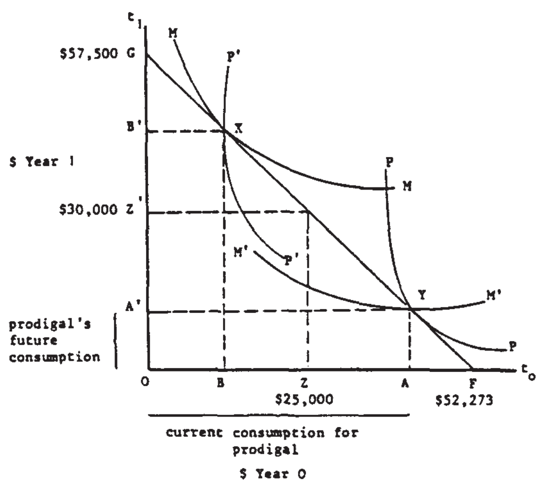
Thus, consumption has been transferred across time to suit the individual's need, removing the obligation for both the prodigal and the miser to match consumption with expected cash flow. The miser, with the same income stream, would consume $10,000 this period and $46,500 in the future period (described as BB' in Figure 2.1).

Neither the prodigal nor the miser would be happy with their initial and future income receipts. By trading cash across time at the market rate of interest, both the prodigal and the miser have more effective use of the consumption value of current income. Since both are better off, the wealth of the economy increases. This is more formally described in [206].

Maximum utility for both individuals is derived where their respective utility curves are tangential to the *capital market securities line,* FG, as this is the highest utility point which can be achieved by both miser and prodigal without consuming more than their total two period income. For the miser, maximum utility is represented by point X, where his utility curve MM is tangential to FG, whilst for the prodigal maximum utility is achieved at point Y, the tangent of PP and FG. In this case, the miser consumes OB in t_0 and OB' in t_1, whilst the prodigal consumes OA and OA' respectively.

Fig 2.1

Consumption patterns in an economy with capital markets



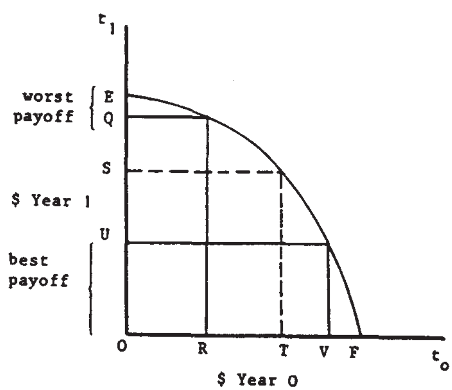
[205] Introduction of productive opportunities into capital markets. In practice, individuals are not limited to investing only in capital market securities. They can acquire plant, machinery and equipment which will provide higher marginal returns (and higher risk) than capital market securities. Initially, *the productive opportunities line* (the theoretical line showing all possible investment opportunities available to the individual) will be very steep. However, as profitable opportunities are exhausted, the curve tends to flatten as very few people are an inexhaustible mine of new and profitable ideas. In the jargon of economics, this (the flattening in the slope of the curve) is evidence of *declining marginal return on capital.*

In Figure 2.2, we define a two period model where, for an initial outlay in real assets in the first period, the investor receives a return in the final period. Figure 2.2 represents the investment opportunities available in real assets only. EF describes the *productive possibility curve* for an investor who invests in productive opportunities (for example, an engineering firm). The payoff of OU in t_1 costs the investor FV in period t_0.

The more steeply inclined the productive possibility curve, the more profitable the investment in real assets become. Maximum return is achieved by investing FV in t_0. Investment FV is more profitable than VT and VT is in turn more profitable than TR. For example, the respective pay outs for equivalent investments of $5,000 in FV, VT and TR would be OU $10,000, US $7,500 and SQ $3,500 respectively in period t_1.

Fig 2.2

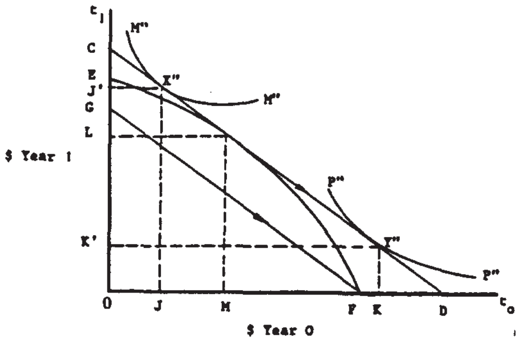
Relative returns from investment in real assets



[206] A world with both capital markets (FG) and real assets (FE) is represented in Figure 2.3, as simply the combination of Figures 2.1 and 2.2. Such a world is characterised by interdependencies. In this case, the curve FG is a function of the productive possibility curve FE and individuals' preferences concerning current consumption. The real return on financial assets effectively determines the slope of the curve FG.

Fig 2.3

Consumption patterns from an economy with real asset and capital markets



The maximum level of current consumption available to both the prodigal and the miser in a world with only capital market securities (FG) or real assets (FE) would yield OF. In a world with dual markets, the prodigal and miser can increase the present value of current consumption beyond OF. By investing MF (in Figure 2.3) in real assets and OM in capital market securities, the investors equate the marginal rate of return on real asset investments to the rate of return achievable by investing in capital market securities (shown as that point where the slope of the curve EF is equivalent to the slope of the line GF) and results in an increase in the present value of FD.

For individuals, their mix of current and future consumption depends upon their utilities as described in [204]. If we assume each anticipated cash flow will occur (no risk) both prodigal and miser have OF total initial wealth and no future expected income, they are both better off if they invest FM in real assets and then the miser lends an equivalent of JM to the prodigal to maximise each other's utility.

No matter what the initial distribution of wealth between the miser and the prodigal in the closed economy, the interaction of each others' utility functions and the productive possibility frontier will establish a unique equilibrium rate of return on capital market securities. This will in turn provide maximum points of present consumption for both the miser (OJ) and the prodigal (OK).

If they could invest only in the capital markets, they would be obliged to a choice of consumption possibilities provided by the line GF. Similarly, a world with only productive assets would limit the choice to

EF. The combination of capital markets and real assets allow a superior choice of consumption possibilities along CD, allowing both the prodigal and the miser the opportunity to spend more in both period t_0 and t_1.

[207] The capital market then seeks to provide the desired balance between current consumption (t_0) and future consumption (t_1) for the benefit of all market participants. The benefit of capital markets, of which banking is an extremely important part, is directly measured by the increase in the present value FD in Figure 2.3. The benefit is derived by all parties (both borrower and lender—prodigal and miser) and is dependent upon the individual's preferences for current versus future consumption. This fundamental result in which everyone wins is the rationale for the development and continued presence of capital markets.

[208] Financial intermediation. The preceding has highlighted the attraction of borrowing and lending for both parties. However, in reality, savings must be channelled in an efficient manner to borrowers. Two basic methods of channelling savings to borrowers[3] are:

(a) *Direct meeting of savers and borrowers.* Difficulties in matching borrowers and lenders interested in the same amount and maturity date, as well as problems associated with credit assessment, management and diversification, means that this form of wealth transfer is mainly used where efficient banking systems have not developed or where the sums are very large and the credit risk well known.

(b) *Financial intermediation.* Financial intermediaries package lenders' (depositors') funds so as to meet the demands of those wishing to borrow while undertaking the functions of credit risk assessment, management and diversification.[4] The economies of scale financial intermediaries (especially commercial banks) achieve by accessing a range of lenders (depositors) and a much smaller group Of borrowers means that the cost of providing this service is generally much smaller than the cost of individual participants undertaking it. The banks predominantly recoup payment for this service through the spread between deposit and loan interest rates.

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3. See for example Nadler, p 12.
4. Refer [501] for a more detailed discussion of risk management.

Many hybrids of these two general categories are in use today. In particular, the use of securitisation[5] of debt by borrowers and the channelling of savings into superannuation funds has changed the way banks and other intermediaries "lend". As identified by the Wallis Inquiry (refer [112]), this trend is expected to intensify over time, particularly as the pool of funds managed by specialist investment management organisations increases.

While the preceding model assumes perfect capital markets[6] this is obviously not the case as different borrowing and lending rates represent a diversion from the perfect capital market assumptions. Banks' earnings are dependent upon the spread between borrowing and lending rates and, as such, their existence breaks down the perfect capital markets assumptions. The more narrow the spread between borrowing and lending rates the less "fat" (or fee) financial intermediaries charge and hence the more efficient the capital market. The competitiveness of financial intermediaries in today's capital markets has ensured that spreads between borrowing and lending are relatively narrow (or fine).

[209] Circular flow of funds. The capital market's role in increasing the economy's wealth or present value of production can be represented in a macroeconomic sense as the "valve" which regulates the flow of funds between producing and consuming units[7] (that is, current and future consumption) as shown in Figure 2.4.

This control valve, which is generally the rate of interest, is a product of the supply and demand for funds for current and future consumption. In a perfect capital market, the credit rationing device is solely the price of money, that is, the rate of interest.

However, in Australia prior to the deregulation of the banking system, the Reserve Bank of Australia's (RBA) controls over banks limited credit to certain borrowing sectors despite those other sectors' ability and willingness to pay. The control valve was not the price, but the

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5. Securitisation refers to the issue of a security, usually transferable, which directly connects primary borrowers and lenders. In effect, it is the direct contrast to intermediation, wherein a financial institution stands between the borrower and the lender.

6. See Brealey & Myers for a further derivation of the investment opportunities curve. Briefly, perfect capital market assumptions are: (a) friction-less markets (ie, there are no transaction costs, regulations or taxes and all assets are perfectly divisible and marketable); (b) there is perfect competition in both product and securities markets (with all participants acting as price takers); (c) markets are informationally efficient (no insider knowledge); and (d) all individuals are rational and maximise their expected utility.

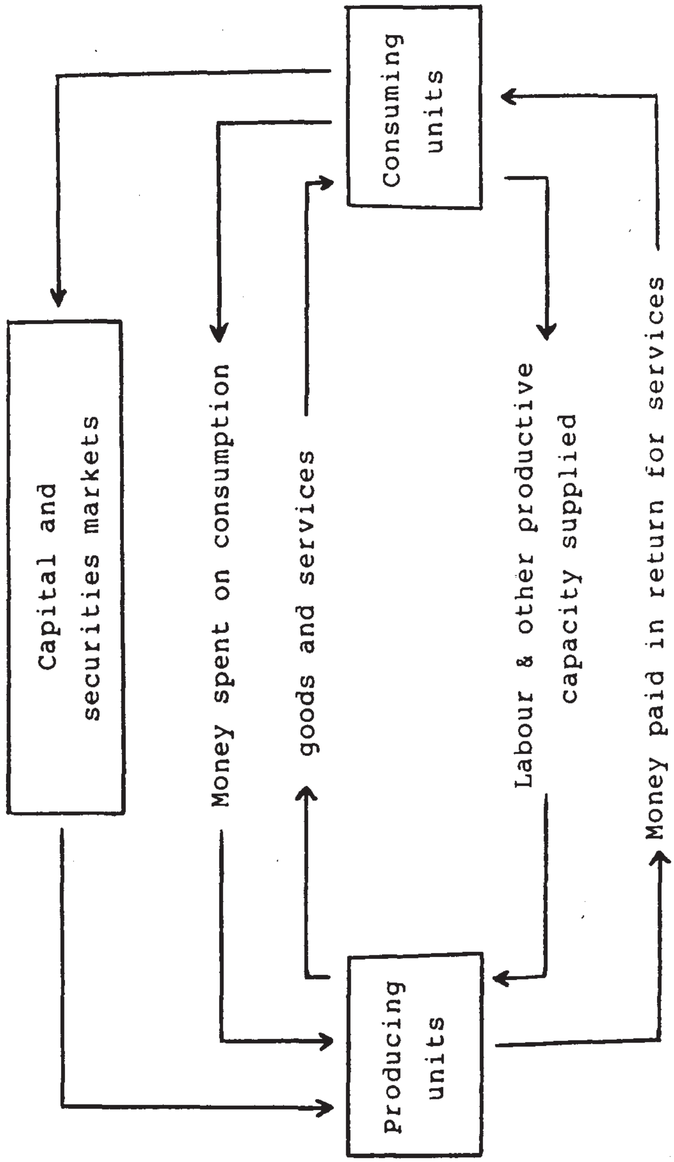
7. See Nadler, pp 6-7.

availability of credit. The availability of funds was determined by forces other than market forces. Similarly, limitations on both banks' deposit maturities and the absolute level of interest rates that banks could offer on deposits and charge on loans facilitated the expansion of other financial intermediaries. The expansion of non-bank financial intermediaries (NBFI) in the early 1980s effectively reduced the RBA's ability to use non-price controls to influence the level of credit creation within the economy, since its controls were concentrated on the licensed bank industry. These restrictions had the effect of increasing the cost of credit within the economy and resulted in an inefficient allocation of scarce financial resources within the Australian economy.

The removal of most restrictions on banking and a decrease in the implicit cost of maintaining a banking licence through technological change has materially improved the efficiency of the banking system and the allocation of credit within the economy. The changes earmarked by the Government in response to the Wallis Inquiry will further improve the extent to which finance is allocated efficiently within the community.

Fig 2.4

Circular flow of funds



Since the beginning of the 1980s, the Reserve Bank has largely abandoned non-price rationing mechanisms preferring more market-oriented mechanisms to ration lending and credit creation. This matter is discussed in greater depth in Chapter 3.

[210] Credit creation.[8] Banks play an important role in the economy as creators of credit. This differentiates them from other financial institutions. The banking system can build up deposits by increased lending and investment activity provided sufficient currency and reserves (NCD and PAR assets[9]) are held by the banks.

Implicit in the credit creation process is the desire of depositors to leave funds with the banks. To maintain depositor confidence, banks must maintain sufficient funds for unexpected callings in the form of currency (notes and coin) and easily liquefiable assets.

In practice, the credit creation process works as follows. Let us assume an economic system where one bank is the only financial intermediary. The bank takes a deposit from a customer who has, for example, sold $100 worth of Commonwealth Government bonds to the Reserve Bank. The bank can then lend[10] only $96 of the $100 deposited by the customer, the remaining $4[11] must be invested in Prime Assets and Non-Callable Deposits with the Reserve Bank ($1 in NCDs and $3 in Prime Assets).[12]

The $96 in loan funds are then used by the initial borrower to purchase goods. The vendor of those goods, who receives cash for the sale, then deposits the $96 with the bank[13] (assuming the vendor does not wish to hold part or all of these funds in the form of currency). Again this deposit will be used by the bank to loan funds and place on deposit as an NCD

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8. See also [308].
9. NCDs—Non-Callable Deposits. PAR—Prime Assets Ratio. Non-callable deposits replaced the former Statutory Reserve Deposit requirements in 1988. These are more fully explained in [322]. The Reserve Bank requires that the banks hold a minimum of 1% of their liabilities less shareholders' funds as NCDs. The Reserve Bank pays a rate equivalent to 5% below the overnight cash rate of interest on these funds. As at September 1997, the overnight rate was 5%. Hence banks were earning nothing on their NCD investments. Following the release of the Wallis Report, the Government announced that it intended to scrap the need for banks to hold NCD deposits with the Reserve Bank. This is expected to take effect from July 1998.

   Banks are required to hold an amount equal to 3% of their liabilities (excluding capital) in high quality, readily cashable assets, including notes and coin, balances with the Reserve Bank and Australian dollar denominated securities issued by the Commonwealth Government and/or the central borrowing authorities of the State and Territory Governments.
10. Loans—include all discretionary assets. They may, in practice, include bank accepted commercial bills or other securities issued by banks.
11. As at September 1997 the PAR ratio was 3%.
12. In 1990, the Reserve Bank announced that NCD deposits would no longer count as Prime Assets in the PAR ratio calculation.
13. In this example only one bank is used. In practice, many banks become involved in the credit creation process by accepting deposits and on lending funds to borrowers.

and invest in PAR assets ($92.16 in loans, $0.96 in NCDs and $2.88 in government securities to satisfy the Government's PAR requirements).

[211] Money Multiplier. The process continues with a further deposit resulting from bank lending activity. This credit creation process is limited by the existence of reserve requirements (in this case the PAR and NCD requirements). The expansion of credit in this way is referred to as the *money multiplier effect.* We can express the growth in lending resulting from an initial expansion in the volume of funds (in this case generated by the sale of $100 worth of government securities to the Reserve Bank) algebraically as in Equation 2.3. For simplicity we have assumed that all bank assets are denominated in Australian dollars and a bank's capital forms a negligible part of its balance sheet.

$$\begin{aligned} \text{Multiplier} &= 1/(\text{NCD}/100 + \text{PAR}/100) \\ &= 1/0.04 \\ &= 25 \end{aligned} \tag{2.3}$$

The money multiplier is simply the reciprocal of the reserve requirements ratios imposed on the banks. Therefore, for every $100 increase in the monetary base, the volume of money or M3 would increase approximately 25 times (or $2,500) assuming no leakages from the banking system occur. In practice, leakages do occur and the observed multiplier is less than the predicted multiplier. Leakages from the credit creation process include demand for currency holdings by both individuals and banks and excess holdings of prime assets above the minimum ratio by banks. Additionally, the existence of non-bank financial institutions has tended to slow the multiplier transmission mechanism, especially as many of these institutions now provide their own chequing facilities. This, plus the creation of paperless money systems (such as Mastercard), has blurred the distinction between banks and other institutions as creators of credit. This blurring will be exacerbated, as more non bank entrants join the payments system.

In a world where banks are the only creators of credit, the multiplier gives the Reserve Bank a useful tool to control growth in the rate of lending, through variation of the NCD and/or PAR ratios. Any increase (decrease) in the NCD or PAR ratios would decrease (increase) the multiplier effect on the monetary base and hence reduce (increase) money supply growth. The Reserve Bank has not sought to use this tool in recent years, preferring the use of open market operations to directly influence the monetary base rather than the factors which affect the size of the monetary base multiplier (that is, NCD and PAR assets).[14] The Reserve Bank's reasons for not resorting to variation in NCD and PAR ratios lies in its recognition that the banks no longer have the exclusive ability to create credit and that direct controls represent an inefficient means for allocating credit in a developed economic system.

[212] The depository function. Banks perform a useful depository function as they offer savers a very high level of security[15] and offer a variety of instruments through which individuals can store funds.

Deposits in bank current (or cheque) accounts give depositors access to the bank payments system. As working balances are generally required to transact daily banking business, they must be readily convertible to cash at call. These funds are often deposited by customers in a current account with the bank. Customers can write cheques on these accounts provided sufficient funds are in the cheque account to cover the drawing. This provides a convenient way of transacting large sums of money without physically transferring the currency.

Longer term savings or investment funds are often held in bank savings accounts, term deposit accounts, used to purchase short or long term money market securities or invested in mutual funds, shares, property, etc. Banks provide convenience and security to the investor. The security of bank deposits is enshrined in the *Banking Act,* by elevating the status of deposits above those of other creditors in the event of a bank default. The Government has announced that this depositor protection clause will be widened in future to encompass funds lodged with all Deposit Taking Institutions. This will erode this hitherto significant comparative advantage of banks.

[213] Payments and collection systems. The Australian payments system utilises a wide range of instruments for the settlement of financial transactions. The cheque has traditionally been the most convenient instrument in terms of value transacted, while currency is the most important method of payment (if the number of transactions executed is used as the comparative criterion[16]). Individuals and businesses present around 3 million cheques per business day for payment, with a value of about $17 billion.

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14. Money supply is a product of the money base and the multiplier effect.
15. See Cross & Hemple, pg 4.
16. Australian Financial System, Report of the Review Group, December 1983, p 172.

Other payment methods include credit and debit cards, electronic funds transfer at point of sale (EFTPOS), autobanks (ATMs),[17] direct debiting, money orders, bills of exchange, travellers cheques, telegraphic transfers and pay-by-phone services.

Banks are the major controllers of the cheques, credit cards and EFTPOS payments and clearing systems. While banks were formerly the only members of the clearing system, other financial institutions are now achieving greater access to these systems via agency arrangements or direct participation.

Table 2.1 compares the impact of various new forms of transaction payment facilities over the past 15 years.

Table 2.1

Alternative forms of payment in the Australian financial system (percentage of total transactions)

	1980	**1995**
Paper (cheques, credit transfers)	85	38
Low value electronic funds transfer (EFT)		
Direct credit	3	18
Direct debit	4	4
ATM	1	17
EFTPOS	0	13
Credit cards (a)	7	10
High value EFT	0	(b)
Total	100	100

(a) Includes paper based credit card transactions

(b) Less than 10,000 transactions per day

Source: Speech by Mr N C Mackrell, Head of Financial System Department, Reserve Bank of Australia to the AIC Conference, *The Future of Cheques,* Sydney, 16 May 1996, reprinted in the Reserve Bank *Bulletin,* October 1996

The table highlights the rapid emergence of electronic forms of transactions, especially ATM and EFTPOS initiated transactions. It is clear that the Australian household has readily accepted the move to use

17. For more information on these systems see also [816] to [823].

ATMs and EFTPOS to withdraw cash from banking accounts and to pay for low value (groceries, day-to-day household items) expenses.

[214] Cheque payments system. Cheques as defined under the *Bills of Exchange Act* can only be issued by parties carrying on the business of banking. However, non bank financial intermediaries (NBFIs), such as building societies and credit unions, have gained access to the cheque clearing system via agency arrangements whereby clearing house members clear the cheques issued by institutions with which they have established agency arrangements.

The cheque clearing system in Australia is managed by the Australian Payments Clearing Association (APCA), which monitors the various clearing houses conducted in each state. All of the established banks (with the exception of most new admissions since 1985) were members of at least one clearing house, with agency arrangements in other interstate centres. The Reserve Bank also participates in the clearing system since it retains the authority to issue cheques and acts as banker to the Federal Government. In addition, the Reserve Bank is banker to the clearing system. To facilitate clearing of the cheques deposited, each bank maintains an Exchange Settlement Account with the Reserve Bank which must be balanced on the following business day. All cheques deposited at banks are sorted and cheques drawn on other members of the clearing system are physically given to their representatives.

Any bank which is, in aggregate, a net debtor to other banks settles the outstanding balance by drawing on its Exchange Settlement Account at the Reserve Bank. Compensation is paid to the creditor banks by debtor banks for the overnight "borrowings" based upon the latest 90 day Treasury note issue yields. In the long run, the "ups and downs" on Exchange Settlement Account due to cheque clearing should balance to zero.

Traditionally households and businesses which deposited cheques into their accounts had to wait for around five business days for the funds to be "cleared"—verified that the drawer had sufficient funds in their account to fulfil the obligations of the cheque. Whilst, in certain instances, banks paid interest on cheques deposited from the date of the deposit, the inconvenience of waiting up to five days to ascertain whether the cheque would be "honoured" was significant. In November 1997, the APCA advised that member banks would be required to reduce the time for verifying cheques and providing "cleared" funds to customers to three business days by April 1997.

Table 2.1 indicated that the share of transactions effected by cheques has declined rapidly since the 1980s, with this trend likely to accelerate with the introduction of BPay.[18] Table 2.2 also highlights that the cheque's share of "value" of payments has also declined. The high value EFT payments reflect payments of foreign exchange transactions and government securities transactions between banks and other market professionals.[19]

Table 2.2

Value of payment instruments (percentage of total payments)

	1991	**1995**
Paper (cheque)	59	35
Low value EFT	2	2
High value EFT	39	63
Total	100	100

Source: Speech by Mr N C Mackrell, Head of Financial System Department, Reserve Bank of Australia to the AIC Conference, *The Future of Cheques,* Sydney, 16 May 1996, reprinted in the Reserve Bank *Bulletin,* October 1996

The move towards replacement of the cheque as a means of payment reflects the high operating cost of this form of payment instrument, including encoding, transportation and storage of drawn cheques and associated security measures. Banks have found it difficult to recover the cost of maintaining the cheque clearing system and have rapidly moved to introduce more cost effective payment mediums. Banks have also moved to improve the cost effectiveness of the cheque payments system by introducing initiatives such as:

- Eliminating the need for manual presentation of drawn cheques between clearing banks. From July 1998, banks will be able to electronically verify that a customer's deposit funds are sufficient to "clear" the cheque which has been presented to another bank. This

18. Refer [218].
19. A "high value payment" is any large value or high priority funds transfer made by banks and special service providers to settle their own obligations or those on behalf of customers. There is no specific criterion for identifying "high value payments" other than they are individually large in value (at least $100,000) and/or that their payment is deemed time-critical by the banks and its customer.

will both speed up the cheque clearing process and reduce the need for transporting the cheques between clearing banks.

- Electronic clearance will also mean that "dishonours" will be recognised electronically, thereby reducing the risk to banks and their customers.

[215] Real time gross settlement.[20] In April 1995 the Reserve Bank announced that it would move to introduce Real Time Gross Settlement (RTGS) for clearing inter bank transactions. Under the current system of "overnight settlement", each member bank of the payments system accumulates the various cheques and other payments during the day. However, it is not until the next day that banks which are in "deficit" have to settle their prior night's position with those that are in "surplus" in terms of the aggregate value of cheques and other payments presented.

The principal reason for the introduction of RTGS is to substantially eliminate credit risks in inter bank payments and hence minimise the possibility of systemic risk in the Australian financial system. If for example under the present "overnight system", a bank was unable to clear its overnight "debit" position (that is be technically in default) the event, if of sufficient size and substance, could trigger a series of similar failures by other banks and result in a systemic failure of the banking system. The one day delay which presently exists in the clearing of payments between banks creates the possibility for systemic failure occurring. To reduce this settlement risk the Reserve Bank will require banks to settle large payments (say over $1 million) amongst themselves as they are received, or in "real time". Such high value payments will be fed electronically into the RTGS system and be immediately reflected in changes to a bank's Exchange Settlement Account. Banks will be required to clear any debits in that account as they occur. As such any problem of a bank being unable to meet its financial obligations (in clearing its debit position in its Exchange Settlement Account) will be identified immediately and allow the Reserve Bank to implement appropriate actions *before* the problem can spread to other banks in the system.

The implications for individual banks are quite profound and relate to how they will manage their intraday liquidity to (a) insure that they have sufficient funds to meet large claims from other banks as they are received and (b) minimise the level of surplus funds held in the Exchange

20. See also [324].

Settlement Account. Banks will in time have to review their existing payment arrangements with corporate customers. They will most probably develop more comprehensive credit arrangements to minimise the impact of one off "surprise" payments which would place undue pressures on the banks' ability to meet those payments. These new credit arrangements may entail assigning different priority ratings for various types of payments, such that the highest priority payments will be processed immediately by the bank and pass through RTGS, whilst others will have lower priority and may take a more leisurely payment route. For all these changes, it is probable that banks will seek to introduce a payment mechanism to recover part if not all of the cost of the new system and monitoring requirements. In the United States for example, corporate clients are charged for "daylight overdraft" (intraday overdraft) facilities. The ability of banks to introduce these fees and look to establish the service as a profitable new business line will ultimately depend upon the competitive pressures from other institutional participants in the payments system.

The Reserve Bank expects to have the RTGS system fully operational in the first quarter of 1998. There are presently 13 countries which operate an RTGS system for clearing inter bank transactions and another 13, which along with Australia will introduce the system in 1997/98. The Australian version of RTGS will integrate with the Reserve Bank Information and Transfer System (RITS).[21]

[216] Credit cards. Bankcard was the first major credit card in Australia and was introduced in the early 1970s. However, in recent years Mastercard and Visa card have become far more dominant. In addition, private label cards issued by retail chains and corporations with large client bases such as Telstra have expanded rapidly as corporations from all industries attempt to retain client custom.

Banks participating in private label schemes issue cards, provide credit lines, bear the credit risk on loans, reserve payments and administer the

21. RITS is the Reserve Bank's electronic securities settlement system, which allows members to settle electronically their transactions in Commonwealth Government securities. The system was introduced in 1992 and presently handles 98% of turnover in these securities conducted in the professional market. Other services provided by RITS include electronic tendering for Treasury bonds, notes and adjustable rate bonds, and the automatic payment of interest and maturity proceeds in respect of securities held in the system. The RITS system provides access to banks' Exchange Settlement Accounts. The RITS system also has provision for simultaneous settlement of interbank obligations arising from the settlement of equity transactions on CHESS—the Australian Stock Exchange's electronic settlement facility.

accounts. On receipt of a statement from the merchants requesting payment, the merchants receive value from the bank immediately. The funds are deposited in much the same way as a cheque deposited in the merchant's account. All vouchers and net indebtedness arising from any day's transactions are settled on the next business day through the bank's Exchange Settlement Account with the Reserve Bank (although for many scheme participants this will convert to same day value following the introduction of RTGS).

In recent years, the manual processing of credit cards by merchants has been replaced by electronic verification tied to the banks' computers. In this way, the customer's credit availability is confirmed electronically and the funds credited to the merchant's account directly, thereby eliminating manual processing by both the merchant and the bank credit card operating centre, as well as significantly reducing the payment process.

[217] Electronic funds transfer at point of sale (EFTPOS).[22] Technological advancements in computing and data transfer between different computers have made EFTPOS possible. Banks and certain NBFI have arrangements with various retailers to allow direct on-line debiting and in some cases cash withdrawal. The penetration of this system is increasing rapidly as highlighted in Table 2.1 and has even surpassed credit card transactions as the cost of setting up EFTPOS terminals at merchant locations has declined rapidly. EFTPOS systems allow both debit account (withdrawal from savings and chequing accounts) and credit account (credit card) transactions.

[218] Pre-authorised funds transfer services. Banks offer services to customers which allow periodic debits or credits to be passed to accounts. For example, loan repayments or insurance premium deductions can be conducted through this system. Clearing of these transactions is principally conducted via magnetic tape which conform to standards agreed between banks. Typically clearing is conducted through the Central magnetic exchange (CEMTEX), although bilateral exchanges of tape do occur. CEMTEX was established in 1974 for the purpose of operating a fully automated clearing system between banks. As with other clearing systems banks' positions are consolidated daily and appropriate entries are passed by the Reserve Bank on each bank's Exchange Settlement Account.

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22. See also [700] and [712].

In July 1997 seven banks (ANZ, BankWest, Challenge, Commonwealth, National Australia, St George and Westpac) launched "BPay" which will further enhance the move towards electronic payment of household bills (such as power, water, rates) by providing a standard form of electronic bill payment based on the same principals as EFTPOS. As with EFTPOS, businesses using BPay will receive cleared funds from the payer and a consolidated statement of all bills paid. Indeed, when RTGS is introduced and operating, large corporates will obtain same day cleared funds from remittances received via BPay. For households BPay offers the convenience of a single (bank) location for the electronic payment of an array of bills.

The introduction of BPay will be a significant step in further improving the efficiency of the Australian financial system and represents a key element in the banks' attempts to retain a pre-eminent position in the Australian payments system. Each year Australia's 6 million households receive around 42 bills from suppliers such as electricity and gas companies. Of these, 85% are paid by cash or cheque (with 75% of these payments being over the counter payments), with only 15% paid electronically. The introduction of BPay should see a rapid increase in the percentage of electronic payments. BPay and similar electronic payment services likely to be established by Australia Post (with its Riposte system) are expected to rapidly replace CEMTEX as the main electronic bill payment medium.

Banks expect that BPay will process around 30% of all bills within five years of its launch.

[219] Internet banking. The first internet banking site was established in 1996. This was uniquely different to the previous "home banking" version where customers would use a modem connection to access the bank's computer network to access information on their accounts. Internet banking allows customers to use the "open" network of the world wide web to connect to their bank. Customers are allowed to transfer funds between accounts and request statements. It is likely that, in time, the internet banking system will be connected with the BPay system to allow customers to pay their bills electronically from home, without the need for any physical transfer of cash.

Whilst internet banking remains in its infancy, concerns have been expressed about the level of security associated with internet banking and the possibility of fraud and counterfeiting.

[220] Phone banking. This system has rapidly become accepted as a convenient means for customers to obtain account details and to effect simple transfers of funds between accounts and to transfer funds to credit cards. The system relies on electronic voice mail prompting the customer to choose from a variety of options. The customer simply has to press the numeral on their phone corresponding to their particular preference.

[221] Provision of other services. In response to both competition from other financial institutions and the availability of profitable opportunities, banks have expanded into other financial markets. These include such areas as interest rate and currency futures and options broking, trust and nominee services, portfolio management, share broking, corporate advice, equity and debt underwriting and life and general insurance.

As such the distinction between banking and other financial services activities is rapidly being blurred. It is clear that the term "full service banking'' will in future imply that the larger banks at least will be able to offer a host of financial services to their customers packaged within a single unit in much the same way that "hypermarkets" offer customers the ability to purchase furniture, clothes, food, white goods and so forth within the one store.

The diversification into insurance and especially funds management has proven a lucrative area for the banks with their extensive distribution networks. By providing this service banks have been able to benefit from a wider movement of investors out of "fixed interest" investments into managed investments funds, providing customers with access to domestic and overseas equity markets and fixed interest markets.

The proliferation of new modes of payment to replace the traditional paper based cheque system, reflects the increasing cost pressures on banks as they endeavour to deliver a more efficient service to their client base. In the following sections we will review the reasons for this rapid move to introduce new payment mediums.

Commercial Banks and Other Financial Organisations

[222] Banks have been the cornerstone of the Australian financial system since banking began in Australia. Table 2.3 provides a break-up of the financial assets controlled by Australia's major financial institutions since 1986. The banks have clearly commanded centre stage in terms of their importance.

Table 2.3

Total assets of financial institutions (percentage share as at 30 June)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Reserve Bank	24	26.1	25.1	24.6	24.9	29	31.7	36.6	33.6	36.8	36
All other banks	154.3	185.8	228.5	283.7	325.8	353.7	361.9	382.8	412.8	437.9	486.6
Building societies	20.1	183	21.5	24.2	23	21.9	21.6	12.1	12	13.5	13.1
Credit unions	6.6	73	7.5	7.7	8.7	9	9.9	11.2	12.5	14	15.5
Authorised dealers	2.1	2.2	3.2	2.7	4.6	4.1	3.6	5.9	6.8	7.8	4.1
Money market corporations	30.9	39.6	49.7	54.2	53.6	48.4	46.7	42.7	43	51.2	59.9
Pastoral finance companies	5.3	6.8	9.6	5.9	2.3	1.9	2	2.1	2.2	2.7	2.9
Finance companies	29.6	29.5	30.5	36.5	40.8	35.8	30.5	30.2	28.2	31.6	34.7
General financiers	5.6	7.7	8.2	10.8	12.4	11.9	10.1	9.3	9.7	10.2	11.4
Life insurance offices	32.1	463	58.4	71.6	85.3	92.7	103.1	107.9	114.7	118.5	126.6
Superannuation funds	41.8	32.7	59.8	72.6	80.8	86	96.7	107.8	122.2	134.1	152
Cash management trusts	3.3	3.4	3.7	3.8	4.7	5.8	53	5.3	5.9	5.6	7
Common funds	3.1	4.2	4.8	5.6	7	6.7	4.4	4.6	4.9	4.2	4.6
Friendly societies	2.1	3.5	6	7.5	8.1	8.3	9	9.2	9	8.5	7.8
Public unit trusts	10.7	15.9	21.2	25.7	27.7	25.8	25.6	28.4	38	41.2	48.5
Total	371.6	4293	537.7	637.1	709.7	741	762.1	796.1	855.5	917.8	1010.7
Securitisation vehicles	0	0	0	3.2	5.7	8.2	9	8.7	9	10.2	15.1

Source: Reserve Bank of Australia *Bulletin*, December 1996, Table D5

Table 2.3 highlights the rapid growth in the managed fund and superannuation industry (including the life insurance sector) over the period under review. The banks have been keen to dominate the movement of funds into these sectors and have adopted aggressive growth strategies, incorporating acquisitions of existing market participants in an endeavour to become key players in this segment of the market.

Table 2.4 highlights how deregulation of the financial system in recent years has encouraged bank asset growth as well as the conversion into bank status by many non bank financial institutions.

Table 2.4

Australian bank asset growth

Year	Asset Growth
1982/83	12.3%
1983/84	14.6%
1984/85	25.6%
1985/86	18.1%
1986/87	20.4%
1987/88	23.0%
1988/89	24.2%
1989/90	14.8%
1990/91	8.6%
1991/92	2.3%
1992/93	5.8%
1993/94	7.8%
1994/95	6.1%
1995/96	11.1%

Source: Reserve Bank of Australia *Bulletin,* December 1996, Table D5.

[223] Definition of banks in Australia. Australian banks are regulated by the *Banking Act 1959* which only allows bodies corporate authorised by the Treasurer to carry on the business of banking.[23] The Banking Act also makes provision for exemption to be granted to persons wishing to carry on any banking business but not the general business of banking.

23. See *Banking Act,* ss 7, 8; Campbell Committee Interim Report, p 245.

General exemptions have been granted to corporations registered under the *Financial Corporations Act.*[24]

Up until the early 1980s, the number of licensed banks had been kept to a minimum in Australia following progressive mergers between banks since the turn of the century. The introduction of 16 new banking licences in the mid 1980s heralded a new era of bank competition and brought the Australian banking system more into line with other competitive systems overseas.

[224] Foreign banks in Australia. Foreign banks and foreign owned merchant banks account for around 16% of the Australian assets of all financial intermediaries operating in this country. This figure does not include the assets under management controlled by foreign owned institutions operating in Australia. These are estimated to represent around 30% of the $380 billion of funds managed by all institutions in Australia. Despite a period of over ten years since 16 foreign banks were granted banking licences, none have been successful in achieving a meaningful, let alone profitable, retail banking presence in Australia. In recent years some banks have purchased existing regional bank franchises (notably the Bank of Scotland which purchased 51% of BankWest and Rabobank which purchased PIBA).

Foreign banks have had substantially more success in funds management, corporate advice, foreign exchange, derivatives and corporate banking.

In February 1992, the Government relaxed further controls on foreign banks establishing subsidiaries in Australia. It also allowed foreign banks to open a branch, subject to the foreign bank being able to indicate that it would "add depth to an existing financial market or develop new niche markets". This contrasted to the situation in 1986 when the 16 foreign banks licensed to operate in Australia at the time were required to establish separate subsidiary companies.[25]

Unlike Australian subsidiaries, foreign branches do not have to hold capital in Australia. However, the Australian based management of the foreign branch will be subject to Reserve Bank overview and will have to report to the Bank on the operations of branch.

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24. See *Banking Act,* s 11; Campbell Committee Interim Report, p 245.
25. The reasoning for not permitting foreign branches at the time was that a subsidiary would be subject to Australian law and prudential banking standards and therefore operate on an equal basis as domestic banks.

Banks authorised under the *Banking Act* 1959 to operate in Australia as at 30 June 1997 were:

Locally incorporated banks:

ABN AMRO Finance (Aust) Limited

Adelaide Bank Limited

Advance Bank Australia Limited

ANZ Grindlays Bank Limited

Arab Bank Australia Limited

Australia and New Zealand Banking Group Limited

Bank of Melbourne Limited

Bank of Queensland Limited

Bank of Tokyo—Mitsubishi (Australia) Limited

Bank of Western Australia Limited (trading as Bank West)

Bankers Trust Australia Limited

Bendigo Bank Limited

Citibank Limited

Commonwealth Bank of Australia

Commonwealth Development Bank of Australia Limited

Hongkong Bank of Australia Limited

IBJ Australia Bank Limited

ING Mercantile Mutual Bank Limited

Macquarie Bank Limited

National Australia Bank Limited

Nat West Markets Australia Limited

Primary Industry Bank of Australia Limited

QIDC Limited

St. George Bank Limited

Standard Chartered Bank Australia Limited

State Bank of New South Wales Limited (trading as Colonial State Bank)

Suncorp-Metway Limited

Trust Bank

Westpac Banking Corporation

Branches of foreign banks:

Asahi Bank, Ltd (The)

Bank of America National Trust and Savings Association

Bank of China

Bank of New Zealand

Banque Nationale de Paris

Barclays Bank PLC (trading as BZW)

Chase Manhattan Bank (The)

Co-operative Central Raiffeisen-Boerenleenbank BA (trading as Rabobank Nederland)

Citibank NA

Credit Suisse First Boston

Dai-Ichi Kangyo Bank, Limited (The)

Deutsche Bank AG

First National Bank of Chicago (The)

Midland Bank plc

Morgan Guaranty Trust Company of New York

Overseas-Chinese Banking Corporation Limited

Overseas Union Bank Limited

Royal Bank of Canada

State Street and Trust Company

United Overseas Bank Limited

Westdeutsche Landesbank Girozentrale (trading as WestLB)

There are a further 55 overseas banks which have bank granted authority to establish a representative office under the *Banking Act 1959*. Representative offices are precluded from conducting any form of banking business, such as taking deposits or granting loans, and must confine their business to purely liaison activities.

[225] Banks and the capital markets. Banks account for around 80% of all financial intermediation. However, as the capital markets have developed, the need for financial intermediation has declined. As such, there has been a proliferation of new product facilitating direct intermediation between borrowers and lenders. The Reserve Bank has reported that intermediated finance has declined from 72% of total finance in 1981 to about 59% in 1994, with a corresponding increase in direct funding.

The trend towards direct financing will accelerate over time as markets become more sophisticated. In particular equity based product will continue to be developed, especially if inflation remains low, so that asset values are not eroded. The banks have reacted to this change by developing expertise in capital markets functions such as underwriting fixed interest issues and other forms of debt placements. Increasingly, the banks are expanding in the area of equity market underwriting and placement via their share broking subsidiaries. The changing face of the Australian financial market and the banks' response of moving towards being sponsors of direct intermediation helps to explain why the Wallis report concluded on the need to remove the special distinction of banks from other non bank financial institutions (refer [112]).

[226] Regulation and supervision of banks by the Reserve Bank. Regulation and supervision of banks and other financial institutions by the Reserve Bank is undertaken to ensure control and the effective operation of monetary and banking policy as well as helping to encourage security and faith in the banking system.[26] The objectives of financial regulation in Australia are outlined in the preamble to the *Reserve Bank Act.* It states:

> "It is the duty of the Board, within the limit of its powers, to ensure that the monetary and banking policy of the Bank is directed to the greatest advantage of the people of Australia and that the powers of the Bank ... are exercised in such a manner as, in the opinion of the Board, will best contribute to:
>
> (a) the stability of the currency of Australia;
>
> (b) the maintenance of full employment in Australia; and
>
> (c) the economic prosperity and welfare of the people of Australia."

During the period from its formation in 1959 and leading up to the late 1980s the Reserve Bank relied heavily on moral suasion to ensure banks' compliance with general economic policy objectives. Moral suasion refers to the use, by a central bank, of its influence and latent power to persuade banks and other financial institutions to conform with its current policy requirements regarding the level and direction of lending, the level of interest rates and other economic policy objectives. These directives were supported by statutory powers which were available to the Reserve Bank should consultative arrangements prove unacceptable. This trend towards increased communication of the Reserve Bank's

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26. This will change in 1998 when the Government establishes the Australian Prudential Regulation Authority. Refer Chapter 1 [117].

monetary stance with banks and other financial markets participants was accentuated by the widespread relaxation of direct controls over banking operations in the early 1980s.[27]

An example of the influence the Reserve Bank directly wields over the banking system was the "deal" between the Reserve Bank and the four major banks over home loan lending rates in late 1989. The Bank, under the direction of the Treasurer of Australia, increased the rate paid on non callable deposits from 5% pa to 5 percentage points below the 90 day Treasury Note yield at the weekly tenders (which was 17% at the time). For this net increase in revenue the banks agreed not to lift the housing loan rate above the then current level of 17%. One proviso to the deal was that the Government did not tighten monetary policy any further.

This deal between the banks and the Reserve Bank was widely criticised in the press because commentators claimed it illustrated that the Reserve Bank did not enjoy the independence from the Federal Treasurer it once did, to control monetary policy.[28] Independence has been widely acclaimed by commentators as an important check on the Government's control of the nation's finances.

In August 1996, the then Treasurer, Mr. Costello and the new Governor, Mr Ian Macfarlane, jointly signed the *Statement of Conduct of Monetary Policy*, which sought to clarify any remaining ambiguity about the relationship between the Government and the Bank. In it, the Government stated its understanding of the high degree of independence given to the Bank under its *Act* and endorsed the objective of keeping underlying inflation between 2 and 3%, on average. Importantly, it also provided for increased accountability through half yearly reports on monetary policy and appearances by the governor before a Parliamentary Committee. The first appearance under this arrangement took place on 8 May 1997.

[227] Statement of conduct of monetary policy.

> "This statement records the common understanding of the governor of the Reserve Bank and the Government on key aspects of Australia's monetary policy framework. It is designed to clarify respective roles and responsibilities.

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27. Since the Campbell and Martin Committee reports significant deregulation of the Australian financial system has occurred.
28. The Reserve Bank's independence was first raised when Mr Bernie Fraser was appointed to the Governorship of the Reserve Bank from his previous position as Secretary of Treasury.

Monetary policy is a key element of macroeconomic policy and its effective conduct is critical to Australia's economic performance and prospects. For this reason, and given the appointment of a new Governor of the Reserve Bank, it is appropriate and timely for the Governor and the Government to set out clearly their mutual understanding of the operation of monetary policy in Australia.

It is expected that this statement will contribute to a better understanding both in Australia and overseas of the nature of the relationship between the Reserve Bank and the Government, the objectives of monetary policy, the mechanisms for ensuring transparency and accountability in the way policy is conducted, and the independence of the Bank.

Relations between the Reserve Bank and the Government. The Reserve Bank Act gives the Reserve Bank Board the power to determine the Bank's monetary policy and take necessary action to implement policy changes.

The Government recognises the independence of the Bank and its responsibility for monetary policy and intends to respect the Bank's independence as provided by statute.

Section 11 of the Reserve Bank Act prescribes procedures for the resolution of policy differences between the Bank and the Government. The procedures, in effect, allow the Government to determine policy in the event of a material difference; but the procedures are politically demanding and their nature reinforces the Bank's independence. Safeguards like this ensure that monetary policy is subject to the checks and balances inherent in a democratic system.

In addressing the Bank's responsibility for monetary policy the Act provides that the Board shall, from time to time, inform the Government of the Bank's policy. Such arrangements are a common and valuable feature of institutional systems in other industrial countries with independent central banks and recognise the importance of macroeconomic policy co-ordination.

Consistent with its responsibilities for economic policy as a whole the Government reserves the right to comment on monetary policy from time to time. However, the Government will no longer make parallel announcements of monetary policy adjustments, when the Reserve Bank changes the overnight cash rate. This will enhance both the perception, as well as the reality, of the independence of Reserve Bank decision making.

Objectives of monetary policy. The framework of monetary policy is set out in the Reserve Bank Act 1959 which requires the Board to conduct monetary policy in a way that, in the opinion of the Board, will best contribute to:

(a) the stability of the currency of Australia;

(b) the maintenance of full employment in Australia; and

(c) the economic prosperity and welfare of the people of Australia.

The first two objectives lead to the third, and ultimate, objective of monetary policy and indeed economic policy as a whole. These objectives allow the

Reserve Bank to focus on price (current) stability while taking account of the implications of monetary policy for activity and, therefore, employment in the short term. Price stability is a crucial precondition for sustained growth in economic activity and employment.

Both the Bank and the Government agree on the importance of low inflation and low inflation expectations. These assist businesses in making sound investment decisions, underpin the creation of new and secure jobs, protect the savings of Australians and preserve the value of the currency.

In pursuing the goal of medium term price stability the Reserve Bank has adopted the objective of keeping underlying inflation between 2 and 3 per cent, on average, over the cycle. This formulation allows for the natural short run variation in underlying inflation over the cycle while preserving a clearly identifiable benchmark performance over time.

The Governor takes this opportunity to express his commitment to the Reserve Bank's inflation objective, consistent with his duties under the Act. For its part the Government indicates again that it endorses the Bank's objective and emphasises the role that disciplined fiscal policy must play in achieving such an outcome.

Transparency and accountability. Monetary policy needs to be conducted in an open and forward looking way because policy adjustments affect activity with a lag and because of the crucial role of inflation expectations in shaping actual inflation outcomes. In addition, with a clearly defined inflation objective, it is important that the Bank report on how it sees developments in the economy, currently and in prospect, affecting expected inflation outcomes. These considerations point to the need for effective transparency and accountability arrangements.

In recent years the Reserve Bank has taken steps to make the conduct of policy more transparent. Changes in policy and related reasons are now clearly announced and explained. In addition, the Bank has upgraded its public commentary on the economic outlook and issues bearing on monetary policy settings, through public addresses and its regular quarterly report on the economy. In furthering the arrangements already in place the Governor will support the release by the Bank of specific statements on monetary policy and the role it is playing in achieving the Bank's objectives. It is intended that these statements will include information op the outlook for inflation and will be released at roughly six monthly intervals.

The Governor has also indicated that he plans to be available to report on the conduct of monetary policy twice a year to the House of Representatives Standing Committee on Financial Institutions and Public Administration.

The Treasurer expressed support for these arrangements, seeing them as a valuable step forward in enhancing transparency and accountability in the

Reserve Bank's conduct of monetary policy—and therefore, the credibility of policy itself.

The Government and the Bank recognise that the outcomes, and not the arrangements underpinning them, will ultimately measure the quality of the conduct of monetary policy."

[227A] Reserve Bank direct controls over banks. The Reserve Bank has the power to directly regulate the level of easily liquefiable assets held by trading banks subject to the Banking Act through the required Non Callable Deposits (NCD) and Prime Assets Ratio (PAR).[29]

Each bank is required to maintain a NCD account with the Reserve Bank. The required proportion held by all banks can be varied with one day's notice subject to a limit on movements of up to 25% of deposits in any one day. Movements of 25% or more require 45 days' notice by the Reserve Bank.

Historically, changes in the required NCD (and its forerunner, the Statutory Reserve Deposit—SRD account) ratio have been very small.

[227B] The PAR was introduced in 1985 to replace the then existing Liquid Asset and Government Securities (LGS) ratio which, when combined with the SRD ratio, accounted for the investment of 25% of all deposits accepted by banks. However, the PAR requirement is wider in scope than the former LGS requirement as prime assets must be held for all Australian dollar denominated assets after adjusting for shareholders' funds, whereas the LGS convention was calculated on Australian dollar denominated deposits. The PAR ratio is presently set at 3% of depositors' balances.

The primary arguments put forward in supporting liquidity controls include:

1. they protect depositors by providing liquidity for deposit withdrawals;
2. they lower the cost of financing the government debt; and
3. they are necessary for monetary control.[30]

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29. Like its predecessor, the PAR ratio is a convention agreed to by the banks and the Reserve Bank. There is no statutory requirement for the banks to conform to this ratio within the provisions of the *Banking Act*. The rate payable on NCD Accounts is determined by the Reserve Bank with the Treasurer's approval. The Government has foreshadowed that it will abolish the need for NCDs from mid 1998—refer [119].
30. See Australian Bankers Association "Submission to the Committee of Inquiry into the Australian Financial System", 1979.

Critics have argued that the greater the prescribed regulatory asset holdings required by these regulations, the greater the risk that a bank will fail as it is locked into holding low yielding assets which threaten its profitability and viability. In addition, the liquidity support offered by controls such as the PAR and NCD requirements have been questioned, as these assets often form the most illiquid component of an intermediary's portfolio in the absence of reductions of reserve requirements. Only in the extreme case of potential failure can reserves be used for liquidity purposes. Australian experience has shown that the large slice of funds committed to PAR and NCDs has not endangered the banking system by forcing banks to increase the risk of other investment portfolios.

[228] Reserve requirements also impose an implicit interest rate on captive institutions reducing their competitive and innovative ability vis-a-vis other competing financial intermediaries. Similarly, it is widely argued that variations to reserve requirements are an inferior form of monetary control when compared with open market operations undertaken by the Reserve Bank. Throughout the 1990s the Reserve Bank has relied exclusively on open market operations to regulate liquidity flows.

In addition to PAR and NCDs the Reserve Bank has other direct regulatory powers which it can exercise over banks.

The Reserve Bank has the power to influence lending policies followed by banks under the Banking Act. Controls available include quantitative controls (controls on the absolute level of lending) and qualitative measures (controls as to which sectors can receive bank credit) designed to influence the size and direction of available funds. Prior to the deregulation of bank controls during the 1980s, the Reserve Bank also imposed controls over the level of interest rates banks could offer and charge on loans and deposits.

However, the Reserve Bank has refrained from using these powers in recent years due to a general recognition that attempts to specifically control bank liquidity only serve to enhance growth of other financial institutions at the expense of banks.

Despite the dramatic shift and removal of direct controls on banks over the past 15 years, it would be wrong to presume that the Reserve Bank has moved away from imposing restrictions on banking operations. In line with developments overseas, the Reserve Bank has increased the scope of prudential supervision (designed principally to protect depositors' balances), allowing the banks to move with competitive pressures, but at the same time, maintaining close liaison with banks' management in an effort to gauge the level and quality of risk undertaken by banks in the ordinary course of their business. The Reserve Bank first released its guidelines for capital adequacy and prudential supervision of banks in August 1988 and has since issued regular and expanded updates as new matters have arisen or following experiences from banking systems overseas.[31] The Reserve Bank's guidelines broadly conform with those established by the Bank for International Settlements and basically requires Australian banks to maintain a minimum of 8% of capital to risk weighted assets, with at least 4% in "core" capital.

[229] Depositor protection provisions. Banks represent a special category of financial institution which are given a measure of protection under investor protection legislation. The PAR and NCD assets held by banks give depositors a measure of protection against liquidity risks.[32] However as noted in [226] only those surplus PAR assets held by banks are easily liquefiable. These provisions were previously augmented by lender of last resort (LLR) facilities provided by the Reserve Bank, wherein banks could seek short term liquidity support if needed. However, since May 1985 the LLR facility is no longer available to banks.

Apart from liquidity risk, provisions in the *Banking Act* and *Reserve Bank of Australia Act* afford protection for banks' depositors against solvency.[33] The provisions do not guarantee that depositors will receive full value for their deposits in the event of a bank's default. Rather, the provisions ensure that depositors rank ahead of all other creditors in the liquidation of assets brought on by a bank default.

A key element in allowing foreign banks to establish foreign branches in Australia was that domestic deposits raised by those foreign branches would *not* be subject to the depositor protection provisions of the above statutes.

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31. The impact of capital adequacy guidelines and other issues are addressed more fully in Chapter 4.
32. Liquidity risk is the risk of a bank having insufficient currency and other easily liquefiable assets to satisfy investor withdrawals on any day despite the bank's underlying financial viability. See Campbell Committee Report, p 415.
33. Solvency risk is the risk of default by banks due to the market value of assets being inadequate to meet the value of debt claims upon them. Under the provisions of the *Reserve Bank Act,* the Bank has the power to assume control of an insolvent bank in order to ensure that depositors' funds are protected. Presumably in such a situation the Reserve Bank will manage that bank until such time as it can be sold to another organisation.

Under the new financial services regime that will operate from July 1998, the depositor protection provisions will be extended to encompass deposits raised by any registered deposit taking institution (DTI).[34] This broader coverage of the depositor protection provisions will place significant pressure on the authorities (especially the soon to be formed Australian Prudential Regulation Authority (APRA)) to explicitly define what constitutes a "deposit".

Presently, the definition of a bank deposit is very distinct and as such promissory notes (bank accepted commercial bills) as well as secured and unsecured notes issued by banks are not incorporated in the depositor protection provisions of the various Acts. However, many financial institutions which presently raise funds from retail investors do so by issuing debentures, unsecured notes and "deposits". There is presently *no clear definition of what exactly constitutes a deposit from such institutions.*

Interestingly, the Federal Government in announcing the creation of the APRA stated that the APRA would also be responsible for supervision of superannuation funds and life insurance companies. Whilst it is clear that the Government intends that market linked product issued by DTI's such as unit trusts and superannuation funds will not be covered by the proposed new depositor protection provisions, it is possible for a DTI to develop a "structured note" whose return is effectively market linked and be classed as a "deposit" by that DTI. Such practices could undermine the good intentions of the Government in creating a "level playing field". Accordingly, there will be substantial pressure on APRA to appropriately define a "deposit" and insure that the definition is both concise and rigorous.

[230] Securitisation. A growing trend in lending, particularly where explicit costs are involved with on balance sheet financing, has been towards debt securitisation. Described simply, securitisation is a method of lending where the instrument is not an illiquid cash funded loan but rather an issue of marketable securities, which may have been guaranteed, underwritten or organised by a bank. Securitisation allows the bank the opportunity to arrange funds for the client(s) and at the same time affords the bank the opportunity to obtain liquidity, if required, by selling the securities into the market and potentially achieve off balance sheet financing.

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34. Refer [119] concerning new developments for depositor protection following the recommendations of the Wallis report.

The security for the loan can either take the form of guarantee by the bank in the event of the client's default (for example, a bank accepted bill), asset cover of the securities issued (in the case of some mortgage debt issues) or simply rely on the credit standing of the issuer/borrower guaranteeing the debt's repayment (for example a promissory note or corporate bond). In addition, many of the "bells and whistles" are being added to issues such as interest rate futures and options. The flexibility of the securitisation process has allowed banks and borrowers to arrange funding when capital adequacy, liquidity and balance sheet constraints would otherwise have made direct loan funding either impractical or too costly.

[231] The bank bill securitisation process is a good example of how securitisation can take place. The bank bill securitisation process in Australia generally involves a bank bill borrower approaching the bank to either accept or endorse the debt security to give it greater strength and hence finer pricing or perhaps to underwrite an issue of promissory notes or other single name paper (unsecured notes). Banks are not essential to any issue. However, they often play an important role in the marketing and placing of the issued paper to end investors. Three methods of securitised debt issue have become popular in Australia in recent years. These three major types of securitised instruments have different balance sheet impacts for any bank involved in a securities issue:

(i) A commercial bill acceptance facility involves borrowers drawing a bill of exchange as defined by the *Bills of Exchange Act 1909.* A commercial bill of exchange involves a number of parties.

   (a) The drawer—who is the party issuing the order. The drawer engages that the bill will be accepted and paid according to its tenor and that if dishonoured the holder will be compensated.

   (b) The acceptor—the party to whom the bill is addressed. By accepting the bill the acceptor undertakes to pay the face value of the bill to the presenter of the bill on the due date.

   (c) The payee—the party to whom the bill is specified to be paid.

   The bank acceptance line involves banks as acceptors, taking the primary liability for payment of the bill when it falls due. However, when banks accept bills the debt appears on the banks' balance sheet. This involves both a capital assignment and an explicit cost as PAR assets must be purchased as a result of commercial bills being accepted.

(ii) The same parties are present on a bank endorsed bill. However, the endorsing bank is not the acceptor but a subsequent purchaser who endorses the bill for a fee. The endorsement involves potentially the same risk as acceptance since the drawer and acceptors are generally of similar credit status or may be related companies. Endorsed bills are not brought on to a bank's balance sheet and do not involve the same tangible costs as do acceptance lines. Naturally, there has been reluctance on the part of banks to offer acceptance lines, given that the latter are on the bank's balance sheet, whilst bill endorsements do not.

(iii) Promissory notes are issued by borrowers with no requirement to endorse by subsequent purchasers. Therefore, banks incur no contingent liability when they sell these products to end investors. Banks in Australia have undertaken advisory underwriting roles on a large number of promissory note issues.

[232] In recent years, debt securitisation has mushroomed—refer Table 2.3. This involves the creation of a trust vehicle whose assets consist of various homogeneous securities (typically housing loans or credit cards) and whose credit risk characteristics can be statistically measured. The process of securitising is illustrated on Figure 2.5. As indicated in the diagram, the bank or mortgage originator will sell a pool of reasonably homogeneous mortgages to a specialist trust vehicle (the securitisation vehicle). The Reserve Bank of Australia requires that banks effect an outright sale of the assets before any capital can be released. The trusts are generally assigned independent credit ratings to make them more marketable to end investors (and the rating can be enhanced by the sponsoring organisation "overcollateralising"[35] the pool of assets, providing liquidity support, obtaining insurance from a third party or providing other forms of support). The trusts then issue units to end investors. The investors receive a return based on the interest paid by the mortgage borrowers comprising the pool. The return and risk profile of

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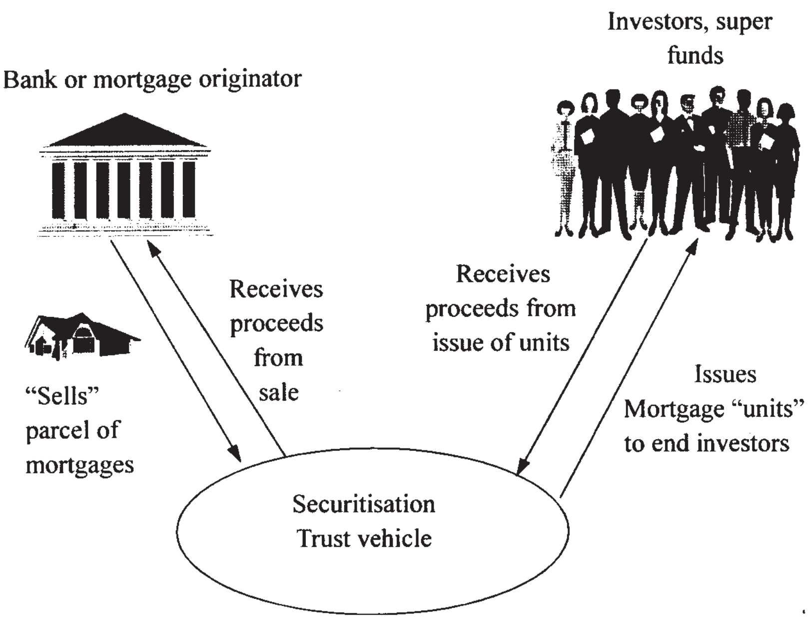
35. Overcollateralisation refers to the practice of assigning extra assets to a pool of investments to compensate for possible credit default. For example a pool of mortgages with a face value of $100 million may be deemed to have a statistically determined default risk of 10%. In order to improve the credit quality of that pool the program sponsor might decide to assign, say, $115 million in face value mortgages to a $100 million trust pool—effectively overcollateralising the pool by 15% and offsetting the perceived low credit quality of the mortgages which make up the pool. In this way the expected default value of the $100 million pool will be zero, since the expected default on the $115 million of mortgages is $11.5 million (10% of $115 million), which means that $103.5 million of all the mortgages should be repaid. Furthermore, even if a borrower defaults on a mortgage, recovery procedures suggest that the bulk of the principal will be recovered.

the units will conform with that of the underlying securities which make up the trust (less any management fees).

Fig 2.5

Mortgage securitisation structure



A number of Australian banks have moved to securitise existing mortgage portfolios by establishing specialist trust vehicles which acquire the mortgages and then issue securities against those mortgages.

For the banks the key question is whether the transfer of part of its mortgage portfolio to an off balance sheet vehicle is worth the trouble. The mortgage backed securities have to be reasonably priced to attract professional investors. The trust has to purchase the securities from the bank which will involve stamp duty (and may involve income and/or capital gains tax issues for the "selling" bank) and thereafter, charge a management or administration fee.

The mortgage originator (bank) generally retains control of the administration of the mortgages (receiving repayments, issuing statements and monitoring each account, plus advising the trustee of the status of the portfolio, with respect to doubtful debts). The mortgage originator then has to decide at what price it will "sell" the mortgage pool to the trust, so that the mortgage backed securities issued by the trust remain attractive to end investors. Invariably the bank is required to sell the securities at a discount to the present value of the expected repayment stream.[36]

The issue for the banks then comes to simple mathematics. Is the savings in capital due to the securitisation of loans sufficient to compensate for the loss of revenue. The answer will vary over time and from bank to bank—depending on such diverse issues as the cost of administering loans, the cost of funds for the bank, the return required by mortgage trust investors, etc.

The move towards securitisation also has implications for the Reserve Bank's control of monetary policy and bank supervision role. As assets become more liquid and assume the properties of money, the greater the difficulty for the Reserve Bank to control the growth of credit creation. Interest rate changes must be more heavily relied upon to adjust private borrowings so that they conform with the economic policy objectives sought by the Reserve Bank.

Banking Structures

[233] Bank controls and their influence on bank structures. Banking, in one form or another, has been occurring since monetary units began to replace simple bartering. However, because banking has been at the very heart of commercial payments it has also attracted more than its fair share of regulation. Typically, the banking industry has tended to structure its operations and asset profiles to reflect and, where possible, overcome these restrictions.

In Australia, the competitive restraints imposed upon banks over the decades[37] has forced banks to establish or acquire other deregulated financial intermediaries to offer services and products which could not be offered by licensed banks at the time. Australian banks have generally

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36. The reason for this is that new entrants to the mortgage market have used the securitisation route to establish a key niche in the market. These new entrants do not have the established infrastructure of banks and consequently require a smaller return to remain viable. Moreover, as they fund their loan pool entirely from mortgage backed securities, their capital requirements are minimal. Accordingly, they are able to price their mortgages at very fine margins, thereby placing significant pressure on banks to match the "price''.

37. See Campbell Committee Report, Chapter 11, p 244.

included at least a merchant bank, general finance company and property company subsidiary among their asset base. The trend towards operating through these subsidiaries has been reversed in recent years as controls on banks have been progressively removed. These divisions exist now more for internal corporate cultural reasons as much as any other, with many of the banks collapsing these subsidiaries into divisions as deregulation progressively removed the advantages of having these operations as separate entities.

One of the longest standing restrictions on banks was that they represent the head of any hierarchy of corporations within a banking organisation. This requirement followed the difficulties of two banks in the early 1980s, the Commercial Banking Company of Sydney and the Adelaide Bank. In both instances, the bank fell into financial difficulties because their respective finance company subsidiaries grew more rapidly than the bank parent and in the end were larger than that parent. When the subsidiary became insolvent, the impact on the bank parent was similarly disastrous. For this reason the Reserve Bank has traditionally required that the bank be the pre-eminent institution in any financial conglomerate and that subsidiaries be significantly smaller in size so as not to threaten the financial stability of the bank parent.

The Wallis Inquiry saw little merit in retaining this requirement under its model of indifference between banking organisations and other financial services providers. The Inquiry went a step further and recommended that banks be permitted to establish holding companies, such that the bank entity would form one of possibly many subsidiary entities within the holding company structure (refer [118]).

A traditional role of banks has been to accept interest rate risk on behalf of borrowers and lenders. Savers traditionally require shorter term fixed rates of interest, whilst borrowers prefer longer term fixed rates of interest (especially in periods of rising inflation). As such, banks have historically tended to run a mismatched balance sheet.[38] Banks have not been purely "brokers" between borrowers and lenders. Instead they have borne very real interest rate risks. The generally short term nature of the Australian banking deposit base was forced initially by regulation (that is banks could not accept deposits for terms greater than four years to maturity prior to 1984 and were also required to hold Commonwealth Government bonds as part of their PAR requirements) and the demands of borrowers to have certain fixed rate borrowings. At the same time, it is

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38. Mismatched balance sheets and the question of interest rate risk are reviewed in Chapter 6.

generally conceded that banks' interest rate spreads on borrowing and lending are due largely *to maturity transformation*.[39] This is the process where banks borrow for shorter terms and lend for longer terms, taking advantage of the generally upward sloping yield curve (where interest rates are lower for shorter terms and higher for longer terms).[40] Relatively long term assets funded by short term liabilities create an exposure to upward movements in interest rates. Expanding capital markets have reduced the extent to which this mismatch is purely a function of investor/borrower preferences. However, this matter is discussed at length in Chapter 6.

[234] Nature of banking within the Australian economy. Although international regulators have attempted to provide an unbiased international market for banking operations (see [423] for further details), the Australian economy possesses several attributes that need to be considered if one is to fully appreciate the role and function of Australian banks. These attributes are elaborated upon below.

[235] (a) Structure of the Australian banking system.

As detailed in [224] there are presently 50 banks authorised to operate in Australia, either as a separate legal entity or as a branch of an overseas bank. However, five Australian banks (ANZ Banking Group, Commonwealth Bank, National Australia Bank, St George/Advance Bank and Westpac) dominate the industry with assets totalling $402 million in May 1997 out of a total of $555 million for all banks operating in Australia (the figure excludes foreign branches).

[236] (b) Characteristics.

Historically, banks have established public confidence in their operations which has been reinforced by the Reserve Bank of Australia's regulatory role to protect the interests of depositors. This phenomenon is probably built on the public's belief, mistaken or otherwise, that the Reserve Bank of Australia would not permit such a collapse and would arrange a rescue rather than threaten the whole banking system.

The five Australian domiciled banks have taken advantage of the public confidence in each organisation to create substantial *franchise value* in each organisation. Each bank has moved in recent years to expand its range of products and services by exploiting the value of the franchise amongst retail customers. The aim is clearly to increase the

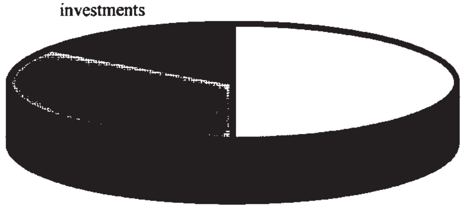
39. Maturity transformation is discussed in greater detail in [703].

40. The factors affecting the slope of the yield curve are discussed in sections [312] to [317].

"share of wallet" that each bank is able to extract from its customers. For example, Figure 2.6 attempts to illustrate how a middle income household might hold its portfolio of financial assets. Traditional banking could incorporate a house (housing loan plus equity), car (again debt plus household equity), etc. Households will also have a significant proportion of their financial assets in superannuation and/or mutual fund investments and more recently in direct investments, such as shares and securities. All the banks have moved rapidly to increase their share of the customers' wallets by providing superannuation accounts, mutual funds and more recently shares through their broking affiliates.

Fig 2.6

Share of customer wallet



With progressive deregulation banks have been able to determine their own product and pricing mixes with their resultant profitability being a function more of the quality of management decisions within the market rather than by government intervention and/or decree. This freedom from regulatory constraint is in stark contrast to many other countries such as the United States and Japan where restrictions on banking, interstate banking or particular types of business activities restricts the ability of banks to quickly react to market developments.

[237] (c) Environment.

As Australian banks move towards the new millennium they face the three-sided challenge of:

- changes in the way consumers view their financial services needs;
- rapid changes in technology which are having profound effects in altering the economics of banking; and

- increased competition from other financial services providers.[41]

As Australian households have become more financially sophisticated they have viewed banking in a broader framework, as just one element in satisfying a total financial services requirement (refer Figure 2.6). There has been a clear trend for households to broaden their outlook of what constitutes savings or more correctly wealth creation, to incorporate superannuation, managed investments (such as unit trusts, insurance bonds), property investments and shares. This has been reflected in the rapid growth in personal superannuation and funds invested in unit trusts, as well as the proliferation of private share ownership in the 1990s. The latter development has no doubt been boosted by the privatisation of such corporate icons as the Commonwealth Bank and Telstra (the latter establishing a share register of some 1,800,000 investors in 1997, of which greater than 50% represented their first purchase of shares).

With the Government openly moving away from providing public pensions, households are more concerned with retirement planning and as such are concerned that their wealth creation be sufficient to provide funds for both old age and to pass on to offspring at death.

A similar development has occurred in borrowing, with an increasing tendency for households to "shop" for the cheapest cost of funds. This signals an increasing interest elasticity of demand for credit amongst the household sector, where previously banks considered household demand for credit to be largely interest inelastic.

The changing patterns of household demand have coincided with rapid advances in computerisation which has markedly reduced the cost of providing a broad range of financial services to both household and corporate customers. This development has perverse implications for banks, for not only has it enabled banks to provide new services to their clients and develop more sophisticated client data bases, it has also significantly reduced the barriers to entry in banking.

Most banks readily agree that only a small percentage of their clients contribute a large percentage of each bank's retail profits. Indeed one bank, First National Bank of Chicago of the United States, has publicly admitted that just 6% of its clients contribute 70% of its retail banking profits, whilst 14% of its clients provide 53% of its losses. Similar trends would no doubt exist amongst Australian banks. The danger to the banks is that with barriers to entry collapsing, other institutions are able to

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41. Refer also to [113] for information on how the Wallis Inquiry viewed these changes.

"cherry pick" the most valuable bank clients by offering price and/or quality incentives.

Moody's has noted that the economics of client profitability are based on the following factors:

1. the size of the deposit or size of the loan advanced to the client;
2. how long the client leaves the balance with the bank;
3. the cost for the bank to originate, service and transact with the client; and
4. the profit spread of the particular product itself.[42]

Clearly new entrants will endeavour to target clients with large deposit or loan balances and/or seek to provide products which generate large profit margins.

The most obvious example of this trend has been the rapid development of mortgage originators (Aussie Home Loans and RAMS) which have offered lower loan rates in an effort to attract households. Home loans in Australia have traditionally been viewed as the largest single profit generator for the retail banks. This is because loan balances are large, average loan terms are around seven years and the interest margin has been around 3.5 percentage points. Little wonder that a number of new entrants specifically targeted this product.

The banks have responded by first matching and then undercutting the mortgage originators on price. For the banks this has meant a significant reduction in earnings as interest margins were squeezed. It has also placed more pressure on banks to end the cross-subsidisation of services.

The banks have reacted to this change in the cost of entry in two ways: first by attempting to rapidly cut their own cost of operations, and secondly by increasing the price at which previously subsidised services are offered.

The most obvious example of cutting costs is in the area of branch representation. Table 2.5 reviews the trends in branch and agency representation of the four main banks.

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42. Refer "Trends in Retail Banking and Rating Implications", Moody's Investors Service, August 1996,p4.

Table 2.5

Major bank branch/agency representation—Australia

	1992	1993	1994	1995	1996
ANZ	2,302	2,136	2,026	1,881	1,744
Commonwealth	6,629	6,149	5,917	5,756	5,604
NAB			1,226	1,212	1,234
Westpac	1,946	1,827	1,616	1,547	1,788
Total			10,785	10,396	10,370

Another example of the move towards reductions in costs is in processing functions. All banks have moved to centralise processing activities, previously undertaken at each bank branch. Westpac has established a specialist mortgage company in South Australia which will process mortgage applications and effect settlements for all of Westpac's branches. The bank is endeavouring to entice other banks to use its service so as to further lower the processing cost of administering mortgages.

National Australia Bank has similarly reacted by purchasing Homeside Incorporated of the United States, that country's fifth largest mortgage provider and seventh largest mortgage servicer (with 1.1 million customers and a portfolio of $US 97 billion). The takeover, valued at $US 1.7 billion, represented an attempt by the bank to lower its costs of mortgage servicing. Homeside was regarded as one of the most efficient mortgage processors in the United States and the bank has stated that it intends to adopt the processing technology to its Australian operations. In Australia the cost of administering a housing loan by any of the major banks is around $160 per annum. Homeside's annual average mortgage administration cost is around $90. If National Australia Bank is successful in transferring the Homeside methodology to the Australian banking scene it can materially alter the economics of mortgage finance in this country.

Most recently, the Commonwealth Bank heralded a new attitude in bank management which had hitherto been limited to American banks, namely "outsourcing" of what were previously considered "core" banking functions. In this case the bank decided to transfer responsibility for all of its technology support and management function to an independent third party provider EDS (Electronic Data Services). The decision means that banks will now review each element of the factor chain for product development, support, marketing and distribution, to ascertain whether it is profitable to undertake this function internally or have it undertaken by a specialist services provider.

In relation to ending the cross-subsidisation of services, all banks have moved rapidly to introducing charges for over the counter and electronic transactions (such as withdrawals, issuing of bank statements and/or bank statements) as well as account keeping fees.

Mortgages are just one example of the change that is occurring in banking. Many department stores are known to be keen to utilise their own franchises to sell financial services through their stores. In the United Kingdom two large department store chains, Sainsbury's and Tesco, have established successful banking operations by providing banking facilities within their stores.

Similarly, Telstra and Australia Post can be expected to utilise their own networks to offer financial services product to customers.

[238] (d) Diversification.

Apart from having strong market share with extensive distribution networks, the major Australian banks have diversified their exposures by client and across domestic geographical boundaries (both State and international).

National Australia Bank has purchased retail banking operations in the United Kingdom, New Zealand and the United States. The ANZ Banking Group purchased Grindlays Bank plc in the mid 1980s, giving it an extensive network of retail operations throughout the Indian sub-continent, South-East Asia and the Middle East. ANZ also operates an extensive retail banking operation in New Zealand. Westpac operates the largest retail bank in New Zealand, Westpac Trust, and has been acquiring regional banks throughout Australia (Challenge Bank and Bank of Melbourne). Similarly, the Commonwealth Bank has a 75% interest in ASB Bank of New Zealand and recently established a joint venture bank in Indonesia (BII Commonwealth) which will target retail customers.

The increased geographic diversification by the banks reflects attempts to both diversify the income base as well as reduce the cyclicality of earnings, especially when banks are targeting underdeveloped new markets (such as South-East Asia). The banks also believe that they can transfer their technical skills to other countries, with National Australia having succeeded in replicating many of its systems to its UK subsidiaries.

Apart from geographic diversification, the banks have diversified into the broader financial services market, largely in response to changing household savings patterns. This trend is one of the reasons for the Wallis Inquiry concluding that it is no longer valid to distinguish between banks and other deposit taking institutions.[43] The banks have ventured into funds management, insurance, stock broking and superannuation in an effort to service the broader financial services needs of households.

Banks now typically offer unit trusts, superannuation and shares to customers in addition to traditional bank deposits.

[239] (e) Asset quality.

Aggressive lending in the late 1980s combined with the worst recession Australia had experienced since the Great Depression of the 1930s, resulted in a significant increase in bank loan losses in the early 1990s.

Banks have progressively reduced their exposures to these problem loans through a combination of progressive bad debt write-offs, loan restructuring and progressive sale of the underlying assets supporting the loans. Impaired assets as a proportion of total assets have fallen to below 2% from a peak of 6% in 1992, whilst bad and doubtful debt charges have fallen to negligible levels compared with a peak of 1.5% of total assets in 1992.

The lessons learned from the late 1980s have been channelled into better credit review systems and procedures. Banks have adopted portfolio management approaches to loans, ensuring that loan portfolios are diversified by industry and geographic sector, employing methodologies for minimising and controlling large exposures to individual corporate customers and controlling the maturity profile of those loans. Banks have also moved to a system of identifying problem loans early by taking faster action on missed interest payments.

[240] (f) Earnings.

The profitability of Australian banks has been favourable from an international perspective. Table 2.6 compares the earnings performance of the four major banks in recent years.

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43. Refer [117].

Table 2.6

Earnings performance of the major banks

	1992	1993	1994	1995	1996
ANZ					
Return on Ave Assets %	-0.6	0.2	0.8	0.9	0.9
Return on Equity %	-11.4	5.0	15.6	17.9	18.3
Profit per employee $'000	(13.166)	6.133	20.736	26.809	28.096
Expense to Income	73.2%	70.7%	66.7%	65.9%	67.3%
CBA					
Return on Ave Assets %	0.5	0.7	0.8	1.0	1.1
Return on Equity %	8.3	10.5	11.8	16.1	16.3
Profit per employee $'000	8.932	10.466	18.299	27.441	31.011
Expense to Income	67.7	66.7	66.8	62.5	60.6
NAB					
Return on Ave Assets %	0.7	1.0	1.4	1.5	1.3
Return on Equity %	8.4	13.2	18.1	18.1	17.1
Profit per employee $'000	17.303	25.929	38.932	43.194	44.555
Expense to Income	58.3%	59.5%	57.3%	57.5%	57.5%
WBC					
Return on Ave Assets %	(1.4)	0.0	0.7	1.0	1.0
Return on Equity %	(22.4)	0.2	9.8	13.0	14.6
Profit per employee $'000	-39.793	1.156	22.455	30.144	33.459
Expense to Income	72.9%	58.8%	61.1%	60.8%	64.6%

Table 2.6 highlights the steady improvement in bank earnings since the early 1990s.

[241] (g) Capital adequacy.

Internationally, the major banks have very high levels of capital, as required by international regulatory bodies, including the Reserve Bank of Australia (see Chapter 5 for a detailed discussion of bank capital adequacy and the position of the Australian banks).

Once again, this reinforces the view that Australian banks are amongst the most stable internationally.

[242] Banks as financial conglomerates. Trading banks offer a great number of services ranging widely from travel to insurance. A brief list of the broad range of services offered by banks and their subsidiaries include:

(a) housing loans
(b) business loans
(c) overdraft finance
(d) leasing
(e) credit and debit card services
(f) travel
(g) foreign exchange
(h) computer software support services
(i) cash management services
(j) deposit services
(k) investment services
(1) insurance—life and general insurance
(m) superannuation
(n) commercial bill finance
(o) underwriting services
(p) stock broking
(q) merchant banking
(r) corporate advice
(s) economic advice
(t) financial advice

The above list helps to understand the arguments presented by the Wallis Inquiry, that there is little benefit in retaining the distinction between banks and other deposit taking institutions. Whilst some bank functions are important for the well being of the economy, especially in relation to management of the payments system, these functions can be supervised directly by the authorities.

However, there is always a concern that a deposit taking institution can meet all of the prudential guidelines established by the authorities and still get into financial difficulties.[44] The issue then becomes whether the failure of that institution will have pervasive effects on other financial institutions. Whilst ever the banks were classified as a separate and

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44. The Wallis Inquiry recommended that the deposits of any deposit taking institution which satisfied the prudential requirements established by the prudential regulator, the Australian Prudential Regulation Authority, would be protected in a similar fashion to that which presently applies for bank deposits.

distinct group of financial institutions, the authorities were able to exercise direct discussions with banks, including inspection of bank operations. In a situation where there might be hundreds of registered deposit taking institutions, it is unlikely that the authorities will be able to undertake meaningful inspections of the operations of all institutions with the degree of regularity that is required.

APPENDIX 2A

Financial Mathematics

[280] The time value of money. In [202] the concept of bringing forward or deferring consumption (that is, borrowing or lending) was discussed. In order to decide whether maximum utility is gained from either approach, an individual must have a measure by which they can value consumption in the current period (as measured by dollars of that period) with consumption in future periods.

A dollar in the current period can either be consumed or lent (that is, invested). If invested, and we know the interest rate it attracts, it is possible to calculate how many dollars we will have to consume at some future period.

The ability to express dollars of one period in dollars of another period provides a powerful tool for comparing expected cash flows in differing time periods. This is referred to as recognising the *time value of money,* that is, recognising that a dollar today is worth more than a dollar in a year's time.

[281] Future and present values. If an individual invests their money and receives interest of 10% pa for the period it is invested, then they will have a future value equal to the original amount invested plus the interest earned on that principal. This is shown mathematically in equation 2.4.

$$FV = PV + PV \times i_t \tag{2.4}$$

or

$$FV = PV \times (1 + i_t) \tag{2.5}$$

Where FV — the future value at the end of the period in question

PV — the principal the individual has to invest at the current time

i_t — the interest rate that will be earned in the period in question

This simple equation provides the basis on which to compare a given amount now with some future expected cash flow. By rearranging equation 2.5, we can make the present value of the subject of the equation (as in equation 2.6) and calculate the amount of present value we would require in exchange for a specified future value (cash flow).

$$PV = \frac{FV}{(1 + i_t)} \tag{2.6}$$

[282] Simple and compound interest rates. As the interest rate employed plays a critical role in calculating the future or present value of cash flows, it is important to realise that the values derived will be dependent on how often interest is charged/paid.[45] In its simplest form, interest is charged/paid only at the end of the period involved, as shown in equation 2.7.

$$FV = PV \times (1 + i_p \times n) \tag{2.7}$$

Where i_p — The interest rate per period of time
n — The number of periods of the loan/investment

Where interest is charged in this manner, it is referred to as *simple interest.* For example, a person has the choice of receiving $1,000 now or $1,200 in two years time. If simple interest rates were 10% per annum then, on the basis of our time value equations which follow, the person would be indifferent between receiving $1,000 now or the $1,200 in the future.[46]

$$\begin{aligned} FV &= PV \times (1 + i_p \times n) \\ &= \$1{,}000 \times (1 + 0.1 \times 2) \\ &= \$1{,}200 \end{aligned}$$

or

$$\begin{aligned} PV &= \frac{FV}{(1 + i_t \times n)} \\ &= \frac{\$1{,}200}{(1 + 0.1 \times 2)} \\ &= \$1{,}000 \end{aligned}$$

For borrowings/investments greater than six months, interest is usually charged/paid more frequently than at the end of the investment period. Accordingly, not only does an investment attract interest, but where it is

45. For our analysis we will assume borrowing and lending rates are the same, ie there is no spread for the financial institution.
46. For our analysis we will also ignore the implications of both taxes and differing credit risks.

invested for more than one charging period, it will attract interest on interest. This interest is referred to as *compound interest.*

The charging of interest on interest is represented mathematically in equation 2.8.

$$FV = PV \times (1 + i_1) \times (1 + i_2) \times \ldots \times (1 + i_n) \tag{2.8}$$

Where i — the interest rate charged/paid in *one* interest charging period

n — the number of charging periods in the investment.

Where a constant interest rate is applied, this can be summarised mathematically as:

$$FV = PV \times (1 + i)^n \tag{2.9}$$

or

$$PV = \frac{FV}{(1+i)^n} \tag{2.10}$$

The impact that compounding interest can have on the time value of money of two cash flows can be seen by re-examining our previous example, assuming that the 10% rate is charged annually. Thus, the revised future and present values would be as follows:

$$\begin{aligned} FV &= PV \times (1 + i)^n \\ &= \$1{,}000 \times (1 + 0.1)^2 \\ &= \$1{,}210 \end{aligned}$$

or

$$\begin{aligned} PV &= \frac{FV}{(1+i)^n} \\ &= \frac{\$1{,}200}{(1+0.1)^2} \\ &= \$991.74 \end{aligned}$$

From this analysis, and taking into account the effect of compounding interest, we can see that the person would be better off accepting the $1,000 today rather than the $1,200 in two year's time. The amount that the person is better off can be expressed as either $10 at the end of year two or $8.26 in present value terms. It should be remembered that at a

10% interest rate, compounded annually, these two dollar values equate (allowing for rounding).

[283] Nominal rates of interest. Although the most common interest charging periods are quarterly, half-yearly and annually, interest rates are normally quoted on a nominal, per annum basis. Where the interest charging period is less than one year, the interest rate applicable to our equation 2.9 can be derived simply by dividing the nominal interest rate by the number of compound periods in one year, as shown in equation 2.11.

$$i = \frac{j}{m} \tag{2.11}$$

Where j — the nominal interest rate
m — the number of charging periods in one year

Apart from the implications to future values of rates being quoted on a nominal, annual basis for different charging periods, there is also a need to convert such quoted rates to a common basis so that comparison can be made. For example, a borrower has a choice of a loan which charges 12.00% pa monthly or one from another creditor at 12.25% pa charged quarterly. To adjust the monthly rate to an equivalent quarterly rate we employ equations 2.11 and 2.9 and determine what the three month future value is for a monthly compounded interest rate.

$$\begin{aligned} FV &= PV \times \frac{(1+j)^n}{m} \\ &= PV \times \frac{0.12}{(1+12)^3} \\ &= PV \times 1.030301 \end{aligned}$$

As this future value must equal the future value of our quarterly (three month) interest rate then:

$$FV = PV \times \frac{(1+j)^1}{4} = PV \times 1.030301$$

or
$$\frac{(1+j)}{4} = 1.030301$$

then
$$j = 0.121204 \text{ or } 12.1204\%$$

[284] Net present value of a cash flow stream. Equation 2.10 shows how to take a future value and convert it to a present value. Where we have multiple future cash flows we can employ equation 2.10 to bring them to a common denominator—the present value. This is referred to as *discounting the cash flow* because, as shown in equation 2.12 (which is the re-arrangement of equation 2.10), we divide each future cash flow by the relevant interest rate for the period of the cash flow.

$$PV = \frac{CF_0}{(1+i)^0} + \frac{CF_1}{(1+i)^1} + \frac{CF_2}{(1+i)^2} + \ldots + \frac{CF_n}{(1+n)^n} \qquad (2.12)$$

Where CF_0 — the expected cash flow at time zero (the start)
CF_1 — the expected cash flow at the end of period 1
CF_n — the expected cash flow at the end of period n

For example, I intend to buy a machine for making buttons which I will sell. The machine costs $1,000 and I anticipate that in the first year I will clear $600 from buttons, $200 in year 2 and $900 in year three, at which date the machine will be obsolete and worthless. As cash flows are the crux of any financial analysis, it is considered wise to first plot them to ensure a clear understanding of what is to be discounted. Hence, in this example, the cash flows could be plotted as follows:

–$1,000	+$600	+$200	+$900
CF_0	CF_1	CF_2	CF_3

If we assume an interest rate of 10% per annum then we can calculate the present value of this anticipated cash stream as follows:

$$PV = \frac{-\$1{,}000}{(1+0.1)^0} + \frac{\$600}{(1+0.1)^1} + \frac{\$200}{(1+0.1)^2} + \frac{\$900}{(1+0.1)^3}$$
$$= \$386.93$$

As the cash flows are both positive and negative, the sum of their present values are referred to as the *Net Present Value* (NPV). In our example, as the NPV is positive, we should proceed with the purchase as it is expected to increase our total wealth (present value).

When discounting, care should be exercised to ensure that the discount period and the interest rate employed reflect the lowest common cash flow period. For example, if we take our previous example about the button machine but assume that the interest is 10% pa charged half yearly and the cash flows were received at the end of six months ($600), eighteen months ($200) and three years ($900), then our charting of the cash flows would be:

–$1,000	+$600	0	+ $200	0	0	$900
CF_0		CF_1		CF_2		CF_3

The NPV can then be calculated as follows:

$$\text{NPV} = \frac{-\$1{,}000}{(1+\frac{0.1}{2})^0} + \frac{\$600}{(1+\frac{0.1}{2})^1} + \frac{0}{(1+\frac{0.1}{2})^2} + \frac{\$200}{(1+\frac{0.1}{2})^3} + \frac{0}{(1+\frac{0.1}{2})^4} + \frac{0}{(1+\frac{0.1}{2})^5} + \frac{\$900}{(1+\frac{0.1}{2})^6} \qquad (2.13)$$

As zero divided by any number is still zero, we can reduce equation 2.13 to

$$\begin{aligned}\text{NPV} &= \frac{-\$1{,}000}{(1+\frac{0.1}{2})^0} + \frac{\$600}{(1+\frac{0.1}{2})^1} + \frac{\$200}{(1+\frac{0.1}{2})^3} + \frac{\$900}{(1+\frac{0.1}{2})^6} \\ &= \$415.79\end{aligned} \qquad (2.14)$$

Again, as the NPV is positive we should proceed with the investment.

[285] Internal rate of return. The interest rate that results in a stream of positive and negative cash flows having a NPV of zero is referred to as the internal rate of return (IRR) of that stream. As such, the IRR represents how much a person will earn from a particular cash flow stream and can be useful in comparing alternative investments (cash flow streams). The IRR is calculated through an *iteration process*, effectively trial and error. IRR is useful for comparing alternative investment proposals. Modern computers are able to effect many iterations within a split second such that determining the IRR for a variety of alternative investments is today a relatively easy task.

[286] Annuities. To date we have considered each period's cash flow in isolation. However, there are many instances where cash flows follow a regular pattern. In these instances, the use of mathematics can save the laborious task of discounting individual cash flows.

Where a cash flow stream consists of equal, regular flows it is referred to as an *annuity*. Examples of annuities would be pension or personal loan repayments.

Where there is no time limit on the annuity, it is referred to as an *infinite annuity or perpetuity*. The present value of such an annuity can be expressed as follows:

$$\text{PV} = \frac{\text{CF}_1}{(1+i)^1} + \frac{\text{CF}_2}{(1+i)^2} + \frac{\text{CF}_3}{(1+i)^3} + \ldots$$

As all cash flows are equal, we can substitute the term C for CF, representing a constant, for each period's cash flow. Also, we know that mathematically, the sum of the arithmetic progression of $A \times r^{1 \text{ to } n}$ can be expressed as $A \times (1 + r)^n$ and where n equals infinity the equation reduces further to $A \times r$.

In the case of a perpetuity, A equals the constant cash flow item C, while r equals the discount factor $\frac{1}{(1+r)}$. Accordingly, the present value of a perpetuity can be expressed as:

$$PVA_p = \frac{C}{i} \tag{2.15}$$

While there are limited examples of perpetuities, there are many more examples of *finite annuities,* that is, constant, regular cash flows which occur for a limited period. By using equation 2.15 we can derive a formula to calculate the present value of a finite annuity. For example, if we have an annuity with five equal, regular instalments of C we can express this as follows:

$$\begin{aligned} PV = {} & \frac{C}{(1+i)^1} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^4} + \frac{C}{(1+i)^5} + \frac{C}{(1+i)^6} + \cdots \\ & - \frac{C}{(1+i)^6} - \frac{C}{(1+i)^7} - \cdots \end{aligned} \tag{2.16}$$

If we substitute equation 2.16 for the net present value of the perpetuities we must further discount the latter perpetuity as we have derived its net present value as at period 5. Thus equation 2.16 becomes:

$$\begin{aligned} PVAi:5 &= \frac{C}{i} - \frac{C}{i} \times \frac{1}{(1+i)^5} \\ &= C \times \frac{(1-(1+i)^{-5})}{i} \end{aligned} \tag{2.17}$$

Where PVA i:n — the present value of a finite annuity at an interest rate of i per period for n periods (in this example, 5).

For example, annual instalments of $5,275.95 on a personal loan for five years repayable by five equal annual instalments at an interest rate of 10% pa would equate to a $20,000 present value. That is:

$$PVA1:5 = \$5{,}275.95 \times \frac{(1-(1+0.1)^{-5})}{0.1}$$
$$= \$20{,}000$$

Generically, this equation can be expressed as follows for any interest rate i and any period n:

$$PVAi:n = C \times \frac{(1-(1\times i)^{-n})}{i} \tag{2.18}$$

Equation 2.18 can be re-arranged to make the regular payment, C, the subject as follows:

$$C = \frac{PVAi:n}{\frac{(1-(1\times i)^{-n})}{i}} \tag{2.19}$$

or

$$C = \frac{PVAi:n \times i}{(1-(1\times i)^{-n})} \tag{2.20}$$

By making the constant repayment the subject we can quickly determine the amount of repayments required to meet a specified borrowing. For example, James and Julia Peters wish to borrow \$100,000 to buy a house. Current housing loan rates are 12% pa charged monthly and the bank has indicated that it is willing to provide a 25 year loan. On the basis of equation 2.20 we can derive the monthly instalments James and Julia will need to meet their commitments.

$$C = \frac{PVAi:n \times i}{(1-(1\times i)^{-n})}$$
$$= \frac{\$100{,}000 \times {}^{0.12}\!/_{12}}{1-(1+{}^{0.12}\!/_{12})^{-(25\times 12)}}$$
$$= \$1{,}053.22 \text{ per month}$$

In many instances, a specific, cash flow requirement exists in the future. For example, a company may wish to know how much of the proceeds of sales it needs to put aside each month to meet a note it has falling due in one year's time. As equation 2.18 provided us with a means of calculating the present value of an annuity that is $C \times \frac{(1-(1\times i)^{-n})}{i}$ and equation 2.9 showed us how to convert a present value into a future value that is $FV = PV \times (1+i)^n$, then by combining these equations we derive the following formula for determining the future value of an annuity:

$$FVAi : n = C \times \frac{(1-(1+i)^{-n})}{i} \times (1+i)^n$$

simplifying

$$= C \times \frac{(1-(1+i)^{-n} \times (1+i)^n}{i}$$

or

$$= C \times \frac{(1+i)^n - (1+i)^{-n} \times (1+i)^n}{i}$$

hence

$$FVAi : n = C \times \frac{((1+i)^n - 1)}{i} \qquad (2.21)$$

[287] Key financial equations. In this appendix we have presented and described several key financial equations. A summary of these are provided below.

Function	*Equation*
Present Value of a Cash Flow	$PV = \frac{FV}{(1+i)^n}$
Compound Interest Rates	$I = \frac{(1+j)^n - 1}{m} = \left(1 + \frac{j}{m}\right)^n - 1$
Present Value of a Perpetuity (Infinite Annuity)	$PVA_p = \frac{C}{i}$
Present Value of a Finite Annuity	$PVA_p = C \times \frac{(1-(1+i)^{-n})}{i}$
Future Value of a Finite	$FVAi : n = C \times \frac{((1+i)\,n - 1)}{i}$

Where

PV	—	the present value
FV	—	the future value

i	—	the interest rate for the period
n	—	the number of interest charging periods associated with the cash flow in question
j	—	the nominal interest rate quoted
m	—	the number of compound periods within the interest charging period
C	—	a constant payment
PVA_P	—	the present value of a perpetuity (infinite annuity)
PVAi:n	—	the present value of a finite annuity at an interest rate of i per period for n periods
FVAim	—	the future value of a finite annuity at an interest rate of i per period for n periods.

3

Liquidity Management

Money Formation and the Flow of Funds

[301] Money formation. Since the floating of the Australian dollar in December 1983, the monetary authorities have exerted much greater control over monetary growth than previously. Indeed, a key monetary variable, money base, is now heavily dependent on actions taken by the Commonwealth Government and the Reserve Bank. However, the authorities also need to consider the demand for funds when implementing policies designed to influence monetary growth. Failure to consider demand factors could result in undesirable volatility in interest rates.

In order to maintain consistency with official statistics, the Reserve Bank's definition of money formation will be used.

Money formation can be disaggregated into two categories:

- changes in the money base; and
- secondary credit creation.

The money base is officially defined as notes and coin held by the private sector, plus deposits with the Reserve Bank and Reserve Bank liabilities to the private sector. As such, the money base represents the underlying liquidity of the financial system.

Factors contributing to the money base therefore, include:

(a) Australia's foreign exchange transactions;

(b) the Commonwealth Government's Budget deficit/surplus;

(c) Reserve Bank loans and advances to financial institutions and various statutory bodies;

(d) transactions involving Commonwealth Government securities between the monetary authorities (referred to as the official sector) and other individuals and/or institutions (the non-official sector); and

(e) the demand for funds.

[302] Expressed algebraically, movements in the money base would be represented as follows:

$$\Delta MB = (G - T) + FET + \Delta RBAONA - \Delta CGS \tag{3.1}$$

Where

Δ	—	Change in a variable
MB	—	Money base
G	—	Commonwealth Government outlays
T	—	Taxation and other revenue of the Commonwealth Government
(G-T)	—	The Commonwealth Government's budget surplus (—) or deficit (+)
FET	—	Australia's foreign exchange transactions
RBAONA	—	Loans and advances by the Reserve Bank to the non-official sector
CGS	—	Commonwealth Government securities transactions between the official and non-official sectors.

The first three items are generally referred to collectively as the change in primary liquidity:

$$\Delta PL = (G - T) + FET + \Delta RBAONA \tag{3.2}$$

such that

$$\Delta MB = \Delta PL - \Delta CGS \tag{3.3}$$

The existence of a negative sign in equations 3.1 and 3.3 reflects the fact that in order to purchase government securities, the private sector has to forgo some of its currency holdings or deposits held with the Reserve Bank (that is, the private sector is receiving government securities in exchange for cash). Hence, private sector purchases of government securities will reduce the money base of the economy.

Foreign exchange transactions

[303] The net effect of foreign exchange transactions (FET) is represented by movements in the Reserve Bank's holdings of gold and foreign exchange net of valuation effects (that is, the effects of movements in Australian foreign exchange and gold reserves), and net of overseas borrowings by the Commonwealth Government.

In December 1983, Australia changed from a fixed to a floating exchange rate regime. Under a floating exchange rate system, the price of a currency (that is, the exchange rate) is determined by supply and demand for the currency in the foreign exchange market.

With the floating rate system operating in Australia, a corporation or private individual can only convert Australian dollars into a foreign currency if it can find an existing holder of foreign currency who is prepared to sell in exchange for Australian dollars. If Australian dollars are in heavy demand their price (or the Australian exchange rate) will rise. If, on the other hand, Australian dollars are not being sought (or there may be many sellers of Australian dollars) their price or the exchange rate for Australian dollars will fall.

In such transactions, the ownership of Australian dollars changes but the quantity of Australian dollars available remains unchanged.

Prior to the floating of the Australian dollar, the bulk of transactions involving foreign exchange were subject to exchange controls and had to be settled ultimately with the Reserve Bank, since the Reserve Bank determined the price (or exchange rate) for the Australian dollar and would guarantee to convert foreign exchange for Australian dollars at that price. As such, all foreign exchange reserves (apart from working balances held by the banks) were held by that Bank. When an exporter received payment in a currency other than Australian dollars he or she would sell that money to a bank in exchange for Australian dollars (either crediting the customer's account or making a cash payment). At the end of each day the bank would exchange its foreign currency holdings with the Reserve Bank and be credited with Australian dollars (AUD) at the exchange rate determined by the Reserve Bank. The Reserve Bank's Australian dollar value of foreign currency reserves would rise by an equivalent amount to the increase in the money base.

The preceding transaction is expressed diagrammatically in Figure 3.1. As illustrated in Figure 3.1, Joe Blow, the Australian exporter is shipping widgets (say) to the United States. His contract with Mr Smith, the US importer, is to supply 100,000 widgets valued at 6 million United States dollars (written as USD 6 million). Upon receipt of the widgets Mr Smith would draw on his bank for the USD 6 million. Mr Smith's bank (in this case the ABC Bank) would debit his account for USD 6 million and provide the equivalent in credit funds to the Commonwealth Bank (Joe Blow's Australian banker).

Prior to December 1983, Australian banks and individual exporters could not hold foreign currency balances apart from working balances.

Consequently, the Commonwealth Bank would need to exchange its US dollar balances for the equivalent in Australian dollars. On this day, the Reserve Bank had set the AUD/USD mid-rate at 0.6000, such that the Commonwealth Bank would receive 10 million Australian dollars (written as AUD 10 million) in exchange for its USD 6 million. The Commonwealth Bank would then credit Mr Blow's account with AUD 10 million.

The effect of the export of the 100,000 widgets in this case has been an increase of USD 6 million in the Reserve Bank's holding of foreign exchange reserves. Simultaneously, by providing AUD 10 million to the Commonwealth Bank, the Reserve Bank has increased the money base by this amount.

Following the floating of the Australian dollar and the removal of exchange controls, the Reserve Bank no longer requires that surplus foreign currency balances be settled with it. Rather, buyers of foreign currency (importers, etc) must find sellers of foreign currency (exporters). As such, there is no change in the money base, but only a change of ownership of Australian dollars. Moreover, the Reserve Bank no longer determines the price of the Australian dollar.

Under a floating exchange rate system, as currently exists, the transaction described in Figure 3.1 would have an entirely different impact on money formation.

Figure 3.2 provides an illustration of the situation under a floating exchange rate regime.

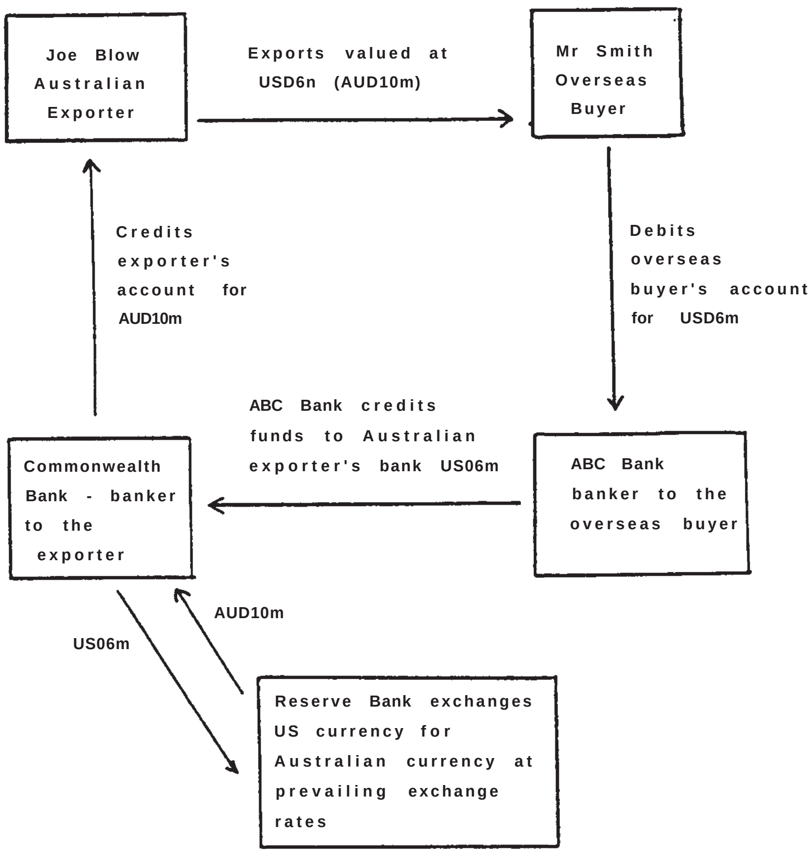
The first three steps are identical to those in Figure 3.1. However, in this instance the Commonwealth Bank will merely credit Joe Blow's foreign currency account with USD 6 million. As in the previous case, Australia's foreign currency reserves are increased by USD 6 million, but there is no change in the money base, since no Australian dollars have been issued by the Reserve Bank.

It will now be up to Joe Blow to convert his US dollars into Australian dollars by bidding to buy Australian dollars on the foreign exchange market. When he has found a seller of Australian dollars in exchange for US dollars at a reasonable exchange rate he will be funded back in Australian dollars.

From time to time the Reserve Bank does enter the foreign exchange market, largely to smooth out the impact of large individual transactions as well as handling its customers' (principally the Commonwealth Government) business. Occasionally, it has entered the market, apparently to give the market a "signal" as to which direction it would like to see the Australian dollar move. When it does enter the market its actions will add to or reduce the money base. Reserve Bank sales of foreign exchange will reduce the money base, whilst purchases of foreign exchange by the Reserve Bank will add to the money base.

Figure 3.1

Payments flow with a fixed exchange rate



What this means is that since the float in 1983, transactions involving foreign exchange will *not* necessarily affect the money base. It is *only* when these transactions involve the Reserve Bank that the money base will be affected.

Over the six months to June 1997, the Reserve Bank sold 167 ounces of gold, representing 68% of its gold holdings. However, this transaction *had no effect on the money base,* since the Reserve Bank used the proceeds of the sales to purchase other foreign currency assets (principally government securities denominated in US dollars, Japanese yen and German marks). The Bank indicated that it believed that it was more appropriate to hold the bulk of its foreign currency reserves in income producing securities rather than gold.

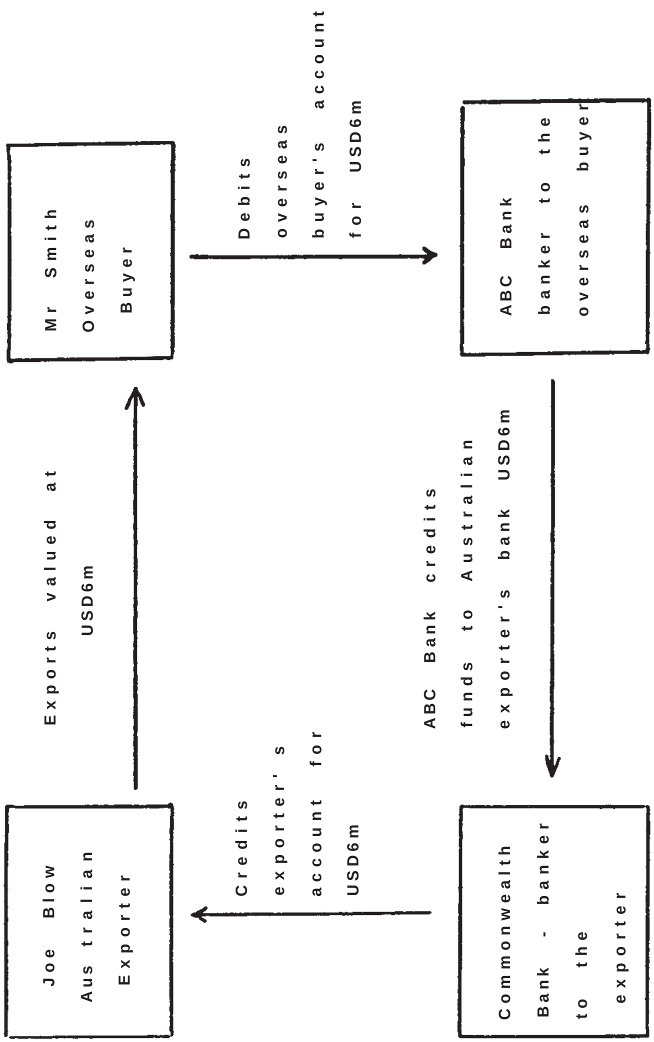


Fig 3.2
Payments flow with a floating exchange rate

Budget transactions

[304] Domestic expenditure by the Commonwealth Government will add to the money base, whilst the Government's domestic receipts will reduce the money base.

Thus, such items as payments of family allowances, pensions, unemployment benefits by the Government, Medicare refunds, etc, will add to the money base, whilst payments to the Government of PAYE tax, sales tax, provisional and company income tax, as well as the Medicare levy, will reduce the money base.

The Commonwealth Government's overseas budgetary transactions (or more correctly the Government's foreign currency transactions) have no direct impact on primary liquidity creation, although the financing of foreign currency transactions can impact on primary liquidity creation (see [306]). It has been conventional for the Reserve Bank to include the total Budget transaction of the Commonwealth Government (including overseas transactions) in estimating the money base. The reason for this is that Commonwealth Government overseas transactions are also included as part of foreign exchange transactions, but as a mirror image (or as an offset). For example, the sale of a frigate to the New Zealand navy by the Australian Defence Department would reduce the Budget deficit (and hence according to equation 3.1 reduce the money base statistics). However, the sale of the frigate would also be classified as an export (and hence increase money base). The end result is that overseas transactions of the Government, *of themselves,* have no impact on money formation. (There are minor differences but these only affect monthly comparison of statistics.) But the means by which these transactions are financed can affect money formation.

The effect of Government spending overseas on the money base depends ultimately on how it is financed. For example, when the Government purchases a new air force fighter plane from the United States, payment will usually be in the form of US dollars. The Government can finance this expenditure by either:

- a run down in the foreign exchange reserves of Reserve Bank; or
- by borrowing overseas in US dollars; or
- advising the Reserve Bank to purchase foreign exchange from the market (non-official sector); or
- some combination of the above.

The first two options will have no effect on Australia's money base, while, as stated in [303], the third option will add to Australia's money base.

Government borrowings overseas will result in an increase in foreign exchange reserves held by the Reserve Bank. Thus, unless the Reserve Bank intervenes in the Australian dollar market, these overseas borrowings will not affect money base. The Government will usually borrow overseas to assist it in financing the Budget deficit, most usually the overseas (or foreign currency) deficit.

RBA loans to financial institutions

[305] From time to time the Reserve Bank will make loans (generally of a very short term nature) to various financial institutions to assist in smoothing out liquidity flows within the Australian financial system. These loans have traditionally been restricted to authorised money market dealers, although on a few special occasions advances have been made to the commercial banks.

Table 3.1 provides details of Reserve Bank loans outstanding in June for the years 1970 to 1997. Rural Credits advances peaked during the late 1970s and reflected the Reserve Bank's short term credit facilities to a number of statutory agricultural marketing boards. Short term loans were advanced to the Australian Wheat Board and Australian Barley Board to assist them in meeting growers payments. (The Boards make advance payments to growers prior to receipt of revenue, principally from overseas buyers.)

Since the mid 1980s the Australian Wheat Board, previously by far the biggest borrower from the Rural Credits Department, has raised all of its short term borrowing requirements through the private sector from both Australian and overseas financial institutions, thereby substantially reducing the impact of Rural Credits Advances on money formation.

Table 3.1

Reserve Bank loans, advances and bills discounted

Average Weekly Figures June	*Rural Credits Advances $m*	*Other $m*
1970	349	na
1971	310	na
1972	266	na
1973	213	na
1974	205	na
1975	120	236
1976	209	636
1977	587	208
1978	481	198
1979	559	80
1980	274	203
1981	388	357
1982	391	137
1983	326	153
1984	354	271
1985	246	154
1986	59	156
1987	18	92
1988	-	130
1989	-	86
1990	-	85
1991	-	89
1992	-	91
1993	-	94
1994	-	99
1995	-	87
1996	-	88
1997	-	97

na—not available

Source: Reserve Bank of Australia *Bulletin* Table A1. Various issues.

Commonwealth Government security transactions

[306] In order to reduce the impact of the Budget deficit on primary liquidity creation, the Government, through the Reserve Bank, issues government securities to the non-official sector.

There are five major types of government securities available—Commonwealth Government Bonds, Treasury Notes, Treasury Indexed Bonds, Treasury Adjustable Bonds and Treasury Bills—four of which are available to the non-official sector.

- Traditionally Commonwealth Bonds represent the main means by which the Commonwealth Government finances its budget deficit. The maturity of the Bonds usually ranges between 15 months and 20 years and the minimum subscriptions being $1,000.

  Since August 1982 Commonwealth Bonds have been issued through a tender system. The frequency of the tenders is determined by the monetary authorities.

- Treasury Notes are issued at a discount to the face value and redeemed at par on maturity. They have a minimum subscription of $100,000 and as such are limited to the professional investor.

  Treasury Notes are primarily used to offset seasonal fluctuations in liquidity, with the Notes usually having maturities of between 13 and 26 weeks. Since January 1980 they have been sold by periodic tender, usually weekly. The Notes can be redeemed at the Reserve Bank prior to maturity, but at a discount penalty. This is generally referred to as *re-discounting.*

- Treasury Indexed Bonds, as the name implies, are bonds whose principal and interest is indexed to the headline Consumer Price Index, as published by the Australian Bureau of Statistics.[1]

  The minimum denomination is $100,000 and as such the securities are restricted to professional investors. The securities are issued by way of public tender.

- Treasury Adjustable Bonds are long term government securities whose interest rate or yield is adjusted every three months in line with market rates. In effect these are *floating rate* securities.

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1. The indexation of the securities occurs on each coupon date, with the principal amount increased by the average rate of inflation published over the six months prior to the previous coupon date.

The minimum denomination is $500,000 and the securities are issued by way of public tender.

- Treasury Bills are only issued to Commonwealth Trust funds and the Reserve Bank and are used merely for residual financing.

Sales of government securities to the non-official sector will reduce the money base while purchases from the non-official sector will add to the money base.

Sales of government securities to the Reserve Bank and/or Commonwealth Trust funds (collectively referred to as the *official sector),* as well as Commonwealth Government bond issues overseas, will not directly affect the money base.

Issues of government securities to the Reserve Bank will merely result in a book entry since the Reserve Bank and the Commonwealth Trust funds act as agents for the Government. Ordinarily, the Reserve Bank will either increase the Government's cash balances held with it or redeem its Treasury Bills in exchange for purchasing other government securities from the Government.

The Reserve Bank can also sell (and buy) government securities from its own portfolio (generally referred to as *open market operations),* in an endeavour to siphon off excess liquidity (or add funds in times when liquidity is short). At the end of June 1997 the Reserve Bank held around $22 billion in Commonwealth Government securities in its portfolio, approximately 20% of all securities on issue.

During 1995/96 net sales of domestic Commonwealth Government securities (excluding Treasury Bills) totalled $5,727 million. Of this amount, the non-official sector's holdings increased by $5,943 million. Table 3.2 provides a break-down of the composition of these sales.

As Table 3.2 highlights, gross sales of government securities to the non-official sector in 1995/96 totalled $12,251 million ($13,331 million in Bonds and net redemptions of $1,081 million in Treasury Notes), compared with a Budget deficit for that year of $5,045 million. During that year the Reserve Bank issued a total of $7,600 million in Bonds through the primary tender process. Accordingly, a further $5,731 million in government securities sales were effected by the Bank in the form of *open market operations.*

Table 3.2

Composition of Government security sales to the non-official sector—1995/96

	$m
Net redemptions of Treasury Notes from the non-official sector	-1,081
Gross sales of Commonwealth Bonds, Indexed Bonds and Treasury Adjustable Bonds to the non-official sector	13,331
Net redemptions of Commonwealth bonds by the Reserve Bank and Commonwealth Trust Funds	-2,932
Less bonds maturing over 1995/96 and held by the non-official sector at 30 June 1995	-(3.375)
Net Sales	5,943

Demand for funds

[307] Whilst it is true that the monetary authorities can, if they wish, control the growth of the base money, they must take account of the level of demand for funds. There is a close nexus between demand and supply factors and movements in interest rates (to be discussed further in [315]). As such, if the authorities act to reduce the money base in the face of strong demand for funds, this could lead to a rapid acceleration in interest rates. Similarly, attempts to increase the money base in a situation of slack demand for funds could result in a dramatic fall in interest rates.

[308] Secondary credit creation. Banks and other financial institutions are able to lend out the funds deposited with them to expand the volume of money within the financial system. Secondary credit creation refers to the expansion in the volume of money resulting from lending by financial institutions. The process of secondary credit creation by banks is explained in [210].

The importance of secondary credit creation is starkly illustrated in Table 3.3. The table shows the consistently larger growth in lending (by both banks and non-bank financial institutions) compared with the growth in the money base.

The relative importance of secondary credit creation in influencing the monetary aggregates is even more apparent in Table 3.4, which compares the percentage growth in the money base with that of the two monetary aggregates, M3 and broad money.

Table 3.3

Changes in Monetary Aggregates ($m)

	CWealth Government Budget deficit (+) surplus (-)	Foreign Exchange Transaction	Other Assets & Liabilities	Primary Liquidity	Private Sector Holdings of CGS	Money Base	Bank Lending	Other (net)	M3	Non Bank Lending	Other	Broad Money
	(1)	(2)	(3)	(1)+(2) + (3) = (4)	(5)	(4)-(5) = (6)	(7)	(8)	(6) + (7) + (8) = (9)	(10)	(11)	(9) + (10) + (11) = (12)
1983/84	7,961	1,338	183	9,482	8,392	1,090	8,391	-1,914	7,567	7,186	-1,530	13,223
1984/85	6,746	-2,486	-391	3,869	2,336	1,533	13,851	-1,906	13,478	10,267	-3,105	20,640
1985/86	5,637	-3,418	1,733	3,952	2,697	1,255	15,547	-5,047	11,755	11,823	-3,994	19,589
1986/87	2,645	2,684	2,105	7,434	6,372	1,062	18,020	-6,050	13,032	6,872	-3,691	16,218
1987/88	-2,042	5,541	727	4,226	2,493	1,733	20,435	-6,900	15,268	15,526	-9,007	21,787
1988/89	-5,904	3,852	1,425	-627	-1,485	858	36,349	-2,410	36,343	11,827	-7,807	38,629
1989/90	-8,036	2,156	4,239	-1,641	-2,676	1,035	28,179	-4,275	23,904	7,445	-11,454	19,895
1990/91	-1,896	1,446	3,591	3,141	2,130	1,011	19,657	-7,417	12,240	-6,097	-1,100	5,043
1991/92	9,339	-3,929	-84	5,326	4,908	418	6,749	-876	5,873	-8,741	6,633	3,765
1992/93	14,571	-3,950	2,280	12,901	11,539	1,362	16,965	4,124	21,089	-9,677	-2,186	9,226
1993/94	13,667	1,054	3,366	18,087	16,559	1,528	21,992	-5,370	16,622	644	-823	16,443
1994/95	11,627	-1,971	5,400	15,056	13,590	1,466	23,563	-6,180	17,383	8,447	-4,652	21,178
1995/96	5,045	821	1,165	7,031	5,976	1,055	40,797	-13,929	26,868	10,693	-5,186	32,375
1996/97	-2,514	90	5,845	3,421	-6,148	9,569	31,156	-627	30,529	5,442	-2,053	33,918

Source: Reserve Bank of Australia *Bulletin.* Various issues.

Table 3.4

Growth of monetary aggregates

Year to June	*Money Base %*	*M3 %*	*Broad Money %*
1985	15.0	17.5[2]	15.9
1986	10.7	13.0	13.4
1987	8.2	12.8	9.8
1988	12.3	13.3	12.0
1989	5.4	27.9	19.0
1990	6.2	14.4	8.2
1991	5.7	6.4	1.9
1992	2.2	2.9	1.4
1993	7.1	10.1	3.4
1994	7.5	7.2	5.9
1995	6.7	7.1	7.2
1996	4.5	10.2	10.2

Source: Reserve Bank of Australia *Bulletin.* Various issues.

[309] Definition of the volume of money. Australian monetary authorities, economists and financial journalists have traditionally relied on the M3 definition of money as the basis for quantifying the growth in the money supply. However, deregulation of the financial system, bringing with it increased *intermediation*[3] and *re-intermediation*,[4] together with the increased sophistication of the Australian financial market has meant that this measure is no longer representative of the underlying trend in monetary growth.

The Reserve Bank alluded to this problem in an article in the December 1984/January 1985 issue of the *Bulletin* titled "Measuring Money".

The Reserve Bank now publishes statistics on the money base, M3 and broad money.

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2. Inflated by the commencement of the Advance Bank and Macquarie Bank which boosted the M3 aggregates.
3. Intermediation is defined as ultimate lenders placing funds with a financial institution which then on-lends these funds to ultimate borrowers.
4. Re-intermediation involves a shift of financing from banks to the non-bank financial institutions.

Changes in the money base as described in [302] can be written as follows:

$$\Delta MB = \Delta PL - \Delta CGS \tag{3.3}$$

While the above equation helps to explain movements in the money base, the money base itself is defined as holdings of notes and coin by the private sector, plus deposits of banks with the Reserve Bank and Reserve Bank liabilities to the private non-bank sector.

Hence

$$MB = C + R + RBL \tag{3.4}$$

Where

C	—	currency or notes and coin held by the private (non-official) sector
R	—	bank deposits with the Reserve Bank
RBL	—	Reserve Bank liabilities to the private sector.

Reserve Bank liabilities to the private sector represent only a small proportion of the money base and for simplification this item is usually excluded from the equation, such that

$$MB = C + R \tag{3.5}$$

Combining equations (3.1) and (3.5) gives:

$$\begin{aligned} MB &= C + R \\ &= (G - T) + FET + \Delta RBAONA - \Delta CGS \end{aligned} \tag{3.6}$$

The money supply (M3) is often referred to as the volume of money in the literature. M3 consists of currency (notes and coin of the public) plus bank deposits (BD).

$$M3 = C + BD \tag{3.7}$$

Bank deposits will equal the sum of bank deposits with the Reserve Bank (R), bank advances (BA) and net other bank assets (BNOA)

$$BD = R + BA + BNOA \tag{3.8}$$

Combining equations (3.7) and (3.8) gives:

$$M3 = C + R + BA + BNOA \tag{3.9}$$

Rewriting equation (3.9) gives:

$$M3 = MB + BA + BNOA \tag{3.10}$$

In other words M3 is equal to the money base plus secondary credit creation by banks where secondary credit creation by banks is equal to BA + BNOA.

The other measure regularly used by the financial sector is broad money (BMY). This is equal to M3 plus deposits lodged with non-bank financial institutions (NBD).

$$BMY = M3 + NBD \tag{3.11}$$

Deposits of non-bank financial institutions are equal to loans and advances of those institutions (NBA) plus their net other assets (NBNOA).

$$NBD = NBA + NBNOA \tag{3.12}$$

Combining (3.11) and (3.12) we get:

$$BMY = M3 + NBA + NBNOA \tag{3.13}$$

Using equation (3.10) we can re-write (3.13) as follows:

$$BMY = MB + BA + BNOA + NBA + NBNOA \tag{3.14}$$

Broad money is equal to base money plus secondary credit creation of all financial institutions.

[310] Seasonal liquidity factors. The Commonwealth Government's Budget transactions have a major influence on primary liquidity creation. Whilst Commonwealth Government spending is broadly spread throughout the year, Government receipts are more lumpy in nature, with the result that liquidity can vary quite erratically throughout the year. For example, until 1989 company tax was collected in August, November, February and May (the latter month's instalments represented approximately 40% of total company income tax collections). This had the effect of deferring by up to ten months the amount of tax paid by corporates from prior year income. Provisional income tax for those with a provisional tax liability in excess of $8,000 is paid quarterly. Nonetheless, a large proportion of corporate and provisional income tax receipts are still paid in the June quarter.

Personal income tax refunds are usually issued between July and October, thereby boosting the level of liquidity in those months. The level of refunds varies, but in recent years has totalled between $7,000 and $8,000 million per annum.

Because of the bunching of provisional company income tax collections over the June quarter, the Commonwealth Government usually builds up a sizeable deficit in its Budget transactions during the first nine months of the fiscal year (July to March), which is offset by a surplus in the June quarter. Consequently, liquidity usually builds up during the first nine months of the fiscal year and falls away rapidly over the last three to four months of the year (the tax run down period). This trend in budget transactions is highlighted in Table 3.5.

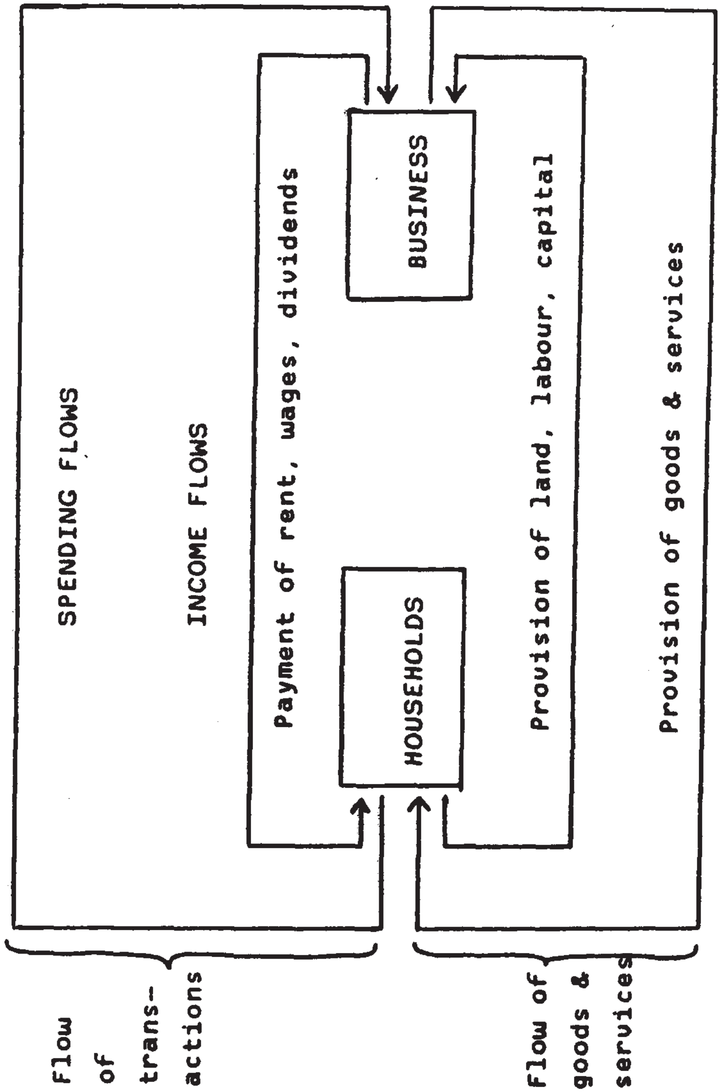
Table 3.5

Quarterly movements in Commonwealth Government Budget transactions ($m)

	Budget deficit (+) surplus (—)
1993/94	
Sept Qtr	2,962
Dec Qtr	6,214
Mch Qtr	3,615
June Qtr	876
1994/95	
Sept Qtr	4,511
Dec Qtr	6,884
Mch Qtr	1,102
June Qtr	-870
1995/96	
Sept Qtr	2,569
Dec Qtr	2,737
Mch Qtr	3,018
June Qtr	-3,279
1996/97	
Sept Qtr	2,250
Dec Qtr	2,948
Mch Qtr	-28
June Qtr	-7,684

Source: Reserve Bank *Bulletin.* Table E2. Various issues

[311] Flow of funds. Within an economy the flow of goods and services has a corresponding flow of financial transactions. The circular flow diagram depicted in Figure 3.3 illustrates the equivalence between financial transactions and the flow of goods and services within the economy.



The circular flow assumes no leakage from an economic system such that all income generated is either consumed or saved.

Algebraically, this can be expressed as follows:

$$Y = C + S \tag{3.15}$$

Where

Y	—	income
C	—	consumption
S	—	savings

A further assumption made is that the amount of savings is equal to the level of investment (or the volume of funds used for the replacement or expansion of the stock of capital equipment). This assumption is consistent with a closed economic system (that is, one where there are no leakages).

Hence

$$S = I \tag{3.16}$$

Where

I	—	investment

While the above identities are true for the economy as a whole they do not necessarily hold for every individual. For example, some individuals may need to supplement their income by borrowing—they are referred to as net borrowers; others will save some of their income—the net lenders. In aggregate the value of net borrowings will be offset by the value of net lending.

Five distinct sectors can be identified within the economy—households, corporate trading enterprises, financial enterprises, the public sector and the rest of the world. For the economy as a whole:

$$S = I \tag{3.16}$$

then

$$S_h + S_c + S_f + S_p + S_w = I_h + I_c + I_f + I_p + I_w \tag{3.17}$$

Where the subscripts

h	—	households
c	—	corporate trading enterprises
f	—	financial enterprises
p	—	public sector
w	—	rest of the world

That is, collectively the savings of all sectors within the economy should equal the level of investment by all sectors within the economy. However, it is not necessary that the savings of each sector equal that sector's investment. Indeed, the flow of funds highlights the divergence of savings and investment between sectors.

The financial flow accounts describe how net savers acquire financial assets or run down financial liabilities and how net borrowers incur financial liabilities or run down existing financial assets. Specifically, for the household sector this can be expressed as follows:

$$S_h - I_h = FA_h - FL_h \tag{3.18}$$

Where

FA_h — financial assets of the household sector

FL_h — financial liabilities of the household sector

If the household sector is a net saver, then clearly the financial assets of households will exceed the financial liabilities of that sector.

Factors Affecting Interest Rates

[312] Interest can be described as the opportunity cost (or price) for holding money. It can also be described as the price for delaying consumption. Borrowers who spend more than their income must pay interest on money they receive. Savers receive interest as payment for foregoing consumption.

In this section we will discuss the factors influencing interest rates and the reasons why there are in fact different types of interest rates.

[313] The supply and demand for funds. In [311] we reviewed the flow of funds which focused on the interaction of supply and demand for funds. Economists generally agree that demand factors are important determinants of the level of monetary growth. From the flow of funds we saw that the demand for funds must equal the supply of funds. Equivalence between the two (demand and supply) is achieved by movements in the price of funds—interest rates. Accordingly, a variation in the supply or demand for funds could result in a change in interest rates. If demand increases relative to supply it will place upward pressure on interest rates. Alternatively, if demand slows relative to supply, it will place downward pressure on interest rates. Similarly, if supply grows relative to demand interest rates Will decline (at least in the short term), while, if supply slows relative to demand it could place upward pressure on interest rates.

[314] Household saving patterns. The household sector has historically been the main source of funds. Accordingly, the spending habits of the household sector will have an important bearing on the supply of finance and hence the direction of interest rates. A higher level of savings will, other things being equal, ease pressures on interest rates, while a reduction in saving will increase pressure on interest rates. Table 3.6 shows the savings ratio since 1976. The savings ratio is the proportion of total household income saved.

Table 3.6

The savings ratio (%)

Average 1969/70 to	1972/73	11.4
	1975/76	12.3
	1976/77	12.2
	1977/78	11.5
	1978/79	11.9
	1979/80	10.3
	1980/81	10.4
	1981/82	9.6
	1982/83	7.6
	1983/84	9.0
	1984/85	8.2
	1985/86	7.2
	1986/87	6.6
	1987/88	5.9
	1988/89	6.2
	1989/90	6.3
	1990/91	5.5
	1991/92	4.7
	1992/93	3.8
	1993/94	3.3
	1994/95	3.8
	1995/96	4.1
	1996/97	4.9

Source: Australian Bureau of Statistics *National Accounts.* Various issues.

As the table indicates there has been a long term decline in the savings ratio from the healthy levels of the 1960s and 1970s. This declining level of savings is one factor contributing to the rise in external debt throughout the 1980s and 1990s.

[315] Inflation and inflationary expectations. A decision to purchase a financial security (or effectively transfer consumption into the future) needs to be taken within the context of the rate of inflation (and as mentioned in [320], the individual's relative income tax rate) which will prevail over the term of the investment. For example, $1,000 invested for twelve months at a rate of 10% will yield $1,100 on maturity. If the inflation rate over the term of the investment is zero, the real return to the investor will be $100, but if the inflation rate is 5%, then the investor's real rate of return will fall to $50.

The real rate of return on an investment is the return after deducting the inflation rate. Algebraically, it can be expressed as:

$$r_1 = n_1 - P_1 \tag{3.19}$$

where r_1 is the real rate of interest during period 1, n_1 the nominal (or quoted) rate of interest, and P_1 the inflation rate during the period of investment.

When making an investment decision the investor will need to make a prediction about the inflation rate over the term of the investment. If the investor's inflation predictions are correct then the investor's real rate of interest will be preserved. Alternatively, if the resultant inflation rate was higher than the investor's predictions then the real rate of interest will be lower. Algebraically, we can express this as follows:

$$r_1 = n_1 - P^e_1 - e_1 \tag{3.20}$$

where P^e_1 is the investor's inflationary expectations and e_1 is the divergence between the actual and expected rate of inflation during the period. Combining (3.19) and (3.20) gives:

$$P_1 = P^e_1 + e_1 \tag{3.21}$$

Investors obviously cannot predict with certainty the rate of inflation. Accordingly the current rate of inflation is often used as an important determinant of the expected future rate of inflation. This can be expressed as follows:

$$P^e_1 = a + f(P_0) \tag{3.22}$$

where "a" is some constant and $f(P_0)$ is the relationship with past periods of inflation. Rewriting (3.22) we get:

$$r_1 = n_1 - (a + f(P_0)) - e_1 \tag{3.23}$$

Both the trend in the past inflation rate and inflationary expectations represent important influences on domestic interest rates. If investors expect inflation to rise they will demand a higher nominal rate of interest to compensate for the higher expected inflation rate.

[316] Overseas interest rates. There has been much debate concerning the transmission mechanism between movements in overseas interest rates and how they impact on domestic interest rates. Economic theory tells us that with a floating exchange rate and free movement of capital flows into and out of a country, overseas interest rate movements can only indirectly affect domestic interest rates by altering the cost of converting foreign exchange into Australian dollars.

An Australian borrower can borrow in Australian dollars or some other foreign currency. If, for example, Australian rates for a one year loan are around 9% and if Swiss rates are 3%, superficially it appears cheaper to borrow in Swiss francs. Indeed, during 1984 and 1985 many Australian borrowers borrowed Swiss francs when Swiss francs were around 6% and Australian borrowing rates were at 15%—suggesting a saving to a borrower of around 9% per annum.

What is not generally realised is that payments of interest and principal on maturity of the loan must be repaid at the prevailing exchange rates when these payments fall due and *not* the exchange rate current at the time of the borrowing.

For example, assume that today the Australian and Swiss currencies are at parity (that is 1$A = 1 Sfranc) and that I can borrow $1,000 on an interest and principal on maturity basis in Australian dollars for 1 year at 15% and on a Swiss franc basis at 5%. If I borrow francs I will need to repay 1,050 francs on maturity as against repaying 1,150 dollars if I borrow $As. I decide to borrow in francs.

Twelve months later the Australian dollar has depreciated by 10% against the franc, such that 1$A = 0.9 Sfrancs. I must now repay 1,050 francs, costing me 1,050/0.9 = $ A 1,167—or the equivalent of an interest rate of 16.7%.

The above example serves to highlight the dangers of borrowing in another currency.

Borrowers can lock in their exchange rate by taking out forward foreign exchange cover. In this way their total interest rate and exchange rate costs are known beforehand: see [528], Appendix 5B.

The cost of forward foreign exchange cover can be given simply as the difference between domestic and overseas interest rates.

$$f_c = r_a - r_s \tag{3.24}$$

where f_c is the cost of forward cover, r_a the one year domestic borrowing rate and r_s the one year overseas interest rate.

Equation 3.24 is known as *covered interest parity* and states that the difference between domestic and overseas interest rates is reflected in the cost of forward exchange cover.

Of course the cost of forward cover will increase/decrease if foreign exchange participants expect an imminent depreciation/appreciation of the domestic exchange rate.

Nonetheless, equation 3.24 is useful in showing the transmission mechanism of how changes in overseas interest rates affect domestic rates. The changes should reflect in a change in the forward exchange costs.

In practice, changes in overseas rates do appear to have had some direct impact on domestic rates from time to time, that is, the impact has not been fully absorbed by movements in the cost of forward cover. The impact of overseas rates on domestic interest rates is most apparent for longer term securities. The reason is probably due to the lack of a "deep" market for forward cover for terms beyond five years.

[317] Regulation and official intervention. Although banks are free of interest rate controls, they are still subject to certain asset requirements (discussed in [322]), which effectively make them captive holders of government securities. By having a certain permanent level of demand from the banks, yields on government securities tend to be artificially lower than if market forces were allowed to operate freely.

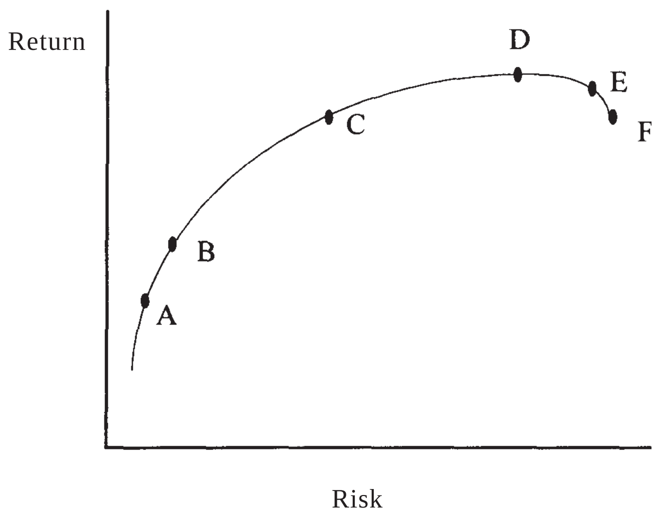
We have discussed (in [312]-[317]) five factors which collectively represented the major influences on interest rates. We now consider those factors which have resulted in different rates applying for different types of securities.

[318] Risk. When individuals decide to save some money they will have a range of financial securities to choose from. They may for example have the option to purchase Commonwealth Government bonds or the opportunity to lend money to a mining venture prospecting for diamonds in Tasmania. Clearly the latter investment represents a riskier alternative, with a greater chance that investors may lose part or all of their money. Investors should therefore demand a higher rate of return if they choose to proceed and lend money to the mining venture.

Figure 3.4 provides a risk/return profile for a variety of hypothetical securities. Security A offers the lowest risk, but also offers the lowest rate of interest. Security F has the highest perceived risk of default, but does not offer the highest return. Indeed, both securities D and E provide higher rates of return for lower risk. If, indeed, there were securities such as D, E and F, investors would always be expected to prefer D and E to F.

Fig 3.4

Risk/Return Profile



Investors must choose their preferred risk/return profile when deciding to commit money for investment. However, in practice it is often difficult to assess the risk of different securities on offer.

In 1909 the first independent rating agency was established in the United States. Rating agencies provide a means for assessing the risk of default for various securities on offer. The agencies review both published and non-published information, rating securities in order of credit risk. Two of the largest international rating agencies are Standard and Poors and Moody's Investor Services.

[319] Term structure of interest rates. Different rates of interest exist even for securities of apparently equivalent default risk. For example, the yield on a 21 year Commonwealth Government Bond is usually higher than the yield on a ten year Bond, despite being of equivalent credit risk.

The common explanation for this occurrence is related to investors' *liquidity preference.* Simply, an individual who decides to postpone current consumption and save part of his or her income will obviously expect a higher return the longer the money is invested, since the investor will be unable to spend that money until the investment matures. The shorter the term to maturity of the investment, the lower the *liquidity premium.*

Fig 3.5

The Yield Curve

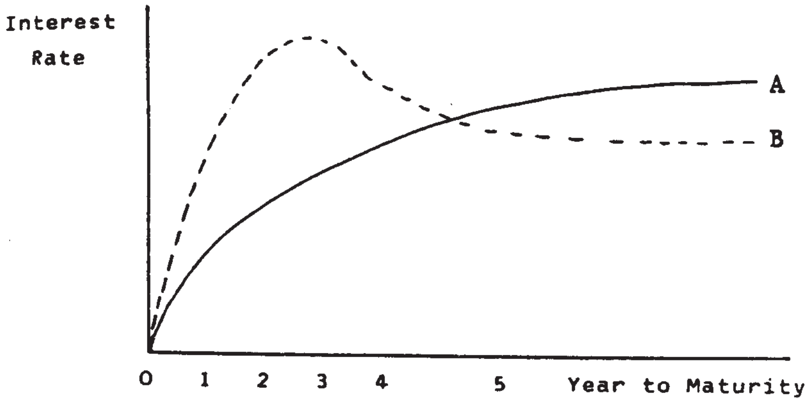
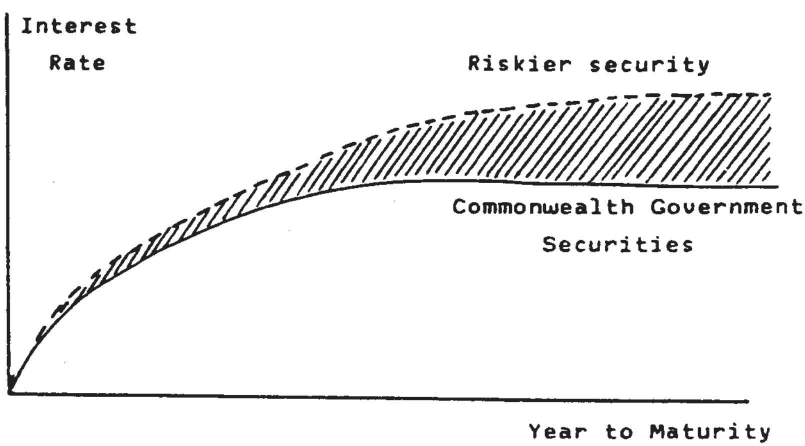


Figure 3.6

Yield curves for securities of varying credit risk



The relationship between interest rates and maturity is defined as the *term structure of interest rates,* and is often represented by a yield curve as shown diagrammatically in Figure 3.5.

The yield curve is normally upward sloping as indicated by the curve OA. However, in periods of high short term interest rates, the curve may be humped (or inverted) as indicated by the curve OB.

The reader should notice that the liquidity premium reduces the longer the term to maturity. For example, yields on 5 year bonds are usually little different from that for 10 year bonds. This suggests that as the term to maturity increases, an investor's liquidity premium increases by a smaller degree.

Having established a yield curve for a riskless security such as government securities, we can construct yield curves for riskier investments as outlined in Figure 3.6.

The shaded area in Figure 3.6 depicts the *risk premium* required by investors at each stage of maturity to invest in the more risky security in preference to the bonds.

[320] Taxes. Interest rates on some securities such as leases and some forms of preference share financing cannot be simply explained by liquidity preference nor risk premiums. Instead, the nominal interest rates applied reflect the peculiar tax profiles associated with such securities.

When attempting to select an asset portfolio, it is not sufficient to compare risk to before tax returns as this may result in a sub-optimal allocation of resources. For example, ABC company wishes to purchase equipment and is indifferent between buying the equipment by borrowing from the bank on a fully drawn loan basis at 10% or leasing the equivalent amount from the bank at 8.5% and thereby transferring the tax deductibility of depreciation allowances to the bank. The after tax return on these two alternatives are:

- For the fully drawn loan, the rate is 6.4%. That is 10% * (1—Marginal Tax Rate), where the marginal tax rate is the company tax rate of 36%.
- For the lease proposal, the rate is 6.35%. That is 8.5% * (1—Marginal Tax Rate), where the marginal tax rate is lowered by the deductions generated from depreciation to 25%.

The above analysis illustrates that selecting an asset portfolio on a before tax basis can result in a bank not achieving the maximum after tax return for a given level of risk. It is, therefore, imperative that investors always look to the *after tax yield* of an investment. The after tax yield can be determined from the following simple equation:

$$ATR = BTR\,(1 - TR) \tag{3.25}$$

where ATR is the after tax rate of interest, BTR is the before tax rate of interest and TR is the applicable marginal tax rate.

Clearly, therefore, securities offering tax advantages should have a "premium price (or lower yield)", such that the before tax rate of interest on these securities is usually below that prevailing for other securities of similar credit risk and maturity.

Bank Liquidity Management

[321] In this section we look at the regulatory liquidity requirements applying to banks and the major tools available to bank management in assisting them to manage their liquidity.

Banks need to ensure that they have sufficient liquid assets to both satisfy the Reserve Bank's liquidity requirements as well as meet any unforeseen funding or large withdrawal of deposits.

Liquid assets generally offer a lower yield than other forms of invested funds. Consequently banks need to determine an optimal level of liquid assets which are sufficient to meet most unexpected situations whilst at the same time not significantly impairing the overall profit performance of the bank.

Because of the relatively lower yield applying on liquid assets, the lower the level of surplus liquids the higher the overall returns to the bank. To assist them in minimising holdings of liquids, banks need to monitor movements not only in their own activities, but also those of other financial institutions and the economy as a whole. A thorough understanding of the workings of the financial system and the factors influencing monetary growth and interest rates is, therefore, essential.

[322] Regulatory measures of liquidity. Banks are subject to two liquidity, or more correctly, prudential requirements—Non-Callable Deposits (NCD)[5] and Prime Assets.

---

5. The Reserve Bank replaced the Statutory Reserve Deposits (SRD) requirement with Non-Callable Deposits requirement in 1988. In response to the recommendations of the Wallis Inquiry, the Commonwealth Government announced in September 1997 that it would abolish the need for banks to hold NCDs as part of its proposed amendments to the *Banking* Art. Refer [116].

Non-callable deposits

Banks must lodge a percentage of their Australian dollar denominated assets *less* shareholders' funds and favourable overnight balances in the Exchange Settlement Account on deposit with the Reserve Bank. The current NCD ratio is 1%. In September 1989 the Reserve Bank announced changes to the interest rate arrangements applying to NCDs. In its statement the Reserve Bank noted:

> "In order to remove undesirable distortions caused by changes in market interest rates, the Bank is proposing that the interest rate payable on NCDs be adjusted regularly so that the penalty element inherent in NCDs is kept constant.
>
> The Bank is planning that in future the interest rate on NCDs will be set monthly at 5 percentage points below the average yield at tender in the previous month on 13-week Treasury Notes. These arrangements will be monitored in consultation with the banks."

While the Reserve Bank's change to a floating rate of return on NCDs reduced the cost of carrying these deposits, their negative yield (given that the banks' cost of funds is slightly in excess of the Treasury Note yield, the banks lose in excess of 5 percentage points for every dollar invested in NCD) requires the banks to charge higher interest rates on loans to recoup this cost. Clearly, there is no advantage in keeping excess funds in NCD accounts.

Prime Assets

Banks are required to hold 3% of their Australian dollar denominated assets (less an adjustment for the level of a bank's shareholders' funds) in the form of prime assets.[6] Prime assets comprise notes and coin, deposits with the Reserve Bank (other than NCDs), secured loans to authorised dealers (secured by Commonwealth Government securities) and Commonwealth Government securities. In June 1997, the Reserve Bank announced that loans to authorised dealers would no longer be included as Prime Assets, but that securitie's issued by semi-government authorities would in future be classified as Prime Assets.

6. The ratio was lowered from 6% on 23 June 1997. The Prime Assets Ratio was introduced in May 1985 and at the time was set at 12%. It was subsequently reduced to 10% in January 1990 and to 6% the following May.

[323] Real Time Gross Settlement. Banks' liquid investment management strategies are primarily directed towards satisfying demands by customers for funds and the Reserve Bank's prudential liquidity requirements. The latter amounts to ensuring that banks' Exchange Settlement Account (ESA) with the Reserve Bank is in credit throughout any business day.

Each bank maintains an ESA with the Reserve Bank. The ESAs act as clearing accounts for bank transactions.

In 1987, Westpac, National Australia Bank, Commonwealth Bank, ANZ Bank, State Bank of New South Wales (subsequently the Colonial State Bank) and State Bank of Victoria (which subsequently merged with the Commonwealth Bank) jointly established BITS *(Bank Interchange and Transfer System).* BITS is a high value electronic payments system designed to handle transactions between member banks of $100,000 or more. BITS transactions can be effected for same day value and/or next day value.

BITS represented the first time that cheques could be cleared on a same day basis.

In April 1995 the Reserve Bank announced that it would move to introduce Real Time Gross Settlement (RTGS) for clearing inter bank transactions. Under the current system of "overnight settlement", each member bank of the payments system accumulates the various cheques and other payments during the day. However, it is not until the next day that banks which are in "deficit" have to settle their prior night's position with those that are in "surplus" in terms of the aggregate value of cheques and other payments presented.

From April 1998, banks will be required to settle transactions between themselves as they occur. The Reserve Bank will require banks to settle large payments (say over $1 million) amongst themselves as they are received, or in "real time". Such *high value payments*[7] will be fed electronically into the RTGS system and be immediately reflected in changes to a bank's Exchange Settlement Account.

[324] RTGS will require that banks clear any debits in their ESAs as they occur. Banks will be precluded from overdrawing on their ESA balance, but rather will be induced to hold surplus funds to act as a buffer from which they can draw instantly to make payments. From 12 July 1996 the Reserve Bank has paid interest on surplus funds lodged in bank

7. Refer [215] for more information on high value payments.

ESAs. Previously these funds earned no interest. The Bank has decided to pay interest on ESAs to induce banks to hold sufficient surplus funds in ESAs to meet customer demands for payment. The Bank pays a rate equivalent to 0.25 percentage points below the money market cash rate for balances in these accounts. The discount rate to market has been established to encourage banks to lend surplus funds back to the market so as to smooth liquidity flows between market participants. In effect, the Reserve Bank will attempt to limit the amount of surplus funds held in ESAs so that they do not unduly disturb liquidity within the financial system.

The Reserve Bank operates, as part of the Reserve Bank Information and Transfer System (RITS)[8] an electronic system for the real time management of exchange settlement balances. The Australian version of RTGS will utilise the infrastructure available within the RITS to effect transactions between banks' ESAs. All exchange settlement transfers are made in this system and the paying bank must have sufficient funds in its Exchange Settlement Account before a transfer is effected.

The Reserve Bank has noted that high value payments would be settled across Exchange Settlement Accounts as they are being made. The Bank has identified two types of high value payments:

- *Bank initiated payments.* In this instance the paying bank would initiate a transfer of funds from its Exchange Settlement Account in favour of the Exchange Settlement Account of the receiving bank. RITS will process the transaction provided the paying bank has sufficient funds in its ESA. If funds are insufficient, the payment instruction will be automatically queued until sufficient funds become available within the paying bank's ESA account.
- *Customer initiated payments.* Since the payments are not being initiated by an institution with a Reserve Bank ESA, the RITS system will first test whether the customer has sufficient credit limit available from its nominated bank to effect the transaction. If sufficient limit

8. RITS is the Reserve Bank's electronic securities settlement system, which allows members to settle electronically their transactions in Commonwealth Government securities. The system was introduced in 1992 and presently handles 98% of turnover in these securities conducted in the professional market. Other services provided by RITS include electronic tendering for Treasury bonds, notes and adjustable rate bonds, the automatic payment of interest and maturity proceeds in respect of securities held in the system. The RITS system provides access to banks' Exchange Settlement Accounts. The RITS system also has provision for simultaneous settlement of interbank obligations arising from the settlement of equity transactions on CHESS—the Australian Stock Exchange's electronic settlement facility.

exists, the RITS system next tests if the nominated paying bank has sufficient funds in its ESA account to effect payment. If both tests are successful, the payment will be processed. If either test fails, then the payment instruction will be queued.

[325] Queue management with RTGS. Payments instructions received within the RITS system will be effected under the First In First Out (FIFO) basis. Where a bank has insufficient funds in its ESA, the payment instruction will be moved to the back of the queue.

For corporate customers, banks will be able to define different priority ratings for either different forms of payment or different corporate customers. The Reserve Bank proposes to apply three different priority levels—"active", "pending" and "priority" . Assigning a "pending" status to a transaction would defer processing and the payment will only be effected once the status of the transaction was changed by the paying bank. An "active" status places the transaction in the queue, whilst a "priority" status will obviate the need for the system to test the customer's credit limit, requiring the paying bank only to have sufficient funds in the ESA to satisfy the payment instruction.

[326] Implications of RTGS for bank control of payments instructions. The implications for individual banks are quite profound and relate to how they will manage their intraday liquidity to (a) insure that they have sufficient funds to meet large claims from other banks as they are received and (b) minimise the level of surplus funds held in the Exchange Settlement Account. Banks will in time have to review their existing payment arrangements with corporate customers. They will most probably develop more comprehensive credit arrangements to minimise the impact of one off "surprise" payments which would place undue pressures on the banks' ability to meet those payments. These new credit arrangements may entail assigning different priority ratings within their own proprietary systems for various types of payments, such that the highest priority payments will be processed immediately by the bank and pass through RTGS as a "priority" payment, whilst others will have lower priority and may take a more leisurely payment route, utilising the "pending" instructions within RITS.

[327] Implications for bank liquidity management practices. RTGS will place substantial pressure on banks to ensure that their liquidity management processes are effective to the point that there are always sufficient funds available within their ESAs to meet payment demands. Because of the discount interest rate payed by the Reserve Bank on surplus ESA funds, banks will be keen to limit the level of funds held in

ESAs during the business day. If they haven't already done so, banks will have to develop computer models for estimating the:

- value and timing of regular and identifiable payments;
- frequency and extent to which individual highly valued corporate customers might utilise their "daylight overdraft" facility provided by the bank; and
- statistical probability of large payment requests being made upon the bank during a normal business day.

From this information, the banks will be able to determine the optimal level of surplus funds to be held in their ESA on any given business day and indeed at certain times during each day. The probability of large "surprise" payments will dictate the extent to which banks will resort to other liquidity support devices to supplement their own funding sources.

[328] If a bank has a substantial surplus balance in its ESA, it can invest in other "*same day*" *investments* in an effort to improve the yield on those funds. "Same day" investments are those investments which can be used to reduce or increase ESA balances within the day (intraday). Same day investments for banks include interbank loans, transactions with the Reserve Bank involving Commonwealth Government securities with maturities less than 12 months, repurchase arrangements with the Reserve Bank, rediscounting of Treasury Notes with the Reserve Bank and investments in Treasury Notes and Commonwealth Bond won at tender.

Interbank loans, as the name implies, are loans between banks. A bank with surplus funds in its ESA will often be prepared to lend to a bank with a debit balance, since it can at least achieve a return of around 0.25 percentage points above that which it would receive from the Reserve Bank by retaining the funds in its ESA. The funds are usually repayable within 24 hours although longer terms can be negotiated.

As part of its day to day liquidity management activities, the Reserve Bank undertakes *purchases and sales of short term Commonwealth Government securities* (those securities with terms to maturity of less than 12 months) with members of the RITS. Each business day at approximately 9.30 am the Reserve Bank publishes its estimate of the level of liquidity in the money market together with its dealing intention for the day over the electronic news services (Reuters, Telerate, etc). The dealing intention is expressed as one of three alternatives:

- an offer to buy Commonwealth Government securities and effect repurchase agreements;

- an offer to sell Commonwealth Government securities and effect reverse repurchase agreements; or
- a statement that the bank does not propose to deal on the day.

RITS counterparties are asked to submit their intentions to transact with Reserve Bank by 10.00 am, in an auctions system based on price. The Reserve Bank has full authority in deciding upon the aggregate volume of funds that will be transacted at these auctions. The bank generally responds by 10.15 am on the results of the auctions, although the names of successful bidders remain anonymous. On occasion the Reserve Bank may engage in a number of auctions during the day because of unanticipated changes in the banking system's liquidity during the day.

System liquidity transactions with the Reserve Bank for short term Commonwealth Government securities will be for tender amounts of at least $10 million (although the Bank may accept smaller amounts at its discretion).

The Reserve Bank will also enter into repurchase agreements of Commonwealth Government securities with RITS members.[9] *Repurchase agreements with the Reserve Bank* will generally be for amounts in excess of $50 million and for terms of up to 30 days. When the Reserve Bank is purchasing government securities on a buy back arrangement from RITS members it invariably is subject to credit risk against the counterparty. Moreover if, during the repurchase period, interest rates rise, the market value of the securities held decreases—further increasing the Reserve Bank's credit exposure. By holding Commonwealth Government securities as collateral, the Reserve Bank can sell these securities in the market if the counterparty fails to repay the funds. However, if interest rates rise, the Reserve Bank will be unable to recover the full value of its loan to that counterparty. In order to mitigate this risk, the Reserve Bank requires that counterparties *over-collateralise* their repurchase transactions with the Bank. In effect, the Reserve Bank requires that counterparties to a repurchase agreement (or "repo" as it is known in the market) where the Reserve Bank is a buyer provide a margin ratio of 102% of the consideration of the repurchase agreement. For example, if the Reserve Bank agrees to affect

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9. Repurchase arrangements involve the sale of securities to another party for an agreed term. At the end of the term the original party agrees to repurchase those securities at a pre-agreed price. Reverse repurchase arrangements involve the purchase of securities from another party and the sale back to that party at an agreed date and pre-arranged price.

a repo with RTTS member A for $100 million, counterparty A must provide securities with a market value of $102 million in consideration for the $100 million in same day funds provided by the Reserve Bank.

The Reserve Bank will repurchase Treasury Notes from holders—a process referred to as *rediscounting Treasury Notes.* However, there is often a very significant penalty interest charge associated with rediscounting. This penalty rediscount rate is determined by the Reserve Bank and is presently capped at a cost equivalent to the yield available on 7 day Treasury Notes.

The Reserve Bank has also indicated that it will be amenable to providing overnight repurchase arrangements in situations where unforeseen market pressures emerge towards the end of a business. This measure would be provided to avoid any market disruptions. The interest rate on such repurchase arrangements will be set at 0.25 percentage points above the prevailing cash rate and will only be available to institutions with ESAs after 4.30 pm when interbank dealing would ordinarily no longer be available.

The Reserve Bank has also indicated that it will provide within day repurchase agreements in Commonwealth Government securities with banks to support intraday liquidity needs. This facility will be provided free of charge (apart from the standard RITS transaction fee).

Prior to 9 August 1996 banks were able to effect repurchase agreements with "authorised dealers" in the short term money market to either generate or reduce their "same day" ESA balances. Prior to that date the Reserve Bank had licensed seven institutions classified by the Reserve Bank as "authorised dealers" to maintain ESAs with the Reserve Bank. Banks would either lend surplus "same day" funds or effect a repurchase arrangement with an authorised dealer to generate funds. The authorised dealers would in turn either lend surplus funds to the market either on a same day (in the case of banks) or overnight basis, or borrow from the Reserve Bank (available under a lender of last resort facility) or the banks. The reasons for retention of authorised dealers was largely historical. However, whilst ever the Reserve Bank paid no interest on ESAs the authorised dealers provided an avenue to generate returns on same day funds. The decision by the Reserve Bank to pay interest on RSAs effectively eliminated any reason for authorised dealers retaining any special status within the Australian financial system.

[329] RTGS and its impact on bank prime assets. Balances held in ESAs will be included in the calculation of a bank's Prime Assets ratio. The Reserve Bank has also indicated that banks will be able to use their

Prime Assets for intraday liquidity when RTGS is introduced. In such circumstances, banks will be required to ensure that they meet the minimum PAR at the end of any business day.

[330] Banks' liquidity management strategy. Banks usually plan their liquid investment strategy over a one or two week period in an attempt to maximise earnings. As such, they will project forward their Exchange Settlement position. However, it will not serve the banks' profit objectives to invest all of their funds with investments which have same day value since these often offer the lowest interest rates available. Accordingly, banks will invariably retain a portfolio of short dated investments which can also be "called" but which will not provide value until the next day (that is, have a next day funds effect). These "next day" investments include overnight loans to financial institutions (although some institutions might also have an ESA and therefore be able to provide "same day" funds if required), commercial bills, certificates of deposit, promissory notes, short dated semi-government securities, etc.

Banks can also raise very short dated deposits (again with a next day funds effect) to supplement liquidity.

Table 3.7 illustrates the type of planning process that may be involved in determining a bank's short term investment/funding strategy.

Table 3.7

Projected cheque clearances and liquidity cover for ABC Bank—$m

	Projected Opening ESA Position	*Known High Priority Cheque Drawings*	*Estimated End of Day ESA Balance*	*Other Same Day Funds Available*	*Cumulative Same Day Funds Position*	*Next Day Liquid Funds Available*
Opening Balance	60			100	160	100
Monday	60	-20	40	100	140	100
Tuesday	40	-40	0	100	100	100
Wednesday	0	-80	-80	100	20	100
Thursday	-80	30	-50	100	50	130
Friday	-50	20	-30	100	70	130

From the table it is clear that the bank's projected same day liquidity cover is comfortable until Wednesday, when it will only have aggregate same day funds of $20 million. However, the bank is able to "liquefy" other funds if need be on Tuesday to create same day funds for Wednesday. Thereafter, the bank is expecting positive high priority cheque clearances, which should refresh its ESA balances. Nonetheless, the bank will need to keep a weather eye on cheque clearances over the next few days and hope that new deposits will boost liquidity—otherwise it will need to raise short term deposits.

Whilst the information provided in Table 3.7 suggests that managing a bank's liquidity position is a simple matter, in reality this is far from the case. Apart from the vagaries of financial flows that affect the money base alluded to earlier, a bank's own customers will heavily influence its liquidity position. Depositors may withdraw funds (especially cheque and savings accounts) without any clear pattern, while loan drawdowns are also sometimes hard to predict.

Banks generally have sophisticated systems to identify large corporate loan drawdowns. However, it is much more difficult to identify the smaller and more numerous drawdowns effected by small business and households.

A further problem in managing liquidity arises from the overdraft system. An overdraft is a loan facility providing the borrower with the ability to redraw the full balance at the borrower's discretion. Similar facilities are being incorporated into housing loans, with an unused loan facility available to be drawn by borrowers to finance other approved activities, such as the purchase of shares, etc. Hence the banks have no control over such loan drawdowns and cannot predict their timing. This form of lending represents the biggest form of liquidity risk to banks.

When banks are facing a deficit in their forward same day funds position and have insufficient other free liquid assets to cover their exposure, they will be forced to raise deposits. In such a situation banks will either raise professional overnight deposits or issue certificates of deposit. These two sources of funds represent the only effective means of raising substantial funds at very short notice—less than a day, say. However, banks will only resort to raising overnight money and/or issuing certificates of deposit as a last resort as they are generally the most expensive form of deposit raising—especially in periods of tight liquidity when the yield curve might become inverse.

Deposit Raising Strategies

[331] Classification of deposits. To facilitate understanding of how banks develop deposit raising strategies it will be helpful to classify deposits into various types. In this book we identify six separate types—although in practice the separations are not clearly defined. These types include:

(a) professional vs retail deposits

(b) variable rate vs fixed rate deposits

(c) domestic vs overseas borrowings.

Retail vs Professional Deposits

[332] Historically banks have relied on their extensive branch networks to access funds from households at relatively cheap rates of interest. However, the proliferation of non-bank financial institutions and the increased sophistication of investors have both steadily increased the cost of retail funds and meant that the "retail depositor" has become more interest rate sensitive and will withdraw their funds from institutions offering uncompetitive rates of interest.

Table 3.8 provides a comparison of rates available to retail depositors compared with professional deposit rates. It is little wonder that banks and other financial institutions consider their retail bases strategically the most important facet of their operations to guard from other institutions.

The increased sophistication of the household investor has been highlighted by the rapid development of cash management trusts which, in mid 1997, had units on issue totalling in excess of $10,000 million and since 1989 had grown by 183%. As indicated in Table 3.8, the trusts offer near professional market rates of interest for what are generally considered retail funds (minimum balances are usually $1,000 and these funds are usually fully callable).

Table 3.8

Comparison of retail and professional deposit rates as at June 1997

	Retail %pa	*Professional %pa*
At call		
Money market	—	5.6
Bank accepted commercial bills	—	5.3-5.4
Transaction accounts at banks <$ 10,000	0.3	—

Table 3.8—*continued*

Cash management accounts at banks <$20,000	1.8	
Cash management trusts	5.0	
Fixed term deposits		
Commonwealth Government Securities 3-10 yrs		5.9-7.1
Bank fixed deposits 1-5 yrs	5.0-6.0	—
Finance companies 2-3 yrs	5.5-5.9	—

Source: Reserve Bank *Bulletin* Tables F1, F2 and F3.

Professional deposits, as the name implies, represent the most expensive source of funds for banks. As a result banks will resort to this form of finance only if entirely necessary to assist in funding a bank's lending programme.

Variable Rate vs Fixed Rate Deposits

[333] An essential ingredient in balance sheet management (see Chapter 6) is to decide on the proportion of deposits offered which have a fixed rate and those that have a floating rate.

Table 3.9

Cost of variable vs fixed rate deposits

Option 1—Raising $100 million in variable rate deposits

		Interest Rate	Interest Cost
			$>m
Existing balances	$ 1,000m	5.0%	50.0
New raising	100m	5.5%" (applies to *all* balances)	60.5
Weighted average rate on deposits	5.5%	Total cost	60.5

Table 3.9—*continued*

Option 2—Raising $100 million in fixed rate deposits

		Interest Rate	*Interest Cost* $m
Existing balances	$1,000m	5.0%	50.0
New raising	100m	10.5% (applies only to *new* balances)	10.5
Weighted average rate on deposits	5.5%	Total cost	60.5

In Option 1 the bank can offer 5.5% on new deposits if it wishes to keep the average interest cost at 5.5%. In contrast, in Option 2 the bank can offer up to 10.5% on new fixed rate deposits and still maintain the average cost of its deposits at 5.5%.

A significant proportion of bank deposits are raised on a variable rate basis. That is, the deposits are usually callable and the interest rate offered can be varied at the discretion of bank management. Savings investment and passbook accounts represented 18% of bank deposits in June 1997.

In contrast fixed deposits are lodged for a fixed term and at an agreed rate of interest. Fixed deposits represent the largest proportion (42%) of bank deposits. Fixed deposits offer banks' management greater flexibility in attracting new deposits without materially affecting the banks' interest costs. Table 3.10 illustrates the higher rate of interest that banks can offer on fixed rate deposits vis-a-vis variable rate deposits.

Because interest rate changes on variable rate deposits apply to *all* balances, banks must be wary of the effect of significant interest rate changes on their total interest costs. In contrast, banks are able to offer much higher rates to attract fixed deposits, since the rates will only apply to the new deposits raised and *not* to the entire deposit portfolio.

Whilst fixed deposits provide banks with greater flexibility in minimising their interest costs, they are also an important instrument for increasing the average maturity structure of a bank's deposit base. But as with all things, there is a cost.

In [319] the impact of liquidity on yields was discussed. Investors are usually reluctant to invest for long terms. Accordingly, banks generally offer a premium interest rate in an attempt to induce investors to part with their money for longer periods.

Domestic vs Overseas Borrowings

[334] In recent years the Australian banks have accessed overseas markets to both supplement domestic fund raisings and to fund their foreign currency lending operations of overseas branches and subsidiaries. At the end of June 1997 Australian banks had the equivalent of $A38 billion in loans and advances denominated in foreign currencies, recorded on their "Australian balance sheets". Concomitantly, Australian banks had deposits and other borrowings totalling $A77 billion, suggesting that part of the remaining borrowed funds were used for Australian dollar lending. It should be noted that the banks have substantial offshore assets and liabilities in addition to those assets and liabilities indicated on their "Australian balance sheets".

Over recent years Australian banks have borrowed funds overseas at very favourable rates of interest to fund their overseas assets. At the same time, the banks have been able to use some of these funds to supplement domestic funds raising. The banks can convert the foreign currency raising into Australian dollars by buying Australian dollars on foreign exchange markets or enter into currency swap agreements (whereby two parties agree to swap each other's currency commitments). These agreements usually involve the swapping of interest commitments. (Swaps are discussed in Chapters 5 and 6).

In recognition of the increased resort to offshore sources of finance by the Australian banks to assist in funding their Australian dollar lending programmes, the Reserve Bank announced on 31 October 1985 that it would extend the PAR arrangements to encompass liabilities denominated in foreign currency. Prior to this foreign currency liabilities on banks' Australian balance sheets were excluded from the PAR arrangements.

Banks will raise funds offshore to fund domestic operations where the absolute interest cost is cheaper after conversion to Australian dollars than raising the same volume of funds domestically.

[335] **Interest burden of PAR and NCDs.** Clearly the interest burden from holding assets in PAR and/or NCDs will depend on the interest rate differential between the NCD/PAR rate and the cost of funds, as well as the rate of interest earned on advances. However, we can write some simple break even equations to enable us to determine the required earning rate on advances to compensate us for holding NCD and PAR assets.

Table 3.10

Interest burden to banks of holding PAR & NCD assets

Banks must hold 1% of aggregate Australian dollar denominated (AUD) on balance sheet assets *less* their shareholders funds and favourable ESA balances in NCDs with the Reserve Bank. The interest rate on NCDs is set monthly at 5 percentage points below the average yield at tender in the previous month on 13 week Treasury Notes.

As a further requirement, banks must hold 3% of Australian dollar denominated balance sheet assets *less* their shareholders funds as Prime Assets.

Hence for every \$100 of total AUD assets, banks must hold at least \$1 in NCDs and \$3 as PAR assets.

(a) *Interest cost of NCD alone*

(i) Assuming — \$100 in deposits raised
— deposit interest rate costs of 5.5%
— earning rate on advances of 5.5%
— earning rate on NCD funds of 0.0%

$$\text{Loss on funds invested} = \text{Earnings on advances} + \text{Earnings on NCDs} - \text{Cost of deposits}$$
$$= \$99 \times 0.055 + \$1 \times 0.0 - \$100 \times 0.055$$
$$= \underline{-\$0.05}$$

(ii) Assuming — \$100 in deposits raised
— deposit interest rate costs of 10.0%
— earning rate on advances of 10.0%
— earning rate on NCD funds of 5.0%

$$= \$99 \times 0.10 + \$1 \times 0.5 - \$100 \times 0.10$$
$$= \underline{-\$0.05}$$

(b) *Interest cost of PAR alone*

Assuming — Australian dollar denominated assets total \$100
— no shareholders' funds
— interest rate on funds employed of 5.5%
— earning rate on advances of 5.5%
— earning rate on PAR funds of 4.5%

Table 3.10—*continued*

$$\begin{matrix}\text{Loss on funds} \\ \text{invested}\end{matrix} = \begin{matrix}\text{Earnings on} \\ \text{advances}\end{matrix} + \begin{matrix}\text{Earnings on} \\ \text{PAR assets}\end{matrix} - \begin{matrix}\text{Cost of funds} \\ \text{employed}\end{matrix}$$

$$= \$97 \times 0.055 + \$3 \times 0.045 - \$100 \times 0.055$$

$$= \underline{-\$0.03}$$

(c) *Interest cost of PAR & NCD*

Assuming — Australian dollar denominated assets total \$100
— no shareholders' funds
— interest rate on funds employed of 5.5%
— earning rate on advances of 5.5%
— earning rate on PAR funds of 4.5%
— earning rate on NCD funds of 0.0%

$$\begin{matrix}\text{Loss on funds} \\ \text{invested}\end{matrix} = \begin{matrix}\text{Earnings on} \\ \text{advances}\end{matrix} + \begin{matrix}\text{Earnings on} \\ \text{PAR assets}\end{matrix} - \begin{matrix}\text{Earnings on} \\ \text{NCDs}\end{matrix} - \begin{matrix}\text{Cost of funds} \\ \text{employed}\end{matrix}$$

$$= \$96 \times 0.055 + \$3 \times 0.045 + \$1 \times 0.00 - \$100 \times 0.055$$

$$= \underline{-\$0.09}$$

The equation for NCD deposits alone can be written as:

$$\text{Adv} \times 0.99 + \text{NCD} \times 0.01 = \text{D} \tag{3.26}$$

where

Adv — the required earning rate on advances
NCD — the rate paid on NCD funds
D — the deposit rate.

Rewriting (3.26) we get

$$\text{Adv} = \frac{\text{D} - \text{NCD} \times 0.01}{0.99} \tag{3.27}$$

which is the break even formula for determining the required advances/lending rate to compensate the bank for holding NCDs.

Similarly we can derive a break even formula for holding NCD and PAR assets. Ignoring capital adequacy criteria a bank's loan product will break even if:

$$\text{Cost of funds} = \begin{matrix}\text{Earnings on} \\ \text{advances}\end{matrix} + \begin{matrix}\text{Earnings on} \\ \text{PAR assets}\end{matrix} + \begin{matrix}\text{Earnings on} \\ \text{NCDs}\end{matrix}$$

Table 3.10—*continued*

or

$$r_D \times D = r_A \times A + r_{PAR} \times PAR + r_{NCD} \times NCD \qquad (3.28)$$

where:

D	—	deposits held to fund assets, PAR and NCD
A	—	advances
PAR	—	holdings of PAR assets required
NCD	—	holdings of NCD assets required
r_D	—	rate paid on deposits
r_A	—	rate charged on assets
r_{PAR}	—	rate earned on PAR assets
r_{NCD}	—	rate earned on NCD assets.

Since D $= A + PAR + NCD$

and NCD $= 0.01 \times D$

and PAR $= 0.03 \times D$

then simplifying, we get:

$$r_D = 0.96 \times r_A + 0.03 \times r_{PAR} + 0.01 \times r_{NCD} \qquad (3.29)$$

re-writing to derive the break even earnings rate required on our assets we get:

$$r_A = \frac{r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD}}{0.96} \qquad (3.30)$$

Those on balance sheet assets not funded by deposits, such as bankers' acceptances are still subject to PAR and NCD requirements. In this case the bank will only need to raise sufficient deposits to purchase PAR and NCD assets.

Accordingly, for every \$100 of non-cash funded assets, \$4.17 of deposits will need to be raised to finance purchases of PAR and NCD assets and conform with the minimum ratios. Therefore, for non-funded assets:

$$\text{Total net return} = 0.96 \times \text{Return on non cash funded assets} - 0.04 \times (\text{Cost of Deposits} - \text{Return on PAR \& NCD assets})$$

Table 3.10—*continued*

If we wish to derive the break even return required on non cash funded lines, we set the total net return equal to 0. Then:

$$\text{Return on non cash funded assets} = \frac{0.04 \times (\text{Cost of Deposits} - \text{Return on PAR \& NCD assets})}{0.96} \tag{3.31}$$

Thus, for non cash funded assets, equation 3.30 reduces to :

$$r_A = \frac{0.04 \times (r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD})}{0.96} \tag{3.32}$$

This is a close approximation since the actual result is only achieved through iteration.

[336] Conclusion. It is clear from the preceding discussion that the development of liquidity management strategies involve much more than simply decisions to raise deposits. Liquidity needs, domestic relative to offshore marketing conditions, the need to ensure that retail funds are retained as far as possible and projected funding costs are but a few of the issues which a bank's management must consider in developing its liquidity management strategies.

4

Bank Capital

[401] Introduction. This chapter examines the thorny question of what constitutes the appropriate level of capital for ensuring the sound operation of a bank. The importance of stability in banking operations is not merely to protect the capital contributed by the bank's shareholders but to ensure the safety of deposits and thus maintain public confidence in the banking system.

Maintenance of public confidence is of paramount importance as the banks operate the most economically efficient method of ensuring payment for goods and services. From a social viewpoint, the stability of the banking system and thus the payment system is desirable. However, if all banks are protected from default then market forces cannot be expected to eliminate inefficient banks. Accordingly, to ensure a socially optimal allocation of resources, prudential authorities must control and attempt to limit, as far as possible, bank defaults or, in the case of defaults, ensure procedures exist to allow banks to leave the industry in an orderly fashion.

Traditionally, it has been held that the higher the proportion of total assets funded by capital the more stable a bank is considered. However, efficient use of financial leverage, that is, borrowing at a cheaper rate than lending, can substantially increase shareholders' return on equity in the short term. The need to delicately trade off profitability and stability has led to both shareholders and regulatory authorities paying particular attention to bank capital as the basis for ensuring the financial viability of the banking system.

Functions of Bank Capital

[402] Before examining what constitutes bank capital it is first necessary to understand what the functions of capital are in a banking environment.

General consensus is that bank capital has three major functions, namely:

- the provision of funds for the development and expansion of the bank's infrastructure;
- to provide a buffer against unexpected losses so as to protect depositors' balances; and
- as a contributor to a bank's profitability.

[403] Infrastructure financing. Unlike the situation that exists with manufacturing enterprises, it is generally agreed that a bank's infrastructure (that is, fixed assets, investments in subsidiaries and establishment costs) should be financed entirely from capital. These are long term commitments of the bank that do not necessarily provide a cash flow to repay their financing source. Thus, depositors' funds should not be used to fund these assets. By funding infrastructure from capital, shareholders and banks' managements can demonstrate to creditors their commitment to the ongoing operations of the bank, as well as removing the liquidity risk[1] associated with funding these assets from creditor financing.

[404] Protection of depositors' balances. Capital provides a firm's creditors with a buffer against the possibility of loss from organisational default. Such losses can arise from either unexpected losses from sale of fixed assets, customer default and/or unprofitable trading.

In a banking environment, the availability of a strong capital base to absorb losses is of paramount importance. It ensures that, should a bank sustain losses, it can continue operating while it corrects this position and at the same time maintain depositor confidence.

Banks generally raise short term deposits which they on-lend for longer periods (referred to as maturity transformation). In order to maintain these illiquid loan portfolios, banks must be capable of continually accessing short term funding. Depositors are unwilling to provide such funding if they consider a bank's capital an insufficient buffer against possible losses. That is, depositors will not lend to banks if they consider that there is a reasonable risk of them losing their deposit.

Thus, in order to ensure on-going operations, a bank's capital base must be capable of satisfying depositors' concerns that a sufficient cushion of capital protects their funds from loss.

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1. The concept of liquidity risk is discussed in [424].

[405] Contribution to bank profitability. The greater a bank's capital base, the more resources it has available "free" of fixed financing costs (although there will, admittedly, be a significant serving charge in the form of dividend payments) and the greater the likelihood of it being more profitable. While many other factors affect a bank's profitability, the size of the capital base supports, to some extent, a certain profit level for the bank.

[406] Balance sheet items that can be classified as capital. From our previous analysis we can observe that bank capital must possess the following characteristics:

(a) represent a permanent and unrestricted commitment of funds;

(b) provide a cushion for loss absorption; and

(c) refrain from imposing unavoidable charges against earnings.

In keeping with these characteristics the following items are generally regarded as part of a bank's capital base.

Definition of Bank Capital[2]

[407] While ideally each element of a bank's capital base should contain the three characteristics referred to in [406], there are some "quasi" equity instruments which possess some but not all of these characteristics. Such instruments do help to reduce the overall risk of a bank and accordingly, prudential supervisors have recognised a two tier structure in defining bank capital. Within the second tier of capital there is a further stratification.

Tier 1—Core Capital

[408] These items contain all the characteristics of capital referred to in [406] and are:

[409] Ordinary shares. This is the primary source of capital in that it represents shareholders' most permanent commitment to the bank. Under corporations law, shareholders cannot reduce the amount of ordinary share capital without the permission of depositors and other creditors.

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2. This section is largely based on the definition of bank capital which appeared in the August 1988 explanatory memorandum issued by the Reserve Bank entitled "Capital Adequacy of Banks".

Ordinary shares can be split between *called* and *uncalled* capital, the latter not fully meeting our requirements for bank capital. While the bank has a legal right to seek uncalled capital from shareholders, it does not provide a funding base for the bank until called. Accordingly, only paid up ordinary shares (that is, called capital) qualifies as bank capital.

When share issues are made, a premium over the par value of a share is often charged. This premium usually reflects the difference between the market price of a share and the nominal par value of the share. Where such premiums cannot be repaid to shareholders they are included within core capital. While Australian company law does not permit cash distribution of share premiums it is possible that internationally such a possibility may exist.

[410] Non-cumulative preference shares. Depending upon the characteristics of the preference shares on issue they may approximate either capital or debt.

For the issue to be considered core capital it must be irredeemable and dividends must be non-cumulative. If these conditions are not met then the issue fails to satisfy the characteristics of capital (permanency, cushion for losses and no fixed servicing obligation).

[411] Retained earnings. As this category represents the company profits reinvested by shareholders, it is of the same nature as paid up ordinary share capital, although, unlike ordinary share capital, shareholders can withdraw these funds by way of dividends (at their own discretion). In practice, however, wholesale withdrawal in this manner does not occur.

[412] General reserves. These reserves are merely an allocation of retained earnings under specified headings. As they usually do not result in an outflow of funds from the bank, they fulfill capital requirements in the same manner as retained earnings. Reserves created from asset revaluation are the only exception to this rule. As the underlying profits on which these reserves are created have not been realised, they fail to meet the permanency requirements of core capital.

[413] Minority interests in subsidiaries. Bank operations can be supported by the capital of minority interests in the same way ordinary shares support operations. For this reason, the Reserve Bank includes this item in the capital base. However, as the capital of minority shareholders relates specifically to the subsidiary in which it is invested, it is not available to support losses elsewhere.

Tier 2—Supplementary Capital

[414] While the foregoing items fulfill *all* the characteristics of capital there may be other elements in a bank's liability structure that possess some of the characteristics and which therefore improve the financial stability of the bank. Prudential regulators refer to these items collectively as supplementary capital. The items recognised by the Reserve Bank of Australia as being supplementary capital are:

[415] Mandatory convertible notes. Convertible notes usually begin as a debt instrument but at some future point convert into ordinary shares, usually subject to pre-determined conditions. They are only considered capital, for bank purposes, if conversion of the debt to equity is *mandatory.* Where the option to convert is at the holder's discretion the issue is considered to be debt.

Such mandatory convertible notes are considered supplementary as the bank still retains a fixed servicing commitment prior to conversion.

[416] Asset revaluation reserves. Common accounting practice is to recognise increases in shareholders' capital that arise from regular revaluations of assets (net of any tax liability associated with such revaluation). Regular revaluations are employed to more evenly report company profit performance rather than lumping profit recognition only into the period in which asset capital gain is realised. The uncertainty of such capital gain increments to a bank's capital base throw doubts on its permanency and indicates why the Reserve Bank considers it supplementary capital.

[417] General provisions for doubtful debts. Provisions, generally, represent a future payment that must be met. Earnings set aside in this manner do not represent a permanent commitment of funds and accordingly are not considered capital.

The general provision for doubtful debts is essentially a setting aside of profits to cover future unidentified losses. As such, it partially fulfills the characteristics of capital by being freely available to absorb losses without imposing a fixed servicing obligation.

This differs from the treatment of the specific provision for bad and doubtful debts. In this latter case there is a setting aside of retained earning to meet a specific loss. As specific provisions do not provide a cushion to meet future unidentified losses they do not qualify as bank capital.

[418] Cumulative preference shares. All preference shares provide a cushion to absorb unexpected losses due to their ranking behind creditors/depositors in the event of liquidation. Where preference shares require dividends to be cumulative, when they cannot be paid due to poor profit performance, they place a fixed servicing obligation on the bank and therefore cannot be included in core capital. However, where they are irredeemable preference shares, they do provide a permanent source of funding with which to meet unexpected losses. This position of permanency can be removed if the preference share issue is redeemable.

Thus, cumulative preference shares exhibit some of the characteristics of capital and are rightly considered supplementary in nature. The strength of this support is increased where the issue is non-redeemable at the holder's option thus adding the permanency dimension.

[419] Subordinated debt. Subordinated debt refers to debt which ranks behind all other creditors of the bank. Should a bank default occur, all other creditors would be ranked above subordinated debt for repayment of funds, but subordinated debt would still rank above shareholders' equity. Accordingly, subordinated debt does provide a pool of funds from which to absorb unexpected losses, thus protecting general creditors.

During the 1980s, banks, particularly American banks, discovered an investor market for subordinated debt issues. In the early 1990s, the introduction of new international capital requirements has seen the Japanese banks also turn to this form of supplementary capital. Such issues prove extremely attractive to banks as they are included, to some degree, within their capital base, diversify their funding sources and provide tax advantages associated with the deductibility of interest payments.

Provided such debt issues are subordinated to the claims of depositors and allow servicing obligations to be deferred, it qualifies as capital. Of course, the fact that such issues still impose an unavoidable charge against earnings results in subordinated debt only qualifying as Tier 2 capital.

A further differentiation can be made between subordinated debt which has a fixed term and that which is perpetual. Perpetual subordinated debt even more closely approximates Tier 1 capital as it also represents a permanent and unrestricted commitment of funds.

[420] The preceding comments illustrate the manner in which the Reserve Bank separates what it considers to be capital into two tiers, as summarised in Table 4.1.

Table 4.1

Characteristics of bank capital

	Capital Characteristics		
	Permanency	*Cushion for losses*	*No fixed servicing charge*
Tier 1—Core capital			
Ordinary Shares—including non-repayable share premium	xxx	xxx	xxx
Non-cumulative preference shares	xxx	xxx	xxx
Retained earnings	xxx	xxx	xxx
General reserves—excluding asset revaluation reserves	xxx	xxx	xxx
Minority interests in subsidiaries	xxx	xxx	xxx
Tier 2—Supplementary capital			
Upper Tier 2			
Mandatory convertible notes	xxx	xxx	
Asset revaluation reserves		xxx	xxx
General provision for doubtful debts		xxx	xxx
Cumulative preference shares—non-redeemable	xxx	xxx	
Subordinated debt—perpetual	xxx	xxx	
Lower Tier 2			
Cumulative preference shares—redeemable		xxx	
Subordinated debt—fixed term		xxx	

This table identifies the elements that combine to form capital. For a discussion of the most appropriate manner of planning capital raisings, see [444].

Types of Bank Risk

[421] In [402] the three major functions of bank capital are identified as funding infrastructure, contributing to profitability and acting as a buffer to absorb unexpected losses. While the amount of capital required for the first two of the functions is easily determined, the uncertainty of the third function makes it difficult to assess the appropriate amount of capital required.

In attempting to quantify the amount of capital required to act as a buffer against unexpected losses, it is necessary to realise that such losses arise from banks undertaking a variety of risks. Before making such an attempt, we need to be aware of these risks.

There are several sources of bank risk and there are many different ways of classifying these risks. The following six categories are based principally on the work by Votja.[3]

[422] Credit risk. Credit risk relates to the possibility of default, or delay in receiving payments arising from insolvency. It is acknowledged that a certain proportion of loan portfolios will inevitably result in normal losses. However, credit risk in this context relates to unexpected losses above these normal losses. Of course, drawing the line between expected and unexpected losses can be quite difficult.

In considering what level of credit risk is associated with a bank's balance sheet, consideration of the type of assets as well as the concentration of exposure to individual clients and industries is important. Some regulatory bodies and bank managements limit such exposure to a certain percentage of the bank's capital base.

[423] Investment risk (also known as market risk). Investment risk refers to the possibility of losses arising from a drop in either value or income flow not due to default or delay by the payer. The most obvious example of this form of risk relates to any mismatch position the bank may have, whether it be either an interest rate or a foreign exchange position. Such mismatch positions, under various interest and exchange rate scenarios, result in operating losses of either a capital or revenue nature.

In a capital adequacy context, it is again difficult to draw the line between where the risk of such losses crosses the line between normal and unexpected losses. However, the greater this mismatch the higher the possibility of profit or loss from movements in interest and exchange rates and, hence, the greater the need for capital as a buffer for creditors.

[424] Liquidity risk. Liquidity risk refers to the probability of losses arising from either the need to pay penalty interest rates on raising short term deposits or incurring penalty costs on asset sales required to meet short term liquidity problems.

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3. George J Vojta, Bank Capital Adequacy, First National City Bank, New York, 1973.

Liquidity risk has always received a high profile from bank managements as this risk is dealt with on a day-to-day basis. Supervising bodies have tended to control these risks through the use of minimum liquidity holding requirements and the effective management of monetary policy in general.

[425] Operating risk. Operating risk relates to the possibility of unexpected losses arising from errors and inefficiencies of bank staff and management. An important function of bank management is to establish appropriate internal financial controls to prevent such losses.

In assessing this risk for a particular bank we are, to a large degree, assessing the quality of management.

[426] Fraud. The risk of internal dishonesty, fraud and forgery as well as exposure to external burglary are well known in a banking environment. A basic tenet of auditing is that the easier the asset resale the tighter the internal control system needs to be to avoid fraud. As money (cash and bank balances) is the easiest asset to resell, the likelihood of fraud increases substantially. In recent years, this risk of fraud has accelerated as computer fraud has highlighted that large amounts of money can be criminally obtained through minor adjustments to the complex, technical computer programs required to efficiently operate banks.

[427] Fiduciary risk. Fiduciary risk refers to the possibility of losses arising from underwriting commitments, provision of letter of credit facilities, bill endorsements and other contingent liabilities. In many cases, the risks associated with the provision of some contingent liabilities are identical with those undertaken in items reflected on the balance sheet.

The rapid growth in the proportion of overall bank risk arising from this category relates to the fact that providing financial assistance "off balance sheet", until 1989, was attractive to banks as it increased their return on assets and was not reflected within prudential requirements. While the prudential authorities now include such risks within their requirements, this category of risk taking still remains popular as income so derived serves to increase reported return on assets. The relative size of these off balance sheet risks can be seen by the proportion of total bank commitments they now represent. This is illustrated in the comparison of on and off balance assets for Australian banks shown on Table 4.2.

Table 4.2

Off balance sheet commitments to total assets as at 30 September 1997

Australia Bank	*Total Assets*	*Total off balance sheet commitments*	*Percentage of total assets*	*Risk adjusted assets*	*Risk adjusted off balance sheet commitments*	*Percentage of risk adjusted assets*
	(AUDbn)	*(AUDbn)*	*(%)*	*(AUDbn)*	*(AUDbn)*	*(%)*
ANZ	138.2	39.3	28.4	106.2	13.5	12.7
CBA	120.1	25.6	21.3	86.5	9.7	11.2
NAB	202.0	46.9	23.2	154.3	16.7	10.8
Westpac	119.0	30.3	25.5	87.1	11.2	12.9

* Source Annual Reports (balance sheet date 30 September 1997 for all Australian banks except the Commonwealth Bank which is as at 30 June 1997).

Capital Adequacy and Prudential Supervision

[428] Capital ratios. Now that we have considered what constitutes bank capital and the demands and risks it is intended to cover, we can turn to the question of how much capital does a bank need.

As mentioned in [401], there is a direct relationship between investors' perceptions of a bank's strength and the bank's capital base. This has led to the use of capital ratios which compare capital to some balance sheet measure. There have been only a few capital ratios that have been widely applied. These are:

(a) *The ratio of capital to total assets (gearing ratio)*: This ratio can be calculated either by dividing capital by total assets or vice versa. With either method, the intent is to recognise that the main source of unexpected losses for a bank is its asset portfolio. Therefore, capital, as a cushion against unexpected losses, should be related to the size of the bank's assets.

(b) *The free reserve ratio*: This ratio is a variation on the gearing ratio as it subtracts from the capital base investments in fixed assets and subsidiaries (either capital or subordinated debt) and then compares this "free reserve" figure to total assets. The rationale behind this approach is that capital which funds these infrastructure items is not available to meet unexpected losses, as liquidation of these assets could force the closure of the bank.

(c) *The ratio of capital to risk adjusted assets*: Not all bank assets have the same risk characteristics. For example, there is far greater risk of unexpected losses arising from a portfolio of corporate loans than there is from a portfolio of government securities. Accordingly, this ratio attempts to relate the risk associated with the bank's differing asset portfolios to its ability to absorb unexpected losses, that is, its capital. The problem with the use of a risk adjusted asset ratio lies in deciding what weighting should be given to each risk category and whether these weightings should alter over time.

Free reserves are also important as they represent a source of funds that do not result in a charge against the bank's revenues. Accordingly, free reserves support a bank's profitability although total profitability relates to overall efficiency.

While capital provides a security buffer, it must be remembered that the bank's first line of defense against unexpected losses is its profits. Thus, the free reserve ratio also provides an indication of the firm's ability to meet unexpected losses through current profits.

Table 4.3 provides a worked example of the various ratios described earlier.

Table 4.3

Example of capital ratio calculations

Consolidated balance sheet of ABC Bank Limited

CAPITAL		ASSETS	
Ordinary Shares	20	Cash	3
Retained Earnings	30	Treasury Notes	20
	50	Australian Government securities (maturing greater than one year)	50
Subordinated Debt*	30	Semi-Government securities	10
		Local Government securities	10
		Non Callable Deposits (NCD)	7
		Commercial Loans maturing:	
LIABILITIES		—less than one year	200
		—greater than one year	250
Australian dollar deposits repayable in Australia	700	Housing Loans	220
Other Creditors	5	Bills Receivable	200
Doubtful Debt Provision	8	Premises	10
Doubtful Debt Provision	7	Goodwill	10
Bills Payable	200	Other Assets+	10
TOTAL LIABILITIES	1,000	TOTAL ASSETS	1,000

* ABC Bank issued ten year subordinated debt which currently has three years to maturity.

\+ Although this is an example of a consolidated balance sheet we will, in order to calculate the free reserve ratio, assume that included in other assets is an item "Investment in Subsidiaries" with a value of 7.

OFF BALANCE SHEET ITEMS	
Standby Letters of Credit	50
Asset Repurchase Agreements	30

Table 4.3—*continued*

Commitments to provide financial facilities to corporates (maturing in four years) secured by a deposit held at another bank	100
6 month forward foreign exchange contract with a corporate	50
4 year fixed/floating domestic interest rate swap with an Australian bank	100

$$\text{TOTAL ASSET RATIO} = \frac{\text{CAPITAL}}{\text{TOTAL ASSETS}} = \frac{50}{1{,}000} = 5\% \text{ OR } 20:1$$

$$\text{RISK ADJUSTED ASSETS RATIO} = \frac{\text{CAPITAL} - \text{GOODWILL}}{\text{RISK ADJUSTED ASSETS}^{*}}$$

* NB: As Goodwill is deducted from Capital it is not included in Risk Adjusted Assets.

Risk weightings —	Cash, NCD and Government/Semi and Local Government securities	0.00
—	Housing loans	0.50
—	Commercial loans maturing within 1 year	0.75
—	Commercial loans maturing more than 1 year	1.00
—	Bills receivable	1.00
—	Premises and other assets	1.00

$$\text{RISK ADJUSTED ASSETS (ie Assets} \times \text{Weighting Factor)} = 730$$

$$\text{RISK ADJUSTED ASSET RATIO} = \frac{50 - 10}{730} = 5.48\% \text{ or } 18.25:1$$

$$\text{FREE RESERVE RATIO} = \frac{\text{CAPITAL} - \text{PREMISES} - \text{INVESTMENT IN SUBS} - \text{GOODWILL}}{\text{TOTAL ASSETS}}$$

$$= \frac{50 - 10 - 7 - 10}{1{,}000}$$

$$= 2.3\% \text{ OR } 43.5:1$$

[429] History of capital ratios. The, generally assessed, appropriate level of bank capital has varied considerably over time. Initial considerations around the 1920s to 30s centred on the relationship between bank capital and depositors' balances. By the late 1930s, the

Federal Deposit Insurance Corporation (USA) had expanded this to consider the ratio of bank capital to total assets. This reflected the fact that risk of unexpected losses springs principally from the asset side of the balance sheet.

Throughout the 1950s and into the 1960s the Board of Governors of the United States Federal Reserve refined this approach by examining the adequacy of capital in relation to the size of the risk adjusted asset base. Risk adjusted assets were computed as total assets less a series of assets considered relatively riskless. This concept was further refined in a position paper by the Bank of England[4] which attempted to weight all bank assets by risk factors, comparing capital to total risk weighted assets.

The late 70s and early 80s saw regulatory bodies tend to de-emphasise ratio analysis as the sole method for evaluating capital adequacy. Instead, these ratios were combined with a general evaluation of the quality of management, liquidity of assets, earnings history, dividend policy, quality and character of ownership, occupancy expenses, potential volatility of the bank's deposit structure, the quality of operating procedures, the capacity to satisfy financial needs of the bank's trade operations, exposure to individual clients and the competitive nature of the environment in which the bank operates.

The need to consider these diverse factors can be seen from Table 4.4 which identifies the cause of some major international bank failures.

[430] The Basle Committee. The 1980s was a period of globalisation of financial markets as floating exchange rates became widespread, sovereign banking requirements were deregulated and investment managers shifted their portfolios freely around the globe as opportunities arose.

This globalisation process saw increased competitiveness as large international banks were placed against one another resulting in a general lowering of fees/rates charged for banking facilities. The squeeze on banking margins together with a host of US banking failures, and the emergence of large bad debt exposures to third world countries brought the spotlight of prudential supervision back to the adequacy of bank capital.

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4. Bank of England, "The Management of Capital", Bank of England Quarterly Bulletin: September 1980.

Table 4.4

Major bank failures

Bank	**Cause of failure**	**Result**
Banco Ambrosiano Holdings *Luxembourg (1982)*	Large loans to companies buying shares in Italian parent Banco Ambrosiano	Bank closed. Basle concordat revised to deal with bank holding companies registered outside country of operation
Bank Bumiputra Malaysia *Malaysia (1985 & 1989)*	Large loan-losses in Hong Kong (1985) and Malaysia (1989)	Rescued by majority shareholder Petronas, the state-owned oil company, which later sold bank to government
Bank of New England *US (1991)*	Over-lending to construction and real estate	Deposit run halted by take-over by Federal Deposit Insurance Corporation which later sold the bank to Fleet/Norstar
Bank of New Zealand	Heavy loan-losses	Government-sponsored rescue
Barings Group *UK (1995)*	*Heavy losses on Japanese bond and equity futures*	*Administrators appointed. The group's banking network was on-sold to another bank*
Canadian Commercial Bank *Canada (1985)*	Over lending to Alberta oil industry	Bank closed
Christiania Bank *Norway (1991)*	Loan-losses throughout Norwegian economy after mid-1980s fall in oil prices. Den Norske, Fokus and other banks also hit	Extra liquidity injected into all three banks by state and commercial banks' guarantee and funds

Table 4.4—*continued*

Bank	Cause of failure	Result
Continental Illinois *US (1984)*	Excessive lending to Penn Square Bank and other small banks overdependent on troubled oil and real-estate sectors. Bank's own funding over-dependent on wholesale and interbank markets	Bank rescued by Federal corporation—shareholders and directors, but not depositors, penalised
Johnson Matthey Bankers *UK (1984)*	Excessively large loans to two doubtful customers. Bank supervisor over-reliant on trust and co-operation of bank management	Bank rescued—shareholders and directors, but not depositors, penalised. New bank supervision law. New supervisor-auditor relationship. UK deposit insurance limit raised to £20,000.

Sources: The Banker, October 1991 and *RBA Bulletin,* November 1995—Implications of the Barings Collapse for Bank Supervisors.

During the second half of the 1980s the Basle Committee on Banking Regulations and Supervisory Practices[5] was formed with a view to increasing the stability of the international banking system through the strengthening of international bank capital resources. It considered the most appropriate method of achieving this goal was to achieve international convergence in supervisory regulations concerning the measuring of banks' capital adequacy and the establishment of minimum capital levels for banks. This approach had the added benefit of removing competitive inequalities that had arisen in international capital adequacy standards being applied in different national supervisory regimes.

The Committee proposed a common framework of capital adequacy based on a risk adjusted assets measurement requiring an 8% minimum

5. The Committee consisted of representatives of central banks and supervisory authorities of the Group of Ten countries (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom and United States).

level of capital. This 8% capital level is designed only to address the credit risk of a bank's asset portfolio. As we saw in [422]-[427], credit risk is but one of the risks associated with operating a bank.

In proposing this approach, the Committee recognised that not all banks would automatically meet these new requirements and accordingly set a five year transitional period by which date the framework and standards should be fully met by all banks. The transitional period ended on 1 January 1993 for all banks except the Japanese banks that had until their balance sheet date (31 March 1993) to conform to the new standards.

While the proposal to apply a risk adjusted asset approach was not new, two features differentiated the Committee's proposal from previous proposals of these types. These were:

1. *International application*: The Basle Committee represented the first real attempt to gather prudential authorities from around the world and derive an international standard. The internationalisation of financial markets and the consensus approach adopted by the Committee provided the basis on which the international acceptance of their recommendations was achieved. As previously mentioned, this not only had implications for the stability of the international monetary system but also served to provide a "level playing field" for banks from all countries competing in what had rapidly become a global market.

2. *Inclusion of off balance sheet risks*: While the growth of off balance sheet fiduciary risks increased during the 1980s, the Basle Committee was the first major international attempt to include such risks within quantitative guidelines.

[431] The Basle Committee and market risk. In January 1996, the Basle Committee on banking supervision published a paper entitled "Amendment to the Capital Accord to Incorporate Market Risk" which sought to establish a global framework for assessing the appropriate amount of capital a bank should require given its personal market risk profile. In line with Vojta's definition of investment risk [423], the Committee considered market risk to be the risk of losses arising in on and off balance sheet positions as. a result of movements in market prices. Accordingly, market risk addresses both the risks in trading books of equities and interest rate related instruments, as well as foreign exchange and commodities risk within a bank.

While the Basle Committee had, for some time, been working towards an appropriate measure for market risk, its proclamation was likely to have been expedited by the appointment, at the end of February 1995, of administrators to the Barings Group. Not only was this a glaring case of a bank undertaking a level of market risk inappropriate in relation to its earnings and capital base but it also highlighted how quickly such large unrecognised positions could bring about such crippling losses.

In the Barings case, a lack of adequate internal controls permitted the manager of their Singapore futures subsidiary to generate unrecognised positions of an extremely large magnitude. By early February 1995, while the positions existed but had not been properly reported to management, unrealised losses were running at around £185m compared to the Barings Group's pre-tax published profit for 1994 of £102m (which had not recognised the Singapore subsidiary's unrealised losses). Within two weeks, the unauthorised exposures in the Singapore subsidiary to

- the Japanese equity "Nikkei" futures (long or bought positions);
- Nikkei exchange traded options (short or sold volatility positions); and
- Japanese Government Bond "JGB" futures (short or sold positions)

increased these losses by a further £740m.

This highlighted the need for banks to have established adequate systems for the identification, measurement and management of such open exposures. Further, it highlighted the need for the bank's board and management to actively be involved, effectively on a day-to-day basis, in the establishment, maintenance and operation of such control devices. Finally, it also strongly reinforced the need for the separation of the reporting lines of the front office (dealing) and the back office (transaction and processing reporting). For without such separation, the integrity of the transaction data and management systems can be easily corrupted.

The most sobering feature of this to bank boards throughout the world was the speed (two weeks) in which losses from these unauthorised exposures went from representing a major setback to the bank to bringing the bank down.

The variety and diversity of market risk has meant that the guidelines issued by the Basle Committee offer greater scope for variation, when calculating an appropriate level of capital to support these risks, than that possible under its guidelines for calculating the level of capital needed to support a bank's overall credit risk. However, the thrust of the Basle Committee's recommendation for the ultimate form adopted to control market risk is to ensure managements and boards of banks have established internally consistent reporting and control systems within their bank which can be reviewed by the appropriate central banks.

Where existing systems do not exist, a "model" set of controls is provided to assist in the establishment of such systems.

[432] Australian prudential requirements. The 1959 Reserve Bank Act delegates to the Reserve Bank of Australia responsibility for the prudential running of the Australian financial system. The limited number of operating banks prior to 1984 resulted in bank prudential supervision being exercised by way of moral suasion (that is, general discussion between banks and the Reserve to achieve a mutual understanding), rather than strict application of capital ratios (that is, quantitative control).

The Reserve Bank's control of the financial system has been highly successful with, over the last 25 years, only the very orderly exit of the Bank of Adelaide and the State Bank of Victoria being recorded. Restricted market size and entry barriers that existed during this period assisted in maintaining this stability.

Internationalisation of the Australian banking system during the 1980s has resulted in the risks associated with the operation of domestic banks differing significantly from those occurring during the 1960s and early 1970s. The floating of the Australian dollar, the tapping of the Euromarkets, development of Australian swap and option markets and underwriting risks associated with the burgeoning promissory note market and other primary issue markets have all been major contributors to this diversification.

The combination of risk diversification from globalisation of financial markets and the erosion of margins arising from increased competition has seen the Reserve Bank, while not a member of the Basle Committee, maintain an active representation and ongoing dialogue with Basle.

In line with the international co-operation of prudential supervisory bodies, the Reserve Bank was one of the first to adopt and apply the Basle Committee's credit risk recommendations (risk adjusted assets test), with minor variations, as the basis on which it will enforce its power under the Reserve Bank Act. Its updated interpretation of the application of these concepts, within an Australian context, has been published in Prudential Statements C1 issued March 1996. The Reserve Bank's interpretation of the application of the Basle Committee's approach to Market Risk, within an Australian context, has been published in Prudential Statements C3 issued December 1996.

[433] The Reserve Bank of Australia's credit risk adjusted asset test. The Reserve Bank has advised that all banks operating in Australia will be required to maintain capital (as per its definitions and restrictions) at a minimum 8% of risk adjusted assets on a fully consolidated basis. Initially, this minimum capital requirement related only to the credit risk arising from bank portfolios. Lately, the capital base is also to support market risk adjusted assets. However, in keeping with the manner in which the guidelines were introduced, we will first examine the credit risk adjusted asset test and then add the market risk factor.

The 8% is a minimum requirement although the Reserve Bank reserves the right to increase this ratio for individual banks should their particular circumstances warrant it.

[434] **Credit risk adjusted assets.** The first step in assessing whether a bank conforms with the 8% minimum capital adequacy guideline is to calculate the risk adjusted assets held by the bank. The risk adjustments have been made *only on the perceived credit risk of assets.* This can be divided into two categories, that is, on and off balance sheet assets.

[435] **Risk weightings for on balance sheet items.** On balance sheet assets have been allocated credit risk weightings on the following basis.

Risk Weighting	*Asset Type*
0%	Notes and coin.
0%	Gold bullion held in own vaults or on an allocated basis to the extent backed by gold bullion liabilities.
0%	Balances with the Reserve Bank of Australia.
0%	Loans and other claims fully secured against cash.
0%	Commonwealth Government money market securities, not exceeding 12 months to maturity, and claims (except for loans to authorised dealers) secured against these securities.
10%	All other Commonwealth Government securities.
10%	State (and Territory) Government securities, including securities issued by State central borrowing authorities.
10%	All other claims on Commonwealth and State (and Territory) Government and State central borrowing authorities.
10%	Claims fully secured against Commonwealth and State (and Territory) Government securities or securities issued by State central borrowing authorities; or guaranteed by Commonwealth and State (and Territory) Governments or State central borrowing authorities.

Risk Weighting	*Asset Type*
10%	Loans to authorised money market dealers.
10%	Claims on central governments and central banks of the OECD, and claims guaranteed by or secured against securities issued by these bodies.
10%	Claims on foreign central governments and foreign central banks, and claims guaranteed by such entities, denominated in the local currency and funded by local currency liabilities.
20%	Claims on Australian local government and public sector entities (except those which have corporate status or operate on a commercial basis), and claims guaranteed by these entities.
20%	Claims on non-commercial public sector entities in OECD countries and claims guaranteed by these entities.
20%	Claims on Australian and OECD banks from the Asia-Pacific region designated by the Reserve Bank and claims guaranteed by these banks.
20%	Claims on other banks incorporated in countries outside the OECD with a residual maturity of up to one year, and claims of similar maturity guaranteed by these banks.
20%	Claims on international banking agencies and regional development banks and claims guaranteed, or secured by securities issued, by these agencies and banks.
20%	Cash items in the process of collection.
50%	Loans for housing, or other purposes, fully secured by mortgage registered against the residential property where the ratio of the value of the mortgaged residential property securing the loans is 80% or less.
50%	Broking positions awaiting settlement in a stockbroking subsidiary of a bank.
50%	Credit equivalent of off-balance sheet exposures arising from market related transactions with counterparties that would otherwise attract a 100% risk weight.
100%	Claims on Australian public trading enterprises which have corporate status or operate on a commercial basis in significant competition with private sector enterprises

Risk Weighting	*Asset Type*
100%	Claims on commercial companies owned by the public sector in OECD countries.
100%	Claims on, or guaranteed by, non-central governments and central banks other than those denominated in the local currency and funded in that currency.
100%	Claims on non-OECD foreign banks with residual maturity exceeding one year (unless otherwise specifically agreed by the Reserve Bank).
100%	Claims on, or guaranteed by, non-bank parents (including bank holding companies which are themselves not banks) of OECD banks, unless specifically guaranteed by an OECD bank.
100%	Claims on non-bank private sector, including non-bank financial institutions (other than authorised money market dealers).
100%	Holdings of subordinated bonds issued by international agencies and multilateral development banks.
100%	Premises, sites, equipment and fixed assets.
100%	Operating leases covering plant, equipment and other fixed assets.
100%	Equity investments and capital instruments issued by other banks held for trading purposes.
100%	All other assets and claims not included elsewhere.

[436] Risk weighting for off balance sheet items. To calculate the risk weighting appropriate to off balance sheet items it is first necessary to apply credit conversion factors to these items so as to convert them into on balance sheet (credit) equivalents. These then have the appropriate "on balance sheet" credit weighting applied.

Credit conversion factors are applied to the face value of off balance sheet facilities except in the case of credit exposure flowing from market-related instruments. For off balance sheet facilities, other than market-related instruments, credit conversion factors are as follows:

Risk Weighting	*Asset Type*
100%	Direct credit substitutes—financial guarantees, assets sold with credit recourse to the bank, standby letters of credit serving as financial guarantees, written put options over specified assets with the character of a credit enhancement and bills endorsed under bill endorsement lines which have not been accepted or endorsed by another bank.
100%	Forward arrangements—sale and repurchase agreements, forward asset purchases, amounts owing on partly paid shares, securities with certain drawdown and placements of forward deposits.
50%	Transaction related contingencies—warranties, bid bonds, indemnities, performance bonds and standby letters of credit related to particular non-monetary obligations.
50%	All not issuance facilities and revolving underwriting facilities.
50%	Other commitments with a *residual* maturity exceeding one year.
20%	Short term trade related contingencies—documentary letters of credit secured against underlying shipment of goods.
0%	Other commitments with a residual maturity not exceeding one year, or which can be canceled or revoked at any time without notice.

Included within the Reserve Bank's definition of market related instruments are:

- Interest rate and currency swaps.
- Basis swaps.
- Interest rate and currency futures contracts.
- Interest rate and currency options.
- Forward interest rate and currency contracts.
- Hedge contracts.
- Stock index futures.
- Other instruments of similar nature that give rise to credit risks.

Specifically excluded from market-related instruments are foreign exchange contracts with original maturity of 14 days or less and instruments trades on futures and options exchanges that are subject to daily mark-to-market and margin payments.

Credit risk on these markets-related instruments arises should a counterparty default on the contract. In such cases the loss to the bank, if there is one, is not the face value of the contract but merely the price of replacing the existing contract. As the cost of replacing these contracts varies with movements in interest rates, exchange rates and people's perceptions of future changes to the two then, the level of credit exposure will vary over time. In acknowledging this variability the Reserve Bank allows banks to calculate the credit equivalent either as:

- the current exposure or "mark-to-market" method where financial instruments are revalued regularly to measure current replacement value plus an allowance for potential future exposure; or
- the original exposure or "rule-of-thumb" method where a simple conversion factor is applied to the "notional" principal amount of the instrument and weighted by its remaining term.

While a choice technically exists on the method banks adopt to assess credit risk on market-related contracts, the Reserve Bank considers the former, mark-to-market method to be a more accurate assessment of the underlying credit risk. Accordingly, the Reserve Bank expects this method to be employed for banks with large volumes of such items which leaves the rule-of-thumb method only really being available to the banks which have limited involvement with such market-related instruments.

Where a legally binding agreement is in place with a single counterparty and it permits the offsetting/netting of interest and exchange rate contracts (referred to as netting by novation), the exposures may be treated, for deriving the appropriate risk adjusted asset level, as a single net exposure.

Unlike other off balance sheet items, when dealing with non-bank private sector counterparties, the risk weighting applied to the credit equivalent of a market-related contract is only 50% whereas it is normally 100%.

[437] **Restrictions on inclusion in capital base.** Table 4.1, in [420], detailed the components of a bank's capital that the Reserve Bank will recognise in calculating a bank's risk adjusted asset ratio. However, there are several restrictions on the amount of each of these items that may be included as capital for the purpose of calculating the risk adjusted asset ratio. These restrictions are:

1. Tier 1—core capital must represent at least half of the bank's capital base. Thus, in order for a bank to have met the Reserve Bank's guidelines it must have at least core capital equal to 4% of its risk

adjusted assets. If core capital is less than 8% of risk adjusted assets and the bank is to meet the minimum capital requirement, it must possess sufficient supplementary capital.

2. Tier 2—supplementary capital cannot exceed Tier 1 capital.
3. Lower Tier 2 capital cannot exceed 50% of Tier 1 capital.
4. The general provision for doubtful debts cannot exceed 1.25% of total risk assets.
5. Asset revaluations pertaining to securities are to be included at a discount of 55%.
6. For inclusion as supplementary capital both redeemable preference shares and term subordinated debt must have an original maturity of at least seven years. The amount of these items which qualifies as supplementary capital is amortised by a factor of 20% of the original amount to apply each year during the last five years to maturity.

To be deducted from Tier 1 capital are the following:

1. Goodwill.
2. Net future income tax benefits.
3. Holdings of other bank capital, except where held for trading purposes.
4. Investment in non-consolidated subsidiaries.
5. Holdings of the bank's own shares or any limit agreed with the Reserve Bank on an amount of its own shares a bank may hold or any planned capital reduction.

[438] Worked example of the Reserve Bank's credit risk adjusted asset ratio. In order to assess whether the ABC Bank Limited, whose balance sheet appears in Table 4.3, meets the Reserve Bank's capital requirements we follow a five step procedure. These steps are as follows:

Step 1—*Calculate risk-weighted on balance sheet assets*

Asset	*Amount*	*Risk Weighting*	*Weighted Amount*
Cash	3	0%	0
Non-Callable Deposits	7	0%	0
Treasury Notes (less than six months)	60	0%	0
Australian Govt securities (more than 1 year)	10	10%	1
Semi-Govt securities	10	10%	1
Local Govt securities	10	20%	2
Housing Loans	220	50%	110

Asset	*Amount*	*Risk Weighting*	*Weighted Amount*
Commercial loans (less than 1 year)	200	100%	200
Commercial loans (more than 1 year)	250	100%	250
Bills Receivable	200	100%	200
Premises	10	100%	10
Other Assets	10	100%	10
	990		784

Step 2—*Calculate credit equivalents for off-balance sheet items (excluding market related contracts)*

The calculation of credit equivalents for off-balance sheet items (excluding market related contracts) is as shown in Table 4.5.

Table 4.5

Calculation of credit equivalents for off-balance sheet items

Off-Balance Sheet Items	Nominal amount	×	Conversion factor	=	Credit equivalent	×	Risk weighting	=	Weighted amount
Standby Letters of Credit	50	×	1.0	=	50	×	100%	=	10
Asset repurchase agreements	30	×	1.0	=	30	×	100%	=	30
Commitments to provide financial facilities to corporates (maturing in four years) secured by a deposit at another bank	30	×	1.0	=	30	×	100%	=	30

Step 3—*Calculate credit equivalents for market related contracts (using Current Exposure Method)*

The calculation of credit equivalents for market related contracts (using Current Exposure Method) is as shown in Table 4.6.

Table 4.6

Calculation of credit equivalents for market related contracts

Off balance sheet market related contracts	Nominal amount	×	Conversion factor	=	Potential exposure	+	Current* exposure	=	Total exposure	×	Credit weighting	=	Risk amount
Forward foreign exchange contract with a corporate with 6 months to maturity	50	×	0.01	=	0.5	+	1.3	=	1.8	×	50%	=	0.9
Fixed/floating interest rate swap with a bank with 4 years to maturity	100	×	0.005	=	0.5	+	Nil	=	0.5	×	20%	=	0.1
													1.0

* Where current exposures are negative, they are ignored.

Step 4—*Calculate eligible capital*

Core Capital		
Ordinary Shares	20	
Retained Earnings	30	
	50	
Less: Goodwill	10	
Total Core Capital	40	40
Supplementary Capital		
Subordinated Debt*	18	
Provision for Doubtful Debts	10	
Total Supplementary Capital	28	28
Total Eligible Capital		68

* Nominal balance sheet value amortised over the final five years of issue.

Step 5—*Calculate risk adjusted asset ratio*

	Total Capital	*Tier 1 Capital*
Eligible Capital	68	40
Divided by Total Risk Adjusted Assets	784	784
Risk Adjusted Asset Ratio (%)	8.67	5.10

[439] Impact of risk adjusted asset requirement on bank policy. The impact of the adoption of risk adjusted asset requirements has generally resulted in:

- an increase in pricing of off-balance sheet items to reflect their new capital weighting;
- differential pricing of loans secured against residential property; and
- a polarisation of pricing by international banks reflecting a more even global "playing field".

Some market commentators had suggested that, as the capital adequacy guidelines do not differentiate between the different degrees of corporate risk then, bank portfolios will adopt a dumbbell appearance with a sizeable base of lowly weighted government securities and a large amount of corporate loans with a high risk/return profit. However, this did not eventuate as such an analysis concentrates solely on capital adequacy requirements and fails to consider the full spectrum of risk, return and risk diversification that are considered in structuring bank asset portfolios. In light of these considerations, the spread of loans have remained broadly in line with the structure that existed prior to the Basle Committee's recommendations.

Indeed, the Reserve Bank's risk adjusted asset controls are not new, but rather represent a change in emphasis. It would appear that the Reserve Bank has almost gone full circle towards re-emphasising qualitative lending guidelines. Current requirements are now broadly similar to the qualitative lending restrictions that applied in the 1960s. However, critical differences include the fact that the Reserve Bank's measures are indeed broad guidelines as opposed to *directions.* Hence, banks are free to ignore these guidelines provided their total capital position is consistent with the Reserve Bank's minimum ratio.

In essence the controls should have little bearing on the manner in which banks evaluate individual credit applications. In fact, the Reserve Bank goes as far as to say that the weightings are *not* meant to be a guide for a bank's own assessment of credit worthiness. While this leaves the banks free to determine their own credit policies they must be mindful of the differences in risk weightings attaching to alternative asset classes. However, this has been evidenced by changes to the pricing of loans, in particular, the aggressive pricing of housing loans by Australian banks.

The Reserve Bank's extreme broad banding of counterparty credit risk does result in significant weakness in credit risk assessment. Specifically, the risk weightings fail to take account of the structure of a bank's commitments (such as the term of the commitments, repayment flows, etc) for other than government securities. Hence, a bank which has a majority of commercial loans with an average term to maturity of two years would be disadvantaged when compared to another bank whose principle business is providing long term, zero coupon financing to small United States regional banks. This issue has been partly addressed by the Reserve Bank issuing minimum capital requirements relating to market risk in portfolios.

Essentially, the Basle Committee and the Reserve Bank have said that any OECD domiciled bank or mortgage borrower carries a lower risk weighting than the best credit rated corporation. Consequently, a AAA rated major international corporation requiring a 12 month fully drawn loan would carry a 100% risk weighting, whereas a 15 year commitment to a BB rated commercial bank domiciled in an OECD country carries a five times *less* risk weighting. Such anomalies in credit risk weightings could be overcome through weighting factors being structured in line with the reports prepared by independent ratings agencies. This would provide prudential authorities with an updated, market assessed measure of credit risk at minimal cost. For a discussion on the approach used by these rating agencies and share analysts to assess "bank" credit risk see Appendix 4A.

[440] The Reserve Bank of Australia's market risk adjusted asset test.[6] Following on from the Basle Committee's "Amendment to the Capital Accord to Incorporate Market Risks" (issued January 1996), the Reserve Bank of Australia issued its guidelines, in December 1996, outlining how its existing capital requirements would be supplemented to quantitatively account for a bank's perceived market risks.

In its statement Prudential Supervision C3, the Reserve Bank defines market risk as:

> "the risk of losses arising in on and off-balance sheet positions arising from movements in market prices".

However, the Reserve Bank makes it clear that, irrespective of any prudential requirement that it may impose, the board and management of banks have a fiduciary duty to their shareholders to ensure that there are in place appropriate systems, of a financial and non-financial nature, to identify, measure, manage and report upon market risks incurred in both its trading and banking books.

While the Reserve Bank is primarily interested in maintaining a prudent minimum amount of capital, to ensure the viability of the payments and banking system, the board and management of a bank will need to consider the bank's capital requirements not only in light of its exposure to both credit and market risk but also to a broad range of other issues relating to the bank's competitiveness, the attractiveness of its shares as an investment and opportunities and threats in the marketplace. For a further discussion of this point see [448].

Banks are now required by the Reserve Bank to assess market risk either by a standardised model, by "approved" internal models or a combination of both. Once a suitable measure of assets at risk, due to market risk, is obtained, it is added to the credit risk adjusted assets and this total is then compared to the bank's capital, Tier 1 and Tier 2 as calculated in the credit risk adjusted asset ratio. Again, a minimum ratio

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6. This section on market risk is largely based on the Reserve Bank of Australia's Prudential Standard C3 (PS C3), Capital Adequacy of Banks: Market Risk (December 1996).

of 8% must be maintained. Generally, exposures are considered on a fully consolidated basis.

As additional "minimum" capital will be required to support the incremental assets added in defining market risk, the introduction of this requirement, both in Australia and throughout the world, has resulted in an increase in both the capital and stability of the international banking community. This effective increase has been easier to incorporate coming as it has after a period of relatively low asset growth in banking assets which has allowed retained earnings to significantly improve capital positions.

In the case of the standardised model for assessing market risk, the market risk derived is considered equivalent to the minimum capital actually required to support these risks. Accordingly, to maintain consistency and provide a suitable measure of risk adjusted assets, the result from the standardised model is multiplied by 12.5 (that is, the reciprocal of the minimum capital ratio of 8%).

To ensure there is no "double counting" of credit risk, the Reserve Bank has excluded from the calculation of credit risk adjusted assets all debt and equity securities in trading books and all on balance sheet positions in commodities. However, they have left, within the credit risk adjusted assets, the credit counterparty risk on all derivatives whether in the trading or banking books.

[441] Calculating market adjusted assets—the standardised model. The standardised model attempts to quantify a measure of a bank's market risk by aggregating perceived risk in the following four categories:

- interest rate
- equity position
- foreign exchange
- commodities.

[442] The standardised model—interest rate risk. The minimum capital sought in relation to interest, rate risk can be divided into two components, *specific* and *general* risk.

Specific risk seeks to quantify the impact of an adverse price movement in an individual security's price due to factors relating to the individual issuer. For example, an adverse price movement is likely to occur in the price of a bank's debt instruments if its credit standing is downgraded by a ratings agency.

Specific risk is applied to each instrument irrespective of whether there is a short or long position and offsetting of long and short matched positions are permitted only for the same issue. That is, due to differences in issue characteristics (such as call features, coupon rates, liquidity etc) prices may diverge even between issues by the same issuer.

Specific risk is weighted by way of five broad categories

Government Securities	0.00%
Qualifying Securities	
• residual term to final maturity 6 months or less	0.25%
• residual term to final maturity greater than 6 months up to and including 24 months or less	1.00%
• residual term to final maturity exceeding 24 months	1.60%
Other	8.00%

Government includes all forms of government securities if they are issued by, fully guaranteed by, or fully collateralised by securities issued by:

- Australian Commonwealth and State (including Territories) governments; or
- central governments and central banks within the OECD; or
- non-OECD country central governments and central banks, and have a residual maturity of one year or less and are denominated in local currency. For this category, there is a further requirement that the bank holding the security must have it funded by liabilities in the same currency.

Qualifying securities are those that are:

- at least rated investment grade by two credit rating agencies from a list supplied by the Reserve Bank (and open to periodic amendment). This list includes the internationally known agencies such as Moody's Investor Services, Standard & Poors Corporation etc;
- rated by one rating agency or unrated but agreed to be of investment quality by both the bank and the Reserve Bank *and* the issuer has securities listed on a recognised major international stock exchange;
- issued by, or guaranteed by, Australian local governments and Australian public sector entities (except those which have corporate status or operate on a commercial basis);

- issued by, or guaranteed by, non-OECD country central governments and banks and have a residual maturity of over one year and are denominated in local currency and the bank's holdings of such paper are funded by liabilities in the same currency;
- issued by, or fully collateralised by claims on, an international agency or regional development bank, including the IMF, the International Bank for Reconstruction and Development, and the Bank of International Settlements and the Asian Development Bank;
- issued, guaranteed, endorsed or accepted by a bank incorporated within the OECD, provided that such instruments do not qualify as capital of the issuing institution;
- issued, guaranteed, endorsed or accepted by a non-OECD bank and have a residual maturity of one year or less, provided that such instruments do not qualify as capital of the issuing institution;
- issued by, or guaranteed by, OECD country, state and regional governments and OECD public-sector entities;
- issued by, or guaranteed by, an entity which is subject to a capital adequacy regime (covering both credit and market risk) which is equivalent to the Reserve Bank's requirements. The Australian Stock Exchange and the European Economic Community's Capital Adequacy Directive are deemed to have equivalent regimes as are the regulators of investment firms from the following countries: Canada, Hong Kong, Japan, Switzerland and the United States; and
- appropriately rated asset-backed securities (for example, mortgage-backed securities).

General market risk seeks to quantify potential losses that banks may incur arising from changes in market interest rates. The required capital to support this risk is calculated as the sum of four components derived from a maturity ladder of exposure:

1. The net short or long weighted position across the whole trading book.
2. A small proportion of the matched positions in each time band (the "vertical disallowance").
3. A larger proportion of the matched positions across different time bands (the "horizontal disallowance").
4. A net charge for positions in options, where appropriate.

The general market risk is assessed in a separate maturity ladder for each currency in which the bank has a significant exposure and summed in a separate ladder for all insignificant currencies.

[443] Calculating interest rate risk. The Reserve Bank has approved two methods for calculating this risk, the maturity or duration methods. The maturity method is a variation of the "gap" model discussed in [608] which weights each net exposure within the following time bands, allocates a risk weight to each time band and assess the impact of assumed interest rate changes on the time band:

Coupons 3% or more	*Coupon less than 3%*	*Assumed*	*Yield*
Risk or the duration method		*Weigh*	*Change*
Up to 1 month	Up to 1 month	0.00%	1.00%
Over 1 up to 3 months	Over 1 up to 3 months	0.20%	1.00%
Over 3 up to 6 months	Over 3 up to 6 months	0.40%	1.00%
Over 6 up to 12 months	Over 6 up to 12 months	0.70%	1.00%
Over 1 up to 2 years	Over 1.0 up to 1.9 years	1.25%	0.90%
Over 2 up to 3 years	Over 1.9 up to 2.8 years	1.75%	0.80%
Over 3 up to 4 years	Over 2.8 up to 3.6 years	2.25%	0.75%
Over 4 up to 5 years	Over 3.6 up to 4.3 years	2.75%	0.75%
Over 5 up to 7 years	Over 4.3 up to 5.7 years	3.25%	0.70%
Over 7 up to 10 years	Over 5.7 up to 7.3 years	3.75%	0.65%
Over 10 up to 15 years	Over 7.3 up to 9.3 years	4.50%	0.60%
Over 15 up to 20 years	Over 9.3 up to 10.6 years	5.25%	0.60%
Over 20 years	Over 10.6 up to 12 years	6.00%	0.60%
	Over 12 up to 20 years	8.00%	0.60%
	Over 20 years	12.50%	0.60%

To account for the fact that the maturity ladder incorporates different instruments within each of the time bands, a 10% capital charge is also levied on the smaller of the offsetting positions. This is referred to as the "vertical disallowance".

The maturity ladder is then divided into three zones (up to 12 months, over 1 up to 4 years, and over 4 years). Then two rounds of offsetting occur. Firstly, an offset occurs between the net time band positions within each zone. Secondly, net positions across the three zones are offset. Finally, these "horizontal disallowances" are subject to a scale.

Thus, the calculation of the capital requirement for general market risk will be the sum of:.

Net Position	Net Short or Long Weighted Position	100%
Vertical Disallowances	The Smaller of Matched Weighted Positions in All Maturity Bands	10%
Horizontal Disallowances	Matched Weighted Positions within Zone 1	40%
	Matched Weighted Positions within Zone 2	30%
	Matched Weighted Positions within Zone 3	30%
	Matched Weighted Positions within Zones 1 & 2	40%
	Matched Weighted Positions within Zones 2 & 3	40%
	Matched Weighted Positions within Zones 1 & 3	100%

An example of this calculation is shown in [450].

The duration method is the more accurate method of analysing interest rate risk as it attempts to account for all cash flows for each financial instrument in a bank's portfolio rather than just the principal positions. Thus, it takes into account the interest rate risk for reinvestment of the coupons as well as the principal repayment.

The amount of capital required under the duration method of calculating risk is as detailed for the maturity approach but with duration measures, instead of maturity measures, being substituted. To reflect the more accurate nature of the duration measure in assessing interest rate risk, the Reserve Bank has reduced the amount of the vertical disallowance from 10% if applying the maturity approach to 5% if applying the duration approach.

[444] Calculating interest rate risk for interest rate derivatives. Interest rate derivatives and off-balance sheet instruments (for example, forward rate agreements (FRAs), other forward contracts, bond futures, interest rate and cross-currency swaps and forward foreign exchange) should be encompassed within any calculation of interest rate risk.

Essentially, when attempting to measure interest rate risk for derivatives, the exposure is assessed on the basis of the underlying physical position. This may result in one implied physical position, such as is the case for a bond future, or in several physical positions, as is the case in a cross-currency interest rate swap. For FRAs, the contract will be treated as if both a long position in the underlying instrument exists, for the maturity of the underlying instrument and the time to delivery of the contract, and a short position in the underlying instrument exists until the delivery date of the contract. Swaps are treated as two notional positions in government securities, with foreign exchange impact of cross currency swaps being slotted into the relevant maturity ladders for the respective currencies.

Generally, interest rate derivatives, which are not based on a specific debt (issuer) security, will be exempted from a charge for specific risk. There may be a further exemption from specific risk for the short position of future or forward instruments that have an underlying exposure to a basket of issuers. This is to reflect the fact that the bank will be able to select the most favourable security to deliver, thus side-stepping the issuer specific risk.

For the purposes of calculating general market risk for interest rate derivatives, banks can exclude positions where matching of offsetting positions in the same instrument with the same issuer, coupon, currency and maturity occur. No offset can be made where positions are in different currencies.

[445] The standardised model—equity position risk. This attempts to measure the minimum capital required to support all instruments within a bank's portfolio which exhibit market behaviour similar to equities. This covers ordinary shares, convertible shares and commitments to buy and sell equity securities.

Again, a charge is made for specific and general risk. Where a portfolio of equities is liquid and well diversified, a 4% charge on the gross equity positions (sum of both long and short positions) is applied. Should the portfolio not be deemed to be liquid and diversified, an 8% charge on gross will result.

An equity will generally be deemed to be liquid if it is listed on a major international board. A portfolio will be considered diversified, on a country by country basis, where no one equity exposure comprises more than 10% of the gross value of the portfolio and the sum of the positions of those equities which represent between 5% and 10% does not exceed 50% of the gross value of the bank's portfolio in that country. For the calculation of this specific risk, each country's risk may be calculated independently.

For general market risk, a charge of 8% will be made against the difference between the sum of the long and the sum of the short equity positions.

With the exception of options, underlying positions in equity derivatives must also be captured in the measurement. Where an exposure is to a "recognised" stock exchange, the specific risk is charged at the lower rate of 2%.

[446] The standardised model—foreign exchange risk. This attempts to measure minimum capital required to support all holdings or positions taken in foreign currencies, including gold. The charge for both foreign exchange and gold is set at 8%; however, the foreign exchange calculation is based on the greater of the sum of the short or long positions while the gold calculation is based on net (long or short) gold position.

In the case of gold, as it is almost exclusively quoted in US dollars (USD), a holding in gold will not only be calculated in the gold section of the risk calculation but will also be captured as a USD exposure in the foreign exchange section.

[447] The standardised model—commodities risk. This attempts to measure minimum capital required to support all holdings in commodities (tradeable physical product) excluding gold. Like gold, most commodities are quoted in USD and thus not only create a commodities position but also a foreign exchange position.

The capital requirement may be calculated by applying either a maturity ladder approach, similar to that outlined in [443], or a simplified approach. Where a maturity ladder approach is adopted, short time bands are employed, spread risk is charged only at 3% and a 15% capital charge is levied on the net open position in each commodity. The simplified approach also applies a 15% capital charge to the overall net position, long or short, in each commodity and a 3% charge on the gross value (sum of the absolute value of both long and short positions) for each commodity.

[448] The standardised model—treatment of options. Within each of the four exposures outlined in [441], exposures may arise'through option instruments. The Reserve Bank has authorised the measurement of the amount of these exposures to be included in the appropriate capital charge by applying either a delta-plus method, a contingent loss method or a simplified approach.

The delta-plus method involves a statistical quantification of the risks which affect option pricing while the contingent loss method involves specifying an expected "worst case" movement in price and volatility for options and calculating the likely portfolio losses that will arise. Where the bank is only involved with a limited range of purchased options, it may elect to use a simplified approach to this risk measurement. In the simplified approach, the charge for long cash and long put as well as short cash and long call positions is calculated by multiplying the market value of the underlying security by the sum of the specific and general market risk charges (16%) then subtracting the amount the option is in the money (if any). Note, this cannot be lower than zero. For just a long call or long put, the capital charge will be the lesser of the market value of the underlying security by the sum of the specific and general market risk charges (16%) or the market value of the option.

[449] Calculating market adjusted assets—use of internal models. Apart from the standardised approach to calculating risk assets adjusted for market risk, the Reserve Bank has also indicated that they will accept the use of approved "internal" models. Currently, the Reserve Bank has indicated that these models are to be based on either a *value-at-risk* basis or a *contingent loss* approach, although the Reserve Bank is only too willing to consider other approaches should individual banks propose them.

Value-at-risk models are statistical models designed to identify the maximum amount of loss likely to occur over a specified period given a certain probability of loss. More developed models allow for diversification within portfolios and run simulation analysis rather than merely assuming that a normal probability curve applies to the risk profile.

The contingent loss approach is where a series of limits are established which are designed to restrict the amount of loss possible to an acceptable level. This approach requires explicit Reserve Bank approval of the limits to be employed.

The Reserve Bank has several minimum conditions that must be achieved for such "internal" models to be considered acceptable for measuring market risk. These are:

- The system is conceptually sound and implemented with integrity.
- Sufficiently skilled staff resources exist to support the application of the model throughout the trading, risk, audit and back offices.
- The model's accuracy has been tested and proven reasonable. In this regard extensive back testing of the model is required with results needing to be consistent with the meeting of 99^{th} percentile, one tailed confidence that a maximum loss will not occur within a ten day trading period.

- The bank undertakes regular stress testing of the model. Stress testing involves the hypothesising of key events or influences that may impact on a bank's positions and then quantifying their effect through the model.

[450] Calculating market adjusted assets for interest rate related instruments—worked example. If we assume a bank has the following holdings/profile:

- $75m of government bonds with a residual maturity of 2 months and a coupon of 7%
- $13.33m of Coles Myer bonds (qualifying) with a residual maturity of 8 years and a coupon of 6.5%
- $150m interest rate swap (pay fixed, receive floating) with the next interest rate fixing date being in 9 months and the residual life of the fixed leg being 8 years
- $50m of long interest rate futures, maturity date in 6 months, underlying security 3.5 year government bond.

A worksheet for calculating the implied capital charge is shown in Table 4.7. From this we can derive that the overall capital charge required $4.58m comprised of:

• Net open weighted position		$3.00m
• Vertical disallowance		$0.05m
• Horizontal disallowance		
Zone 1	$0.08m	
Adjacent Zones	$0.45m	
Between Zones 1 & 3	$ 1.00m	$1.53m
		$4.58m

This capital charge for the interest related component is then added to the capital charge calculated for equity, foreign exchange and commodities positions. This total capital charge is then multiplied by 12.5 to derive a comparable level of risk adjusted assets.

This measure is then added to the credit risk adjusted assets to derive total risk adjusted assets. The minimum capital required is then calculated and compared against total capital. If we assume that the bank has Tier 1 capital of 550 or Tier 2 capital of 500 and that its credit and market risk adjusted assets were 7,500 and 4,375 respectively, then the final capital calculation would be as follows:

Table 4.7

Worksheet for calculating capital charge for interest rate related instruments

	Zone 1				Zone 2			Zone 3					
Timeband	**0-1**	**1-3**	**3-6**	**6-12**	**1-2**	**2-3**	**3-4**	**4-5**	**5-7**	**7-10**	**10-15**	**15-20**	**Over 20**
	Months				Years								
Position		+75 Govt	-50 Fut.	+150 Swap			+ Fut.			-150 Swap +13.33 Qual.			
Weight (%)	0.00	0.20	0.40	0.70	1.25	1.75	2.25	2.75	3.25	3.75	4.50	5.25	6.00
Position × Weight		+0.15	-0.20	+1.05			+1.125			-5.625 +0.5			
Vertical Disallow.										0.5 × 10% = 0.05			
Horizontal Disallow. 1	0.20 × 40% = 0.08												
Horizontal Disallow. 2					1.125 × 40% = 0.45								
Horizontal Disallow. 3	1.0 × 100% = 1.0												

	Risk Assets	Minimum 8% Capital Charge	Required Minimum Capital	Existing Capital	Excess Capital
Credit Risk	7,500	600	Tier 1 300 Tier 2 300		
Market Risk	4,375	350	Tier 1 175 Tier 2 175		
Total Risk	11,875	950	Tier 1 475 Tier 2 475	Tier 1 550 Tier 2 500	Tier 1 75 Tier 2 25

[451] The risk adjusted asset and market risk tests in context. The risk adjusted asset ratio and the measure for market risk are not panaceas in assessing the stability of a bank. In [422] through to [427] six major categories of risk facing a bank were identified. As the Reserve Bank makes painfully clear, these tests are only designed to address credit and market risks facing a bank. This does not mean that their supervision ends here, merely that the usefulness of these tests as an aid to prudential supervision is limited to credit and market risk assessment.

Australian prudential standards now cover:

- capital adequacy;
- off-balance sheet exposures;
- payments systems;
- liquidity management;
- large credit exposures;
- associations with non banks; and
- ownership and control of banks.

To ensure liquidity management is adequate the Reserve Bank employs the following two measures.

[452] Non Callable Deposit (NCD). NCDs are funds lodged with the Reserve Bank which impact on the growth, stability and overall liquidity of the banking system. The size of NCDs is variable at the discretion of the Reserve Bank and currently stands at 1% of Australian liabilities, other than capital, invested in Australian dollar assets within Australia. For practical purposes, this is measured as Australian dollar assets less capital as calculated for capital adequacy purposes.

The interest rate payable on NCDs stands at 5% below general Treasury Note rates, with a floor at zero. While this rate is somewhat punitive, it represents a significant improvement on the flat 5% previously payable on balances of this type when interest rates were in the mid teens. This flat rate exacerbates interest rate trends as in times of the rising interest rates it increases prudential costs to banks, forcing them to increase lending rates further, while doing the reverse in a falling rate environment.

[453] Prime Assets Ratio (PAR). The Reserve Bank also requires banks to hold a certain proportion of their assets in highly liquid, risk free assets. These assets include deposits with the Reserve Bank, cash on hand, government securities (both short term securities—Treasury Notes—and long term securities: Commonwealth Government Bonds), Australian dollar securities issued by the central borrowing authorities of State (and Territory) Governments and secured loans with authorised money market dealers.

At the time of writing, the minimum proportion of the PAR assets required by the Reserve Bank was 3%.

[454] PAR, like NCD, is set as a percentage of Australian dollar liabilities, other than capital invested in Australian dollar denominated assets minus total shareholder's funds (including retained earnings and reserves). For example, if we assume a bank has:

Total Australian assets	:	1000
Total shareholders funds	:	50
Cash	:	2
Exchange settlement accounts	:	1
Treasury Notes	:	5
Government Securities	:	25

then,

TOTAL NET ASSETS = TOTAL AUSTRALIAN ASSETS - TOTAL CAPITAL

$$= 100-50 \tag{4.1}$$

$$= 950$$

MINIMUM PAR REQUIREMENT = TOTAL NET ASSETS x 3%

$$= 950 \times .03 \tag{4.2}$$

$$= 28.5$$

$$\text{CURRENT PAR} = \frac{\text{EXCHANGE SETTLEMENT ACCOUNT} + \text{CASH} + \text{TREASURY NOTES} + \text{GOVERNMENT SECURITIES}}{\text{TOTAL NET ASSETS}} \tag{4.3}$$

$$= \frac{(1+2+5+25)}{950}$$

$$= 3.47\%$$

Responsibility for monitoring compliance with prudential requirements rest squarely with the Reserve Bank. It attempts to supervise the banks through a series of statutory reports and by observing market transactions. However, the Reserve Bank has indicated that it will also rely upon a bank's external auditors to ensure that any breaches of these prudential requirements are reported to the Reserve Bank. Should the Reserve Bank actually appoint a bank's external auditor, this would further strengthen the fiduciary relationship the external auditor owes the Reserve Bank.

[455] The future of NCD and PAR. At time of writing, the Reserve Bank has indicated that with falling supply of government securities and the wider reporting requirements now imposed upon banks, the time for banks to be required to hold NCD and possibly even PAR assets may be drawing to a close. Given the changes in the market and the improvements that computerisation have brought in banks' internal control systems, the removal of such measures appear to be inevitable as the evolution of prudential controls continues.

[456] Current challenges to prudential supervision. Prudential supervision has, through the Basle Committee, taken great strides forward in dealing with the globalisation of capital markets and is creating a uniform set of standards for banking throughout the world. However, it is the world wide trend to deregulation of capital markets which provided the pressure for prudential supervisory bodies to reach a common accord.

Deregulation resulted not only in an increase in banking business and more competitive pricing of facilities but also in prudential supervisors having to come to grips with the banks assuming non-traditional risks. Three major issues arising from this deregulation are:

[457] (a) Horizontal integration of financial services. With the deregulation of the banking industry, banks have had the opportunity to diversify their product range across the full spectrum of financial services such as insurance, funds management and custodial services. This has been particularly noticeable in the Australian market where extensive branch representation by the banking sector has provided an ideal cost efficient distribution network for the delivery of other "non bank" financial services.

While the banks have been keen to follow this horizontal integration, because it provides greater utilisation of infrastructure assets and diversifies the revenue base, it has provided prudential supervisors with a quandary in that no one supervisory body covers each aspect of a fully diversified bank. It could easily be suggested that, as the diversification usually occurs through fully owned subsidiaries, simple consolidation of a bank and its financial service subsidiaries would provide the basis on which prudential supervision should be applied. However, such an approach ignores the fact that banking activities may vary significantly from activities in other financial service sectors, for example, insurance. Accordingly, to ensure adequate supervision of such banks, the Reserve Bank may need to draw upon the specialised expertise of other supervisors, such as the Insurance and Superannuation Commission (ISC), who not only have developed skills to monitor such activities but who also have responsibility for direct regulation of these activities.

At present, the banking activities of Australian banks still far outweigh their operations in other financial service sectors. This has meant that contagion risk—the danger of loss to the bank because of problems in other parts of the group—has not, as yet, been excessive and has been handled by the Reserve Bank through liaison with the ISC, deducting equity in insurance subsidiaries from a bank's capital base, insisting that banks distance themselves from their funds management operations and insisting that it be made clear to investors that they, and not the bank, bear the risk of loss. However, the Australian government's stated reliance on superannuation as its preferred savings vehicle is rapidly increasing the risk of contagion.

[458] (b) Securitisation. Securitisation generally refers to a financial vehicle (usually a trust) which purchases assets from the bank and finances the purchases through the issue of securities backed by cash flow from the assets. A deeper analysis of securitisation can be found at [226].

Where a "clean" sale of bank assets occurs, with no residual risk attaching to the bank, then no problems should arise for the prudential supervisors. However, the challenge is to ensure that banks do not remain so closely associated with the financial vehicle that, for moral or commercial reasons, a risk of incurring a loss does exist, should the vehicle encounter financial difficulties. Accordingly, banks cannot underwrite the creditworthiness, liquidity or market value of the vehicle's assets nor may it seek to underwrite the solvency or liquidity of the vehicle.

[459] (c) Netting. The focus on bank capital and the increase in transactions associated with deregulation has resulted in banks examining their gross exposures with counterparties to identify if the possibility exists to reduce gross exposures to one net exposure.

Prudential supervisors have acknowledged the efficiency of legally binding netting arrangements, such as novation (extinguishing old contracts and creating a new one) and are examining and have approved some forms of netting by close-out. However, while close-out appears acceptable in a single domestic market, problems with legal jurisdictions can impact upon the recognition of netting by close-out for multilateral, cross-border schemes.

A fuller discussion on the topic of netting can be found in [544].

[460] Capital adequacy, asset growth and profitability. The concept of capital adequacy is dynamic rather than static. While a bank should know or be aware of its capital position at any point in time it is strategically important for it to understand how this capital position will vary in the future.

Many of the elements of Tier 2 supplementary capital have an easily quantifiable cost vis-a-vis debt. Accordingly, provided sufficient core capital exists, the question of whether to gear off Tier 2 supplementary capital is a fairly straightforward cost benefit analysis. However, as it is far more difficult to increase Tier 1 core capital and as the cost of such equity is far more nebulous, management of a bank needs to pay close attention to the ratio of Tier 1 capital to credit and market risk adjusted assets. This ratio and, more particularly, trends in this ratio, have significant strategic implications on the bank's profitability, growth rate and need for capital raisings. By making assumptions about the bank's future asset growth rate, the ratio of credit and market risk adjusted assets to on-balance sheet assets, before tax return on assets, tax rate and dividend rate we can forecast the bank's future Tier 1 capital ratio. This can be achieved through computer modelling of the following basic formula:

$$TOCR_1 = \frac{TOC_0 + A_0 \times (1 + AGR) \times BTROA \times (1 - T) \times (1 - D)}{A_0 \times (1 + AGR) \times (CRAAR + MRAAR)} \quad (4.4)$$

where:

$TOCR_1$	—	The ratio of Tier 1 capital to risk adjusted assets at period 1
TOC_0	—	Tier 1 capital in period zero
A_0	—	Asset base in period zero
AGR	—	Asset growth rate
BTROA	—	Before tax return on assets
T	—	Tax rate
D	—	Dividend payout ratio
CRAAR	—	Credit risk adjusted assets as a ratio of on-balance sheet assets
MRAAR	—	Market risk adjusted assets as a ratio of on balance sheet assets

For example, if we assume the following:

Initial Tier 1 Capital	: 375
Initial asset base	: 10,000
Asset growth rate	: 20%
Before tax return on assets	: 1.0%
Tax rate	: 36%
Dividend payout ratio	: 25%
Credit risk adjusted asset ratio	: 75%
Market risk adjusted asset ratio	: 5%

then the forecast Tier 1 capital ratio will be:

PERIOD	0	1	2	3	4	5
TIER 1 RATIO (%)	4.69	4.51	4.36	4.23	4.12	4.04

This form of strategic analysis helps to identify periods over which a bank will need to raise additional capital. The need to raise additional capital over an extended period of time reflects the fact that it takes very high levels of profitability and low levels of asset growth for capital ratios to be maintained solely by the bank's profit performance. In fact, it is normal for bank capital ratios to increase substantially at each capital raising then drift downwards until the next capital raising. From a regulatory point of view, it is important to ensure that the range through which a bank's capital ratio varies is not too wide and is centered around an acceptable level.

By combining the simple equation detailed in equation 4.4 with computer modelling, we can conduct sensitivity analysis to assess how changes in a bank's assumptions may alter a bank's projected position. For example, sensitivity analysis on the interaction of our assumptions about the asset growth rate and before tax return on assets would produce the strategic information shown in Table 4.8.

Table 4.8

Forecast Tier 1 ratio—sensitivity analysis

Before tax return on assets	*As at year 1 Forecast asset growth rates*			*As at Year 5 Forecast asset growth rates*		
	10%	*20%*	*30%*	*10%*	*20%*	*30%*
0.75%	4.71	4.36	4.06	4.79	3.50	2.69
1.00%	4.86	4.51	4.21	5.41	4.04	3.16
1.25%	5.01	4.66	4.36	6.04	4.58	3.64

Such an analysis highlights the deterioration in capital ratios over time, where asset growth rates are high, the dynamic nature of capital ratios and the importance of both future asset growth rates and before tax return on assets in determining future capital positions. In fact, if we wished to maintain the existing Tier 1 ratio, we can rearrange equation 4.4 as follows so that either the before tax return on assets or the asset growth rate is now the subject:

$$\mathrm{BTROA} = \frac{\mathrm{AGR} \times (\mathrm{CRAAR} + \mathrm{MRAAR}) \times \mathrm{TOCR}}{(1 + \mathrm{AGR}) \times (1 - \mathrm{T}) \times (1 - \mathrm{D})} \tag{4.5}$$

$$\mathrm{AGR} = \frac{\mathrm{BTROA} \times (1 - \mathrm{T}) \times (1 - \mathrm{D})}{(\mathrm{CRAAR} + \mathrm{MRAAR}) \times \mathrm{TOCR} - \mathrm{BTROA} \times (1 - \mathrm{T}) \times (1 - \mathrm{D})} \tag{4.6}$$

On the basis of our previous assumptions, to maintain the bank's 4.69% Tier 1 capital ratio with an asset growth rate of 20% would require a before tax return on assets of 1.30% or alternatively with a before tax return on assets of 1.0% it would be necessary to restrain asset growth to 14.68%.

This underlines how assessment of a bank's credit and market risk asset ratios, at a specific point in time, provides only extremely limited insight into the adequacy of its capital base. It also emphasises the need for banks to periodically enter the capital markets to support high levels of asset growth.

[461] Bank capital raisings. In raising new capital, most banks have to consider the same basic factors as those considered by any public company raising new capital. That is, they need to assess such factors as:

- The market's assessment of the attractiveness of a bank's stock from both a dividend and capital gains perspective.
- The market's assessment of the bank's relative stock price and profit performance.
- Market perception of future industry performance.
- Size of the issue.
- Relative attractiveness of equities as opposed to other forms of investment.
- The likelihood of other new capital issues also being sought at the time of issue.
- Whether it is better to delay raising capital until a more favourable investor climate exists.

Although this is by no means an exhaustive list of factors requiring consideration before a new issue occurs, it gives some indication of the strategic thought that goes into such an issue. In fact, capital planning, and more particularly Tier 1 capital planning, is of even more import to banks as it establishes its operating capacity. While most commercial companies have a fair latitude in employing debt to establish and vary its operating capacity, banks are limited by prudential restrictions to a maximum level of debt funding.

The fact that throughout the decades, bank capital ratios have traditionally hovered at the minimum prudential requirement indicates that the "socially" optimal level of bank capital adequacy is generally above that implied in a perfect market, where marginal cost is allowed to equate with marginal revenue. Thus, the long term maintenance of a Tier 1 capital ratio significantly above the 4% minimum indicates that a bank has not utilised its operating capacity fully and it will be judged accordingly. As mentioned previously, capital raisings will cause short term blow outs in a bank's capital ratio which will be reduced over time.

The successful strategic planner will be the one who maintains the bank's capital within a tight band around a buffer zone above the prudential minimum. The size of this buffer will be a function of the speed and ease with which capital can be raised and any implications this may have for the credit rating of the bank.

One should not lose sight of the fact that management of the Tier 1 capital ratio does not rely solely on managing Tier 1 capital and raising thereof but also asset management, whether it be through altering the asset mix or some form of securitisation. The desire to utilise a bank's excess operating capacity may result in "one off pricing reductions consistent with an incremental rather than full cost pricing basis.

[462] Summary. Banks provide the payments system which operates and maintains the world's economies. It is therefore important to ensure the stability of the banking industry. Bank capital is considered a bellwether measure of this stability as it provides a permanent, unrestricted commitment of funds, provides a cushion for loss absorption and contributes to the bank's profitability.

Once the capital base has been defined, it should then be compared with risks faced by the bank. Regulatory authorities have, over time, applied different capital ratios in making this comparison.

The Reserve Bank, in line with the recommendations of the Basle Committee, has adopted risk adjusted asset ratio to quantitatively assess the minimum capital a bank needs to meet both credit and market risks undertaken. However, the Reserve Bank's prudential supervision does not end there but includes both quantitative liquidity measures and qualitative assessment of other risks facing banks operating in Australia.

How a bank's capital adequacy varies over time is a function of the current situation, future asset growth rates, bank profitability and new capital raisings. By considering these factors in tandem it is possible to identify when a bank needs to raise capital. This allows bank management to identify and trade-off factors that might influence the timing of new capital raisings. As a bank's capital establishes its maximum operating capacity, utilisation of this capacity should be as high as possible to maximise performance without impinging on a bank's credit standing.

APPENDIX 4A

Evaluation of Banks[7]

[463] (a) The Rating Agency approach to bank evaluation.

In assessing the credit quality of Australian banks, rating agencies adopt an international perspective focusing upon a bank's debt obligations in its broadest context (not just deposits) and examining its ability to meet future payments on these obligations on a timely basis. While no set formula or ratios are associated with different levels or ratings,[8] the following six categories encompass key issues addressed in the credit rating of banks.

(1) Market characteristics

The Australian regulatory environment has left banks in a very favourable position as the Banking Act not only enhances market and public confidence in their ongoing viability but it has also delivered a market place not restricted by structural limitations, as exist in many other countries. This relative freedom from direct controls has provided the Australian banks the opportunity to freely offer and price a range of services and thus determine their own profitability through the mix and pricing of services provided.

Of course, the four major trading banks are in a particularly strong position as, together, they dominate the Australian banking industry with no one bank being in a dominant position.

(2) Market environment

The deregulation of the banking industry through the 1980s, coupled with the asset bubble in the later part of that decade, saw Australian bank balance sheets expand rapidly with increased corporate lending in foreign markets, diversification into stockbroking, investment

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7. This approach is drawn largely from papers by Mr G Lees, Director Banking, Australian Ratings and Mr C Drummond, Banking Analyst, J B Were & Son presented at the 3rd Australian Institute of Bankers Banking and Finance Conference July 1991.

8. For a listing of the various levels of ratings, applied by Moody's and Standard and Poors, see [508].

banking and life insurances operation all increasing the risk profile of the banks.

With the high interest rates through 1989 and 1990, we saw a collapse in property prices followed by a deep recession which saw the failure of many large corporations and has cut a swathe through small businesses. This resulted in a blow out in non-performing loans which has since reverted to a level consistent with its longer term trend.

(3) Company characteristics

The four major Australian banks have rated well as each has strong competitive market shares with an extensive distribution network (franchise) providing a business base diversified across client type and geographic location. They also have a good balanced exposure to international markets (see Table 4.9) and have horizontally diversified into other financial services.

Table 4.9

Major banks—distribution of assets

	ANZ	*CBA*	*NAB*	*WESTPAC*
Financial year ended				
1985				
Australia	57.9	88.9	76.8	64.7
Foreign	42.1	11.1	23.2	35.3
1990				
Australia	66.0	86.4	57.5	64.1
Foreign	34.0	13.6	42.5	35.9
1997				
Australia	58.1	84.3	53.3	71.5
Foreign	41.9	15.7	46.7	28.5

(4) Asset quality

Australian banks' excellent record in terms of loan losses and general asset quality underwent considerable pressure during the early 1990s as their level of loan losses and non-performing loans reached unprecedented levels. Table 4.10 shows the most recent figures for the major Australian banks.

Table 4.10

Loan provisions and impaired loans—major Australian banks 1997 financial year

	ANZ		CBA		NAB		WESTPAC	
	AMT $bn	%of Loans	Amt $bn	%of Loans	Amt $bn	% of Loans	Amt $bn	% of Loans
Specific and General Provision for Bad and Doubtful Debts	2.8	3.2%	2.2	2.6%	1.4	1.1%	1.6	2.0%
Impaired Loans	0.9	1.0%	0.5	0.6%	1.3	1.0%	0.8	1.0%
Total Gross Loans	86.9		83.8		132.8		79.5	

(5) Earnings performance

While Australian bank earnings have traditionally compared favourably with international banks, they have of late come under some pressure from loan losses associated with problem loans. This can be seen in Table 4.11.

Table 4.11

Return (after abnormals) on average total assets—major Australian banks

Financial Year	*1997*	*1996*	*1995*	*1994*
		(percentage)		
ANZ	0.7	0.9	0.9	0.8
CBA	0.9	1.1	1.0	0.8
NAB	1.2	1.3	1.4	1.4
Westpac	1.0	1.0	1.0	0.7
Financial Year	*1993*	*1992*	*1991*	*1990*
		(percentage)		
ANZ	0.2	-0.6	0.5	0.7
CBA	0.5	0.4	0.7	1.2
NAB	1.0	0.8	1.2	1.6
Westpac	—	—	0.4	0.5

Apart from the loan losses attributable to the excess of the late 1980s, the major banks have demonstrated their capacity to improve their earnings by:

(a) maintaining net interest margins despite the squeeze on housing margins,

(b) increasing their level of non interest income, and

(c) cutting expense ratios.

(6) Capital adequacy

The major Australian banks are in a relatively strong capital position compared to their international counterparts. This is especially so from a ratings viewpoint where the emphasis is more generally placed on core equity which is akin to the Tier 1 capital ratio as set out in Table 4.12.

Table 4.12

*Tier 1 and Tier 2 capital ratios—major trading banks as at 30 September 1997**

	Tier 1 (%)	*Tier 2* (%)	*Total* (%)
ANZ	6.0	3.8	9.8
CBA	8.1	2.8	10.9
NAB	6.5	2.2	8.7
Westpac	7.4	3.1	10.5

*Excluding the CBA which is at 30 June 1997

[464] (b) The equity analyst's approach to bank evaluation

As expected, an equity analyst's evaluation overlaps, to a large extent, that conducted by rating agencies with a greater emphasis placed upon the bank's future earnings potential. The following eight criteria represent, in order of relative importance, the basis on which some bank analysts assess relative strength:

1. asset quality
2. earnings growth
3. capital strength
4. earnings quality

5. management consistency and quality
6. geographic diversification
7. provisioning coverage
8. efficiency/productivity.

While these form the basis of analysing a particular bank stock it is also necessary for any analyst to consider the implications on the banking sector as a whole of external factors such as trends in monetary policy, inflation, interest rates, credit growth and asset prices. As well, consideration needs to be given to regulatory reform, competitor activity, potential takeovers and dividend franking potential.

5

Credit and Foreign Exchange Risk Management

Introduction

[501] Banks, unlike other non-finance companies, hold the bulk of their assets in financial assets. To fund such assets they raise financial liabilities from both retail and wholesale markets. Why then don't those providing the bank's financial liabilities (depositors) merely purchase the financial assets the bank invests in and thus increase their return by earning the bank's profit margin?

There are five major reasons why banks continue to perform this financial intermediation[1] role. These are:

- Aggregation: Many of the depositors are looking to place much smaller amounts than that sought by those looking to sell such assets (borrowers). Accordingly, particularly in the retail sector, economies of scale can be achieved by aggregating smaller amounts into parcel sizes sought by borrowers.
- Maturity transformation: As mentioned in [601] and [703], because depositors generally do not have the same investment horizon as borrowers, a role exists for a party of sufficient standing to "roll" liabilities and assets such that their maturities are matched.
- Credit risk assessment: The purchase of any financial asset involves undertaking the credit risk of the party issuing the asset. That is, the risk that the borrower will meet payments as they fall due. Rather than collecting information about each individual borrower, depositors prefer to limit their assessment to intermediaries who specialise in making such assessments.

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1. Financial intermediation is discussed in [208].

- Credit risk management: Once a financial asset is purchased, the credit risk associated with that asset can be reduced through active monitoring of the borrower. Again, financial intermediaries undertaking this specialised role can achieve economies of scale.
- Credit risk diversification: Spreading exposure over several parties rather than "placing all your eggs in one basket" can reduce credit risk. By investing in a spread of financial assets, financial intermediaries offer their depositors the benefits of their credit risk diversification.

From the preceding comments we can see that analysis, management and diversification of credit risk are important functions of successful bank management. These three key roles are examined below.

Credit Risk Analysis

[502] Whenever a bank makes an investment in a financial asset it undertakes, to some degree, a credit assessment of the proposed investment in order to decide whether it fits the risk/return profile acceptable to the bank. The principles employed in making such an assessment are basically the same whether the borrower is an individual or a multinational corporate entity. The difference in assessing various issuers is more one of emphasis rather than altering the basic principles employed.

Although there are many methods of conducting a credit risk analysis, we will use the method known as the "Five Cs of Credit Analysis". This approach divides the borrower's credit risk assessment into the following five categories:

1. Capital — appraisal of the borrower's position and performance;
2. Capacity —analysis of the borrower's repayment capacity;
3. Character —appraisal of the borrower's integrity;
4. Conditions — analysis of key external and internal factors that may affect the borrower's future performance;
5. Collateral —appraisal of the security available to support the borrowing.

Each of these categories is examined in greater depth.

[503] **(1) Capital.** In this section of the credit risk assessment, the bank attempts to ascertain the financial strength of the prospective borrower. Analysis of financial strength is only one of the factors involved in conducting a credit risk assessment. The information gathered to appraise capital generally forms the basis of assessing some of the other factors examined, for example, capacity. Accordingly, credit appraisal usually begins with an assessment of the financial strength of the borrower.

To assess the financial strength of the borrower, the bank officer needs to form an opinion as to:

(a) the borrower's current net wealth; and

(b) what future increase (in earnings) is reasonably expected.

The need to form an opinion on these two items is necessary irrespective of whether the borrower is an individual or a large corporate.

An indication of a borrower's position on these items can be achieved by examining two key accounting statements—the balance sheet and the income statement. While individuals and some small businesses may not have these readily available, the major components of these statements can usually be ascertained at the initial interview.

The balance sheet provides an indication of the borrower's current position. As most accounting reports are prepared on the basis of historical costs their assigned values for "real" assets may vary from market valuation. Despite this limitation, a balance sheet provides an indication of the value of the borrower's assets and liabilities and, should it be necessary, act as a starting point from which to develop a more accurate valuation of real assets.

In making a credit analysis, the bank officer looks for a sound balance sheet. This is typically one that exhibits a reasonable proportion of assets in a fairly liquid form and a pool of working capital considered sufficient to meet normal trading operations.

The income statement gives an indication of the borrower's earnings capacity and is generally less affected than the balance sheet by the problems associated with the historical cost doctrine. In making a credit assessment, the bank officer looks for a strong earnings position that is typified by a steady, increasing earnings history. In the case of corporate borrowers, the bank officer will also look for such things as fairly static debtors' turnover, creditors' turnover being less than debtors' turnover (money coming in before being paid out), acceptable stock turnover and the majority of earnings arising from ongoing, repetitive operations.

[504] Ratio analysis

To assist a bank officer to quickly form an opinion on whether the borrower has a sound balance sheet and strong earnings capacity, ratio analysis is often employed. Ratio analysis refers to the comparison of elements or items in the balance sheet and/or income statement. These comparisons provide insights into a borrower and the likelihood of default should funds be provided.

While the calculation of various ratios is a fairly straightforward mathematical exercise, the interpretation of these ratios is not so straightforward. One ratio in isolation provides little information and is far more useful when compared inter-period (that is, against the same ratio over the previous years) and intra industry (that is, against the same ratio for other companies of a similar size within the industry). Additionally, due to the dynamic and interactive nature of business, a movement in a ratio in isolation may indicate something completely opposite to that shown by considering the ratio in conjunction with other ratios. For example, an increase in debtors' turnover may initially indicate that there is a lack of control in collecting payments for sales but it may well show that the borrower, having secured more favourable terms from suppliers, passes these on to customers, to increase sales. Thus, by looking at a debtors' turnover, creditors' turnover and interest cover ratios we can see whether such a policy was instigated and whether it has been successful.

Some of the major ratios employed in a credit assessment are:

[505] (a) *The gearing ratio*

This can be expressed mathematically as:

$$\frac{\text{Shareholders' funds}}{\text{Total assets}}$$

The percentage so derived represents the proportion of the borrower's assets funded by equity. This indicates equity's commitment to the assets held and the associated earnings arising from these assets. As such, it is a key indicator of the long term stability of the borrower.

The greater the proportion of shareholders' funds to total assets, the less risk there is of the borrower defaulting on its obligations. This is because earnings from assets must first be directed to meet external liabilities. Thus, the higher this percentage the sounder it appears to the bank officer.

The term gearing is used quite loosely in the financial world, not only to represent the ratio shown in this section but other variations thereof. Another common method for calculating gearing is to divide external liabilities by total assets. As both shareholders' funds and external liabilities fund total assets, this alternate ratio is the same as our ratio subtracted from one. Both are measuring the same thing (the equity of the borrower) but by different approaches. It is the latter gearing ratio that is usually referred to when a firm is said to be highly geared. That is, common terminology normally implies that a highly geared borrower is one that has a high proportion of its assets funded by external liabilities.

Table 5.1

*Industry gearing ratios: 1986-1991**

	Minimum (%)	*Average (%)*	*Maximum (%)*
Alcohol & Tobacco	28	42	54
Building Materials	43	48	50
Chemicals	46	49	54
Developers & Contractors	40	44	48
Diversified Industrials	38	43	47
Diversified Resources	36	42	50
Engineering	42	47	50
Entrepreneurial Investors	36	42	50
Food & Household	39	45	52
Gold	56	65	74
Investment & Financial Services	37	54	67
Media	34	38	40
Miscellaneous Industrials	47	48	49
Miscellaneous Services	45	49	55
Oil and Gas	33	41	49
Other Metals	44	52	60
Paper & Packaging	36	44	52
Retail	35	44	48
Solid Fuels	47	51	54
Transport	31	34	38
All Company Average	44	45	48

* Banks, Insurance and Property Trusts have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

While highly geared borrowers may enjoy taxation advantages arising from the deductibility of interest, the level of gearing employed must be established giving due consideration to the availability of earnings on assets. This is because in periods of reduced earnings on assets, equity returns can be reduced/eliminated but payments on external liabilities must still be met.

Generally, this ratio (shareholders funds divided by total assets) should be at least 50% before the risk is considered sound. However, as Table 5.1 shows this may vary from industry to industry and over time.

Since equity cannot be raised as easily as debt, it is common for gearing ratios to strengthen at the time of a capital raising then deteriorate until the next capital raising. While this, of itself, should not significantly affect credit assessment, it is important to ensure that the range over which this variation occurs is acceptable.

[506] (b) *The working capital ratio*

This can be expressed mathematically as:

$$\frac{\text{Current assets}}{\text{Current liabilities}}$$

This percentage indicates the borrower's ability to meet day-to-day commitments. As such it reflects the working capital a borrower has at its disposal.

Many consider this a somewhat drastic ratio as it assumes all the borrower's short term liabilities are immediately called and must be met from existing short term assets. Accordingly, this ratio ignores any wealth creation the borrower may generate between the appraisal date and when the liabilities fall due. However, it does provide a quick indication of the borrower's liquidity position.

Normally, a ratio in the range of 125% to 175% indicates a sound liquidity position but, as Table 5.2 indicates, an appropriate average varies considerably between industries and can be significantly lower for those industries with quick cash turnover such as the food industry, media and retailing industries.

Care should be exercised in attempting to interpret this ratio as being too high, as it could, besides indicating strong short term solvency, also indicate assets being unprofitably employed. Conversely, a declining ratio could indicate either an insufficient holding of liquid assets or more efficient management of working capital.

[507] (c) *The quick assets ratio*

This can be expressed mathematically as:

$$\frac{\text{Current assets} - \text{stock}}{\text{Current liabilities}}$$

Once again, this percentage measures the short term liquidity of the borrower but, unlike the current ratio, it recognises that although stock is defined as a current asset it is frequently highly illiquid and its value unpredictable in the event of a forced sale.

A borrower is considered to have a sound liquidity position if quick assets (current assets less stock) equal current liabilities, that is, the quick ratio is at least 100%. Once again, certain industries can afford to operate at lower percentages because their holding of high turnover of stock items results in having the capacity to rapidly realise the value of their stock, for example, the food industry.

Table 5.2

*Industry current ratios: 1986-1991**

	Minimum (%)	*Average (%)*	*Maximum (%)*
Alcohol & Tobacco	100	128	138
Building Materials	129	137	147
Chemicals	120	142	157
Developers & Contractors	123	142	166
Diversified Industrials	126	138	146
Diversified Resources	85	114	133
Engineering	146	163	170
Entrepreneurial Investors	89	130	159
Food & Household	106	120	133
Gold	76	134	190
Investment & Financial Services	121	140	175
Media	56	92	113
Miscellaneous Industrials	128	135	142
Miscellaneous Services	114	131	147
Oil and Gas	91	138	175
Other Metals	139	146	155
Paper & Packaging	120	140	156
Retail	85	115	131
Solid Fuels	113	119	130
Transport	118	128	133
All Company Average	119	129	136

* Banks, Insurance and Property Trusts have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

[508] (d) *Earnings before interest and taxes (ebit)*

This can be expressed mathematically as:

$$\frac{\text{Earnings before interest and taxes}}{\text{Total assets}}$$

The percentage indicates how efficiently a borrower employs its assets, irrespective of the financing mix adopted. While this does not have a direct influence on short term liquidity, from this ratio we can gain insight into the likely long term performance of the borrower.

Table 5.3

*Industry ebit ratios: 1986-1991**

	Minimum (%)	*Average (%)*	*Maximum (%)*
Alcohol & Tobacco	9	15	18
Building Materials	10	13	15
Chemicals	10	13	16
Developers & Contractors	7	8	10
Diversified Industrials	10	12	14
Diversified Resources	11	12	13
Engineering	8	11	13
Entrepreneurial Investors	-4	8	15
Food & Household	10	12	13
Gold	-9	3	8
Investment & Financial Services	-2	7	9
Media	4	7	10
Miscellaneous Industrials	2	7	9
Miscellaneous Services	6	10	12
Oil and Gas	6	8	10
Other Metals	5	10	16
Paper & Packaging	9	11	12
Retail	-2	11	15
Solid Fuels	8	10	14
Transport	9	12	13
All Company Average	7	10	11

* Banks, Insurance and Property Trusts have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

For the credit assessor to consider the borrower is efficiently utilising its assets, this ratio should be around 10%. Table 5.3 shows how this varies from industry to industry and over time. The range shown indicates the impact of the recession of the early 1990s.

[509] (e) *Gross profit margin*

This can be expressed mathematically as:

$$\frac{\text{Gross profit}}{\text{Sales}}$$

This ratio indicates the percentage of each dollar of sales available to meet overheads and provide a return on equity. Thus, it approximates the borrower's variable profit from a dollar of sales.

While the gross profit margin varies widely depending on the industry involved it should be fairly consistent over time.

[510] (f) *Pre-tax profit margin*

This can be expressed mathematically as:

$$\frac{\text{Pre - tax profit}}{\text{Sales}}$$

This ratio indicates the percentage of each dollar of sales available to provide a return on equity. When used in conjunction with the gross profit margin, this ratio indicates the borrower's ability to control overheads, including financing charges.

This ratio can vary widely as high turnover industries tend to have low profit margins and low turnover industries tend to have high markups. While these ratios are somewhat stable, each individual year's ratio reflects industry conditions more than other ratios. This is shown in Table 5.4. The negative results and the wide range reduction in the industry average once again highlight the recession's impact.

[511] (g) *Debtors' turnover*

This can be expressed mathematically as:

$$\frac{\text{Accounts receivable}}{\text{Sales/365}}$$

This ratio indicates the average number of days it takes to collect accounts receivable and, as such, measures the effectiveness of the borrower's credit policy.

Changes in this ratio may reflect not only a possible change in either credit policy or a reduction in a borrower's ability to collect its debts but it may also reflect management's reluctance to write off bad debts.

As "normal" credit terms vary from industry to industry, it is difficult to say what should be a well-managed debtor's turnover ratio. However, it should generally not exceed 1.5 times the borrower's normal credit terms. The industry and temporal variability of this ratio is shown in Table 5.5.

Table 5.4

*Industry pre-tax profit ratios: 1986-1991**

	Minimum (cents)	*Average (cents)*	*Maximum (cents)*
Alcohol & Tobacco	2.3	6.0	8.8
Building Materials	7.9	9.4	10.5
Chemicals	4.1	7.7	10.6
Developers & Contractors	4.3	5.6	7.7
Diversified Industrials	6.5	8.2	9.6
Diversified Resources	6.3	13.5	20.0
Engineering	3.2	5.2	6.7
Entrepreneurial Investors	(22.3)	0.2	8.1
Food & Household	2.3	5.9	8.2
Gold	(2.8)	8.0	18.8
Media	(2.3)	7.2	17.2
Miscellaneous Industrials	(0.7)	2.9	4.5
Miscellaneous Services	1.7	4.4	6.3
Oil and Gas	14.1	19.6	30.0
Other Metals	14.5	20.0	23.5
Paper & Packaging	4.1	6.2	8.3
Retail	(3.4)	2.6	4.6
Solid Fuels	6.8	10.4	17.3
Transport	3.7	6.9	9.3
All Company Average	4.6	7.4	9.3

* Banks, Insurance, Property Trusts and Investment & Financial Services have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

Table 5.5

*Industry debtors' turnover ratios: 1986-1991**

	Minimum (days)	*Average (days)*	*Maximum (days)*
Alcohol & Tobacco	12	21	28
Building Materials	44	51	55
Chemicals	38	51	63
Developers & Contractors	30	35	43
Diversified Industrials	40	50	57
Diversified Resources	39	44	51
Engineering	50	53	55
Entrepreneurial Investors	24	37	53
Food & Household	37	40	47
Gold	17	42	63
Media	56	65	82
Miscellaneous Industrials	38	45	52
Miscellaneous Services	32	36	41
Oil and Gas	33	45	53
Other Metals	34	42	47
Paper & Packaging	48	52	58
Retail	4	5	5
Solid Fuels	23	38	54
Transport	44	49	53
All Company Average	37	39	40

* Banks, Insurance and Property Trusts have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

[512] (h) *Creditors' turnover*

This can be expressed mathematically as:

$$\frac{\text{Accounts payable}}{\text{Total purchases}} \times 365$$

This ratio indicates the average number of days a borrower takes to pay its creditors (accounts payable). The ratio, of itself, does not provide a lot of information but when used in conjunction with the debtors' turnover ratio shows whether payment from debtors is being received before they are made to creditors. This has important implications for the working capital/liquidity position of the borrower. Average industry figures for creditors' turnover are shown in Table 5.6.

While a high creditor's turnover ratio may indicate the borrower is efficiently utilising suppliers' credit, it may also reflect a poor liquidity position that forces the borrower to delay creditors as long as possible, or the borrower may not be taking full advantage of supplier discounts that may apply for early repayment.

Table 5.6

*Industry creditors' turnover: 1986-1991**

	Minimum (days)	*Average (days)*	*Maximum (days)*
Alcohol & Tobacco	12	21	30
Building Materials	31	35	39
Chemicals	31	36	39
Developers & Contractors	56	58	61
Diversified Industrials	29	37	44
Diversified Resources	29	34	44
Engineering	26	32	36
Entrepreneurial Investors	21	43	71
Food & Household	30	35	41
Gold	26	31	37
Media	64	87	107
Miscellaneous Industrials	36	42	47
Miscellaneous Services	22	28	33
Oil and Gas	28	35	47
Other Metals	26	33	41
Paper & Packaging	27	45	68
Retail	18	21	24
Solid Fuels	18	29	36
Transport	22	24	25
All Company Average	34	35	37

* Banks, Insurance, Property Trusts and Investment & Financial Services have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

[513] (i) *Stock turnover*

This can be expressed mathematically as:

$$\frac{\text{Closing stock}}{\text{Sales}} \times 365$$

This ratio indicates how quickly the borrower, on average, turns over (sells) its stock. While the number of days stock held will vary greatly between different industries, a low rate, vis-a-vis competition or previous year's ratios, may indicate overstocking, falling sales, obsolescence, slow moving or damaged stock.

Table 5.7 shows how the average stock turnover ratio for different industries has varied over time.

Table 5.7

*Industry stock turnover ratios: 1986-1991**

	Minimum (days)	*Average (days)*	*Maximum (days)*
Alcohol & Tobacco	12	37	62
Building Materials	44	52	58
Chemicals	69	78	84
Developers & Contractors	55	79	103
Diversified Industrials	59	62	64
Diversified Resources	48	57	67
Engineering	68	75	77
Entrepreneurial Investors	17	44	72
Food & Household	35	42	49
Gold	49	58	65
Media	16	27	52
Miscellaneous Industrials	61	65	73
Miscellaneous Services	41	48	58
Oil and Gas	21	28	34
Other Metals	60	71	82
Paper & Packaging	50	66	74
Retail	46	48	49
Solid Fuels	40	47	56
Transport	4	5	6
All Company Average	46	52	57

* Banks, Insurance, Property Trusts and Investment & Financial Services have been excluded.

Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

Stock levels are particularly sensitive to seasonal trends and, therefore, care should be exercised when interpreting information derived by calculating and comparing this ratio.

[514] (j) *Interest cover*

This can be expressed mathematically as:

$$\frac{\text{Net profit before tax and interest}}{\text{Interest}}$$

This is one of three more important ratios employed by credit assessors as it measures the number of times interest expense is covered by the borrower's earnings. This ratio provides the credit assessor the ability to gain a feel for whether interest servicing will be affected by a downturn in the borrower's earnings.

Generally, a ratio of three times interest is considered to represent a strong earnings performance. Table 5.8 shows industry averages over time.

While the interest cover ratio is important in assessing the borrower's interest servicing capacity, it fails to consider the borrower's ability to repay principal and therefore should not be relied upon as a sole measure of debt serviceability.

The preceding ratios are the starting point in undertaking a credit assessment but it should be noted that ratios do nothing more than indicate where problems arise. Unless commonsense is applied in interpreting ratios, the likely result is misinformation about the borrower's credit risk. A financially strong borrower will have at least 50% of its assets funded by equity, a current ratio of 150% or more, a quick asset ratio of 100% or more, earnings before interest and taxes around 10% of total assets, consistent profit margins, debtors turnover fairly static, creditors turnover being greater than debtors turnover, consistent or improving stock turnover and interest cover three times or greater.

Of course, not every borrower will meet all of these guidelines. This does not mean that the borrower is not creditworthy but instead that further investigation needs to be undertaken before deciding on its creditworthiness.

Table 5.8

*Industry interest cover ratios: 1986-1991**

	Minimum (times)	*Average (times)*	*Maximum (times)*
Alcohol & Tobacco	1.4	3.7	7.6
Building Materials	3.1	4.2	4.7
Chemicals	2.1	3.8	5.9
Developers & Contractors	2.4	2.9	3.5
Diversified Industrials	3.1	3.3	3.4
Diversified Resources	2.5	3.8	5.3
Engineering	2.0	2.8	3.7
Entrepreneurial Investors	(0.6)	1.2	2.0
Food & Household	1.4	3.5	6.0
Gold	(6.6)	3.0	10.8
Investment & Financial Services	(0.6)	1.9	3.2
Media	0.8	2.3	3.8
Miscellaneous Industrials	0.8	2.3	3.4
Miscellaneous Services	1.6	3.0	4.2
Oil and Gas	1.6	2.1	2.7
Other Metals	1.6	4.3	7.8
Paper & Packaging	1.9	2.7	3.4
Retail	(0.4)	2.5	4.1
Solid Fuels	2.8	3.6	5.7
Transport	1.8	3.2	3.9
All Company Average	1.9	2.7	3.2

* Banks, Insurance, Property Trusts and Investment & Financial Services have been excluded.
Source: The Stock Exchange Financial and Profitability Study, 1992 and 1989 Summary Report, Australian Stock Exchange.

[515] (2) Capacity. For a borrower to repay debt it must be both willing to repay and have the capacity to service/repay (that is, the cash flow). While the willingness of the borrower is discussed in [516] it can, to a degree, be obtained through the legal system. However, servicing capacity is dependent solely upon the borrower.

Servicing capacity does not mean profitability. Income assessment, under generally accepted accounting principles, is conducted on an accruals basis. As such, revenue and expense transactions are recorded as they arise irrespective of whether they result in a cash flow to or from the borrower. For example, a borrower who sells an item on credit recognises the profit on sale even though no cash flow has materialised.

Additionally, capital transactions (increase/decreases in equity, liabilities and assets) result in cash flows but unless they generate a revenue or expense are not reflected in the borrower's profitability (for example, the repayment of loan principal does not affect a borrower's profitability but may drastically alter the borrower's cash position). Thus, the profit cycle of a borrower can differ, in some cases significantly, from the cash flow cycle. This is especially true where a borrower's profitability is largely derived by unrealised capital gains.

As debts must be repaid from cash flows, it is imperative that a credit assessor establishes that the borrower has a satisfactory servicing capacity. A quick assessment of servicing capacity (also called servicing ability) can be obtained from the borrower's income statement as shown in Table 5.9.

Table 5.9

*Quick method of assessing servicing capacity**

Net profit after tax	xxxx
Add back	
Non-recurring expenses/losses*	xxx
	xxxx
Less	
Non-recurring revenues/gains*	xx
	xxxx
Add back	
Non-cash expenses such as depreciation, amortisation of goodwill etc*	xxx
Less	
Non-cash revenues such as revaluations, future income tax benefits*	xxx
	xxx
Add back/less	
Net changes in cash flow arising from the planned borrowing*	xxx
Servicing capacity/recurring cash flow	xxx

* All figures employed are after tax (ie after their tax effect).

To illustrate how this would be applied in practice consider the following example. Angela Brooks runs an accountancy practice which last year reported an after tax profit of $100,000 (included in this figure are expenses of $6,000). During the year, Angela had established a subsidiary company involving set up costs of $10,000 and sold her existing premises for a profit of $100,000, before legal expenses of $3,000. Currently, Angela is renting premises in the city for $80,000 pa. To reduce her rental bill, Angela has decided to shift her practice from the city to the suburbs. However, instead of renting she intends buying an office property for $300,000, to be fully funded by a 10 year bank loan. Angela anticipates the move will result in her losing some clients and gaining others with a worst case position being a decrease in her net income after tax of $20,000. This potential drop in income will be partially offset by rental of excess office space in the building, which is expected to net $20,000 before tax. Angela's practice is incorporated and thus attracts a marginal tax rate of 39%. On the basis of this information, a quick assessment of Angela's after tax servicing capacity would be:

	$	$
Net profit after tax		100,000
Plus Non-recurring costs		
Subsidiary set up costs	6,100	
Legal expenses on property sale	1,830	
Formation expenses[2]	6,000	13,930
		113,930
Less Non-recurring profits		
Capital gain on property sale	61,000	61,000
		51,430
Recurring after tax profits		
Add Non-cash expenses		
Depreciation	12,200	12,200
Recurring after tax cash flow		63,630
Add Cash inflows from property purchase		
Saving in office rental	48,800	
Rental of excess office space	12,200	61,000
		124,630

2. Non-tax deductible expense.

Less Cash outflows from property purchase

	$	$
Repayment of loan at 15% charged quarterly[3]	49,500	
Loss of client income	20,000	69,500
Excess after tax cash flow after property purchase		55,130

On the basis of this analysis it would appear that, as there is satisfactory servicing capacity, a loan should be provided.

As this approach concentrates on the after tax cash flows available to service both principal and interest, it is superior in assessing repayment capacity to the interest cover ratio, described in [503], as that ratio merely examined the borrower's ability to meet interest repayments.

However, this quick approach to calculating repayment capacity has two drawbacks.

- The analysis is based on historical results whereas repayments are made from future performance.
- It ignores other cash changes that may be occurring to the equity liabilities or assets of the borrower that are not reflected in the incoming statement.

Where warranted, these drawbacks can be minimised/eliminated by examining the borrower/s predicted cash flow budget. By forecasting future cash flows we remove our reliance on past performance but also reduce the reliability of the information produced.

A projected cash flow statement differs from the quick approach in that it attempts to examine changes to earnings, the funding implication of these changes (particularly for working capital items) and capital transactions that are expected to occur. The end result of such an analysis is not a single figure that determines servicing capacity but rather a net borrowing requirement of which the current loan may only provide part of the funding. The remainder of the funding would usually be met by the extension of existing facilities. However, the credit assessor needs to consider both the size of these borrowings and the performance/reputation of the borrower before safely assuming that other

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3. Principal and interest repayments on a loan of $300,000 for ten years at a rate of 15% pa charged quarterly would be approximately $58,400pa. However, as the interest component of the loan is tax deductible and as this amount decreases over time, in deriving the loan repayment net of tax effect we have assumed an average tax savings of $8,900pa.

funding facilities will be extended and, therefore, whether the cash flow forecast by the budget will materialise.

[516] (3) Character. The borrower's history, reputation and managerial ability are all crucial in assessing its integrity and willingness to meet repayments. Accordingly, the importance of assessing the character of the borrower cannot be over-emphasised.

The history of a borrower not only provides an understanding of how the borrower has organised its affairs, but also what its goals are, where it is headed and any changes in products, structure or ownership that may have recently occurred and which may affect future performance.

While a poor opinion of a borrower from one source can be dismissed as a clash of personalities or unfortunate one-off circumstances, a generally poor reputation is somewhat more alarming. This is because it is usually funded on poor/shoddy business practices and can be an indicator of a failing business and/or poor management.

Management of the borrower's affairs is another key element in assessing character. In particular, how the borrower has performed in the past, met payments on previous facilities and provided timely and reliable financial information all contribute to assessing the borrower's character. Additionally, ensuring the borrower has the technical, marketing and financial skills necessary to efficiently operate its business as well as checking exposure to key personnel is part of character assessment.

[517] (4) Conditions. Financial statements give an indication of how the borrower performs given the specific conditions that existed in the past. To accurately assess the borrower's future performance we need to consider how future conditions may affect it. These conditions can be divided into two broad categories as follows:

(a) *External conditions*: These are conditions over which the borrower has little or no control. Many are related to the borrower's industry (where is the industry heading, what is the level of competition in the industry, where does the borrower rank within the industry?) or the economy as a whole (where is the economy headed generally, how does this apply to the borrower's specific industry?).

(b) *Internal conditions*: These are conditions over which the borrower has a significant amount of control. For credit assessment purposes, reliance on a major project, customer or supplier all increase the riskiness of the borrower.

[518] **(5) Collateral.** We use the term collateral to refer to anything pledged or deposited in support of a loan and over which the lender has taken a charge is security. In commercial banking, security is usually taken for three reasons:

(a) ensure the full commitment of the borrower to its operations;

(b) provide protection should the borrower deviate from the planned course of action outlined at the time credit is extended; and

(c) provide insurance should the borrower default.

It is important to remember that security is no substitute for repayment ability. When making a credit assessment, the assessing officer should first check whether there is sufficient servicing capacity, and only if this is so should the officer then proceed to check that the borrower has sufficient security available.

The historically high levels of commercial failures in the early 1990s reinforce why it is important that security be taken wherever possible. However, the increase in competition among banks has forced them to reassess what they define as adequate security. During the 1980s, the banks became far more willing to lend directly against some forms of business assets and by way of a floating charge over assets (referred to as a registered equitable mortgage—R/E/M). A detailed discussion of lending against R/E/M security can be found in Appendix 5A. However, such lending necessitates a far more active monitoring of security and a much greater reliance on the borrower's management ability.

The intense competition for loans, which occurred in the 1980s, resulted in R/E/M security becoming almost commonplace for large corporate borrowers. However, the excesses of that period highlighted that lending against such security is only appropriate in limited circumstances.

[519] While not a substitute for a credit assessor's personal appraisal, an indication of a borrower's credit standing can be obtained from independent credit ratings. Many of the large companies seek funding directly from investors and to do so they need to obtain a credit rating from a recognised independent body. This is to avoid investors charging them a punitive rate of interest.

The two major international ratings organisations are Moody's Investor Service and Standard and Poor. Their rating systems are as follows:

1. Moody's Investor Service divides its ratings between a long term and short term rating. Its long term credit rating can be categorised, in

descending order, as Aaa, Aal, Aa2, Aa3, Al, A2, A3, Baal, Baa2, Baa3, Bal, Ba2, Ba3, Bl, B2, B3, Caa, Ca or C. Its short term credit rating can be categorised, in descending order, as Prime—1, Prime—2, Prime—3, and Not Prime. These ratings reflect Moody's Investor Service's assessment of the borrower's credit risk, its future ability to repay its obligations and indenture protection, that is, the level of legal protection afforded the investor based on the loan indenture provisions concerning seniority, security, negative pledge clauses, guarantees, etc.

2. Standard and Poor's debt rating is a current assessment of creditworthiness of an obligator (borrower) with respect to a specific obligation. This assessment may take into consideration obligors such as guarantors, insurers or lessees. The debt rating is not a recommendation to purchase, sell or hold a security, inasmuch as it does not comment as to market price or suitability for a particular investor. The ratings are based, in varying degrees, on the following considerations:
   (a) Likelihood of default—capacity and willingness of the obligor as., to the timely payment of interest and principal in accordance with the terms of the obligation.
   (b) Nature and provisions of the obligation.
   (c) Protection afforded by, and relative position of, the obligation in the event of bankruptcy, reorganisation, or other laws affecting creditors' rights.

Standard and Poor categorise debt issues as follows:

AAA	—	The highest rating—capacity to pay interest and repay principal is extremely strong.
AA	—	Has a very strong capacity to pay interest and repay principal and differs from the highest rated category only to a small degree.
A	—	Has a strong capacity to pay interest and repay principal although it is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than debt in higher rate categories.
BBB	—	Adequate capacity to pay interest and repay principal. While it normally exhibits adequate protection parameters, adverse economic conditions or changing circumstances are more

likely to lead to a weakened capacity to pay interest and repay principal for debt in this category than in higher rated categories.

BB, B, CCC, CC — Predominantly speculative with respect to capacity to pay interest and repay principal in accordance with the terms of the obligation. BB indicates the lowest degree of speculation. While such debt will likely have some quality and protective characteristics, large uncertainties or major risk exposures to adverse conditions outweigh these.

C — Reserved for income bonds on which no interest is being paid.

D — Debt is in default, and/or repayment of principal is in arrears.

[520] To summarise, in conducting a credit risk analysis, the assessing officer should first consider the "Five C's" (see [502]) and decide whether the borrower is willing to repay, then whether they have sufficient repayment capacity and, finally, provided the answer to the two previous questions is yes, whether the borrower has sufficient security to support its request for credit. However, when dealing with corporate borrowers there are several warning signals that an assessing officer can be alert to, such as:

(a) Overtrading: Rapid expansion funded by borrowings, places a drain on both cash flows and profitability unless sufficient returns can be obtained from increased turnover generated by the expansion.

(b) Erosion of profit margins: Where this is not an industry wide trend, it may indicate an inability to control costs or pass them onto customers.

(c) The big project: Over concentration of resources on one major project leaves the success or failure of the borrower strongly tied to the progress of this one project and therefore increases the risk of default.

(d) Over gearing: High gearing means high interest servicing cost which, should fluctuations occur in the borrower's earning, could result in the borrower not being able to meet those fixed costs.

(e) Corporate inertia: If a borrower does not move in line with industry changes it is likely that market share and profitability will slide which will endanger repayment capacity.

(f) Mismatched borrowings: Mismatching of short term borrowings to fund fixed assets may cause pressure to be exerted on cash flows and thus endanger repayment capacity.

(g) Lack of financial information: The failure to maintain timely financial information generally implies a lack of management control which casts doubts on the borrower's ability to maintain repayments.

Credit Risk Management

[521] A decision to extend a borrower credit facilities is taken at a point in time. However, credit standing/repayment capacity is dynamic and varies over time. Accordingly, the risk that repayment of principal and interest will be met can be reduced through actively monitoring the borrower's performance over the term of the facility. Should the borrower's position have deteriorated significantly it may be necessary to call upon the security taken in order to ensure repayment.

In reviewing an existing facility, the reviewing officer should first and most importantly read the file created when the loan was first approved and funded. This gives the reviewing officer an understanding of the borrower's position and expected performance at the time credit was approved. Additionally, the assessing officer should review documentation to ensure that it is up to date, that adequate security has been taken and that security has been properly registered/stamped.

Once the reviewing officer has studied the file, the next step is to check whether the borrower has been meeting commitments with the bank. If the borrower has been conducting its loan facility in a satisfactory manner then the depth of the review rests largely with the assessing officer. However, where possible, updated financial statements should be sought to check whether repayments are being met from the borrower's earning rather than increased borrowings or additional capital injections. Where repayments are not being met out of earnings, future servicing capacity should be closely examined.

If the borrower is conducting the loan satisfactorily and servicing is being sourced from earnings, greater emphasis of the review should shift to the conditions, both internal and external, that may impact upon the borrower's future earnings capacity. While the information for reviewing external conditions is generally derived from sources other than the borrower, it is imperative that regular contact be maintained with the borrower so that changes to internal conditions can be monitored and their likely impact on the borrower's servicing capacity be assessed.

Where the borrower is not making payments when required or conditions have deteriorated to such an extent that the borrower's repayment ability is beginning to be questioned, the assessing officer needs to conduct a full review of the borrower's credit risk. This will involve contacting the borrower to ascertain reasons why the current situation has arisen and deciding on an appropriate course of action to remedy it. Such a course of action could be either to reduce or defer repayments until the borrower stabilises or converts the current loan to an interest only basis. Since the borrower's credit risk has increased from the time the loan was approved, it may be appropriate to increase the credit fee charged.

Provided the assessing officer considers the borrower still exhibits satisfactory repayment ability then the loan should be reviewed in, say, one, three or six months depending on how badly the borrower's situation has deteriorated. If the assessing officer believes the borrower is incapable of servicing his loan then arrangements should be made with the borrower to sell its assets or, if the borrower is unwilling to sell, it may be necessary to realise the bank's security.

In conducting a credit assessment on a borrower whose account is being unsatisfactorily maintained, the assessing officer employs the "Five C's" discussed previously (see [502]) but greater emphasis needs to be used in establishing the value of business assets. Where the bank is relying on registered equitable mortgage security, it may be necessary to physically inspect assets to ensure their existence and appraise their value.

Care should also be exercised to check financial information supplied by the borrower for its "reasonableness" as it is likely that the borrower will take a more optimistic view of its current and forecast position from that formed by the reviewing officer.

In any review of a loan, it is very important that diary notes be made of all conversations with clients as this is a time when, frequently, borrowers will dispute information supplied or instructions received. In particular, the extensive use of diary notes and taped telephone conversations was instrumental in establishing the facts surrounding the management of many of the foreign currency loans which fell into arrears during the later 1980s.

Credit Risk Diversification

[522] As the old adage states, you should not "put all your eggs in one basket". By spreading credit facilities over a number of borrowers, with a number of different attributes, the bank can lower the overall risk of its loan portfolio. This is not to suggest that there will be no defaults but rather that the percentage of defaults to loans provided will be smaller as changes in conditions affect a smaller proportion of the total loan portfolio.

The main attributes that a bank seeks to diversify are:

(1) *Individual credit risk*: The rash of corporate failures brought about by the high interest rate regime prevailing in Australia during the late 1980s highlighted that over exposure to any one borrower can increase the risk of the bank's loan portfolio.

In particular, the demise of Rothwells, the Linter Group, Hooker Corporation, Quintex and the Bond Corporation, indicate that size is no guarantee against corporate failure and this may occur across a range of industry types. Banks generally established individual exposure limits up to a limit of 20% of the bank's capital base. These restrictions apply only to the very largest of customers, as smaller customers simply do not have the repayment capacity to borrow such large sums.

(2) *Geographic risk*: As the Australian economy, to a large extent, operates as a single market, changes in market conditions equally affect borrowers based in Perth or Melbourne. This contrasts with the United States where there are several regional economies which do not necessarily move in tandem over time. The one exception that may exist in the Australian economy is the property market where each state capital has its own individual set of demand and supply factors.

The expansion of Australian banks into overseas markets has highlighted exposure undertaken to the economies of other countries and regions. For example, a fall in demand for natural resources was behind default problems of some third world countries.

(3) *Political risk*: While diversification of geographic risk seeks to reduce the bank's overall exposure to falls in the borrower's repayment capacity (arising from changes in the various economies around the world), diversification of political risk looks to reduce the bank's overall exposure to loss of willingness to repay borrowings

(which may arise from changes in the borrower's political environment).

History has shown that, particularly in difficult times, political parties have taken a view that loan repayments due to other countries will be suspended if not defaulted upon. This especially occurs where a sudden change of the ruling political party occurs. As this may happen well into the term of the borrowing, it is necessary to acknowledge political risk and diversify the total loan portfolio over a number of political counterparties.

Another method for reducing political risk is for the bank to undertake borrowings in the same political jurisdiction that loans are made. This implies that should a change in the political environment occur and loans are not repaid then the bank will default on its borrowings. That is, the net equity of the bank exposed to political risk is significantly reduced. This may not be a totally acceptable strategy as, no matter how warranted the bank defaulting upon its borrowings may be, this may result in other countries losing confidence in the bank.

The term "country risk" is often applied to cover both the geographic and political risk, which applies to a particular country. However, we have separated these two elements as the first reflects repayment capacity and the second willingness to repay.

(4) *Industry risk*: Changes in market conditions can impact differently on various industries within an economy. Accordingly, by spreading loan facilities across a range of industries we can reduce the overall risk the bank may face from changes in an industry's repayment ability. Table 5.10 shows how major Australian trading banks have diversified their industry risk over time.

Of course, it is difficult to decide what the appropriate level of diversification should be in each industry. For example, assume a bank currently has 4% of its portfolio in loans to the mining sector and is offered a chance to either provide loan funds to the best credit risk in the mining industry or a very average credit risk in the manufacturing industry. Which should it choose? There is no clear-cut answer to this question but it does help to highlight how the credit quality of loans available may interact with any attempt to diversify risk, not just industry risk.

Table 5.10

Total lending commitments classified by industry

Industry	*June 95*	*June 96*	*June 97*
Agriculture, Forestry, Hunting and Fishing	4.2%	4.5%	4.3%
Mining	2.4%	2.8%	2.7%
Manufacturing	6.4%	7.7%	5.5%
Construction	3.4%	3.1%	3.3%
Wholesale Trade	2.7%	2.7%	2.2%
Retail Trade	4.0%	3.9%	4.0%
Transport and Storage	1.5%	1.5%	1.9%
Finance, Investment and Insurance	6.5%	8.0%	7.7%
Property and Business	7.7%	7.5%	9.4%
Other Industry	11.2%	15.5%	13.1%
Housing	30.1%	23.7%	23.9%
Personal	19.9%	19.2%	21.9%
	100.0%	100.0%	100.0%

Source: The Reserve Bank of Australia.

Credit Default Swaps

[523] In recent years banks have developed new means for managing their credit portfolios, including the use of securitisation. A more recent phenomenon has been the development of *credit default swaps* or *credit derivatives* or *credit swaps,* as they are sometimes known. Credit swaps are off balance sheet derivatives which involve an agreement between two parties (usually banks) to transfer the default risk associated with a loan to the other party in exchange for a fee (often an annual fee).

Assume, for example, Bank A decides that it has significant exposure to corporate client XYZ and wishes to reduce this exposure. For simplicity assume that Bank A has a total credit exposure to client XYZ of $200 million on a one year *exposure equivalent basis*[4] and would prefer to reduce this exposure to $150 million. On the other hand, Bank B

4. Exposure equivalent basis is used to convert credit exposure of varying maturity and payment terms to a uniform basis for ease of comparison and risk evaluation.

may have little or no exposure to client XYZ and will be happy to accept that exposure in exchange for an annual fee (say).

The essence of the credit swap is that client XYZ remains unaware that Bank A has "sold" part of its exposure to Bank B. This need for confidentiality is embedded in the "swap" document. To facilitate identification and monitoring of the swap exposure it is common practice for the banks to refer to a benchmark corporate security issued by client XYZ. For example, assume client XYZ has a Medium Term Note program and has issued 5 year unsecured corporate notes which have a Moody's credit rating of BBB. These notes are presently trading in the corporate bond market at BBSW + 65 basis points.[5] Bank A has a $20 million 5 year floating rate loan to client XYZ, priced on a similar basis as the MTN program. The $20 million loan has a one year equivalent exposure of $50 million. Both banks agree that the 5 year corporate bond is a reasonable benchmark for the corporate loan issued by Bank A to XYZ.

The next step in the process is to establish a reference ratio between the "benchmark" security and the loan—in this case it might be 0.98 (say), since the two facilities are very similar. The banks then agree that in the event of default by client XYZ, Bank B will pay the equivalent of 98% of the value of the loan arranged by Bank A to XYZ.

The next step is to agree a mutually acceptable fee that A should pay B for accepting the credit risk. Assume that A agrees to pay B 75 basis points per annum to accept the risk. Presumably the 65 basis points reflects the market perceived "credit risk" associated with client XYZ and the extra 10 basis points reflects the benefit to A of assigning the credit risk to B, the lack of liquidity in credit swaps (they cannot easily be "sold" to others in the market) and the cost of "confidentiality" and using Bank B's balance sheet in order to keep client XYZ happy with Bank A.

Figure 5.1 provides a graphical presentation of the credit swap and the various payment flows that result.

As Figure 5.1 illustrates, Bank B is required to pay Bank A the proceeds of the loan to client XYZ only when client XYZ is in default. Hence even though XYZ's credit rating may well decline between the time the credit swap is effected and the maturity of the facility, Bank B is

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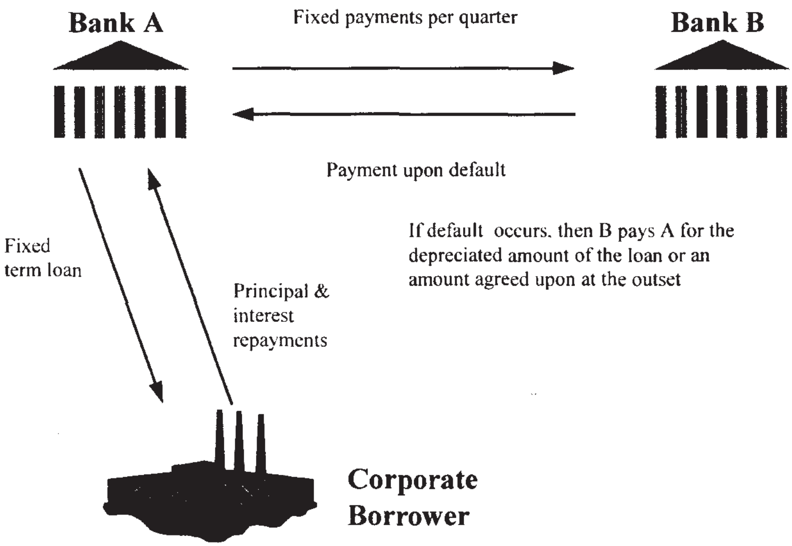
5. BBSW—the Bank Bill Swap Rate is assumed to be the effective cost of funds for both banks.

under no obligation to make a payment to Bank A. Bank B is only obliged to pay if and only if client XYZ defaults.

Fig 5.1

Credit default swap



Source: Board of Governors of the Federal Reserve System—*Supervisory guidance for credit derivatives,* USA, August 1996, p 4.

The critical issues for Bank B then are:

- what is the probability that client XYZ will default;
- if client XYZ defaults, what is the probability of recovering part or all of the outstanding debt;[6] and
- is the fee to be received sufficient to compensate the bank for the above risks, plus provide sufficient return on equity funds allocated to the exposure.

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6. Even though client XYZ may default on its loans, there is generally a high probability that creditors will receive some of their funds after the company is liquidated and all assets are sold.

Whilst Bank B does not have to fund the loan, it is in effect accepting a risk participation and will have to assign capital to the exposure. Bank B also has to establish a means for assessing the change in its credit exposure to client XYZ. The most objective means for solving this matter is to monitor the change in the price of client XYZ's benchmark corporate bond. As mentioned earlier, client XYZ's corporate bond was trading at BBSW + 65 at the time the credit swap was effected. If this margin deteriorates over time, this represents an unambiguous measure that the market believes that client XYZ's credit risk has increased (the reverse is also true). Bank B can, therefore, establish monitoring systems to ascertain if and when it is necessary to make specific provisions for this credit.

[524] **Risk based capital treatment.** The regulatory authorities have established certain guidelines for banks entering into credit default swaps. For the guarantor (Bank B), the exposure created by the credit default swap is equivalent to an ordinary off balance sheet exposure to a corporate client (such as a guarantee). As such, the bank will have to assign a 100% risk weighting to the exposure.

For the bank which is assigning the exposure, the situation is rather different. Notwithstanding the fact that the bank (Bank A) is assigning its exposure to another party (Bank B), the regulatory authorities have noted that Bank A has accepted some credit risk in entering the credit swap. In this case, Bank A will be forced to retain its exposure to client XYZ, if Bank B fails to acquire the credit in XYZ in the event of default by XYZ. Hence Bank A has assumed an exposure to Bank B. However, since Bank B is a bank the credit exposure is reduced to 20% of the notional value of the loan on a risk weighted basis (that is, $10 million on a risk weighted basis).

Derivative Transactions and Deemed Credit Risk

[525] In recent years the regulatory authorities have taken a greater interest in how banks manage and monitor credit risk associated with derivative transactions. There are two types of credit exposure for derivative transactions; namely, settlement risk and pre-settlement risk (usually referred to as replacement risk). The preceding sections of this chapter have essentially dealt with settlement risk—the risk of the customer or counterparty defaulting on their obligation when the transaction matures. In what follows, we will review another aspect of credit risk, as it relates to derivative transactions, namely, replacement risk.

Traditionally banks have used the "original exposure" method of credit risk assessment, under which credit exposure is assessed at the inception of a transaction on the basis of broad product and term categories. Under the "original exposure" method credit exposures on derivative transactions are aggregated with all other credit exposures to a counterparty in determining the overall level of counterparty risk. Recorded exposure is adjusted to reflect the reducing term of exposure. However, this method failed to take account of the change in the market value of the transaction over time, and the fact that, in many cases, the actual credit exposure reduced over time.

[526] Current exposure method. The current exposure method takes explicit account of two items, namely:

- the marked to market *replacement cost*, determined from the outstanding cash flows of the derivative contract and current levels of market rates, and
- potential exposure of the derivative contract, estimated as the peak exposure over the remaining term of the contract based on a certain probable expectation (usually expressed as, say, a 95% confidence level).

The current exposure method produces the "*deemed credit risk*" associated with a derivative contract with a particular counterparty. The concept of *deemed credit risk* has progressively been employed by financial institutions as a better measure of the replacement risk of a derivative contract. Deemed credit risk relies on the estimation of the current exposure value of the particular derivative transaction and is based on the following formula:

$$\text{Deemed credit risk} = \begin{array}{c}\text{Marked to market value}\\ \text{of the transaction}\end{array} + \begin{array}{c}\text{Potential exposure}\\ \text{of the transaction}\end{array} \quad (5.1)$$

The *marked to market replacement value* of the transaction refers to the current replacement cost of the transaction after allowance for the term to maturity of that transaction (since, over time, the term to maturity of a transaction will decline).

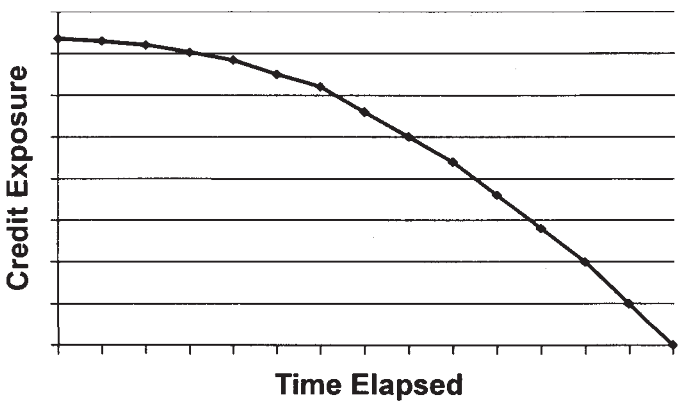
The *potential exposure* of the transaction refers to an estimation of the future *potential* movement in marked to market values over the remaining life of the derivative contract (usually expressed as, say, a 95%

confidence level that the price will be within certain limits). The potential exposure is in turn a function of two factors, namely the:

- amortisation effect; and
- diffusion effect.

Fig 5.2

Amortisation effect of a derivative transaction with intervening cash flows



[527] The *amortisation effect* refers to the extent to which certain payments are met or fall due during the life of a derivative transaction. For example, an interest rate swap transaction involves a series of (net) interest payments between two counterparties.[7] As each intervening interest payment is met, the underlying credit exposure due to amortisation effects declines. Figure 5.2 provides a graphical representation of the amortisation effect of an interest rate swap—or for that matter any similar derivative transaction—where there are intervening cash flows.

Figure 5.2 highlights that for an interest rate swap, the amortisation impact results in a declining deemed credit risk as the transaction approaches its maturity date—assuming all other factors are unchanged.

[528] The *diffusion effect* refers to the extent to which the financial price of the derivative transaction can change over the remaining life of

7. Interest rate swaps are discussed in greater detail in [628]-[630].

the contract within certain defined levels of probability (confidence levels). Simply stated, the longer the term to maturity, the greater the expected variation in the final price of the contract. Graphically this can be represented as shown in Figure 5.3.

Fig 5.3

Diffusion effect of a derivative transaction

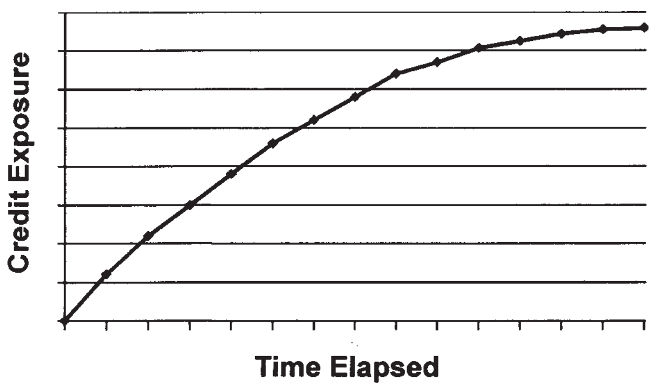
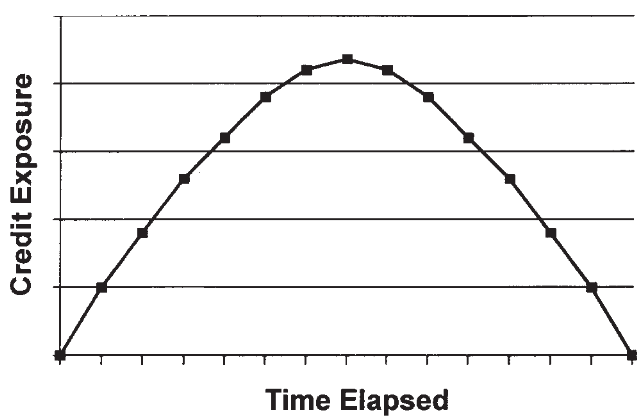


Fig 5.4

Potential exposure effect of a derivative transaction with intervening cash flows



[529] Hence the *potential exposure* of a derivative transaction is obtained by combining the impact of both effects. For an interest rate swap transaction, this can be expressed graphically as Figure 5.4.

As highlighted in Figure 5.4, the low expected change in financial price during the early stages of the interest rate swap agreement provides a low potential exposure effect, which increases as the time elapsed increases. At some point, the repayment of cash flows has been of such a magnitude that it begins to have a greater impact than the diffusion factor. Figure 5.4 only applies to derivative transactions involving regular payment of cash flows. Where a derivative contract involves a bullet repayment at maturity, such as a credit default swap, then the amortisation effect would more closely resemble the diffusion effect diagram shown in Figure 5.3 and the potential exposure effect would be an upward sloping line.

By combining the marked to market replacement value of the contract with the potential exposure of that contract, banks are able to obtain the deemed credit risk of the counterparty to a derivative contract.

[530] **Implications for bank managements.** The increasing use of deemed credit risk measures has made bank managements more aware of the dynamism of credit exposures, especially as they relate to derivative transactions. Each derivative product will exhibit different deemed credit risk characteristics, which will change over the life of the particular contract in question. Accordingly, individual credit limits to bank counterparties have to exhibit this dynamism.

The traditional system of ascertaining the extent to which a credit limit is utilised by aggregating all existing exposures has tended to exaggerate the bank's real credit exposure. Moreover, many derivative transactions, especially when they relate to different products (equity, fixed interest, foreign exchange) have correlation effects which when taken together can mitigate the overall credit exposure of a counterparty. Banks have had to develop sophisticated credit monitoring systems to effectively monitor marked to market value of particular transactions, the potential exposure of those transactions and also the correlation effects of differing transactions between the bank and its counterparty.

The Management of Banks' Foreign Exchange Risk

[531] An exchange rate is simply the price of one currency expressed in terms of another. As outlined in [303], with floating exchange rate currencies (which represent the major currencies traded) this price fluctuates daily, depending on investors' perceptions of changes in the economic, political and/or trade factors between two respective countries. Exchange rate variations are usually small, although on occasions quite erratic movements can occur, especially when investors perceive a fundamental change in an economy's fortunes. As an example, in February 1985 the Australian dollar/US dollar (AUD/USD) exchange rate fell from 0.8123 on 1 February to 0.6765 on 20 February, a fall of over 16% over the space of just 19 days, as overseas investors reacted adversely to Australia's worsening international trade position and burgeoning foreign debt problem. The situation regarding fixed exchange rates is slightly different, in that foreign exchange traders have an institution which will stand ready to buy or sell the currency at a specified price—namely the central banking authority. In this instance, the ability to vary the exchange rate is at the discretion of the monetary authority.

This section will deal only with the management of foreign exchange risk in the context of a floating, exchange rate system. Managing exposures under fixed exchange rate systems are basically the same as for a floating rate system, except that there is always one party (the central banking authority) which is prepared to accept the foreign exchange risk (that is, it stands ready to purchase foreign exchange at its stated exchange rate).

With most foreign currency denominated transactions, particularly those resulting from trade, there is usually a delay between the time the details are agreed and the date the payment is actually effected. During this period, it is probable that the amount of Australian dollars required for payment, or received in payment for a transaction, will vary according to the movement in the exchange rate. This is what is known as "foreign exchange risk" (or "foreign currency risk" or "exchange rate risk"). Simply put, it means that at the time of the agreement or contract, at least one party is at risk that the exchange rate will move against it before settlement is completed. As an example, assume an Australian import enters into a contract to purchase USD 1 million of television sets with the proceeds payable in 30 days. The importer's foreign exchange risk is, therefore, that the USD will appreciate against the AUD. If this occurs and the importer has not taken appropriate action, the importer will have to pay more AUD for the equivalent of USD 1 million in 30 days time, thus either reducing profit margins or forcing price increases.

All Australian traders whose overseas contracts are written in terms of overseas currencies, are subject to foreign exchange risk (unless they have taken action to "fix" the exchange rate), in that they do not know how much Australian currency they will require or receive to complete the transaction. It could be more or less than originally planned. Likewise, banks that undertake foreign exchange transactions are subject to foreign exchange risk.

But before discussing the means by which banks manage their foreign exchange risk it will be useful to describe the foreign exchange market and its participants.

[532] The foreign exchange market. As with any market, the foreign exchange market consists of buyers and sellers of a common product. In this case the products being traded are foreign currencies.

Foreign exchange prices are generally quoted to four decimal places and, generally, represent the proportion of the first quoted currency that is to be exchanged for one unit of the second quoted currency. For example, a 1.4732 DEM/USD price means that a participant is willing to exchange 1.4732 German deutschmarks for 1 US dollar. A list of currencies and their abbreviations are detailed in Appendix 5**B.**

The exception to this pricing rule occurs with Commonwealth countries where, generally, the price represents the proportion of the second quoted currency a participant is willing to exchange for one unit of the first quoted currency. For example, a 0.7235 AUD/USD price means a participant is willing to exchange 72.35 US cents for 1 Australian dollar. This pricing approach applies for those currencies marked with an asterisk in Appendix 5B.

The difference between the price at which a participant will buy a currency and that at which they will sell it is known as the spread. Usually the last two decimal places are altered to reflect the difference between the price at which the participant will buy the second currency and the price at which it will sell the second currency. Thus, a 0.7435/40 AUD/USD quote states that the participant is willing to buy US dollars at an exchange rate of 0.7435 and sell them at a rate of 0.7440. Generally, spreads are between 5 to 120 pips (where a pip is 0.00001). However, the size of the spread will vary over time reflecting both uncertainty in the market and a participant's individual demand for the two currencies in question.

Unlike most other markets, where there is common meeting place, the foreign exchange market has no physically defined location. Buyers and sellers transact their business over the phone, subsequently confirming details via telex. Moreover, as with domestic money markets, extensive use is made of electronic dealing screens, enabling dealers to display indicative buying and/or selling prices for various currencies.

The ability to dispense with a physical market place has enabled the foreign exchange market's size to expand rapidly. Indeed the size of the market is only dependent upon the number of creditworthy participants who are prepared to deal.

The extensive use of phones, telexes, facsimile machines and dealing screens in conducting foreign exchange business means that participants can be located in different cities, states and countries. This flexibility has resulted in the establishment of a multitude of foreign exchange centres throughout the world.

[533] Foreign exchange centres. The most important foreign exchange centres are London, New York and Tokyo. Their pre-eminent position is due to the following factors:

- the number of participants located in each centre;
- the number and volume of transactions undertaken each day;
- the influence that these centres have on other foreign exchange and investment centres;
- developed funds transfer and settlement systems;
- London and New York's historical position as the two major financial centres in the world; and
- the emergence of Tokyo as a major international capital market.

The importance of these centres is further enhanced by their strategic location in different world time zones, allowing the international foreign exchange market to remain open 24 hours each day.

[534] Since the floating of the Australian dollar and the removal of exchange controls, the Australian dollar market has "deepened" considerably and enhanced Sydney's position to that of a major regional dealing centre. However, in terms of transactions involving the major convertible currencies (for example, Swiss Francs/US Dollars, Pounds Sterling/US Dollar, etc) it ranks well behind London, New York and Tokyo, in terms of volume and number of transactions undertaken. The bulk of Sydney's foreign exchange volume is concentrated in Australian dollar/US dollar transactions.

[535] Foreign exchange market participants. Within the foreign exchange market there are three broad types of participants: market makers, brokers and clients (or price takers) as well as the central bank.

Market makers

[536] Institutions which are always prepared, on demand, to provide buying, and/or selling prices for a particular currency are referred to as market makers. Essentially, these institutions stand ready to support a market between two currencies. The market maker must have the ability to buy a currency with a view to either selling it immediately (hopefully at a higher price and thereby generating a profit) or accepting the currency risk exposure, and selling it after a lag. Clearly, if the bank decides to accept the risk it is expecting to profit from any exchange rate variation that may occur. This profit element is reflected in the spread between buy and sell prices.

Because of their substantial financial resources, market makers are usually commercial banks. Because of the Aussie dollar's lower status amongst the world's currencies, a number of Australian investment banks, in addition to the Australian trading banks, can be classed as active market makers in the AUD/USD market.

Within this broad group, a number of sub-classifications can be established. For example, the first or top tier would include those banks which would generally deal a larger amount at one particular price. In the Australian/US dollar market, this group would include the four major banks. The second tier of market makers is represented by those institutions who are also prepared to quote a two way price, but, in a volatile market (that is, where the exchange rate is falling or rising rapidly or even moving erratically within wide bands), at a wider spread between the purchase and the sale price.

Clearly, an endless number of sub-classifications could be developed. However, the broader definition of the market maker is considered to effectively describe an important and identifiable segment of the foreign exchange market.

Brokers

[537] Brokers serve to bring together buyers and sellers of foreign exchange in an efficient manner. They generally have a relatively large broking staff, which keep in regular contact with market makers and a host of other participants in the market.

Because of the volatility in the market many institutions are unwilling to accept the first price quoted and may not have the resources or time to ring a number of other market participants. They may, therefore, find it more expedient to place their order with a broker who will receive a commission for this service.

Due to their potentially advantageous position in having knowledge of customers' orders it is essential that brokers do not act on their own behalf in the foreign exchange market (that is, do not take *principal* positions yet still refer to themselves as brokers). Their sole function is to bring buyers and sellers together. Moreover, it is essential that they keep the name of the customer anonymous until the transaction is effected. A major ingredient of an efficiently operating market is that brokers maintain a high degree of integrity.

Brokers actively promote the market by showing customers the best prices available at any time. They thereby enhance the liquidity of the market since a larger number of institutions can have better access to the latest available prices and quotes.

Clients—price takers

[538] The most important participants in the foreign exchange market are the clients or price takers. It is these players which place the primary orders to buy or sell foreign exchange. They may be importers, exporters, government agencies, speculators, investors and/or financial institutions.

The clients will request prices or markets upon which they will deal, but will not quote prices as they are only really interested in either buying or selling a particular currency to hedge an underlying physical position. Since they are only in a position to accept prices offered they are referred to as price takers. However, should an arbitrage exist between market makers, price takers may take advantage of this and buy and sell the currency for a profit.

Central Bank

[539] Since the float of the Australian dollar, the Reserve Bank has adopted a much more passive role in the foreign exchange market. It now principally undertakes foreign exchange transactions on behalf of the Commonwealth Government, although it has occasionally undertaken support operations for the AUD when it experienced a sharp fall. During August 1992, for example, the Reserve Bank bought large volumes of AUD in an endeavour to keep it above the 0.7100 level against the USD when international investors began to dump the Australian dollar due to fears of a budget blow-out.

[540] In reviewing how banks manage their foreign exchange exposures it is assumed that the banks are active market makers of at least one exchange rate, say the AUD/USD exchange rate. Nonetheless, the techniques described herein can apply equally well to those banks and financial institutions that are also price takers.

[541] Forward foreign exchange markets. Often, the underlying physical position a price taker wishes to hedge is known well in advance of the need to deliver the foreign currency immediately (referred to as a "spot" transaction) then invest the foreign currency until it is required. However, individual price takers cannot achieve this aim as efficiently as banks because banks can obtain economies of scale through aggregating individual requirements.

Accordingly, banks/market makers not only quote buy/sell prices for spot transactions but also provide prices on forward delivery of a currency. In pricing this forward quote, price makers employ the covered interest parity theorem (see [318]) which states that the difference between domestic and overseas interest rates is reflected in the cost of forward cover.

To see how the cost of forward cover is derived we must first look at how a forward price is calculated. The price is determined by examining the relationship between the amount owed if a participant borrowed funds today, converted them through the spot market then invested the foreign currency. For example, I wish to calculate the 30 day forward price for the AUD/USD when spot is 0.7200, Australian 30 day interest rates are 10% pa and US 30 day interest rates are 5% pa. Thus, if I borrow AUD 1,000,000,1 can convert this into USD and invest the USD 720,000 resulting in a holding of USD 723,000 at the end of 30 days (that is, Principal x Spot x (1 + US interest rate x Days/36000)). At the same time, the Australian debt has risen to AUD 1,008,219 (that is, Principal **x** (1 + Australian interest rate x Days/36500)).[8] The expected exchange rate is then the amount of US currency on hand at the end of 30 days divided by the amount of Australian currency owed at the time as shown in equations 5.2 and 5.3.

$$\text{Forward Exchange} = \frac{\text{Principal} \times \text{Spot} \times (1 + i_f \times D/36000)}{\text{Principal} \times (1 + i_d \times D/36500)} \qquad (5.2)$$

8. Australian interest costs/earnings are generally calculated on the basis of a 365 day year, whilst interest cost/earnings in the United States are generally calculated on the basis of a 360 day year.

Where

Spot	=	The spot exchange rate at the time of the forward quote
i_f	=	The foreign interest rate (expressed as an integer not decimals)
i_d	=	The domestic interest rate (expressed as an integer not decimals)
D	=	The number of days forward cover sought.

This formula can be simplified as follows:

$$\text{Forward Price} = \text{Spot} \times \frac{(1 + i_f \times D/36000)}{(1 + i_d \times D/36500)}$$

$$= 0.7200 \times \frac{(1 + 5 \times 30/36000)}{(1 + 10 \times 30/36500)} \qquad (5.3)$$

$$= 0.7171$$

Should the forward prices not reflect this equation, market makers will continue to enter the market, take out forward positions, borrow and lend (thus locking in a profit) until the variables in the equation alter and re-establish the equation's equilibrium level.

It should be noted that the forward price quoted is not guaranteed to be the spot price prevailing at the nominated point in time and is in fact rarely the same. Rather, the forward price is merely the market's best unbiased estimate, at this moment, of where the currency will be.

To more fully appreciate how interest rate differentials dominate forward pricing we can focus on the forward margin. This is the difference between the forward exchange rate and the current spot rate. By employing equation 5.3 we can re-arrange this as follows:

$$\text{Forward Margin} = \text{Forward price} - \text{Spot}$$

$$= \text{Spot} \times \frac{(1 + i_f \times D/36000)}{(1 + i_d \times D/36500)} - \text{Spot} \qquad (5.4)$$

$$= \text{Spot} \times \frac{(i_f - i_d \times D \times 360/365)}{36000 + i_d \times D \times 360/365)}$$

$$= 0.7200 \times \frac{(5 - 10 \times 30 \times 360/365)}{36000 + 10 \times 30 \times 360/365)} \qquad (5.5)$$

$$= -0.0029$$

From equations 5.4 and 5.5, we can see the importance interest rate differentials have on setting forward margins. The actual forward margin quoted by market makers may vary marginally from that implied from equation 5.5 in order to reflect transaction costs and withholding tax.

These equations help to explain the mechanics by which overseas interest rates differentials will either be reflected in movements in the forward margin or movements in the spot exchange rate. In practice, the changes in the forward margins lag changes in interest rates, such that spot exchange rate will generally reflect the changes in interest rate differentials first.

[542] The size of the foreign exchange market in Australia. The Reserve Bank reported that the Australian foreign exchange market ranked ninth in terms of global turnover (with some 2.5% of global turnover).[9] The United Kingdom is the largest foreign exchange market followed by the United States, Japan, Singapore and Hong Kong. The US dollar dominates global trading, representing some 80% of global turnover. By comparison the AUD was the eighth most actively traded currency with 3% of total turnover. Around 40% of Australian dollar trading occurs within Australia.

Table 5.11 provides information on the size of the Australian foreign exchange market. The information is based on regular statistical collections conducted by the Reserve Bank.

Table 5.11

Total market turnover in foreign exchange

1995	1996		1997	
$A Billion	$A Billion	% Change	$A Billion	% Change
15,093	15,207	0.8	17,728	16.6

Source: Australian Financial Markets Association *1997 Australian Financial Markets Report—Summary Booklet,* p 1.

Table 5.12 shows the major currency pairs traded in the Australian market, revealing that AUD/USD transactions represent by far the greatest proportion of foreign exchange business.

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9. Reserve Bank of Australia, "Australian Financial Markets" in Reserve Bank *Bulletin,* May 1996, p 4.

Table 5.12

Currency composition of foreign exchange turnover in Australia
April 1995 (gross turnover)

	Per cent of total
AUD/USD	42.0
USD/DEM	21.7
USD/JPY	13.3
GBP/USD	7.0
NZD/USD	3.2
USD/CHF	2.6

Source: Reserve Bank of Australia "Australian Financial Markets" in Reserve Bank *Bulletin*, May 1996.

[543] Credit exposure in dealing with foreign exchange. Traditionally, settlement of a spot transaction occurs two days after the deal is agreed. This delay is maintained to allow paperwork and confirmations to be completed. During this time, the bank has a "replacement" credit exposure to the counterparty because, should the counterparty default prior to settlement, the bank would be required to replace the contract at the current market price and not that agreed with the counterparty. Given the time involved and the contingent nature of the risk, this is not considered an overly significant risk when dealing spot. However, this risk magnifies when forward contracts are undertaken as the potential for the market to have significantly moved away from the contract price is greatly increased. This "replacement" credit exposure is termed "pre-settlement risk" and is a significant element in ascertaining the level of credit exposure against a counterparty.

As a foreign exchange transaction, by its very nature, is an exchange of two currencies and where the domicile of the currencies are in different time zones, a significant credit risk arises at settlement. Until settlement the risk is only the cost of a change in the market prices which should represent only a small proportion of the face value of the transaction. However, the bank is exposed to the full face value at settlement, that is, a bank may pay one currency in its time zone and never receive the other currency because the counterparty has defaulted in a latter time zone. Such defaults have occurred where settlements made in Asian time zones have been defaulted upon by a subsequent collapse of a bank. The most celebrated example of a bank creating significant settlement risks, to a point where a real risk of widespread systemic failure could have occurred, involved the failure of the Bankhaus Herstatt on 26 June 1974. On that day German bank regulators closed the operations of the bank at the end of the German banking day. The problem arose from the fact that the Herstatt bank had taken delivery of all of its foreign currency receipts but had not made its USD payments at the time of closing, resulting in substantial losses to its USD counterparties. The result was a severe strain on the world's currency payments systems with the real possibility of a world wide systemic failure. The Herstatt experience heralded the importance of focussing on the payments settlement systems and the impact of differing time zones in exacerbating the risk of settlement failure.

For these reasons, it is appropriate to establish a series of credit controls (as discussed in [530]) to ensure the bank is not overly exposed to either the replacement or settlement risk from dealing with foreign exchange counterparties.

[544] Allsopp Report. In March 1996 the Bank for International Settlements (BIS) published the results of a survey of 80 major banks within the Group of Ten (G10) countries[10] on Settlement Risk in Foreign Exchange Transactions." The BIS defines foreign exchange settlement risk as follows:

> "A bank's actual exposure—the amount at risk—when settling a foreign exchange trade equals the full amount of the currency purchased and lasts from the time a payment instruction for the currency sold can no longer be cancelled unilaterally until the time the currency purchased is received with finality."[12]

The key results of the Allsopp Report (after the Committee's chairman) were as follows:

- Settlement exposure is not an intraday phenomenon—it lasts at a minimum from one to two days. Given current practices, foreign exchange settlement exposure to a particular counterparty could equal or surpass three day's trades (including weekends and holidays) and exceed a bank's capital base.

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10. The G10 comprises Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States.
11. Bank for International Settlements *Settlement Risk in Foreign Exchange Transactions,* March 1996, Basle.
12. Bank for International Settlements *Settlement Risk in Foreign Exchange Transactions,* 1996, p8.

- Individual banks could significantly reduce the possibility of systemic risk and their own exposures by improving their back office payments processing, correspondent banking arrangements, obligation netting[13] capabilities and risk management controls.

- Bilateral and multilateral obligation netting arrangements could greatly enhance efforts of individual banks to reduce their foreign exchange settlement exposures.

- Some banks are actively pursuing ways to improve their own settlement practices although many remain sceptical about devoting significant resources to such efforts.

The Report recommended several initiatives that should be adopted by banks for the reduction of settlement risk. The following was recommended:

- *Measure exposures*: Banks should adopt procedures to update their exposure calculations periodically (for example, once or twice per day) and to measure maximum and minimum exposure at any time on the basis of all available information. Systems limitations and the cost of achieving an "ideal" solution are recognised.

- *Manage exposures*: Banks should manage foreign exchange exposures in a manner consistent with the way they control other credit exposures, that is, by accepting that the credit risk arising from foreign exchange settlement transactions represents the same credit risk and probability of loss as a loan of identical size and duration.

- *Reduce excessive exposures*: Without lowering the scale of foreign exchange trading, banks should reduce exposures by improving settlement practices, for example by eliminating overly restrictive payment cancellation deadlines, or introducing netting (bilateral and multilateral) and collateralisation.

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13. Foreign exchange netting involves the aggregation of foreign currency exposures between two or more counterparties to arrive at the "net exposure" that exists between those parties. This netting process involves marking to market all exposures to a base currency (usually USD), then deducting the present value of all credits (where one counterparty is in a "profit" position for a transaction with the other counterparty) from the present value of all debits. Two forms of netting include "close out netting"—an agreement to settle all outstanding foreign exchange obligations in the event of a counterparty default by way of a single net payment—and "netting by novation": the satisfaction and discharge of all existing obligations through their replacement with a net payment obligation.

[545] Reserve Bank report. In December 1997 the Reserve Bank released a survey of foreign exchange settlement practices in Australia.[14] The Bank noted that the Australian market ranked ninth in terms of global turnover, while the AUD was the eighth most actively traded currency. Moreover, Australia's foreign exchange market is the first major world market to open each day, with a 14 to 16 hour time zone difference with the second largest foreign exchange market—the United States, and the USD the most actively traded currency. Accordingly, with such a large time zone difference to the second largest foreign exchange market, Australian participants are particularly exposed to foreign exchange settlement risk, especially if they are payers of AUD and receivers of USD.

For this reason, it is imperative that Australian market participants adopt world best principals in the management of foreign exchange settlements.

By minimising the time by which banks can identify a payment as being received in another country (the US) or extending the time to which banks can cancel a foreign currency payment, banks can at least limit the time delays before verifying payment to time zone differences. Unfortunately, the Reserve Bank survey noted that operational weaknesses amongst the Australian foreign exchange participants meant that the verification of receipts from overseas markets was not undertaken in a timely fashion, thereby significantly exacerbating the possibility of foreign exchange settlement exposure.

As with the Allsopp Report the Reserve Bank identified five steps in settling a trade, namely:

"• *Status R*: **Revocable.** The payment instruction for the sold currency either has not been issued or may be unilaterally cancelled without the consent of the counterparty or any other intermediary. No settlement exposure exists for this trade.

• *Status I*: **Irrevocable.** The payment instruction for the sold currency can no longer be cancelled unilaterally either because it has been finally processed by the relevant payments system or because some other factor (eg internal procedures, correspondent banking arrangements, local payment system rules, laws) makes cancellation dependent upon the consent of the counterparty or intermediary. Contrarily, the final receipt of

14. Reserve Bank of Australia *Foreign Exchange Settlement Practices in Australia,* December 1997.

the bought currency is not yet due. In this case the bought currency is clearly at risk.

- *Status U*: **Uncertain.** The payment instruction for the sold currency can no longer be cancelled unilaterally and receipt of the bought currency is due, but the dealer does not know whether it has received these funds with finality. In normal circumstances, it expects to have received the funds on time. However, since it is possible that the bought currency was not received when due (eg owing to an error or to a technical or financial failure of the counterparty or some other intermediary), the bought amount might, in fact, still be at risk.

- *Status F*: **Fail.** The dealer has established that it did not receive the bought currency from its counterparty. In this case the bought amount is overdue and remains clearly at risk.

- *Status S*: **Settled.** The dealer knows that it has received the bought currency with finality. From a settlement risk perspective, the trade is considered settled and the bought amount is no longer at risk."[15]

The Reserve Bank noted that in order to classify trades according to the above precepts, banks need to know the three critical times for each currency that they trade:

1. the unilateral payment cancellation deadline;

2. when the currency purchased is due to be received with finality;

3. when final and failed receipts are identified.

The Reserve Bank survey noted that the duration of foreign exchange settlement exposure for Australian market participants ranges from 12 hours to as much as 30 days. The duration of settlement risk is usually lower when the bank is on the selling side of the foreign exchange (since the bank will receive the proceeds first in AUD) and will be higher the more exotic the currency (particularly certain Asian, African and South Pacific currencies). The table below reproduces the average duration of settlement risk for the major traded currencies in the Australian foreign exchange market.

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15. Ibid, p4.

Table 5.13

Industry weighted average foreign exchange exposure (hours)

Currency pair	USD bought	USD sold
AUD/USD	33	12
USD/DEM	31	22
USD/JPY	37	17
NZD/USD	37	18
GBP/USD	29	24
USD/CHF	32	30
USD/FRF	32	20
USD/MYR	35	27
USD/SGD	36	24
USD/HKD	35	18
	AUD bought	**AUD sold**
AUD/USD	12	33
AUD/JPY	23	25
AUD/DEM	17	30
AUD/NZD	24	26
AUD/GBP	16	32

Source: Reserve Bank of Australia *Foreign Exchange Settlement Practices in Australia,* December 1997, p 9.

The Reserve Bank expressed concern at the result of the survey. It noted that many respondents were largely unaware of the spectrum of risks to which they were exposed in settling foreign exchange transactions. The Bank also noted that banks could reduce considerably the duration of their foreign exchange settlement risks by improving reconciliation and monitoring practices and also requiring correspondent banks to advise the status of successful and failed payments earlier. The introduction of Real Time Gross Settlement[16] should also ameliorate the settlement of AUD payment times, from the present next business day reconciliation.

Table 5.14 details the various payment systems used for settling AUD transactions. Interestingly, a large proportion of these settlements still involve paper clearings. The Reserve Bank reported that this reflects the practice of many foreign exchange dealers to maintain their own

16. Refer [215].

accounting records but utilise the services of a large domestic clearing bank for settlement of transactions.

Table 5.14

Daily AUD settlements by system

Method	AUD Payments		AUD Receipts	
	$A million	%	$A million	%
BITS[17]	6,870	22.3	6,713	21.9
Austraclear[18]	7,726	25.1	7,687	25.1
RITS[19]	129	0.4	131	0.4
Paper clearings	10,055	32.7	10,020	32.7
Domestic Nostro accounts	4,032	13.1	4,123	13.4
Other[20]	1,983	6.4	1,993	6.5
Total	30,795	100.0	30,667	100.0

Source: Reserve Bank of Australia *Foreign Exchange Settlement Practices in Australia,* December 1997, p 24.

As outlined in [541] the measurement of settlement and pre-settlement risk by banks is poor and if anything tends to grossly inflate the level of counterparty exposure (and consequent capital that needs to be assigned to this form of risk).

[546] External management techniques. Banks can use a variety of mechanisms for hedging a foreign currency exposure. If, for example, a bank is committed to buying sterling in 30 days time, the bank's exposure is to the UK pound appreciating against the AUD. The foreign exchange manager can either leave the position open (that is, remain exposed) or cover the exposure (that is, hedge it). If it is decided to offset the exposure, the manager may buy spot sterling, buy sterling forward or

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17. Refer [822].
18. A private sector company that operates the main securities depository in Australia and enables members to make foreign exchange confirmations and deliver the AUD side of the transaction.
19. Refer [215].
20. Refers to transactions between a bank and its customers where the transaction is effected internally for the bank.

convert the sterling exposure into some other currency exposure, say USD.

[547] A **spot transaction involves the immediate purchase or sale of a currency.** If the manager decides to buy spot sterling (sell AUD), the manager is essentially removing the foreign exchange exposure, but is now bearing an interest rate mismatch exposure (refer to Chapter 6). By entering into an offsetting spot transaction, the manager is essentially matching cash flows. However, because of the timing difference in settlement dates (spot against 30 days time), the manager is accepting an interest rate exposure (that is, that interest rates will move between the two dates).

[548] Banks may also enter into foreign exchange contracts with other banks through the forward foreign exchange market to cover an exposed position. The foreign exchange manager could hedge this sterling exposure by buying sterling forward for 30 days and selling AUD forward through the interbank forward market. The differential between the forward exchange rate and the current exchange rate (the spot rate) is referred to as the forward margin. The margin is determined by the interest rate differential between the two currencies for the term of the forward exchange contracts (see [533]).

In practice banks use both the forward markets and international money markets to offset a currency exposure. The two options effectively provide similar solutions. The following example shows how banks can use either the forward market of the (foreign) money markets to "close" or cover an exchange rate exposure.

Let us assume that ABC Bank has to pay another bank USD 10,000 in 90 days time. Assume that the rates shown in Table 5.15 prevail on day 1.

Table 5.15

Market rates on day 1

Exchange Rates		
Spot Rate	USD/AUD 0.7000	
90 day forward rate	USD/AUD 0.6870	
Interest Rates	USD	AUD
90 Days	9.00%	17.00%

For the sake of simplicity, we will assume that the rates quoted in Table 5.11 are available for both buying and selling of currencies and borrowings and investing of funds. The interest differential of 8.00% approximates the forward discount of 130 basis points on the AUD against the USD. Hence there is interest rate parity I the market. (The forward margin can be derived by using equation 5.3.) Using the forward markets, the ABC bank can fully cover its exposure at a cost of AUD2,703. It does this by purchasing USD forward on day 1 at the prevailing forward discount (130 base points).

To cover its exposure in the money markets as shown in Table 5.12, the ABC Bank borrows AUD at the prevailing 90 day rate and uses the proceeds to buy USD spot. The USD funds are then reinvested for 90 days at 9.00%. On day 90, ABC Bank repays the USD commitment.

In this instance, the transaction has cost ABC Bank AUD5,998, but it has earned interest on its investment of USD2,250. Hence it has an uncovered foreign exchange exposure (AUD5,988 versus USD2,250). However this remaining exposure is minute compared to its position before covering in the money markets.

[549] Another option to cover a particular foreign exchange exposure is to convert one currency exposure into another currency exposure. Using the earlier example, the foreign exchange manager may decide to convert the sterling exposure into USD exposure, by buying sterling forward and selling USD forward. Apart from there being a deeper market in the AUD/USD exchange rate viz the GBP/AUD exchange rate, the foreign exchange rate, the foreign exchange manager may well find that the change in exposures improves his or her overall foreign currency position. For example, it may be that the manager was previously long in USD (that is, over invested in USD), so that by selling the USD now he or she has reduced his AUD/USD exposure, whilst simultaneously removing the forward GBP exposure. Moreover, because the manager does not invest the GBP proceeds, the bank does not incur an asset and hence an expansion in its balance sheet.

It should be stressed that decisions to "cross" a foreign exchange exposure in, say GBP, into a USD exposure will usually represent an inter-day decision.

Table 5.16

Covering an exchange exposure

Date	Transaction	*Currency** AUD	USD
Initial situation			
Day 90	Scheduled net cash flows	+142,857	-100,000
Net exchange positions		+142,857	+100,000
Cover in the forward market			
Day 1	Buy USD 100,000 against AUD for delivery on day 90 at AUD0.6870	no cash flow	no cash flow
Day 90	Scheduled net cash flows		
	Delivery on forward	+142,857	-100,000
	contract from Day 1	-145,560	+100,000
	Net cash flows	-2,703	—
Net exchange position		-2,703	—
Cover in the money markets			
Day 1	Borrow AUD at 17.00%		
	for 90 days	+142,857	
	Convert AUD into USD spot	-142,857	+100,000
	Invest USD at 9.00%		
	for 90 days		-100,000
	Net cash flows	—	—

Date	Transaction	*Currency** AUD	USD
Day 90	Scheduled net cash flows		
	Repayment of borrowings		
	Principal 142,857	+142,857	-100,000
	Interest 17 x 142,857 x 90/36500 = 5,988		
		-148,845	

Table 5.16—*continued*

Collection of USD investment Principal 100,000 Interest 9 x 100,000 x 90/36000 = 2,250		+102,250
Net cash flows	-5,988	+2,250
Net exchange positions	-5,988	+2,250

* + cash inflow

* - cash outflow

[550] The decision to hedge a foreign currency exposure will inevitably depend upon the potential risk involved and the cost of obtaining forward cover. Therefore, it is usually a relatively simple decision for a foreign exchange manager, especially if the bank has developed a comprehensive system of controls and limits which effectively ensure that foreign currency exposures are at all times maintained within prudential levels.

[551] **Internal management techniques.** An essential ingredient in the management of any exposure is the ability to first clearly identify the exposure as it arises or, if possible, identify possible exposures before they occur.

Australian banks have foreign exchange dealing centres located in most capital cities as well as in major financial centres. Even within dealing rooms there will invariably be a number of dealing cells, namely corporate dealers, professional spot dealers and forward dealers, etc. Accordingly, it is essential that a comprehensive accounting and monitoring system be in place to provide the foreign exchange manager with information so that he or she can readily assess the bank's net exposure in any currency worldwide throughout the day. This will make it possible for the manager to take appropriate action if he or she decides that a certain currency position needs to be rectified.

To facilitate the monitoring of exposures, some banks have introduced computerised dealing and dealing accounting systems linking all dealing centres into an integrated network. At the completion of each transaction an updated record of the bank's exposure in each currency in absolute terms and by maturity is available.

[552] The introduction of comprehensive monitoring systems has helped to enhance banks' internal control mechanisms. These control systems have invariably taken the form of limits on individual dealers' transactions as well as global limits for the bank in each foreign currency transacted.

During a normal business day a bank will generate a substantial number of transactions for relatively small amounts—say less than $500,000—whilst others would be for many millions of dollars. Because of the potential exposure that may be generated, each dealer will have an authorising limit regarding the value of each transaction they may undertake. In this way, less experienced dealers will be limited to transacting smaller volumes of foreign currency.

Global limits for the foreign exchange operation need to be established for all currencies traded by the bank. Trading limits are imposed to control "market risk"—the risk that a bank will incur a loss due to an adverse movement in interest or exchange rates. Banks engaging in financial markets activities are concerned with maximising the level of trading profit arising from dealing activities after specifically taking account of market risk.

Market risk arises from the volatility of market prices (exchange and interest rates). Banks engaged in trading activities are concerned with daily price volatilities, especially the possibility of severe and adverse spikes in prices, as occurred with the exchange rates for many of the South East Asian economies in November and December 1997. Banks track historical daily price volatilities extending over a number of years and use often complex statistical models and simulation techniques for predicting price volatilities. Expected price volatilities are projected for all currencies and interest rate products dealt by the bank. More sophisticated models take account of cross correlation factors that may exist between markets.

By aggregating all "predicted" price volatilities and comparing these with trading limits established for all dealers over all products, the bank can estimate the maximum Potential Loss Amount (PLA) that the bank may incur on any particular trading day, given a certain statistical level of confidence (usually 95% but sometimes up to 97.5% confidence levels) and assuming all limits were fully utilised. This would involve aggregating all trading limits and assuming they were fully utilised and thereafter superimposing the largest adverse predicted variance for all products to ascertain the worst possible loss situation.

Similarly the bank can work from another position to ascertain the level of trading limits with which it is comfortable. The bank would begin by determining the level of Earnings At Risk (or Value At Risk—VAR) which it is comfortable to allow for trading purposes. This may be equal to, say, 2.5% of after tax earnings. Assuming annual earnings of $1 billion and based on a 97.5% confidence level the bank would accept earnings at risk of $25 million on any trading day. The bank might then review its model and discover that with a 97.5% level of confidence, it would expect to incur such losses on 6 business days per year (assuming 240 business days per annum). Expressed another way, the bank would expect to fully utilise its earnings at risk limit once in every two months. Provided the bank's board is satisfied with the PLA and VAR global limit, the bank can thereafter assign trading limits for individual products and traders, which when aggregated equate to the global limit.

Banks will normally have spot and forward limits on all currencies traded.

[553] Apart from setting limits on a dealing centre's foreign currency position, line limits are also required for dealing counterparties. The corporate lending department will usually be required to prepare approved dealing line limits for each counterparty dealing with the bank's dealing room. Dealing lines are required to protect the bank against settlement risk and foreign exchange risk. A settlement line refers to the maximum AUD equivalent of any currency that the bank will be prepared to pay and receive from another institution on any particular day. An exposure limit is also assigned for each institution dealt with. This limit represents the maximum amount of outstanding contracts that can be transacted with the counterparty. Again, the exposure limit is expressed in Australian dollars.

In its survey of foreign exchange settlement practices the Reserve Bank noted that in the absence of a legally binding foreign exchange netting agreement, banks' counterparty limits traditionally measure the gross value of all transactions that are awaiting settlement, and for operational reasons these limits and exposures are expressed in US dollars. The Bank noted that many respondents employed real time limit monitoring systems, supplemented by daily "excess" reports.

A major weakness in "aggregation" systems is that they grossly exaggerate the exposure of a bank to **a** particular counterparty. Say, for example, the aggregate exposure to Company A is $100 million. This exposure may consist of an array of transactions, some of which represent an "unrealised profit" to Company A if marked to market. In a liquidation situation, the bank's exposure would not be to those transactions where it would be required to pay Company A, but rather where Company A's transactions were in a loss situation. Moreover, where Company A deals in many currencies with the bank, the bank may be able to offset losses in one currency with gains in another. Consequently, only by moving to a full marked to market or novation netting system will banks be able to ascertain the correct credit exposure to a counterparty. The Reserve Bank did not report whether any bank was able to provide a marked to market position report of individual clients on a real time basis. However, one suspects that this ability is still some way off for many banks and that few if any banks in the world are able to measure credit exposures globally on this basis.

The Reserve Bank noted that no Australian bank had joined a multilateral foreign exchange netting system, although two banks (Commonwealth and Westpac) had expressed their commitment to join the ECHO system. Multilateral netting requires a sound and unambiguous legal structure because it involves the netting of payments and receipts in one currency by using a common legal counterparty (ECHO), for all foreign exchange contracts between the users of the system.

Whilst on this point the Reserve Bank also noted in its survey that no bank was able to monitor the flow of payments from one counterparty to the other. Consequently, when a foreign exchange settlement date has been reached the banks generally do not track the progress of the payments for the relevant clearing houses. This is a clear area of concern for all central banks and one which commercial banks will need to focus upon in the future.

[554] Clearly, effective control of dealing limits and lines requires regular updates of the global and individual exposures as the deals are transacted.

[555] Reserve Bank monitoring. The Reserve Bank closely supervises the domestic foreign exchange operations of individual banks and has established, for each bank, limits in respect of its net open overnight foreign exchange position (oversold or overbought, both spot and forward).

The Reserve Bank also reviews information on banks' global foreign exchange exposures, and reviews with them the adequacy of their internal monitoring and control systems.

[556] The exposure of a bank's other operations to foreign currency movements. To date, we have focused on how banks manage foreign exchange exposures generated by their trading activities in foreign currencies. However, it needs to be recognised that foreign currency movements may also affect other operations of the bank.

Recently, Australian banks have moved to expand their operations overseas as a means of diversifying operations. Whilst this development may assist in the future growth potential of banks, it carries with it a number of potential pitfalls.

A rapid increase in the size of banks' offshore assets may, other things being equal, result from a depreciation of the Australian dollar. If a bank's offshore assets represent a sizeable proportion of its total balance sheet position, this could have significant and adverse impact on its gearing position. Similarly, income and expenses from offshore operations would also be potentially exposed to foreign currency movements. A depreciating Australian dollar, for example, may result in an uncomfortable increase in offshore operating costs.

Because of both the absolute level of exposure involved and the long term nature of offshore operations, it is unlikely that banks would take direct hedging measures to reduce the foreign exchange exposures in this instance. Rather, it may be more prudent to assume that, over the long term, such exposures are nullified.

Another bank operation that may involve a foreign exchange exposure relates to bank transactions of a capital nature. This may include such things as the purchase of computer hardware from an offshore supplier, the purchase of offshore premises, or the takeover of an offshore financial institution. In both instances, the delay between the agreement of a price and the date payment is effected may involve the bank in a foreign currency. Because the expense usually represents a once-off payment, the bank may well decide to hedge its foreign currency exposure in such instances by purchasing forward cover. This cover may be identified separately from the bank's foreign exchange trading operations or it may indeed be merged with those operations.

[557] Because of the volume of transactions and the potential losses involved, it is essential that banks maintain rigid control mechanisms on their foreign exchange operations. At the same time, it is important to recognise that other facets of a bank's operations may also be subject to a foreign exchange exposure, although this" may not be immediately clear.

APPENDIX 5A

Lending Against the Registered Equitable Mortgage/ Registered Debenture Mortgage (R/E/M)

[558] The Registered Equitable Mortgage (R/E/M) is commonly used to obtain additional comfort by the bank to support its company advances by taking a charge over the trading and fixed assets of the company. The necessity for this has evolved from the nature of a company itself (that is, it possesses its own separate legal identity). Generally banks have utilised R/E/M primarily as a source of "makeweight" security, where the business may have warranted additional consideration over that normally available against the traditional forms of security, namely land and buildings. Opportunities for expanding a bank's share of worthwhile business can be enhanced by the adoption of a wider recognition of the possibilities of lending against the assets of the company. The R/E/M itself is merely a security instrument and does not have any intrinsic value as such. Rather the worth of the security it can provide is dependent entirely on the underlying value of the company's assets. The major question, which needs to be addressed, is "Is the client capable of servicing the debt?" If the answer to this question is "No" then the application should not proceed any further.

A requirement exists in the first instance for a more thorough initial analysis of servicing capacity.

The basic rationale for providing facilities against the underlying assets of a company (via an R/E/M) is the anticipation that the lender will be mostly unlikely to ever need to rely on those assets to recoup moneys lent. Hence, the facility is not aimed at a company experiencing major operational problems or dire financial straits. Rather, the target for lending of this variety is the company exhibiting sound cash flow, and bright future prospects. Where prime security remains an available option, it would continue to be taken as a matter of course in most instances.

Advantages and Disadvantages of a Floating Charge

[559] Figure 5.5 illustrates the segment of potential customers for which an R/E/M would provide the bank with access to business in most cases previously beyond reach.

Fig 5.5

Matrix for lending against a floating charge

SERVICING ABILITY ↓ / SECURITY AVAILABLE ON LOAN →	LOW	HIGH
YES	2. Marginal ground. In this quadrant examination for an R/E/M based loan. Directors Guarantees would also be sought.	1. Lending likely. Strong grounds for approval exist in quadrant, subject to satisfactory compliance with other assessment criteria.
NO	4. No Lending. No lending should be considered as there is poor repayment capacity and poor security.	3. No Lending. No lending should be considered for applications in this quadrant, as realising on security is expensive. Servicing is the primary motivation for all approvals.

Advantages

- A legal form of security for the lender registering priority over the trading assets of the company.
- The company is prohibited from selling the business without prior consent of the lender.
- The lender has the right to appoint a receiver and/or manager on default.

- The floating charge crystallises automatically upon liquidation of the company.

Disadvantages

- The company has the ability to deal in the "charged assets" unlike traditional forms of security where the prior permission of the lender is necessary; hence, greater margin exists for malpractice and/or erosion of security value via drawings and unrealistic valuation of trading assets.
- Bad management will also reduce the value of the company's trading assets.
- A floating charge over trading assets is invariably at its lowest value when one must rely on it to recover the debt. The simple explanation for this phenomenon is that business failure does not happen overnight. Generally, a business moving from one crisis to the next and encountering liquidity difficulties will run down its cash, liquidate its debtors and stock and divert such funds to meet pressing creditors, prior to the lender calling a halt to proceedings or the company entering liquidation. As a result of this crisis management, the value of the bank's security deteriorates.
- Fixed assets such as plant and equipment are often found in a poor state of repair. This is because the company has been forced to focus on its short term liquidity often to the detriment of the remainder of the business.

While it may appear, at first glance, that the disadvantages of the instrument itself are considerable, the most important thing to realise is that such problems are generally avoidable by implementing appropriate controls and by specifying a basic criteria to be complied with before the lending (that is, security against the trading assets of the company) dictates a more "hands on" approach.

The R/E/M can include a fixed charge over a specific asset of the company. The advantages of such a fixed charge are:

- security is easier to perfect;
- the bank can exercise right of sale without having to appoint a receiver; and
- no one else can gain a prior charge.

However, a fixed charge remains impracticable over the trading assets of a company due to the continual need for the client to buy and sell without the prior consent of the lender on each occasion.

Major Pitfalls of R/E/M Lending

[560] (a) *Statutory Requirements*: s 566 of the Companies Code provides that a floating charge over the assets of a company given within six months of the commencement of winding up of the company is invalid unless it can be proved the company was solvent immediately after the creation of the charge. While the charge remains valid in respect of moneys paid to the company at the time of creation of the charge and interest (at 8% pa) any other amounts will only rank simultaneously with the unsecured creditors. Hence, debts in existence before the creation of the floating charge would not have priority over unsecured creditors for recompense from liquidation of the company's trading assets if the floating charge is invalidated under s 566.

From a lender's point of view two points should be borne in mind in respect of s 566.

(i) Initial credit examination should be conducted thoroughly as the burden of proving the company was solvent at the time of execution of the R/E/M is placed on the lender.

(ii) Care must be taken when an R/E/M is being taken to secure past debts to ensure that the solvency of the company is unquestioned at the time of execution.

A company is not considered to be solvent unless it displays the ability to pay its debts as they fall due. When a company is experiencing severe liquidity problems it is necessary to assess the ongoing solvency of the company. Note that s 279 dictates that a fixed charge created after a floating charge will have priority over the floating charge as long as:

- the floating charge has not already been charged; or
- the floating charge did not contain a provision prohibiting/limiting the creation of subsequent charges.

Additionally, s 592 imposes on the directors and management of a borrowing company minor criminal and monetary penalties for incurring debt when a reasonable ground existed to suggest that the company would not have been able to repay all its debts as and when they became due. Thorough credit analysis in the first instance is essential.

(b) *The "Romalpa clause"*: Most businesses purchase raw materials or finished goods from a number of suppliers for either conversion in the production process and/or resale. As a result a considerable part of the trading assets of the business often includes stock. When lending on the basis of an R/E/M the security is likely to include a valuation for the stock and work in progress.

The Romalpa clause was derived from a common law decision in 1976 by a UK Court and has the basic effect of preserving title for the supplier to goods supplied by him or her on credit until such times as payment is received in full by the supplier.

The clause, if used, is found in the contract between the supplier and the purchaser. Its validity relies on its compatibility with the other terms and conditions of the purchase contract.

The advantage offered by the Romalpa clause to a supplier is that if the purchaser defaults on the contract, then the supplier, having "retained title" to the goods until payment in full, is entitled to repossess the goods, including proceeds of sale where the original goods have been sold or converted in the production process and then sold.

While this may appear at first glance to be the normal practice where a trader defaults in payment to creditors, consider the following example:

- A bank provides finance to A Pty Ltd against the security of an R/E/M over the stock and debtors of A Pty Ltd. A Pty Ltd has received raw materials under a purchase contract with B Pty Ltd for use in the production of Ninos. The contract with B Pty Ltd includes a "Romalpa" retention of title clause.
- A Pty Ltd defaults and enters into liquidation and, by so doing, crystallises the floating charge over its trading assets held by the bank.
- Due to the existence of the "Romalpa clause", the priority of the bank as a secured creditor is overridden, to the extent that B Pty Ltd can reclaim from the stock of raw materials and/or proceeds of sale of the Ninos the amounts owing under the original purchase contract.
- Normally (that is, in the absence of the Romalpa clause), B Pty Ltd would rank after the bank as an unsecured creditor in seeking reimbursement.

In this instance, the value of the bank's R/E/M is minimised by B Pty Ltd's prior claim. Initial inspection and valuation of stock would be needed to determine the extent to which the client (A Pty Ltd) has exposure to "retention of title" type clauses. Reliance on the R/E/M by the bank would then be proportionately reduced. In the light of this situation the basis on which trading stock is acquired should be confirmed in writing by the company's principals. It may be appropriate to obtain copies of purchase contracts where doubt exists on this issue.

(c) *Notices serviced by the Commissioner of Taxation*: Section 218 of the Income Tax Assessment Act and the recent case of *Tricontinental Corporate Ltd and Anor v Federal Commissioner of Taxation* indicated that a notice served by the Commissioner of Taxation under s 218 has priority over a floating charge held by a lender over the assets of a company, where that company has an unresolved taxation liability.

It is therefore necessary when assessing a lending proposal against R/E/M security to determine whether the company has any outstanding taxation liabilities including unpaid group tax, sales tax or PA YE tax, which could affect the bank's priority in the event of reliance on the R/E/M.

(d) *Retrenchment moneys have been accorded with priority since December 1985*: Such amounts can often be substantial and as a result may impact on the value of the R/E/M. This can also apply to employee wages and salaries outstanding at the date of default, although limits prescribed by the legislation can restrict the impact of such items.

(e) *Liens*: It is difficult to establish when liens may arise, although they are most common in the construction industry and can effect work in progress. A lien is a right to hold property until a debt is paid off. Care must be exercised when lending to contracting companies, especially undercapitalised companies prone to liquidity shortages or those engaged in overtrading (that is, contracting to do too many jobs).

(f) *Factoring*: Factoring of a company's book debts is not restricted by the presence of an R/E/M; however, a specific assignment of book debts to defeat an R/E/M is rare. The lender is entitled to be informed when book debts are to be factored; indeed, the debtor factoring should be carried out via" the bank account.

A sign that debtors are being factored is the application of bulk credits to a bank account rather than a consistent flow of individual debtor collections.

(g) *Execution creditors*: If an unsecured creditor obtains judgment from the courts for payment, and seizes the company's goods under execution, the floating charge will only take priority if the charge has crystallised and become a fixed charge over the trading assets of the business, before the creditor sells the seized goods and obtained the proceeds. Execution occurs when a bailiff acting on a judgment of the courts seizes the company's assets. Consequently, it remains important for the loans officer to regularly review the Moore's Gazette, or similar publication, to identify any action being taken by creditors of the borrower when an R/E/M is involved. This is good practice in lending generally, as it indicates whether a company is experiencing any trading difficulties.

(h) *Second or Subsequent R/E/M's to 3rd Parties*: The precedent set by Clayton's case applies, whereby the size of the debt secured by the first charge is limited to the amount of original approval plus one year's interest, when a subsequent floating charge is registered over the company's assets. Care must therefore be exercised when the facilities involve some form of revolving credit such as an overdraft or bills facility.

However, this can be overcome where the bank's charge prohibits the company from giving additional securities without the bank's consent. This is a significant bargaining factor in the bank's favour when obtaining the required priority from a subsequent mortgagee.

Overcoming the Pitfalls of R/E/M Lending

[561] The majority of pitfalls associated with R/E/M lending can be overcome within the credit analysis process. The initial analysis needs to be a more thorough exercise than may be undertaken in most circumstances. This is attributable to the "hands-on" nature of the R/E/M cash flow lending. The following areas should be considered in the credit analysis:

(i)	Record of profitability	Minimum 3 years financial statements.
(ii)	Ability to produce cash flow	Cash flow information should be extracted from financial statements to assess servicing capacity to demonstrate strong cash flow over time.

(iii)	Satisfactory projections	Have specific risks of the business been addressed? Are projections realistic in light of known market condition? Has the applicant conducted their own market research?
(iv)	Management	Assessment of management's integrity and ability. The bank must be satisfied that information will be received, will be accurate, reliable and timely. Management must also display an intention to repay moneys lent. The business must possess the necessary internal control mechanisms to monitor cashflow, debtors, stock and creditors.
(v)	Solvency	Is the company experiencing a liquidity crisis?
(vi)	Overexposure	The business should preferably not be reliant on: one major supplier, or one major customer, or one major project, or one key person (although this factor can be mitigated by the existence of key man insurance).
(vii)	Growth rate	Growth can be too rapid and can threaten the solvency of the company by placing a strain on liquidity. Over-trading (inadequate cash resources for level of business) is a major cause of business failure.

The bottom line is that the cash flow-R/E/M style of lending is not for the desperate client. Servicing capacity must be demonstrated by past results and prospects. Both sound management and the ability to provide the bank, at regular intervals, with the reliable information it requires are a must for this form of lending. It is envisaged cash flow lending, especially where the sole security is to be R/E/M, be provided to those worthwhile businesses demonstrating a proven track record albeit a lack of traditional collateral. New businesses, while often offering exciting prospects, should generally provide collateral by way of third party support until the elements of profitability, servicing ability and sound management are sufficiently evidenced. Generally speaking, reviews should be carried out on a quarterly basis; however, where individual circumstances dictate, the interval adopted may be either relaxed to no more than six months or more closely monitored at monthly intervals. A decision on this aspect will be a function of the operating nature of the business. Proper monitoring is required to ensure the bank's position remains sound. A company, which is unable to provide results and estimates at regular intervals, should be viewed with caution. The lender must be satisfied that both the control mechanisms are in place for the results to be regularly generated and that management intends to preserve the reliability of the data and continue to deliver the data to the bank. Customer information may require verification, which can take the form of physical inspection, provision of authenticated documents, certificates or audited reports. The integrity of the management is assessed to determine the form and extent of verification necessary in each instance.

Crystallisation of the Charge

[562] Unless the company enters into liquidation or simply ceases to carry on trading, crystallisation of the charge would need to be initiated by the bank. This involves:

1. issue of letter of demand for the amount of outstanding principal and interest; and
2. appointment of a receiver upon default.

APPENDIX 5B

International currency abbreviations

[563]

Country	*Monetary Unit*	*Code*
Australia*	Dollar	AUD
Austria	Schilling	ATS
Belgium	Franc	BEF
China	Renminbi	CNY
Canada	Dollar	CAD
Denmark	Kroner	DKK
Fiji*	Dollar	FJD
Finland	Markka	FIM
Germany	Deutschmark	DEM
Greece	Drachma	GRD
Hong Kong	Dollar	HKD
India*	Rupee	INR
Indonesia	Rupiah	IDR
Ireland	Punt	IEP
Japan	Yen	JPY
Kuwait	Dinar	KWD
Malaysia	Ringgit	MYR
Malta*	Lira	MTL
Netherlands	Guilder	NLG
New Zealand	Dollar	NZD
Norway	Krone	NOK
Oman	Rial	OMR
Pakistan	Rupee	PKR
Papua New Guinea*	Kina	PGK
Philippines	Peso	PHP

Country	*Monetary Unit*	*Code*
Portugal	Escudo	PTE
Saudi Arabia	Riyal	SAR
Singapore	Dollar	SGD
South Africa	Rand	ZAR
Spain	Peseta	ESP
Sri Lanka	Rupee	LKR
Sweden	Krona	SEK
Switzerland	Franc	CHF
Thailand	Baht	THB
United Kingdom*	Pound	GBP
United States	Dollar	USD

*—Inverse quoted currencies

6

Interest Rate Risk

Background

[601] Traditionally, Australian banks have borrowed via short term and/or variable interest rate facilities in order to finance long term and/or fixed interest rate loans and investments, a process referred to as *maturity transformation*: see [703]. This, to a large extent, reflects only the wants and needs of investors and borrowers in the Australian market. That is, householders, historically the largest domestic providers of funds, place a high premium on the capability/availability of credit funds. Australian corporates and the Federal Government, on the other hand, perennially net users of finance, have generally sought longer term debt to match long term construction and development programmes. Obviously, in a non-intermediated finance system, this diversity in investment/borrowing horizons would be unworkable. Banks have, however, provided the bridge between the two markets—a pool of continually rolled over maturing deposits providing the stability to meet the longer time profile of the average borrower.

The inducement that has enticed these normally conservative institutions into indulging in this fairly risky exercise has been the profitability that has, in the past accompanied it. This profitability can be traced to the following factors:

1. The "normal" shape of the yield curve (see [319]) in Australia has been upward sloping. In a world where interest rates presumably fall as often as rise, this would suggest that despite possible short term reversals, short term funds will, *in the long run,* prove relatively cheap while longer term lending will eventually provide the highest returns; and
2. The banks also charge a premium for term. In other words, the banks' "own" loan yield curves (that is, the rates charged on bank loan products for various terms) would generally be more sharply upward

sloping than the "market" yield curve. Similarly, the margin between a bank's long term deposit and lending rates would be greater than the corresponding margin at the "short" end.

Although there are other financial institutions in competition with banks that might have been expected to eat into the margin described in (2) above, the sheer size of the banks relative to other financial intermediaries has ensured that only the banks were in a position to bear the risk of the possibly large short run losses associated with running a mismatch. Viewed in this light, the phenomenon described in (2) above, can be regarded perhaps less as a monopoly return and more as an *economy of scale induced* comparative advantage in interest rate risk-bearing ability. While to an extent anticipating the arguments commencing at [634], the preceding analysis provides us with the first simple rule of mismatching: *The size of optimal balance sheet interest exposure is positively related to the absolute size of the balance sheet itself.*

In any event, the deregulation of financial markets and the volatility in interest rates over the past decade have meant that the yield curve can no longer be safely assumed to have any "normal" shape (in fact, from the stand point of economic theory, the concept of a "normal" yield curve has always been fairly dubious), therefore eliminating the first of our identified sources of mismatching profitability. Deregulation has seen off the second source—"fat" margins above or below market interest rate levels no longer persist for any substantial length of time.

[602] Presented with an ever-increasing array of products and financial intermediaries, Australian investors and borrowers are increasingly interest rate sensitive. The proportion of funding available to banks from "cheap" retail sources is dwindling rapidly, whilst the margins available from lending have shrunk rapidly. New competitors in the industry have targeted these customers and the hitherto "profitable" middle sized business borrower is most susceptible to poaching—in terms of the scope for price competition.

Additionally, interest rate volatility has meant that the "short term reverses" in net interest margins that banks occasionally experienced under traditional mismatches and referred to above, may be both larger in size and occur more frequently. Banks can no longer assume long run profitability will cover these short term losses. In the United States for example, it has been suggested that a number of banking crises (for example, the collapse of the First Pennsylvania National Bank and the failure of many savings and loan institutions during the 1980s) can be traced more to poor interest rate risk management practices than to poor credit decisions. That is, interest rate margins (and the margin between the rate at which banks lend and the rate that they offer customers for deposits) had failed to provide a sufficient buffer to protect against short term liquidity and/or default pressures.

The phenomenon of *securitisation* (see [230]) has also played its part in turning the eyes of financial managers to interest rate risk—again via its impact on the liability profile of lenders. Direct on-sale of loans in the form of bank accepted commercial bills, promissory notes, letters of credit, structured notes, etc, necessarily implies that this paper will be purchased or financed by "professional" market players and intermediaries (such as other banks or fund managers). As discussed, this means an ever-diminishing proportion of loan funding arising out of "captive" and interest rate insensitive small investors.

These, then, are the factors which in recent times have forced banks to institute interest rate risk management strategies to immunise earnings from adverse interest rate movements, while still allowing, where possible, maximum benefit to be gained from favourable interest rate movements.

Defining interest rate risk

[603] Interest rate exposure refers to the problems of having one side of the balance sheet based largely on rate sensitive (or floating rate) items and the other side on rate insensitive (or fixed rate) items. It can be said to exist whenever a bank enters into an agreement to either provide or accept funds for a specified rate. In this case, both the bank and its customer either explicitly or implicitly are taking a "bet" on the likely movement in interest rates over the term of the agreement.

Examples of interest rate risk that may be faced by company executives include:

- A Treasurer has a borrowing which is priced at a fixed margin over a benchmark rate (say the Bank Accepted Commercial Bill Rate) but fears that interest rates will rise.
- A Company Finance Director is aware that in the near future the company will be cashed up in preparation for a major capital expenditure. However, he anticipates that short term rates will fall between now and the time the funds will be required to purchase the equipment.

- Management approves a capital expenditure project with a positive net present value based on a borrowing cost of 8.0% pa. Sensitivity testing shows that, should rates average 9.25% pa, the project will return a negative net present value.

[604] Interest rate exposure can be disaggregated into three types:

i. direct interest rate risk;

ii. indirect interest rate risk; and

iii. basis risk.

[605] *Direct interest rate risk* is generally quantifiable and refers to the extent to which a bank's asset and liability interest rate reset dates are mismatched.

If, for example, a bank has mainly longer term fixed rate deposit liabilities and floating rate assets, then its interest rate margin (and profits) will tend to improve when interest rates rise and worsen when rates fall. When rates rise the bank will be able to increase its (floating rate based) lending rates and immediately boost earnings. However, even if the bank raises its term deposit rates, its deposit costs will rise more slowly, since existing deposits have been locked in for a specified term at a lower rate.

Alternatively, a bank which has mainly floating rate or call deposits and fixed rate/term assets will find that its interest margin will improve when interest rates fall and worsen when interest rates rise.

[606] *Indirect interest rate risk* arises both from the change in customers' behavioural incentives (economically, a change in optimal financial plans) due to changes in interest rates, and from the change in customer *circumstance* (economically, a change in the constraint set) due to changes in interest rates.

The first of these effects can be seen in the tendency of personal instalment loan customers to pre-pay their fixed rate loans early and housing loan customers to re-finance their loans in times of falling interest rates. Similarly, in times of rising interest rates customers with fixed deposits might be expected to redeem their deposits before the maturity date (provided the "break" costs were not prohibitive).

The second "circumstance" effect refers to the fact that changes in interest rate levels are often strongly correlated with the level of activity in an economy and, therefore, with the level of loan defalcation. Hence, a change in interest rates may change the value (that is, the discounted expected future profitability) of even a "matched" deposit/loan portfolio as the perceived *risk* level of that portfolio will have changed.

[607] The final form of interest rate risk is termed *basis risk.* While the first two identified risks refer to the bank's exposure to changes in *absolute* price/interest rate levels, basis risk refers to an exposure to movements in *relative* prices/interest rates. While much of the finance literature refers to the level of interest rates or the yield curve, there are in fact many different lending/borrowing markets and, consequently, many different yield curves. These yield curves do not necessarily all move at the same time, by the same amount, or even in the same direction!

Naturally, there is an exposure here if, for example, a bank borrows predominantly from the household sector and on-lends primarily to corporate customers. In such instances, the bank may be adversely affected by, say, the introduction of dividend imputation for personal income tax payers, which effectively enhanced the relative value of investing in equity investments over bank deposits. The bank would have to raise interest rates on its deposits to maintain their attractiveness to householders relative to share investments. However, on the other side of the balance sheet, the bank is unable to maintain its lending at existing interest rates to corporate customers as they now have access to cheaper funding, since the cost of capital will be lower (assuming nothing else has changed).

Another example of basis risk occurs where a bank uses a reference rate for pricing its loans (such as say the bank bill swap rate—BBSW). Assume the bank raises funds on the wholesale market, based on the same reference rate, and that its traditional cost is BBSW + 1. The bank looks for an average margin of 59 basis points for all of its loans (that is, charging on average BBSW + 60). Unfortunately, because of a ratings review, the market has down graded the bank, requiring it pay BBSW + 2 for its funds. The bank has experienced a narrowing of average margins to 58 points, due to an increase in the "basis" on its deposits rates.

Measuring interest rate risk

There are four main methods of estimating interest rate risk:

i. the gap model;

ii. variance analysis;

iii. duration/adjusted duration; and

iv. full simulation

[608] The gap model. The gap model measures the dollar value difference between interest rate sensitive (or floating rate) assets and liabilities. Simply stated, it is based on the following equation:

$$\text{Gap} = \text{RSA} - \text{RSL} \tag{6.1}$$

Where

RSA — the dollar value of rate sensitive assets; and

RSL — the dollar value of rate sensitive liabilities.

As an example, a bank with a $100 million balance sheet might have $40 million in rate sensitive assets and $10 million in rate sensitive liabilities. Its mismatch gap would then be equal to $30 million, being the net amount of the balance sheet which is potentially exposed to interest rate changes.

As a further example, assume that XYZ Company Ltd has borrowings as follows:

$ 10 million	bank overdraft
$ 5 million	bill acceptance/discount facility
$10 million	five year interest rate bank bill facility
$25 million	

Assume further that all facilities are utilised.

XYZ Company Ltd has the following investments:

$10 million	overnight cash
$15 million	bank bill investment
$25 million	

From equation 6.1, we get:

Rate Sensitive Assets: $10 million on overnight cash;
$15 million in bank bills.

Rate Sensitive Liabilities: $10 million overdraft debt;
$ 5 million in bank bills.

Mismatch gap: $10 million.

XYZ Company Ltd is said to have a positive mismatch gap of $10 million.

The gap model can be extended to provide a profile of the relative sensitivity of a bank's balance sheet over time. The bank's individual assets and liabilities are categorised chronologically, according to their relative interest rate reset dates. Fully floating rate items appear at the left of the table with the gap model extending to the right at regular intervals—generally every three to six months.

The gap model can be expressed graphically as illustrated in Figure 6.1. In the diagram we have taken a bank with assets totalling $1,000 million. The diagram indicates that the bank is basically "long" in assets and "short" in liabilities (that is, has a higher proportion of term fixed rate assets to liabilities). Consequently, if interest rates generally were to rise, the bank's interest costs would respond more quickly to this change than its interest earnings, suggesting a squeeze on its interest margin.

The gap model has the over-riding advantage of simplicity. It can also provide a dollar measure of the asset-liability gap mismatch each time interval under consideration.

However, while such mismatch tables represent a major advance in obtaining some idea of the potential interest rate exposure faced by a bank, they suffer from some important failings, namely:

- The gap model provides no measure of *basis risk* (see [607]). That is, the tables indicate the net dollar value of aggregated assets and liabilities exposed to interest rate movements over a particular time horizon.

- There can be sufficient timing mismatch within each chosen "maturity bucket" to make conclusions regarding the direction of interest rate exposure erroneous. For example, in an extreme case, a gap model may indicate a "perfect" match of assets and liabilities of say, $10 million each in "< 3 month" category, "guaranteeing" a maintenance of normal interest margins over that period. However, if all $10 million of the assets mature on Day 1 of the period while all the liabilities mature on Day 90, an immediate 1% movement in rates would cause an unanticipated shortfall/excess in earnings over the period of ($10 million x 0.01 x 89/365 = $24,383.56).

  It is possible for this effect (in this admittedly extreme case, at least) to dominate reported earnings over a period.

  While this problem can be alleviated to an extent by narrowing the "range" of each period, the effect of this may be to lose all the simplicity (and, as a result, most of the meaning) of the model.

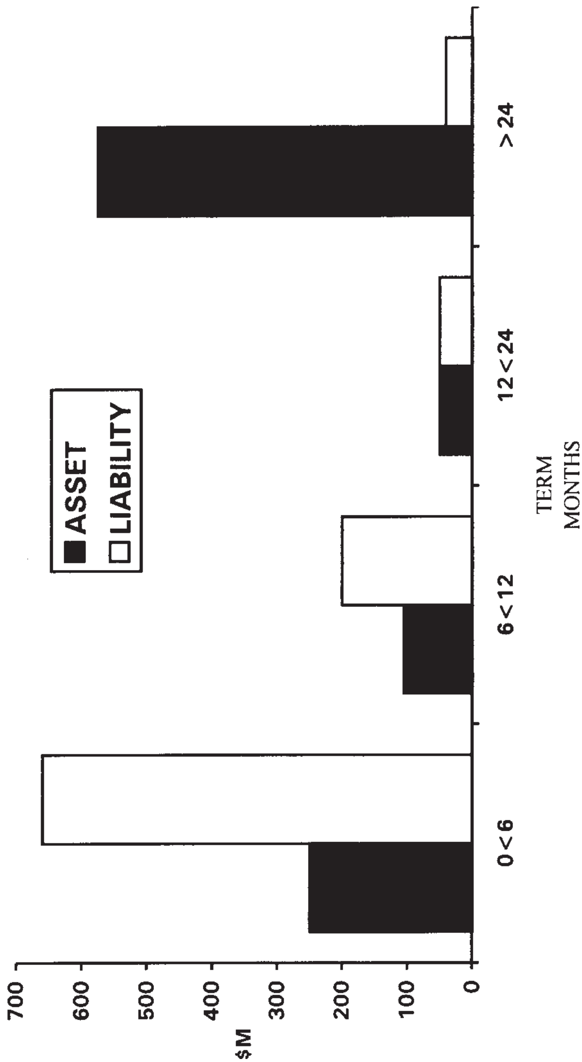

Fig 6.1
Asset/liability mismatch

- Most importantly, the mismatch tables provide no information on the timing of cash flows from principal and interest payments and the reinvestment returns derived therefrom. As an example of this exposure to mismatched cash flows, consider a 15 year fixed rate loan for $20 million at, say, 15% pa with equal annual repayments (that is, $3,420,341.10 per year) financed by a $10 million 15 year zero coupon/deep discount[1] (for simplicity) deposit at, say, 12.0% pa (annual effective)—that is, paying $109,471,315.20 (= $20,000,000 * $(1.12)^{15}$) on maturity. The gap model will show this as "riskless" and, on the face of it, the transaction appears to lock in a profit to the bank of 3.0% pa (that is, $31,159,348.33 on maturity). However, this assumes that the yearly loan repayments are each reinvested at 15.0% pa until maturity. There is, obviously, an exposure here to a *fall* in interest rates. Consider the effect of an immediate fall in rates such that each payment received can only be reinvested at 10.0% pa. At the end of the 15 year period, total investment returns are:

$$\$3{,}320{,}341.10 \times (1.10)^{14} + \$3{,}320{,}341.10 \times (1.10)^{13} + \ldots$$
$$+ \$3{,}320{,}341.10 \times (1.10)^{1} + \$3{,}320{,}341.10 \times (1.10)^{0}$$
$$= \$108{,}672{,}725$$

Note that this now represents an overall loss on the deal ($109,471,315 -$108,672,725 = $798,590).

While this is a very simple example, eschewing deposit coupons and based on equal yearly loan payments, it emphasises the reinvestment assumption (and hence the exposure if that assumption breaks down) behind estimating the profitability of the mismatched cash flows.

Again, the gap model can be adjusted to more clearly reflect this type of risk. This is done by basing it on principal flows. The 15 year $20 million loan above would, for instance, appear in each of 15 different maturity buckets depending upon the calculated amount of "principal" repaid in each period. However, this both complicates the otherwise simple data requirements of the gap model and it still neglects the timing of interest payments/receipts. These problems are most clearly addressed in the duration model described in [610].

[609] Variance analysis. The variance analysis model provides a means for quantifying the earnings impact of interest rate changes. Assuming that we can identify the balance sheet at two points in time, the change in net interest earnings over the period can be disaggregated into rate induced effects and volume induced effects. Algebraically, the model can be expressed as follows:

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1. A zero coupon or deep discount security or *consol* is a security offering no interest payments between purchase date and the maturity date. Rather, the interest payments are imputed in the purchase price, since the security's original issue price will be substantially below its maturity or face value.

$$\Delta E = \underbrace{v_1 \times (r_2 - r_1)}_{\text{rate movement}} + \underbrace{r_1 \times (v_2 - v_1)}_{\text{volume movement}} + u \tag{6.2}$$

where

ΔE	—	change in net interest earnings
r_1, r_2	—	the rate of interest in periods 1 and 2
v_1, v_2	—	the level of outstanding balances in periods 1 and 2
u	—	unidentifiable factors

The variance model is especially useful for ascertaining the reasons for changes in a bank's earnings, be it forecast or actual earnings, between two time periods. It can also be used to evaluate the effectiveness of budget forecasts by comparing actual earnings and their components, with budgeted earnings. Table 6.1 provides an example of how a variance model works. In this case the model is disaggregated by bank product and total interest income and expense is disaggregated by interest rate or volume components.

Table 6.1 indicates that net earnings (shareholders' funds) were \$0.5 million above the previous period. Much of the reason for the better result would be attributed to higher earnings arising from higher interest rates generally, as exhibited in the interest rate variance for both assets and liabilities of ABC Bank.

The model can be represented diagrammatically in Figure 6.2. It has the major advantage that it can quantify the impact of interest rate changes on earnings for each balance sheet item. However, like the gap model, it suffers from a number of disadvantages.

Firstly, it cannot identify all of the factors contributing to the change in earnings.

In Figure 6.2 interest earnings, given r_1v_1, will equal OFBG, while at r_2v_2 interest earnings total OEDH. The variance analysis model identifies the segment FEAB as the increase in earnings due solely to an increase in interest rates. Similarly, GBCH is the increase due solely to the rise in volume. The segment ABCD, while identified as an earnings increase, is not clearly attributed to variation in either rate or volume. However, this problem can be overcome by using equation 6.3 which essentially divides the segment ABCD in half and apportions it between rate and volume variation:

$$\Delta E = \underbrace{\tfrac{1}{2}(v_1 + v_2) \times (r_2 - r_1)}_{\text{rate induced}} + \underbrace{\tfrac{1}{2}(r_1 - r_2) \times (v_2 - v_1)}_{\text{volume induced}} + u \tag{6.3}$$

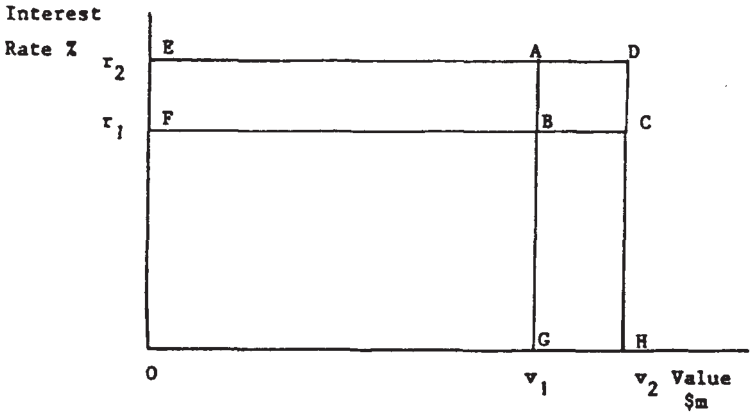
Table 6.1

Variance model in practice—ABC Bank

	Rate Variance $m	*Volume Variance* $m	*Total Variance* $m		*Rate Variance* $m	*Volume Variance* $m	*Total Variance* $m
Passbook a/c's	1.5	2.0	3.5	Housing loans	1.2	-0.2	1.0
Call deposits	0.9	-0.2	0.7	Personal loans	0.1	0.1	0.2
Retail term deposits	2.0	1.0	3.0	Credit cards	0.3	0.5	0.8
Wholesale term				Commercial loans	—	-0.2	-0.2
deposits	-0.9	—	-0.9	Commercial bills	-0.1	1.7	1.6
Certificates of				Corporate loans	—	0.6	0.6
deposit	-0.2	-1.0	-1.2	Government securities	0.8	0.4	1.2
Shareholders' funds	—	0.5	0.5	Other assets	0.6	-0.2	0.4
	3.3	2.3	5.6		2.9	2.7	5.6

Fig 6.2

Diagramatic representation of the variance model



Another major disadvantage of the variance model is that it fails to identify the timing of rate changes on a bank's earnings. For example, rate changes may have occurred prior to the period under review, but because of the existence of rate sensitive assets and liabilities, these rate changes will not reflect on the average earnings/cost rate on the assets and/or liabilities being reviewed. Similarly, for a term deposit portfolio, the rate variance component will only measure the change in the "average cost of funds of term deposits" between the two periods under review. This average may incorporate a host of interest rate changes which have occurred both prior to and during the two periods under review. Moreover there is no way to tell the impact of each interest rate change on the term deposit portfolio as we have no information on the term structure of that portfolio or, more importantly, the interest rate reset dates for deposits within the portfolio. Hence the model fails to quantify the interest rate sensitivity of a bank's balance sheet.

[610] Duration model

(i) *The duration of an individual security*

Duration essentially measures the weighted (by term) average of the present values of the future cash flows of a security, thereby explicitly taking into account interest and principal repayments. It is useful primarily because it provides a single number measure of the interest rate sensitivity of the security.

Although more complex equations have been developed, the original duration formula developed by Frederick Macaulay in his 1938[2] analysis remains both the simplest and fully comparable in terms of explanatory power to any other. The Macaulay duration formula is re-written as equation 6.4:

$$D = \frac{\sum_{n=1}^{m} \frac{nC_n}{(1+i_n)^n}}{\sum_{n=1}^{m} \frac{C_n}{(1+i_n)^n}} \tag{6.4}$$

where

C_n	—	payment in period n
m	—	number of periods to maturity
i_n	—	yield in period n. In the original Macaulay formula, $i_1 = i_2 = i_3 = \ldots = i_m$

For example, the duration of a 2 year 10% coupon bond with interest payments twice yearly, valued at a yield of 12% is:

$$D = \frac{\frac{0.5}{(1.06)^1} + \frac{2 \times .05}{(1.06)^2} + \frac{3 \times .05}{(1.06)^3} \times \frac{4 \times 1.05}{(1.06)^4}}{\frac{.05}{(1.06)^1} + \frac{.05}{(1.06)^2} + \frac{.05}{(1.06)^3} + \frac{1.05}{(1.06)^4}}$$

$$= 3.5889 / 0.9653$$

$$= 3.7177 \text{ half years or } 1.8589 \text{ years}$$

The use of duration as an interest rate sensitivity measure derives from the fact that the formula can be seen to convert—for heuristic purposes at least—any security or any flow of payments into the equivalent zero coupon (or consol) security. The formula does this by defining the period for which a yield is locked in on the investment. In the example above, any losses (gains) on the re-investment of coupons received within the first 1.8589 years—re-invested for 1.8589 years from date zero—due to an immediate interest rate fall (rise), will be exactly offset by an increase (decrease) in the capital value (valued 1.8589 years hence) of the

2. F Macaulay, "*The Movement of Interest Rates, Bond Yields and Stock Price in the United States since 1865*", Columbia University Press, 1938, pp 44-53.

remaining payment stream. Hence (making some assumptions—detailed below), if the security is sold after having been held for its period of calculated duration, the holding period is unaltered by an immediate change in interest rates remaining in force for the rest of the holding period. The implication is, therefore, that the end effect is identical to having purchased a "couponless" instrument *maturing* after 1.8589 years, as stated.

By using an example, we can test the duration approximation as follows:

- The gross price of a "cum-interest" 10% coupon, 2 year bond yielding 12.0% and having a face value of $100 = 96.53489
- Let interest rates fall to 11.9%
- Re-investment of coupons to a date 1.8589 years hence, yields:

$$5 \times (1.0595)^2 \times (1 + 0.119 \times 0.3589)$$
$$+ 5 \times (1.0595)^1 \times (1 + 0.119 \times 0.3589)$$
$$+ 5 \times (1 + 0.119 \times 0.3589)$$

Note that since we are dealing with half year periods, we must adjust for the incremental term after 1.5 years, in this case 0.3589 years.

$$= 5.82541 + 5.52375 + 5.21355$$
$$= \$16.59.$$

- Proceeds from sale of the bond at 11.9% after 1.8589 years will be as follows:

$$105 - (1 + 0.1190 \times (1 - 0.8589))$$

Where $(1 + 0.1190 \times (1 - 0.8589))$ refers to that part of the final coupon to be earned by the purchaser of our bond.

$$= \$103.27$$

- Total return = $119.86 (ie 103.27 + 16.59)
- Investment of $96.53489 at a 12.0% semi annual yield in a 1.8589 year *zero* coupon security yields:

$$\$96.53489 \times (1 + 0.06)^3 \times (1 + 12 \times 0.3589)$$
$$= \$119.93.$$

(The 7c difference is due to rounding/approximate nature of the duration calculation. The difference represents less than 0.01% pa.)

It follows from this analysis that *all securities of equivalent duration are also of equivalent price volatility for a given change in interest rates.* This is of *critical* importance for understanding the use of duration for minimising interest rate exposure.

While we have concentrated until now on protecting interest earnings margins from movements in interest rate fluctuations, it is easily seen that the excess of asset market value over liability market value is equivalent to the discounted value of the future earnings margin. Duration emphasises the price/value aspect of this relationship—arguing that *by ensuring that the asset value changes by an equivalent amount to the change in liability value for a given change in interest rates will produce the same result as immunising the earnings margin.*

In fact, by emphasising market valuation of securities, duration provides a better signal of the effects of interest rate movements. Consider, for example, an investor holding a 6 month fixed asset yielding, say 13.0% against a 2 year fixed rate liability yielding, say, 11.0%. If interest rates move against the investor (that is, rates fall), an earnings based performance measure will provide no signal of the investor's worsened position for six months, and even then will give no indication of the seriousness (that is, length of time the worsened performance will persist) of the position. Market valuation will provide an *immediate* indication of the adverse impact on the investor's earnings potential, and the *magnitude* of the change in value can easily be translated into a size or period of worsened earnings. Returning to our example of the 15 year loan from the gap model in [609], we now know that we should seek to finance that loan *not* with a deposit of equivalent maturity necessarily, but with one of equivalent *price volatility,* that is, equivalent duration. Reverting to equation 6.4:

$$D = \frac{\sum_{n=1}^{m} \frac{nC_n}{(1+i_n)^n}}{\sum_{n=1}^{m} \frac{C_n}{(1+i_n)^n}} \qquad (6.4)$$

In this case, the 15 year lease has a duration of:

$$D = \frac{\sum_{n=1}^{15} \frac{n \times 3{,}420{,}341.10}{(1.15)^n}}{\sum_{n=1}^{15} \frac{3{,}420{,}341.10}{(1.15)^n}}$$

$$= 5.565 \text{ years}$$

Funding via a zero coupon liability of 5.565 years maturity (Present Value = \$20 million. Face Value = \$20 million x $(1.15)^{5.565}$ = \$43,532,486.82) is, therefore, one means of immunising the immediate interest rate risk (although naturally there would be a host of coupon paying liabilities of equivalent price volatility/duration). A 0.50% fall in rates from 15.0% to 14.5% leads to the following change in capital value:

Asset:

$$\sum_{n=1}^{15} \frac{\$3{,}420{,}341.10}{(1.15)^n} - \frac{\$3{,}420{,}341.10}{(1.15)^n}$$
$$= \$493{,}855.04$$

Liability:

$$\sum_{n=1}^{15} \frac{\$43{,}532{,}486.82}{(1.15)^{5.565}} - \frac{\$43{,}532{,}486.82}{(1.15)^{5.565}}$$

$$= -\$490{,}895.75$$

Again, as the price volatilities/duration were (roughly) equivalent, total portfolio value did not change substantially—meaning that the value of the future "earnings" flow was protected.

Note that the change in market value of an instrument due to a change in interest rates can be approximated by equation 6.5:

$$\frac{(\text{Value of Asset}) \times \text{duration} \times \text{interest rate change}}{(1 + \text{initial market yield})} \tag{6.5}$$

(ii) *The duration of a portfolio*

[611] As the duration formula breaks down a security into its component cash flows, so the duration of an entire asset portfolio can be measured the same way—by explicitly defining all the cash flows of the portfolio and applying the Macaulay formulae to them. Once this is understood, however, the procedure can be expedited by applying the following rule: *the duration of a portfolio is simply the weighted average of the durations of its component securities.* This can be expressed algebraically as follows:

$$\text{Dport} = \frac{P_1D_1 + P_2D_2}{P_1 + P_2} \tag{6.6}$$

where

Dport	—	the portfolio duration
P_1	—	the present value (price) of security 1
D_1	—	duration of security 1
P_2	—	the present valuer (price) of security 2
D_2	—	duration of security 2

Additionally, the duration measure can be expanded to accommodate the impact of futures transactions on a bank's interest rate exposure. The duration of the portfolio containing both cash securities and futures contracts can be given as follows:

$$D = D_p + D_f \times \frac{V_f}{V_p} \tag{6.7}$$

where

D	—	the overall portfolio duration
D_p	—	the duration of the physical portfolio
D_f	—	the duration of the deliverable securities involved in the futures contract from the delivery date
V_p	—	the market value of the securities in the physical portfolio
V_f	—	the market value of the underlying securities in the futures contracts in the portfolio (positive for contracts to buy securities and negative for contracts to sell securities).

The importance of this formula is made clearer in the discussion of the use of financial futures and volatility matching in general in [624].

The meaning of a portfolio duration does not vary significantly from that of an individual security. Consider, for example, an asset portfolio of $10 billion. In this portfolio may be commercial bills, term loans, government bonds, lease finance loans, overnight loans, etc. By computing the duration of the portfolio as described above and discovering it to be of weighted average duration equal to say seven months, we know that for purposes of interest rate risk management the portfolio can (roughly) be treated as a single $10 billion zero coupon security with a maturity of seven months. If the liability portfolio duration were shorter, say five months, we could from these simple calculations not only deduce an overall exposure to rising interest rates, but even quantify (on a present value basis) the effects of a change in the general level of interest rates on the economic value of the business.

This is the major benefit of duration as an interest rate risk measurement tool—it can convert the cash flow characteristics of a diverse portfolio into a single number measure of interest rate risk that is easy to interpret and use for management reporting purposes.

[612] As with the previous measures of interest rate risk, the duration measure has a few limitations:

- Naturally, the extent of *simplification* achievable via a duration measure implies the *loss* of some information as well. The chief drawback involves the distinction between a *matched* balance sheet (that is, one which is virtually riskless as fixed cash receipts match fixed cash outgoes) and a balance sheet which is merely *immunised* (that is, where the price volatility of the asset portfolio is matched against the price volatility of the liability portfolio). Significant mismatch may exist in an immunised portfolio—in fact, the matched balance sheet is really only a special case of immunisation. While the "gap" model can distinguish these cases, the duration model does not.
- Duration immunisation (that is, matching asset and liability portfolio volatilities) provides protection only against an *immediate* change in interest rate levels. An asset and liability of equal duration but of dissimilar cash flows at one level of interest rates will have *different* durations at a different level of interest rates. The volatility of all debt securities varies with the level of interest rates, but the *rate* of this variation differs between securities. Hence, while no significant overall change in an immunised portfolio's market value will have occurred for a given immediate change in interest rate level, the portfolio will no longer be immunised against the *next* change in interest rates. Some portfolio adjustments will have to take place to "re-immunise" the position.
- Similarly, even if interest rates remain stable over time, the duration of securities with dissimilar cash flows does not (as does term-to-maturity) change uniformly over time. To take an extreme example, our 15 year lease of duration 5.565 years considered in [610] is, naturally, initially equivalent in price volatility to a 5.565 year consol or zero coupon security. At the end of 5.565 years, the remaining payment stream of the consol is, transparently, zero, while the lease has 10 remaining payments due—obviously with significant non-zero volatility/duration. The duration of the consol has "shortened" at an appreciably faster rate than that of the lease. Again, the conclusion to be drawn is that a portfolio that is immunised on day 1 will no longer necessarily be perfectly protected against interest

rate risk on day 2. As above, continual re-adjustment of the portfolio will be necessary to maintain immunisation. Appendix 6.1 illustrates the impact of yield curve movements on duration "matched" and "non-matched" portfolios. It also introduces and identifies the impact of *convexity*—the derivative or "second moment" of duration.

- Duration provides a high level of accuracy in ensuring offsetting gains and losses only for *small* changes in interest rates as it is based on a differential concept.

For *finite* changes in interest rate levels, some discrepancies arise—duration being only a linear approximation to what is actually a curvilinear relationship.

- The use of Macaulay's duration formula (see [610]) involves the assumptions of a flat yield curve moving in parallel shifts. With the break-down of these assumptions, Macaulay's formula becomes only an approximation of volatility. In practice, there is considerable theoretical and empirical justification for the assumption of parallel yield curve shifts at the "long" (beyond two or three years) end of the yield curve. Studies testing the usefulness of more sophisticated duration formulae (allowing for various assumptions about the stochastic process driving interest rate changes) have shown little or no superiority over the simple Macaulay approach. For the purposes of financial managers, it is suggested that *non-anticipated changes* in the shape of the yield curve should be borne as a (long run neutral) basis risk. *Anticipated* changes can be countered via spread trading (for example anticipated yield curve *steepening* can be profited from by issuing longer term fixed rate debt and buying shorter term securities).

- Duration's use as a risk measure requires, as a practical consideration, a highly developed management information system providing details of maturity and cash flow profiles, and interest rate profiles. With the potential benefits that can be derived from being able to quantify interest rate (and other) risk, development of such a comprehensive management information system is considered both desirable and, in the long run, essential.

- Finally, in its simplest form the duration measurement for an asset or liability portfolio uses a single yield curve to discount payments on all types of securities. While a representative rate may be found, there is obviously basis risk inherent in the implicit assumption that all rates move together. This leads on to the following discussion of beta-adjusted duration. Again, anticipated basis changes can be counteracted via spread trades (for example, an anticipated fall in home loan rates relative to bank bills can be profited from by home lending approvals financed out of commercial bill sales).

[613] **Beta-adjusted duration.** The emphasis that has been placed on duration as a proxy for a security's price volatility allows for a simple extension of the concept to allow for different interest rate volatility between different types of securities.

As discussed above, a single representative interest rate will have to be chosen for duration calculations. Up to this point, it has been assumed that a one-to-one relationship exists between the representative rate and all other interest rates. Consider, however, two 90 day zero coupon securities of different type (say a 90 day bank accepted commercial bill and a Treasury Note). While at first glance they are transparently of identical duration and hence *price volatility,* if we knew that a 1% movement in Treasury Note rates would correspond to a 1.5% movement in bank bill rates (for example), then the securities are *not* of equivalent risk.

From historical data, it is possible to estimate the relative interest rate volatilities of various securities relative to the benchmark rate, that is, we estimate over time the equation:

$$r_x = \alpha + \beta(r_B) + u \tag{6.8}$$

where

r_x	—	the interest rate on security x
r_B	—	the interest rate on our benchmark security
α	—	constant
u	—	error term

The resultant estimate of beta (β) can then be used to adjust the duration of security x (by multiplication) to get a "real" volatility vis-a-vis the benchmark. An easy confirmation for this can be seen by referring to the change in market value formula provided in equation 6.5.

While this methodology is in itself quite simple, it can be expanded to include non-linear relationships between different types of interest rates, leads, lags, etc. It is, in fact, only a step away from full simulation.

The drawbacks are twofold. Firstly, the literature of financial economics would have us be wary of any attempt to extrapolate historical interest rate relationships. This argument—arising out of the Efficient Market Hypothesis (refer footnote 5, Chapter 2)—can also be directed at similar economic models such as CAPM (the Capital Asset Pricing Model) and is open to debate.

Secondly, if the duration model itself requires massive investment in management information systems, the input required for beta-adjustments is even greater. It is problematical whether the extra precision gained from this methodology justifies the required resource investment.

[614] Full simulation. It is, of course, impossible to describe the simulation approach to interest rate risk management as fully as maturity gap or duration analysis. All that can be done is point to the advantages and disadvantages of the simulation approach.

Advantages

- The main advantage of simulation is that it is dynamic. Whereas maturity gap and duration models provide only a "snapshot" of a firm, simulation is a forward-looking motion picture, and by anticipation of the future reduces reliance on crisis management.
- Simulations allow the testing and comparison of strategies.
- Properly designed simulations can measure the interest rate risk of a balance sheet more accurately than maturity gap models (although no more so than, say, beta-adjusted duration models).

Drawbacks

- The main drawback of simulations is, simply, too much data. As mentioned, the main advantage of the duration analysis was that it could provide a single number measure of interest rate risk. This summary, naturally leaves out information. The simulation model, on the other hand, excludes no information, generating instead enormous amounts of output to be digested.
- Simulations are only as good as the data, assumptions and structure of the model. There is a likelihood of "black box" simulation results being accepted and acted upon by management as gospel without that management having sufficient understanding of the model's results to its assumptions, and the sensitivity of the model's results to the quality of the data. There is also the likelihood that, as time passes, the internal structure of the simulation models will diverge increasingly from reality.
- Finally, but nonetheless importantly, simulation models have been unpopular largely because of the enormous computer power and personnel resources required to support them.

On the whole, simulation models should be accepted with caution, and be used only by large institutions possessing the required skilled manpower and computer resources, and only if the gap/duration models prove too restrictive—which should rarely occur.

Managing interest rate risk

[615] Knowledge of risk can only be an aid to management if means for alleviating or controlling that risk exist. The most common tools of interest rate risk management are discussed below.

(a) Short term "physical" interest rate risk management tools

(1) *Marketable asset portfolio management*

[616] For those securitised loans for which active secondary markets exist, the bank treasurer can take steps to lengthen or shorten asset structures.

The simplest is to switch his portfolio of assets by selling off, or minimising purchasing, those asset maturities which do not conform with his interest rate immunisation strategy and/or purchasing those asset maturities which would lower interest rate exposure.

As well as the active trading that occurs in shorter term bank securities (with maturities less than six months) such as commercial bills, an active secondary market exists for other longer dated assets held by banks, namely Commonwealth and semi-government securities. More recently, the emergence of a secondary mortgage market[3] has enabled banks to "sell" portfolios of loans into the market for capital management and interest rate risk management purposes. This is likely to spread to credit card receivables and personal loan receivables in due course.

There are, however, some drawbacks to this particular risk management device:

- The yield on most longer term securitised loans (and these are the ones whose purchase/sale can *immediately* alter portfolio duration)

3. The secondary mortgage market is the term given to the active trading of mortgages and mortgage backed securities between mortgage originators and other investing institutions and individuals.

is substantially below that which can be earned on most corporate/retail unsecuritised lending—although having somewhat lower handling costs. For this reason the increased risk management capability (and liquidity) obtainable by holding portfolios of these securities brings with it a cost. Most Australian banks limit their holdings to that prescribed by prudence and the Prime Assets Ratio (refer [324]).

- Sale of long held, long term securities can generate significant book and tax effects that are not always desirable. That is, the valuation of a government bond at *book* value (purchase price net of accrued coupon income *plus/minus* straight line amortisation of any discount/premium at time of purchase) may diverge significantly from the (net) *market value* of that bond. Algebraically, the impact of book and tax effects can be expressed as follows:

$$\text{Market sale price - Tax value = Taxable income} \tag{6.9}$$

$$\text{Market sale price - Book value = Increment to reported profits} \tag{6.10}$$

- Finally, while there is, as stated, active trading of government and semi government securities, market depth (as far as outright position taking) for mortgage backed securities remains poor. It would be difficult for a major institution in Australia to radically alter the maturity structure of its various fixed interest asset portfolios without generating significant price movements in the securities in question.

(2) *Marketable and "professional market" liability management*

[617] To the extent that there is a secondary market in bank liabilities, liability management can serve a similar function to marketable asset portfolios. Unfortunately, there has been little active trading in direct bank liabilities beyond say, six months. A number of banks have issued longer term medium term notes (MTN) into the Australian markets (whilst most have issued MTNs into overseas markets, especially the Euro-AUD and Yankee-AUD markets), but there has been little active trading of this paper (one reason being the Reserve Bank requirement that banks cancel any of their own securities which they re-purchase from the market).

Banks then are able to achieve an immediate change in the interest rate sensitivity of their liability portfolios by issuing MTNs. Unfortunately, primary (new) issues of MTNs absorb considerable time and expense in arranging the issues. Moreover, the bank is then required to address the matter of what to do with the funds raised. Until other liabilities can be "run off", any attempt to change a liability structure quickly means taking in unwanted funds and holding them—generally at a cost—in liquid assets.

Contrarily, active secondary market trading of existing issues would produce a quicker and more cost effective variation to a bank's interest rate exposures. However, until a mechanism is developed for facilitating the ability of banks to quickly and easily re-purchase their'own debt, banks will continue to be impaired in their ability to significantly alter their interest rate exposures.

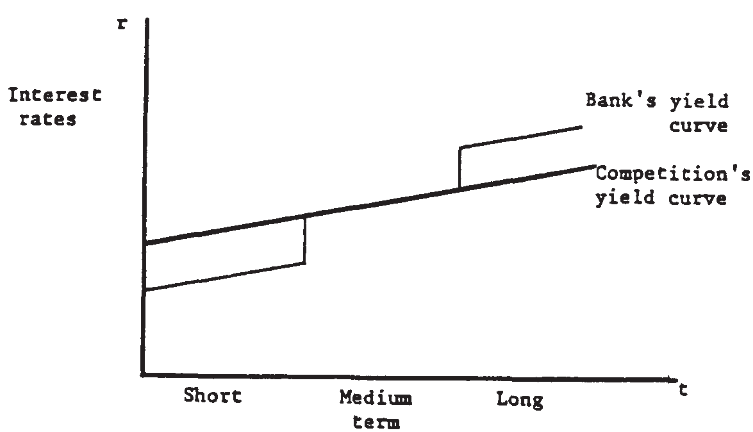
(b) Longer term "physical" interest rate risk management tools

(1) *Asset and liability pricing/loan approval policy*

[618] In trying to correct a chronic mismatch of, say, long assets and short debt, a bank may adjust its term deposit rates in an attempt to induce depositors to lodge funds for terms consistent with minimising the bank's interest rate exposure. In this case, the bank's "own" yield curve for deposits may look like that shown in Figure 6.3 relative to its competition:

Fig 6.3

Bank's versus market's yield curve



The interest rate setting will need to be consistent with the bank's other objectives of liquidity management and profit maximisation and also accord with customer preferences.

While Australian banks only rarely use their retail term deposit structures to correct interest rate mismatches, it is evident that most, if not all, have actively attempted to induce investors into maturities distant from the usual seasonal liquidity pressure zones.

On the other side of the balance sheet it is also possible to use price as a means of directing borrowers to draw down loans for preferred maturities. However, in Australia it has generally been a case of the borrower setting the term of the loan. Nonetheless, it is possible to vary the interest rates charged on fixed interest rate loans of differing maturity to entice borrowers into the bank's preferred maturity "bucket". Branch managers, loans officers and points of control can be directed to approve fixed rate loans for the bank's desired maturity where possible. It is possible that this approach may result in price competition over terms, but it is unlikely.

The *advantage* of the above approach is that all action is taken via the retail market with no significant alteration to cost structures. The *disadvantage* is that such policy will only induce substantial changes to an existing interest rate mismatch over a significant time horizon. The approach is, therefore, best directed at addressing more substantial balance sheet mismatch positions.

(2) *Prepayment/redemption penalties*

[619] Penalties for early repayment of loans by borrowers and for early redemption of fixed term/fixed interest deposits are a safeguard for financial institutions against some forms of indirect interest rate risk—that is, that incentive for term borrowers to prepay loans in times of falling interest rates and then re-finance more cheaply, or the incentive for investors to redeem deposits in times of rising interest rates, thereafter re-investing at a better rate.

To eliminate, or at least cushion against, these risks, it is imperative that the penalties imposed on the customer recognise the two advantages that the small retail bank customer has over a professional investor/lender in the securities market:

- a professional investor when forced to re-purchase (or sell before maturity) a security does so at a market yield. For example, assume a professional investor invests $1 million in a 2 year, 12.0% semi-annual coupon bond (at par, that is, 100.00—indicating that the investor will earn $240,000 in interest). After 6 months, interest rates rise and after receiving the first coupon (of $60,000) the investor decides to *redeem* the deposit and re-invest elsewhere at a higher rate of interest. If interest rates for an 18 month deposit have risen to 15% the professional would expect to receive an extra $45,000 in interest (three interest payments of $75,000, versus three at $60,000 at the old rate of 12%). However the market value of the security has declined by 3.9% (that is, the price of the security for the remaining term of 18 months has declined to $0.961 per dollar invested). Hence, the bank would pay the investor $960,992 (in lieu of the original principal of $1 million), reflecting the lower value of the investment following the rise in interest rates.

The retail term deposit investor has a legal right to receive the full principal amount of his or her investment. It is important then that the bank ensure that (a) it limits the ability of retail term depositors to redeem early, and (b) that when early redemption is permitted it coincide with an interest payment date so that the bank can deduct "breakage" charges from the amount of interest earnt by the investor. Indeed, in the above example the bank should seek to recover at least $0.039 per dollar invested.

This means that repayment/redemption penalties must be related to the current market interest rate for refinance/re-investment of the principal for the remaining term of the asset/liability.

- a professional securities market trader can only liquidate an existing position after negotiation with another player in that market. The retail depositor/borrower on the other hand, can redeem/pay *at his or her own discretion.* Even if a financial institution structures its penalties in such a way as to effectively repurchase deposits/sell-back loans at "market" interest rates, prepayments and pre-redemptions can still cause significant disruption in terms of altering planned mismatching strategy—a bank may be forced to accept pre-redemption of long term deposits at a time when it was attempting to lengthen its liability base. There is also an unplanned liquidity effect. *This means that penalties for prepayment/pre-redemption must contain an additional loading in recognition of the cost of forfeiting control of the asset/liability to the customer*—effectively an option premium: see [628].

(3) *Decreased reliance on interest margins*

[620] Interest rate exposure can obviously also be reduced by financial institutions reducing the proportion of profit reliant on net interest margin. Without going into detail, the last decade has seen banks attempt to generate a base of fee-income by more aggressively charging for bank services (including ATM access), and enter into new areas such as share broking, security and share underwriting, advisory services, life and general insurance, funds management, custodial facilities and trustee management, travel services, etc.

(c) "Synthetic" interest rate risk management tools

(1) *Interest rate futures*

[621] Since the introduction of the 90 day bank bill "Interest Rate Futures" contract by the Sydney Futures Exchange (SFE) in the late 1970s, the use of interest rate futures as an interest rate risk management device has exploded.

[622] A simple hedge. Consider a corporate treasurer who knows in January, that in March he will have an inflow (outflow) of $1 million in funds to invest (cover by borrowing) on 90 day bank bills. The March bill futures contract is trading at 85.50 (that is, 14.50%—interest rate futures are quoted in price terms by subtracting the rate from 100). The treasurer knows that he would be happy come March, to invest (borrow) at that rate, but is worried that in the interim interest rates will move against him, that is, fall (rise).

To protect himself, the treasurer buys (sells) two $500,000 90 day March bill contracts, locking in the rate at 14.50%. On 4 March his funds arrive (are needed), but interest rates are now only 12%. He closes out—sells (buys) back—his two contracts at 12.0%, realising a profit (loss) of:

$$\frac{\$500{,}000 \times 2}{(1 + 0.12 \times \frac{90}{365})} - \frac{\$500{,}000 \times 2}{(1 + 0.145 \times \frac{90}{365})}$$

$$= \$5{,}780.55$$

He then purchases (draws down) $1 million of 90 day bank bills. The purchase price (net proceeds of the drawdown) is $971,261.31—a yield (or interest cost) of 12.0%. However, the futures profit (loss) effectively increases the investment return (borrowing cost) to the locked in yield of 14.5%.

It is easy to see that a similar result is reached if interest rates rise—the investor's higher "physical" return is offset by a futures loss, while the borrower this time makes a futures profit, reducing his overall cost back to the locked in rate.

A similar hedge example can be constructed for other fixed interest futures contracts, with the analysis broadly the same.

[623] Volatility matching. More interesting (and perhaps more practical) is the case where the security, the purchase or sale of which is to be hedged, is of dissimilar risk or maturity to the underlying futures instrument.

Consider an investor looking today (say July) to lock in the purchase of $1 million in 6 year semi-government debentures—coupon 13.0%—in September. As there is no futures contract for 6 year semi stock, the investor must use the futures contract with the smallest basis risk—that is, the one the price of which will have the highest correlation against movements in the instrument being hedged. We will assume for example that the 10 year bond contract is chosen.

Having made for practical purposes, the assumption that the futures will provide 1:1 cover for interest rates,[4] the question to be answered is, how many contracts to buy? The answer is to buy that number of contracts which, given a movement of X points in interest rates, will provide an equivalent dollar futures profit/loss to the dollar capital value change caused by a movement of X basis points in the market value of the security being hedged.

The formula used (an approximation using finite differences to avoid some messy calculus) to find this magic ratio of contracts is simple:

$$r = \frac{A_1 - A_2}{B_1 - B_2} \tag{6.11}$$

where

A_1 — price of the security being hedged at market rates—0.01% (valued at the anticipated purchase date[5])

A_2 — price of the security being hedged at market rates + 0.01% (valued at the anticipated purchase date[5])

4. Other relationships can be assumed, but 1:1 is almost always used in practice.

5. The example abstracts from cost of carry assumptions.

B_1 — value of 1 contract's worth of the underlying futures security at market futures rates—0.01%

B_2 — value of 1 contract's worth of the underlying futures security at market rates + 0.01%

As at 15 July 1986, say, the 15 September 1992 13.0% coupon stock was trading at 14.0%. If this was the rate at 15 September 1986, the purchase price for $1 million face value would be $960,286.57. To protect against interest rate falls in the interim, the investor will need to buy 10 year 12.0% coupon bond contracts at 87.50 (12.5%).

Using the formula gives:

$$r = \frac{\$960{,}673.22 - \$959{,}900.12}{\$97{,}244.92 - \$97{,}134.70}$$

Therefore, the investor needs seven 10 year bond contracts.

By 15 September interest rates have fallen by 1% across the board. The investor buys his $1 million semi-government bond at 13% but this now costs $1,000,000 or $39,713.43 more than anticipated in July. However, given that 10 year bond rates have also fallen to 11.5% (88.5 in price), the investor makes a futures profit of $40,157.46—almost matching the notional loss on the physical security.

Naturally, in many cases, the movements in rates between differing instruments may not be proportionate (or even of like sign). However, this sort of volatility matching is often the best hedge (even if "rough") available.

Note that the 90 day bill contract can also be used in like manner to hedge purchase/sale of, say, 60 day bills, or promissory notes, Treasury Notes, etc.

[624] Portfolio hedging. In practice it would be a mistake for the manager of a financial institution to attempt to hedge the interest rate risk of securities on a case by case basis. Rather, the manager should be looking to protect the *value* of his or her entire portfolio. This concept, added to the concept of volatility matching above, helps us to better understand equation 6.7: see [611].

$$D = D_p + D_f \times \frac{V_f}{V_p} \tag{6.7}$$

It is, in fact, a sophisticated form of volatility matching. The *ratio* of futures contracts to portfolio value is a function of the relative price volatility (where duration is an index of that volatility) of the futures contract vis-a-vis the portfolio. That is, the portfolio is treated as a single security and then the normal volatility matching formula is used.

Consider a simple example, a portfolio manager holding the following portfolio.[6]

	CURRENT YIELD
1. \$20m F/V **2** Year 10.0% coupon	12.1%
2. \$25m F/V 3 Year 10.0% coupon	12.4%
3. \$10m F/V 5 Year 10.0% coupon	12.9%
4. \$10m F/V 8 Year 10.0% coupon	13.5%

Using the Macaulay formula, individual bond durations are:

D_1 = 1.86 years (P_1 = 19,273,160.18)

D_2 = 2.65 years (P_2 = 23,534,027.23)

D_3 = 3.99 years (P_3 = 8,955,176.24)

D_4 = 5.44 years (P_4 = 8,319,097.39)

Calculating D_p, the portfolio duration, using the weighted average formula:

$$D_p = \frac{P_1D_1 + P_2D_2 + P_3D_3 + P_4D_4}{P_1 + P_2 + P_3 + P_4}$$

D_p = 2.90 years (portfolio duration)

V_p = \$60,071,463.04 (portfolio value)

Given a 10 year bond futures rate of 14.0%, it is possible—again using the Macaulay formula—to calculate D_f = 5.85 years, V_f = \$89,405.99 per contract. Imposing as a goal that D = 0 (that is, immunisation), and solving for V_f, we get:

$$V_f = \frac{-(V_p \times D_p)}{D_f}$$

$$V_f = \frac{-(\$60{,}081{,}463.04 \times 2.98)}{5.85}$$

$$V_f = -\$30{,}605{,}599.98$$

6. In a full example, the underlying liability duration would also be calculated, and the bought futures contracts required to immunise that side of the balance sheet would be offset against the sold contracts required here, giving a net requirement. Further, this example assumes that the 10 year bond contract is used exclusively as the hedging vehicle.

That is, to immunise the portfolio—to hold that amount of futures cover so that a change in interest rates has no effect on portfolio value—requires approximately 342 (-$30,605,599.98 x $89,405.99) *sold* 10 year bond futures contracts.

Individual hedging of each bond using the volatility matching formula described above would give (check this as an exercise) respectively for each bond, 68.4 + 119.1 + 68 + 85.9 = 341.4 contracts—showing that the two approaches yield nearly identical results.

The portfolio duration measure is again a proxy for volatility, and for a large balance sheet the method is certainly easier to calculate than that of using the individual volatilities of each security. (Indeed, it could be argued that duration is a better measure than volatility, since the former explicitly takes account of coupon income and the re-investment of that income.) In addition, it emphasises the concept of hedging a *portfolio value*—which is one of the essentials in moving from using hedging devices such as futures for simple, single product offerings such as fixed rate bank bills (backed off against futures "strips" to lock in rollover rates) to using them as a tool for the *management of an entire balance sheet.*

[625] Advantages/disadvantages of futures. Financial futures are an extraordinarily simple instrument to use. Market spreads are small, price information is readily available from the "bid-ask" spreads quoted (and up-dated within seconds from the floor of the SFE) on the Reuters system. As well, the futures market is very deep, in the sense that daily volumes across the various financial futures products offered are quite large.

The disadvantages of financial futures are as follows:

- The contracts trade only for delivery on specific dates—effectively once per quarter. This creates considerable basis risk where an anticipated security purchase/sale is to occur on a date substantially removed from any contract delivery or settlement date. From an *overall* balance sheet portfolio perspective, this is *not* a major problem.
- There are only a limited number of financial futures contracts traded. This leads to considerable risk between available contracts and securities of substantially different maturity and credit risk. In times of rapid changes in the shape of the yield curve, or during periods of movement in the "credit quality", this can be a major drawback, even in a balance sheet/portfolio perspective.
- There is generally very little trading in any but the closest contract months. Few institutions are willing to "make a market" in the distant

contracts. This is somewhat surprising, insofar as there has been no shortage of market makers in the interest rate swap market (see [628]). The interest rate risk is nearly identical, yet the use of the futures market would abstract from the credit risk problems of the swap market—enabling finer margins to be quoted. This can only be due to a poor understanding of the issues involved by Australian financial portfolio managers.

- There can, in the case of the longer bond futures contracts, be an uncertain tax effect involved in using futures. It is argued by some tax experts that, unless a specific underlying transaction can be identified, all futures profits/losses must be treated as assessable/deductable in the year in which the contract terminates. Yet the "other side" of the hedge may only be reflected in an increased/decreased yield on an asset or portfolio (offset in price terms by futures loss/profit) over a term of several years. Obviously, there is the possibility of a significant distortion of tax flows between years. The matter is open to debate and should be referred by the balance sheet manager to tax experts.

(2) *Forward rate agreements (FRAs)*

[626] Description. FRAs are similar to financial futures, though a somewhat more flexible instrument. As with financial futures, FRAs involve the payment (receipt) on maturity of the net divergence in interest differential. The differences are:

- FRAs are negotiated directly with the counterparty over the telephone rather than on the floor of a clearing house.
- FRAs are traded on a settlement basis only—that is, no physical delivery of the underlying security is required by the contract.
- FRAs can be agreed for settlement on any day. Again, as an agreement is *not* negotiated in the fairly anonymous atmosphere of a trading pit, standardisation of date and the underlying commodity is unnecessary. Both matters can be negotiated for the maximum convenience to each party.
- Similarly the tenor of the underlying instrument is negotiable. Unlike bill futures, where a 90 day bank bill is specified (and some volatility matching may therefore be required), FRAs can be used to hedge the purchase/sale of 30, 60, 90, 120, 150, or 180 day securities.

[627] Advantages/disadvantages of FRAs. The advantages of FRAs are obvious from the list of differences to futures and can be summed up in one word: *flexibility.* Negotiability of tenor and timing substantially reduces the *basis risk* inherent in most futures transactions.

The disadvantages of FRAs vis-a-vis financial futures stem from both the credit and administrative aspects of the lack of a clearing house in FRAs. A futures trader can buy, sell, buy again, sell again, and again and at the end be left with no outstanding contingent liability and no obligation to come up with either cash or stock on delivery/settlernent date. An FRA trader, however, attempting the same thing, would have contingent liabilities equivalent to the deemed credit risk on each agreement for the life of those agreements *plus* he or she must, on the agreed settlement date, settle on each separate contract.

(3) *Interest rate swaps*

[628] Description. An interest rate swap (also referred to as a coupon swap) is a contract between two parties under which they agree to exchange *interest* payments. Generally, this involves fixed interest payments being exchanged for floating (or variable) rate payments. There is no exchange of principal amount under an interest rate swap agreement. Again as with futures and FRAs, payment at each interest rate reset date represents a "net" payment based on interest differentials.

The floating rate index in swaps is almost invariably the Bank Bill Swap rate (BBSW). The fixed rate is dependent on the term to maturity and on market conditions. Fixed rates under swaps tend to trade in line with the semi-government bond rate for the same term (at a margin above, of course). In fact, analytically they can be treated as identical to a back-to-back loan, where the party exchanging his or her own fixed interest payments for floating rate payments can consider the swap as an issue of a floating rate note to the counterparty and the simultaneous purchase of a fixed rate note of like term and amount from the counterparty. No money changes hands initially as the "loans" are for the same amount—avoiding also the necessity of showing the implicit loan and borrowing on the balance sheet.

The first publicised interest rate swap in Australia was completed in 1983 between the Commonwealth Bank of Australia and the Australian Industry Development Corporation. Since then the market has grown exponentially.

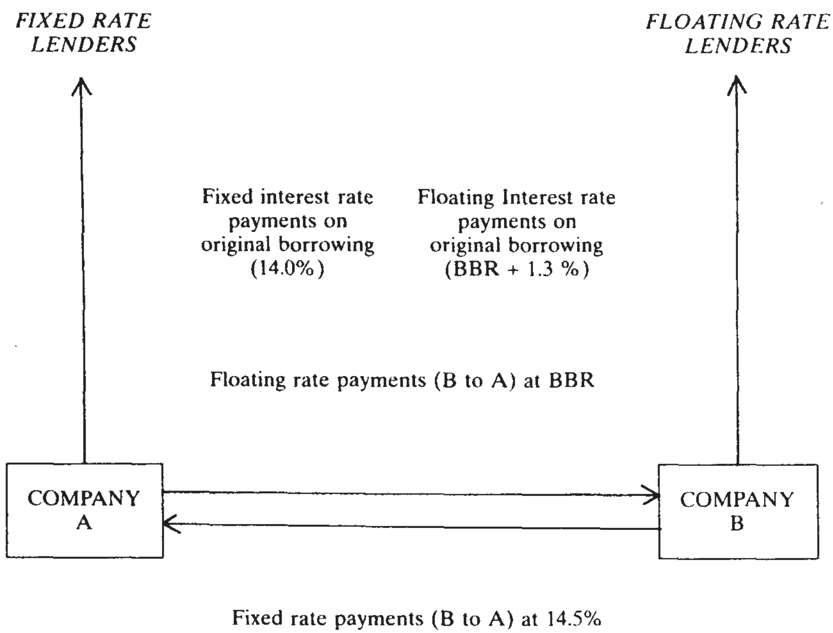
[629] It may be useful to use an example to clarify the operation of a swap. There will ordinarily be two parties to a swap:

- Company A has a $10.0 million loan with 5 years to run to maturity at a fixed rate of 14.0% pa payable semi-annually. Company A decides that it would prefer floating rate borrowings because, perhaps, its earnings fluctuate in line with the bank bill rate.

- Company B has floating rate borrowings totalling $10.0 million costing BBSW plus fees of say, 1.3% pa. Company B decides that it would prefer fixed rate borrowings because, perhaps, it is seeking a known cost for a particular investment project.

Fig 6.4

Standard interest rate swap diagram



Companies A and B could achieve their desired positions through an interest rate swap. Company A would make floating rate swap payments to Company B equal to:

$$\$10{,}000{,}000 \times \text{BBSW} \times \frac{\text{No of days in period}}{365}$$

Company B would make fixed rate payments (based on an agreed fixed rate of, say, 14.5%) to Company A equal to:

$$\$10{,}000{,}000 \times 0.145 \times \frac{\text{No of days in period}}{365}$$

The following should be noted:

- There are no flows of principal amounts.
- Swaps are always described in terms of interest flows under the swap—arrows represent the direction of the interest flows.
- The terminology is to be a fixed rate *payer* and a floating rate *receiver* (Company B), or a fixed rate *receiver* and a floating rate *payer* (Company A).
- Payments are generally effected on a "netted" basis to avoid two way flows of payments.

These payments take place generally at the end of the period to which they relate (usually six monthly).

The effect of the swap is as follows:

	COMPANY A	COMPANY B
Borrowing cost before swap	14.0%	BBSW+1.3%
Swap receipts	14.5%	BBSW
Net borrowing costs	—0.5%	1.3%
Swap payments	BBSW	14.5%
All up borrowing costs	BBSW-0.5%	15.8%

[630] The advantages of swaps are as follows:

- Swaps enable a financial manager to separate the interest rate and funding decisions. For example, suppose a portfolio manager has an undrawn bank bill line (or an underwritten promissory note facility, or new customers who can only ever be induced to invest short term), but wants, for interest rate risk management reasons, to raise fixed rate debt. To access the fixed rate market directly may involve new costs of setting up a debenture issue. Instead, he can fund himself with his bank bill (or other floating rate) facility and swap into a fixed interest rate. Swaps can effectively provide access to new funding sources—in the example, even with set-up costs the financial manager may not have had access to a fixed rate debt market.
- Swaps can provide a lower cost of funds via the *theory of comparative advantage.* For example, a semi-government authority wanting floating rate funds may have a borrowing cost of government bond +

0.5% in the term debt market and a promissory note programme that trades at a rate equivalent to BBSW. A strong corporate name looking for term debt on the other hand, may borrow via bank bills at say, BBSW + 0.5% (fees), but could issue corporate debentures at about government bond + 2.0%. The semi-government authority has an *absolute borrowing advantage*—owing to its superior credit rating—in both markets. It may, therefore, appear as if its cheapest floating rate funding option is to issue promissory notes (cost = BBSW). The corporate's direct fixed interest cost would be bond + 2.0%. But since the corporate has a relative or comparative advantage in floating rate funding (that is, its cost disadvantage is smaller in the floating rate market), *both parties can gain* if the corporate draws down its bill facility (BBSW + 0.5%) and the authority issues term debt (bond + 0.5%). Splitting the cost saving of 1.0% equally, a swap could now be arranged whereby the authority agrees to pay BBSW to the corporate in return for payments of bond + 1.0% from the corporate. The corporate's final cost is bond + 1.5% (direct bill cost = BBSW + 0.5%, receives under swap and pays bond + 1.0% under the swap), while the semi-government authority has achieved all-up funding at BBSW - 0.5% (direct issue cost = bond + 0.5%, receives bond + 1.0% under the swap, pays BBSW under swap). This characteristic distinguishes swaps from futures, options and FRAs in that it is not a zero sum game. All parties benefit from the separation of interest rate and funding decisions as it enables each party to issue paper only in that market in which its credit is relatively strongest.

- Swaps can be agreed quickly and easily, with standard documentation, and the Australian swap market is very deep with a host of market makers.
- Swaps are a flexible instrument, with possibilities of delayed or immediate start, in arrears or in advance payments, variable term, variable periodicity, lower (higher) fixed rate coupons in exchange for up-front payments, etc.

As with FRAs, but on a larger scale, swaps have an element of credit risk. While no principal changes hands and, therefore, a $10 million swap has a risk considerably less than $10,000,000, some loss[7] can still be

7. Indeed the loss is limited to the remaining interest payments over the term of the swap agreement. Most agreements are now written for "net" payment wherein that counterparty owing the most interest pays only the differential, the actual credit risk is even smaller. Indeed, the chances of default will be smaller again when the counterparty is a "net receiver" of interest. Hence, the credit risk on a swap will (a) be limited to the net differential

incurred if the counterparty defaults. If a bank, expecting rates to rise, locks in a funding cost by paying fixed and receiving BBSW under a swap and rates subsequently do rise, the cost of default is the cost of having stayed in floating rate liabilities in a rising interest rate environment.

(4) *Options*

[631] Description. The difference between financial futures and options on debt instruments is that where a party to a futures contract has *accepted an obligation* to buy or sell a security at a known price at a known date in the future, an option *confers the right* to buy or sell the security at the specified date and price, *but not the obligation in exchange for the payment of a premium.* The contract will only be exercised if it is profitable for the option holder to do so.

There are two parties to an option—the writer or granter of the option and the taker of the option. In return for a fee or option premium, the writer of the option gives the taker the right to buy (a "call" option) or sell (a "put" option) the given security at a predetermined price. In essence, the transaction can be viewed as an insurance contract. An option writer attempts to collect sufficient premiums to cover "claims" (that is, exercises options).

The taker, on the other hand, pays a fixed fee to insure that he or she cannot be hurt by interest rate movements, while still able to gain from any favourable movements.

Options are available both on cash market debt instruments (physical securities) and on futures contracts. That is, one can take an option to buy (or sell) a security, or one can take an option to purchase (or sell) a futures contract. Although an option on a security is conceptually simpler, options on futures have some advantages which have resulted in them becoming very popular. Some of these advantages are:

- homogeneity of the underlying commodity (as we have seen, futures contracts are extremely standardised);
- one can always obtain a futures position to "supply" if an option is called; that is, there are no supply constraints as there may be on a physical security;

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7 *Continued*
in future interest payments, (b) decline over time as there will be fewer payments due, and (c) only apply to interest payments where the counterparty is "out of the money"—a net payer.

- writing options on futures facilitates the trading of the option contracts themselves;
- the prevailing futures price is easily determinable and widely available at any given time due to the constancy of trading in that market; and
- pricing for physical securities often involves some "search".

[632] Uses of options. Options can most simply be used as one-sided futures contracts—a mismatched portfolio can be immunised against adverse interest rate movements, but can still benefit from favourable ones. See the following example for a comparison of a futures hedge and an options hedge. An obvious instance of when this could be useful is if a major shock or news item is anticipated and consequent large swings in interest rates can be expected as sentiment shifts following the news release—but it is unknown whether the news will be bad or good. Naturally in an uninformed market, option premiums should increase in this sort of situation.

Example

Consider a bank which plans to issue 90 day Certificates of Deposit (CD) in March to provide for funding for June. In December, whilst planning for this issue, bank management becomes concerned that, come March, interest rates will have risen—making the issue more expensive. March options on bank bill futures exercisable in March with an exercise price of 16.0% are quoted at a premium of 0.25% (premiums on options on debt instruments are commonly quoted as a yield). A comparison of a hedging strategy based on taking "put" options as against purchasing sold futures contracts outright is shown below (it is assumed that CD issue rates move perfectly in line with bank bill rates):

Borrowing on March CD issue

Interest rate on 90 day bank bill in March	*Put option*	*Futures*	*Unhedged*
12% pa	12.25% pa	16% pa	12% pa
13% pa	13.25% pa	16% pa	13% pa
14% pa	14.25% pa	16% pa	14% pa
15% pa	15,25% pa	16% pa	15% pa
16% pa	16.25% pa	16% pa	16% pa
17% pa	16.25% pa	16% pa	17% pa
18% pa	16.25% pa	16% pa	18% pa
19% pa	16.25% pa	16% pa	19% pa
20% pa	16.25% pa	16% pa	20% pa

Naturally, a similar example could be constructed for a prospective investment comparing a bought futures hedge with taking call options, or using different underlying securities.

Options are the only synthetic risk management tool that can be used to hedge *indirect* interest rate risk. For banks in particular, the repayment of fixed rate personal loans that can be anticipated in the event of an interest rate fall (thereby denying the banks their implicit capital gain from holding a fixed rate asset at a time of falling interest rates) is not offset by a similar gain in the event of a rate rise (banks cannot "call" loans early). The risk is one sided—a characteristic of options—and can be covered by the bank in the form of taking a call option. If rates fall and the customer prepays, the asset can be replaced at historic rates by the exercise of the option. Note that the option premium is an *implicit expense* (even if the bank does not cover in the options market) that should be built into loan fees.

Almost all bank products have this implicit option in them, as early redemption or repayment are generally at the prerogative of the customer. For this reason banks are natural option takers.

A similar type of one-sided risk occurs in underwriting, where the underwriter is exposed to having to "take up" (that is, buy) the stock from a debt issue if the issue fails to achieve the underwritten rate for all the securities offered. This is an exposure to a high interest rate prevailing for the issue. If the underwriter has to buy stock at a rate below the prevailing market rate of interest, then he or she is taking a loss and the higher the market rate above the underwritten rate, the larger the loss. However, the underwriter gets no extra benefit for providing the guaranteed ceiling rate to the issuer if the market buys the issue at significantly below (rather than just below) the underwritten rate. Banks frequently hedge underwriting commitments by purchasing put options on the relevant securities to lock in a selling price on securities that may be required to be taken up.

It is often argued that an option writing programme can "stabilise portfolio returns". There seems to be little basis in this argument except the known concept that diversification of business into areas of less-than-perfect positive correlation yields a lower earnings variance without necessarily affecting expected return. Certainly, writing call options has a negative correlation with an investment portfolio, as options will generally be exercised (and therefore, money lost) in cases where the stock held is showing a capital gain (that is, rates have fallen).

[633] The price, or premium, charged on a debt option is affected by four major factors (the current level of interest rates also has an indeterminate impact):

- The current price of the security in the futures market which has delivery on the exercise date of the option (where no futures market exists, the spot price is used). Obviously, if the current futures rate on a 90 day bill is, say, 14% a call option (that is, option to buy) with an exercise price of 13.9% has more chance of being worth exercising than if the relevant futures market is currently at 20%. That is, the futures rate is more likely to move 0.1% or more by expiry than it is to move 6.1%. This is because the prevailing futures rate is presumably at or near the centre of some sort of probability distribution of what the spot rate will be at expiry.
- The exercise price. An option to buy a security at 13.9% is worth more than an option to buy the same security at 13.8%.
- The time to expiry. It is more likely that a call option on a 90 day bank bill with an exercise price of 13.9% with a prevailing equivalent bank bill futures rate of 14.0% will become profitable to exercise if there is a month before the contract ceases trading than if there is a day to go before expiry. This is simply because the greater the likelihood of the option becoming profitable, the greater the increase in the value of the option.
- The volatility of prices on the underlying instrument. It is more likely that a call option on a 90 day bank bill with an exercise price of 13.9% with a prevailing equivalent bank bill futures rate of 14.0% will become profitable if the futures rate is volatile, that is, if it moves around a lot. It is more likely that the rate will drop below the exercise rate the greater the volatility of interest rates for the underlying instrument.

The general effect of each relevant variable on the value of a debt option (where all other variables are held constant) can be summarised as follows:

Increase in:	*Effect on call price*	*Effect on put price*
Futures price	Increase	Decrease
Exercise price	Decrease	Increase
Time to expiry	Increase	Increase
Volatility	Increase	Increase

Various pricing formulae exist for debt options—the most famous being the Black and Black-Scholes models. Most of these models start with the existing price of the underlying instrument and then postulate—based on historic volatility—a stochastic process for movements in that price. This leads to a probability distribution of possible future prices. Each probability-weighted outcome is then effectively discounted back to the pricing date to generate a price.

Much of this analysis uses fairly sophisticated stochastic calculus (a requirement that could be obviated by simply starting by postulating a future price probability distribution rather than deriving one by postulating the stochastic price movement process. This would also provide the flexibility to build subjectivity, based on economic forecasts of interest rate movements, into the pricing model). It must be emphasised that such sophisticated mathematics does not mean that a "right" price has been generated—the models all contain assumptions (the stochastic price movement process and the assumption that historic volatility is a relevant factor in assessing current volatility are two obvious ones). These assumptions should be clearly understood before attempting to interpret and apply the results of such a model.

A Philosophy of Risk Management

[634] Having measured interest rate risk and possessing a wide range of tools for managing that risk, the question remains *what is the desired level of exposure to interest rate movements*?

[635] The chief executive of Citibank has been quoted as saying "If I can't gap, I can't make profits". This suggests that balance sheet interest rate risk is not only measured and viewed as controllable, but exposures and open positions are actually generated for "speculative" reasons. It should be remembered that one of the traditional functions Of banking was the acceptance of interest rate risk. A policy of continual interest rate immunisation is non-optimal. A properly managed bank should seek to take advantage of any favourable interest rate movements.

Discussion with Australian financial managers makes it apparent that many feel that "you can't beat the market" citing the *Efficient Markets Hypothesis* (EMH) of economic theory. The EMH does state that, *given perfectly and instantaneously disseminated costless information,* it is generally not possible to generate a strategy yielding "super-normal" returns.

In practice economic information and the skills required to interpret that information to advantage are in fixed supply. As such, the possession of market intelligence of superior analytic ability can be expected to lead to the earning of higher returns (or super-normal profits).

[636] Despite the fact that the Australian banks are fairly obviously our best placed institutions in terms of access to information on money flows and interest rate policy, as well as being possessed with large teams of economic researchers and financial analysts, bank risk management policy is generally reactive rather than anticipatory or active. Even in periods when rises in interest rates have been generally anticipated—presumably by the banks as early as any—banks have generally not cut back in terms of fixed rate lending or discouraged the same by steepening their "own" yield curves until after rises in their own term cost of funds or heavy increases in demand for fixed lending has been experienced.

The obvious cost of this reactive behaviour emphasises the first rules of interest rate risk management:

- *Economic forecasting and pro-active management are vital*;
- *Investment in information and analysis can yield high returns.*

The second set of rules has to do with the size of the speculative position to be taken based on one's interest rate forecasts. The major rule can be related back to the first law of demand from economic theory:

- *The larger the anticipated gain (risk adjusted)*[8] *from interest rate risk bearing—that is, the lower the "price" of risk—the more risk should be taken on.*

In other words, a "demand curve for risk" should be generated. No hard and fast rules can be made about the shape of this curve.

The shape will vary with the risk preference profile of the institution. Generally speaking however, the following can be said:

- *The level of interest rate risk borne should be chosen so as to maximise the market value of the firm—assessed on the basis of the firm's own "fair pricing" (see [637]) of its choice range of assets and liabilities* and following from this;
- The level of interest rate risk accepted at any "price" (that is, risk adjusted anticipated gain) level will be greater, the lesser the impact of variability of net interest margin has on overall bank earnings—that is, the larger, more stable and more diversified the bank.

8. Obviously the variance or "uncertainty" of one's forecasts is a factor. A "certain" 0.01% movement in interest rates justifies a larger position than a "suspected" 5% movement.

[637] "Fair pricing" refers to the practice of evaluating, from one's own financial data, what the value of a security "should" be. If the market price is below the fair price, the security should be bought; if above, it should be sold. If a firm was purely maximising "expected return", all cash would go into the single asset which had a market value mostly below its "fair price". A firm maximising its "own" value, however, will adopt a more rational, diversified holding as the variability of portfolio return reduces portfolio value—risk is an economic "bad". In essence, a rational portfolio strategy would be to develop a "demand curve" delineating the level of interest rate risk acceptable to the bank for varying levels of divergence between the "market price" and the "fair price".

It is worth noting that this "demand curve" approach to balance sheet "gapping" is incompatible with the "stop loss" or "cut your losses but let your profits run" mentality of many financial managers. If a security is trading at $1, but its price is expected to rise to $1.10, it is obviously a good "buy". If its price now falls to $0.90, it is a "better buy" if no revision to forecasts and no fundamental change in circumstances (both direct and indirect) has occurred. It should not be sold merely because of a recorded loss against the historic purchase price—a sunk cost.

This leads us to our final rule of interest rate risk management which emphasises the need to continually re-evaluate existing positions and forecasts in the light of current prevailing conditions. If a bank gets a "bargain" by raising 3 year funds at, say, 12.0%, when the going rate is 13.0%, this does not mean that it is profitable to lend at 12.1%. The profit of a 1% capital gain on the liability side has *already been earned.* To illustrate, suppose the funds had been raised at a loss—say 14.0%. Obviously to attempt to lend at 14.1% when the market rate is 13.0% is pointless. The historical fact of having made a loss or profit on the funding is now irrelevant. Having raised the funds, the only question to be addressed is how to use those funds. Our rule is:

- *Every day consider your portfolio as if it had been sold the night before and its cash equivalent was in your hands. How would you now invest that money? That is the portfolio to be targeted. To do nothing is to re-purchase yesterday's portfolio.*

In other words, to run a multi-billion dollar balance sheet without an interest rate risk management policy is equivalent to choosing the best investment for several billion dollars by using a pin and newspaper or a wheel of fortune.

APPENDIX 6A

The Impact of Yield Curve Shifts on Bank Portfolios

In this section we will quantify the impact of yield curve movements on balance sheets. For simplicity we have assumed that all portfolios are marked to market (that is, revalued to market daily). It will be shown that if the bank's asset/liability portfolios are not actively managed, extraordinary gains or losses (or more correctly changes in the net worth of the balance sheet) can occur due to the differing interest rate sensitivities of the various portfolios.

In practice most banks' portfolios are not marked to market. Hence, these variations in net worth due to portfolio changes will not appear immediately. Rather, they will appear over time (say 2-3 years) and reflect in variations to the bank's net interest margin.

Two measures of interest rate sensitivity have been utilised. The duration of the portfolio is the weighted average term of the portfolio's cash flows and convexity is a measure of the diversity of the portfolio's cash flows.[9] As new business is written, the interest rate sensitivity (both duration and convexity) of the portfolio changes. To compensate, bank managers should vary the duration and convexity of other portfolios if they wish to maintain an immunised or interest neutral position.

The example in Table 6.2 shows the dependence of the net worth on the duration mismatch for various changes in the interest rate structure. Scenarios 1 and 2 illustrate a situation where the asset portfolio is

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9. Note that it is possible to accurately calculate the impact of a large change in yield on the change in price of a bond if the bond's duration and convexity are known. The change in price is calculated as follows:

$$\Delta P = \frac{1}{100} \times P_0 \times D \times \Delta Y + \frac{1}{2} \times P_0 \times \frac{C}{10{,}000} \times Y^2$$

where:

ΔP	—	the change in price of the bond
D	—	duration of the bond in years
P_0	—	the initial gross price of the bond
ΔY	—	the change in yield of the bond
C	—	the convexity of the bond
Y	—	initial yield level.

"longer" than the liability portfolio. Hence in a "bull" market (decreasing interest rates) the revaluation of assets increases at a greater rate than the revaluation of the liability portfolio and in a "bear" market (increasing interest rates) the revaluation of the asset portfolio decreases at a faster rate than for the liability portfolio. Scenario 3 is an example of the classic immunisation strategy for parallel yield curve shifts. No matter which way the yield curve moves or how large the magnitude of the change, the net worth only increases in value. This increase is typically very small, otherwise holding the position would result in a licence to print money, as it were. Scenarios 4 and 5 are the reverse of Scenarios 1 and 2 respectively, with the asset portfolio being "shorter" than the liability portfolio.

For a 1% deviation from the ideal case, there is 0.03% volatility in the net worth (0.03% of the value of the asset portfolio for a 100 basis point change in the yield curve). The change attributable to the convexity mismatch in all scenarios is positive due to the fact that all the convexities of the asset portfolios are greater than the convexities of the liability portfolio. If this were not the case, the change attributable to convexity mismatch would be negative and still relatively small. The change attributable to the duration mismatch tends to dominate the overall change in net worth.

Remember that after the interest rate change has occurred, the structure of the two portfolios will be different and a re-balancing will be required.

Table 6.2

Sensitivity analysis of duration and convexity deviation

LIABILITIES

Market value	*Duration (Years)*	*Convexity*
1,000,000	3.884	0.1728%

ASSETS

Market value
1,000,000

Table 6.2—*continued*

Scenario	*Duration (Years)*	*Convexity*	*Deviation of duration*	*Deviation o convexity*
1	3.4223	0.1786%	1.00%	3.36%
2	3.3901	0.1765%	0.05%	2,16%
3	3.3884	0.1764%	0.00%	2.01%
4	3.3867	0.1763%	-0.05%	2.04%
5	3.3546	0.1742%	-1.00%	0.85%

Impact on net worth for Scenario 1

Yield curve change (bp)	*Estimated change due to duration*	*Estimated change due to convexity*	*Total estimated change in net worth*	*Actual change in net worth*
100	($31,774.83)	$3,049.67	($28,725.16)	($28,824.83)
10	($3,177.48)	$30.50	($3,146.99)	($3,147.09)
1	($317.75)	$0.30	($317.44)	($317.44)
-1	$317.75	$0.30	$318.05	$318.05
-10	$3,177.48	$30.50	$3,207.98	$3,208.08
-100	$31,774.83	$3,049.67	$34,824.50	$34,929.63

Impact on net worth for Scenario 2

Yield curve change (bp)	*Estimated change due to duration*	*Estimated change due to convexity*	*Total estimated change in net worth*	*Actual change in net worth*
100	($1,588.74)	$2,014.71	$425.97	$354.98
10	($158.87)	$20.15	($138.73)	($138.80)
1	($15.89)	$0.20	($15.69)	($15.69)
-1	$15.89	$0.20	$16.09	$16.09
-10	$158.87	$20.15	$179.02	$179.09
-100	$1,588.74	$2,014.71	$3,603.45	$3,678.60

Table 6.2—*continued*

Impact on net worth for Scenario 3

Yield curve change (bp)	*Estimated change due to duration*	*Estimated change due to convexity*	*Total estimated change in net worth*	*Actual change in net worth*
100	$0.00	$1,960.49	$1,960.49	$1,891.01
10	$0.00	$19.60	$19.60	$19.53
1	$0.00	$0.20	$0.20	$0.20
-1	$0.00	$0.20	$0.20	$0.20
-10	$0.00	$19.60	$19.60	$19.18
-100	$0.00	$1,960.49	$1,960.49	$2,034.07

Impact on net worth for Scenario 4

Yield curve change (bp)	*Estimated change due to duration*	*Estimated change due to convexity*	*Total estimated change in net worth*	*Actual change in net worth*
100	$1,588.74	$1,960.30	$3,495.04	$3,427.05
10	$158.87	$19.06	$177.94	$177.87
1	$15.89	$0.19	$16.08	$16.08
-1	($15.89)	$0.19	($15.70)	($15.70)
-10	($158.87)	$19.06	($139.81)	($139.74)
-100	($1,588.74)	$1,906.30	$317.56	$389.57

Impact on net worth for Scenario 5

Yield curve change (bp)	*Estimated change due to duration*	*Estimated change due to convexity*	*Total estimated change in net worth*	*Actual change in net worth*
100	$31,774.83	$881.41	$32,656.24	$32,616.58
10	$3,177.48	$8.81	$3,186.30	$3,186.26
1	$317.75	$0.09	$317.84	$317.84
-1	($317.75)	$0.09	($317.66)	($317.66)
-10	($3,177.48)	$8.81	($3,168.67)	($3,168.63)
-100	($31,774.83)	$881.41	($30,893.42)	($30,851.02)

7

The Pricing of Bank Lending Products[1]

[701] Deregulation of bank lending products has led to an increased awareness amongst bankers of the need to effectively manage the price of their loan products in order to maintain stable profit growth.

Prior to the deregulation of the banking industry in the early 1980s, pricing was not a major priority in banks' operating strategies. The monetary authorities set maximum lending rates, leaving banks the option to determine the supply of loans. With loan rates set and the banking system limited to a few participants, the banks were able to achieve stable profit growth by rationing loans and maintaining reasonably stable interest rate margins.

The removal of interest rate controls heralded a change in bank strategies, with greater focus placed on loan pricing. In this chapter we analyse the factors influencing pricing decisions and the various approaches to pricing.

Santomero[2] argues that loan pricing decisions should seek to maximise a bank's market value or shareholder wealth. Hence, he argues that banks need to develop a loan pricing system for its loan applicants that is based on their effect on the bank's long term returns. This approach is intuitively logical but is difficult to put into practice. Factors such as macroeconomic events, the action of competitors, borrowers and investors and the bank's own market strategies will have a major impact on a bank's ability to predict its long run returns.

Nonetheless, banks should be mindful of the required long term returns whenever deciding upon a loan pricing strategy.

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1. Updated from an original article by R D De Lucia which appeared in the *Applied Finance Bulletin* No 2 1990, The Centre for Applied Finance, University of Technology (Ku-ring-gai Campus).
2. Santomero: refer R C Aspinwall and R A Eisenbeis, pp 589-606.

Factors influencing the price of loan products

[702] The price of a loan product is a function of a number of factors, namely:

- *The demand for the product*—the interest elasticity of demand for funds will vary between products and between different customer groups. Banks must, therefore, be conscious of the extent to which demand will change for any material movement in the price of the product they offer. A case in point has been the on-going furore within the community in reaction to attempts by the banks to progressively charge higher service and administration fees on loans.
- *Delivery cost*—for many years banks have argued that they have been unable to fully recover the cost of providing the various delivery systems (branches, EFTPOS, automatic teller machines, etc) and that, in effect, a relatively few high balance low activity customers subsidise the majority of low balance high activity customers.[3] In recent years banks have endeavoured to reduce this cross-subsidisation through the rationalisation of products, streamlining of procedures and automation.
- *Level of risk*—theoretically a risk premium should be attached to the various types of risk encountered by banks. (The four main risk types are credit risk, market risk, legal risk and operational risk—refer Chapter 5.) However, given the degree of competition that has characterised the Australian banking system throughout much of the 1990s, it is probable that the implicit risk premiums charged by banks do not fully compensate them for the underlying risk.
- *Strategic factors*—a bank may decide to price a product in a particular way because of a particular strategic emphasis. Examples include attempts by the major banks to lower the interest rates on housing loans, in an attempt at winding back some of the market share lost to the mortgage originators during the mid 1990s. In the short term such strategies may result in a bank introducing "loss leading" strategies to gain market share. (The decision to sharply lower housing loan rates was not a "loss leading" exercise, but rather a "margin reduction" exercise, since that product was probably the most profitable of all bank products.)

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3. Refer [237] for further comment on this issue.

- *Funding costs*—banks need to factor in the cost of funds in any product pricing strategy.
- *Balance sheet costs*—inevitably, all products will need to be assessed against their return on capital employed. Over time those products offering insufficient returns will either have to be rationalised or a decision taken to scrap the product. A critical matter here is how long bank managements are prepared to persevere with a poorly performing product.

Whilst all of the above factors represent important determinants of a product's price over time, the cost of funds, delivery cost, risk and balance sheet effect are considered the key considerations.

Pricing loan products

There are numerous approaches to pricing loan products. In what follows the major variations that can be adopted will be analysed.

(a) Maturity transformation

[703] Prior to the 1980s, many banks adopted the principle of *maturity transformation.* In effect, banks borrowed on short term (callable funds and/or deposits with maturities of six months or less) and lent for longer terms. The approach required that the banks continually "rolled over" (that is, refinanced) the deposits for similar short terms until the loans matured. If, for example, a bank provided a five year fixed interest rate loan for, say, 7.5% pa, it might raise 12 month deposits at, say 5.0%, to fund the loan. It would then need to raise new deposits at 12 month intervals until the loan matured.

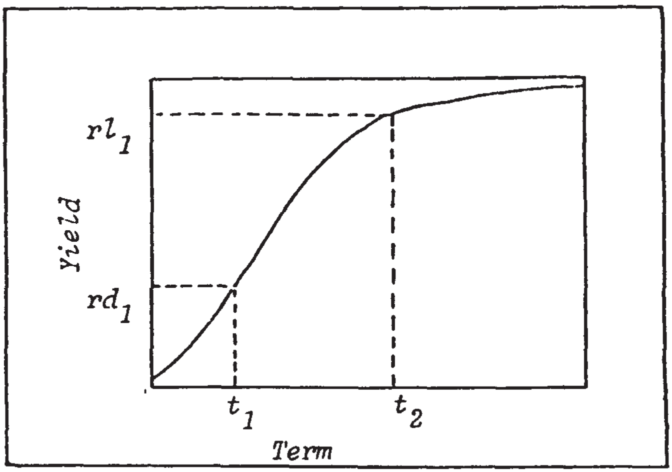
As indicated in Figure 7.1, maturity transformation assumes a normally shaped (upward sloping) yield curve.

Hence the cost of borrowing is lower than the lending rate, although the term of the deposit is considerably less than the term of the loan. In Figure 7.1, the bank raises deposits with a term to maturity of t_1. The interest rate on the deposit is rd_1. The bank uses the funds to lend to a term of t_2 at a higher rate of interest, rl_2.

A major assumption associated with the *maturity transformation* concept is that the compound interest cost to the banks of rolling over the individual deposits for the full term of the loan was less than the interest earnings on the loan. In Figure 7.1, a major unknown is the deposit interest cost for the term $t_2 - t_1$.

Fig 7.1

The concept of maturity transformation



Provided the compound interest cost of raising and then rolling over the deposits for the full term (t_2) is less than the interest earnings on the loan, the bank will make a positive contribution. For example, if a bank provided a one year loan for 8.0% pa and borrowed for six months at 5.0% pa, its borrowing costs over the remaining six months would need to be less than or equal to 10.73% pa to at least break even on the loan (the impact of handling costs and the impact of capital have been ignored).

Banks utilising the maturity transformation concept in periods of inverse yield curves can still make profits provided the risk premiums charged on loans are large enough to offset the higher cost of the deposits. Whilst it would be difficult to expect such a situation occurring in the context of a competitive financial system, those banks would presumably be expecting the yield curve to change shape quickly, such that at future deposit rollovers, the cost of funds would be sufficiently lower to completely compensate the higher deposit costs which existed prior to the change in the shape of the yield curve. Hence, over the life of the loan, the banks would be expecting that the overall cost of deposits is below the earnings on the loan.

Another option for banks lending in periods of inverse yield curves is to increase the proportion of variable interest rate loans. Hence, while the loan term might be for, say, five years, the loan could be subject to annual or even quarterly interest rate reviews. This effectively reduces the interest rate risk to the bank on its loans. Alternatively, banks could increase their lending to reflect the uncertain interest rate environment. (Such decisions would need to be taken within the context of the impact of market forces on banks' abilities to increase margins.)

The concept of maturity transformation is heavily dependent on the assumption that interest rates are not rising, and is clearly inappropriate during prolonged periods when the yield curve is inverse.

Apart from the move away from maturity transformation, the 1980s heralded the extensive use of synthetic securities (such as swaps, options and futures) as a means of managing interest rate risk. The period was also notable for the emergence of *disintermediation* as companies increasingly sought direct financing from end investors (both domestic and international). As a result, the period witnessed a significant move away by banks from relying solely on cash funded lending toward the increased acceptance of non cash funded risk, such as market risk.[4]

(b) Marginal vs average pricing techniques

[704] At the heart of the recent debate on the pricing of bank products has been the question of whether to use *marginal or average cost* techniques.

Appendix 7c provides the economic rationale for using marginal cost techniques for determining product pricing decisions. However, whilst marginal pricing techniques are favoured, Australian banks have traditionally had difficulty in differentiating costs between the various product classes. Effective use of marginal pricing techniques requires an intimate knowledge of the cost factors affecting each product, such that banks would require a comprehensive product based transfer costing system.

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4. Readers should refer to Chapter 5 for more information on the types of risk that banks face, including market risk, and to Chapter 6 for further information on how banks manage their interest rate risk.

All the banks have basically established transfer pricing/transfer costing systems in an effort to clearly identify product costs. This has facilitated the development of more cost effective pricing policies and has helped banks in evaluating productivity enhancements and the extent to which these can be passed on to consumers.

An item which is linked to the question of marginal or average costing techniques is the matter of how to measure the cost of funds. Two alternatives are available—using latest available cost of funds data (LACF) or the moving average cost of funds (MACF) approach.

LACF policies are intuitively the most appealing alternative as they reflect the current cost of effecting a transaction and, as such, banks are able to insulate margins by adjusting prices consistently with movements in the cost of funds. Adoption of marginal cost techniques in loan pricing decisions would imply increased volatility of loan rates. Corporate customers have become used to such developments, especially as they have become more involved in direct financing. Similarly, retail customers have also recently been exposed to marginal pricing, with banks offering "special prices" on fixed rate home loans, priced off movements in government security yields. As mortgage securitisation (and indeed, other forms of loan securitisation) expands, we can expect even greater use of the LACF approach to pricing.

The advantage of using MACF techniques is that banks are able to smooth the process of charging. Table 7.1 shows the impact of charging on the basis of LACF versus MACF pricing techniques over an imaginary period and assuming a required margin of 200 basis points. Let us assume two average pricing formulae are used—one a three month average and the other a six month average.

Table 7.1 highlights the dilemma often facing bankers. Using the LACF techniques enables the bank to immediately pass on the impact of variations in the cost of funds. Conversely, resorting to MACF techniques raised the question of how long the "averaging period" should extend. The longer the averaging period, the greater the likelihood that the bank's loan rate charges will be inconsistent with market trends. Moreover, if rates are on an extended upward trend, resorting to average pricing formulae could result in an erosion of profitability (as the interest margin is reduced). The reverse is also true in periods of steadily falling interest rates. It is interesting, for example, that the banks have been reluctant to lower the interest rates charged on their credit cards. These have been "stuck" at around 16.5% at time of writing (with the interest free period) since mid 1995, despite the fact that interest rates on overnight and three month funds have fallen by around 200 basis points over the two year period.

Table 7.1

Impact of LACF and MACF pricing policies on loan products

Time period	*Benchmark market interest rates*	*Price based on LACF price*	*Price based on MACF price*		*Difference*	
			3 Mth	6 Mth	3 Mth	6 Mth
		(1)	(2)	(3)	(D-(2)	(D-(3)
	%	%	%	%	%	%
- 5	13.50					
- 4	13.50					
- 3	13.75					
- 2	13.75					
- 1	14.00					
1	14.00	16.00	15.92	15.75	0.08	0.25
2	14.50	16.50	16.17	15.83	0.33	0.67
3	14.75	16.75	16.42	16.04	0.33	0.71
4	15.00	17.00	16.75	16.25	0.25	0.50
5	15.25	17.25	17.00	16.50	0.25	0.50
6	14.75	16.75	17.00	16.63	-0.25	0.12
7	15.00	17.00	17.00	16.79		0.12
8	15.25	17.25	17.00	16.92	0.25	0.33
9	15.00	17.00	17.08	16.96	-0.80	0.04
10	14.75	16.75	17.00	16.92	-0.25	-0.17
11	14.50	16.50	16.75	16.79	-0.25	-0.29
12	14.25	16.25	16.50	16.83	-0.25	-0.58

A major advantage of using the averaging techniques is that provided interest rates rise and then fall (or vice versa) within a relatively short time frame, utilising averaging techniques can reduce the volatility of a bank's loan price movements. Nevertheless, banks using averaging models must accept that interest margins will be variable over time.

Provided interest rates follow a cyclical pattern and do not remain on an upward or downward path for any extended period, the averaging technique would be preferred from a marketing perspective. In periods of rising interest rates banks are able to delay passing on the full impact of increases in the cost of funds to the customer (as interest margins are reduced). This can be a useful tool for banks wishing to maintain/ enhance market share. The corollary of this assumption is that banks should not allow their loan rates to fall as quickly as market rates when the latter are in cyclical decline. However, market pressures may often force banks to match market trends and move their rates ahead of that indicated by the average pricing formula.

The realities of a competitive banking market often dictate that banks' loan rates (especially as they relate to retail customers) lag market trends when interest rates are rising (that is, they appear to utilise MACF policies), but match downturns in market rates when they occur (that is, banks apparently switch to LACF techniques in such instances). Inevitably, such policies will serve to erode profit margins and the underlying profitability of the banking system. The simple rule should be which ever system is used—stick to it.

Another problem with using the MACF formula is the question of which cost of funds basis to use. Marginal pricing dictates that the cost of funds base is that market upon which the bank can rely to obtain funds in volume and in short measure. In the case of short term deposits this would effectively mean the professional cash market and/or certificate of deposit (bank bill) market.

In contrast, bankers using average price formulae often argue that the entire deposit base should be included in the pricing model. This is an illusory and potentially dangerous assumption. It is conceded that retail funds are generally cheaper than professional deposits due to the lower sophistication of retail customers. However, banks have less influence on the flow of retail funds and hence cannot accurately predict the level of retail fund inflow, especially during periods when interest rates are moving.

When using the whole range of bank deposits in the averaging formula, bankers must make assumptions on the proportion of funds that will be attracted from different deposit categories. Simple reliance on existing portfolio distributions can be both contradictory and dangerous, especially during periods of rapidly rising interest rates.

The following example may serve to highlight the problem. Table 7.2 outlines the outstanding balances and their share for a variety of deposit products as well as the interest payable at different points in time.

For simplicity, we will assume that the interest rate payable on all other bank deposits at December 1995 was 4.5% pa and at June 1995 was 4.0% pa. Further, we will assume the deposit structure outlined in June 1996 in Table 7.2 was representative for a bank using average pricing techniques. Hence, the weighted average cost of deposits for that bank was 4.07% pa.

Table 7.2

Bank deposit balances

As at June	Statement/ Passbook Savings		Investment Savings Accounts		Certificates of Deposit		Total Deposits
	$m	%	$m	%	$m	%	$m
1994	15,574	6.5	29,630	12.4	31,085	13.0	238,475
1995	15,224	6.0	25.745	10.1	31,228	12.2	255,230
1996	13,688	4.8	24,171	8.5	39,969	14.1	283,777
Interest rate payable							
December 1995	(%)	0.3		2.0		5.95	
June 1996	(%)	0.2		1.4		5.23	

Source: Reserve Bank of Australia *Bulletin*

Irrespective of which method is used, bankers need to be sure that they are pricing off the correct *benchmark.* In Chapter 6 we argued that products should be priced off benchmarks exhibiting similar cash flow characteristics. Benchmarks which have a *duration*[5] approximating the duration of the bank's loan product are recommended. For example, the duration of a 15 year fixed rate loan for $20 million at, say, 15% pa with equal annual repayments is 5.7 years. Hence the appropriate benchmark in this case is a traded security with a similar duration.

Once bankers have decided on the appropriate benchmark, they are free to decide for themselves whether they prefer to use average or marginal pricing techniques.

(c) Floating rate pricing vs fixed rate pricing

[705] Another area of debate amongst bankers has been the extent to which the loan portfolio is provided on a *fixed interest rate* basis as against a *floating interest rate* basis. Australian banks have traditionally written a larger proportion of their loans on floating rate terms, compared with their American counterparts. The provision of floating rate loans effectively passes the burden of interest rate risk onto the borrower. The bank will ordinarily price its floating rate loan against some benchmark interest rate plus a margin; for example, overdraft rates are either priced off the professional overnight cash market or the 90 day bank bill yield.

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5. Refer [610].

A major advantage of floating rate lending is that banks have greater control over their interest margins. By linking the lending rate to a benchmark which presumably is itself related to the bank's cost of funds, the bank is able to minimise the impact of movements in market rates on its net interest margin. (The precise extent to which it is able to insulate its interest margin will depend on whether the bank resorts to marginal or average pricing.)

Increased competition amongst banks in recent years has led to a dramatic increase in the proportion of fixed rate loans. By providing fixed interest rate loans, a bank thereby accepts a certain degree of interest rate risk. Having assumed responsibility for accepting interest rate risk, banks can adopt a plethora of alternative strategies for offsetting this risk. The cost of these strategies would and should be incorporated into the price of the loan.

When pricing fixed rate loans, banks should incorporate the possibility of early repayment of loans. Hence, prepayment fees/penalties are normally incorporated into fixed interest rate loan contracts. These penalties are designed to insulate the bank from major prepayments of loans arising from a fall in interest rates. Failure to recognise the prospect of early prepayment can expose a bank to bearing the higher funding costs in a period of lower interest rates, with consequent diminution of its net interest margins.

While banks have readily accepted the challenge of offering fixed rate term loans, they have been rather remiss in creating a natural hedging market. Retail depositors have traditionally been reluctant to invest for terms much greater than 12 months. Indeed, only a small fraction of retail term deposits are invested for terms greater than twelve months despite regular attempts by banks to induce retail customers to invest for longer terms by offering higher rates of interest. In the wholesale segment of the market, the banks have generally been reluctant to issue deposits because of the higher funding costs. However, most of the banks have issued medium term debt paper into the Australian corporate debt market, although the issues are sporadic and appear to be driven more by short term funding opportunities rather than measures designed to offset the interest rate risk of the banks' asset portfolio.

Through the extensive use of interest rate swaps and other derivative products a fixed rate term market has evolved in Australia.[6] The banks have used these synthetic securities extensively in recent years to effect

6. For more information on interest rate swaps refer [628].

and/or minimise their interest rate risk. For example, if a bank provided a five year fixed interest rate loan and was uncomfortable with the interest rate exposure, it could enter into an interest rate swap agreement. Effectively, the bank would be a payer of fixed interest rate commitments and be a receiver of floating rate commitments. Since it would receive a fixed interest rate commitment on its loan, this would be offset by its agreement to pay a fixed interest rate commitment on its swap agreement.

The emergence of an interest rate swap market was assisted by the on-going domestic debt issuing programmes of Commonwealth and State government instrumentalities. However, with these authorities being subjected to increasingly commercial responsibility their level of new debt raising has progressively declined in recent years. This trend is unlikely to change.

Consequently, if banks are to continue to provide fixed rate financing (and market pressures suggest that they will), they will either be forced to become more active issuers of term debt in the domestic market or become more willing to accept the interest rate risk of these loans (the latter alternative is unlikely to please the Reserve Bank). As mentioned in Chapter 2, a number of banks have initiated debt securitisation programmes to remove the balance sheet (and presumably interest rate risk) effects of certain types of loans on their books. Economic theory would indicate that a natural equilibrium will emerge between the cost of issuing term debt and the cost of securitising loans, with price being the equilibrator.

Creation of a vibrant domestic bank term debt market will not only help to foster the growth of the fixed loan rate market, it will also help banks to more accurately price this market.

(d) Specific vs portfolio based pricing systems

[706] Another issue for banks writing fixed interest rate loans is whether to price these loans on a *specific* or *portfolio* basis. Specific pricing, as the name implies, requires the bank to immediately fund a loan, usually with a liability of the same duration. On the other hand, portfolio pricing enables the bank to aggregate a parcel of fixed rate loans of similar maturity (or more appropriately, similar duration) and fund these as if they were one loan. The lack of a sizeable term debt market for bank paper in Australia has ostensibly eliminated the specific pricing facility as an option. Moreover, this lack of a term debt market has also meant that banks have had to raise predominantly shorter term funds and utilise interest rate swaps to both price the loans and immunise the bank from the interest rate risk associated with such loans.

An issue which often exercises the minds of bankers is the ratio of fixed rate to floating rate loans that should be maintained. The answer is heavily dependent on two factors, namely:

- the extent to which a bank can access a fixed and/or floating interest rate liabilities; and
- the level of interest rate exposure a bank is prepared to accept.

The question of how much interest rate exposure a bank should accept is a subjective one and depends largely on the risk profile of a bank's management. Nonetheless, it is important to quantify the level of risk in terms of the potential impact on a bank's net interest margin, so that appropriate and measurable action can be taken when the impact on a bank's margin becomes too severe.

(e) Price takers

[707] One final form of loan pricing worth mentioning is the *price taker* (or *price follower*) strategy. This essentially requires the bank to adopt the pricing policies of market leaders. An essential assumption of such a strategy is that the price taking bank's deposit structure is similar to that of the price setting bank and that its cost structure is at least similar (if not more efficient).

In practice the price taker's deposit structure is rarely similar to that of the price setter. However, in a financial market where only a few institutions dominate the banking environment (as in Australia), the smaller banks often have little choice but to be price takers. Whilst their average deposit costs are generally higher than the major banks (because of their smaller pool of low interest accounts), the price taking banks generally have much lower operating costs which can offset the higher cost of funds. Hence a strategy of being a price taker can be financially rewarding, especially if it means higher margins for the price taking bank.

(f) Pricing of non-cash funded products

[708] Up to this point, the discussion has focused on the pricing of cash funded loans. However, as mentioned earlier, banks are increasingly accepting non-cash funded risk, involving interest rate risk and/or credit risk (where, say, the bank acts as guarantor for the borrower).

Where non-cash funded loan products involve only "performance guarantees", the pricing essentially comes down to one of assigning an appropriate fee for the credit risk accepted by the bank, which will be weighted by the term of the guarantee. However, non-cash funded lending invariably involves the bank accepting a combination of credit risk and interest rate risk. In such cases, the fee for the interest rate risk is effectively measured as the cost to the bank of *immunising* (or nullifying) this risk.

In effect the various pricing policies outlined earlier can be similarly applied in determining the cost of immunisation. Invariably, the banks will create contingent liabilities through interest rate swaps, futures and options. If the banks wish to minimise the interest rate exposure of these contingent commitments, they would ordinarily establish swap books, option books, etc. Effectively, the banks attempt to offset swaps, options, etc that they have created with other swaps, options, etc, where the banks accept the opposite exposure. In this way, the banks seek to make a "spread" (the net return after eliminating all interest rate risk) on their various "books".

(g) Relationship based pricing systems

[709] In recent years, banks have become increasingly aware of the need to develop relationship pricing systems for high net worth customers and corporate customers.

Traditionally banks have concentrated on adopting a single pricing policy for all customers who "purchase" one of the bank's products. However, market pressures have led to a realisation that there are different categories of customers with similar socio-economic characteristics and similar financial needs. Banks have moved rapidly to developing client segment models to identify these diverse groups and develop comprehensive financial solutions based on offering a packaged array of product. This has forced banks to unbundle the pricing of individual products so that they are aware of the cost to the bank of providing a package of products and can ascertain the breakeven point on the package.

As mentioned in Chapter 2, banks are acutely aware that a small percentage of their clients provide the bulk of the bank's earnings. They are, therefore, very anxious to retain and if possible build on the custom of this key group. Banks have moved to a relationship based model for these key individual and corporate clients, using the packaged system and offering personalised service, with a relationship executive responsible for all of the bank's interaction with that client. Banks are now in a position to evaluate the worth of each "relationship".

The extension of these relationship based forms of pricing requires the bank to develop a comprehensive customer information system, detailing transaction activity, average loan and/or credit balance by product and term, fees generated, etc. All of this information is essential in compiling an accurate profile of each customer segment and developing packages designed to maximise earnings and/or build market share in each segment.

Relationship pricing can be viewed as both a defensive and/or aggressive pricing strategy by banks. It will be defensive for banks wishing to protect their high net worth customers from predator banks. For these banks, the pricing policy will be sub-optimal, as it will in effect represent an attempt to reduce the cost to the customer of retaining his or her relationship with the bank.

For other banks, relationship banking can be viewed as an aggressive pricing policy. In this situation it could represent an attempt to acquire new business and hence generate extra revenue.

The impact of prudential guidelines on loan pricing decisions

[710] Before concluding this chapter, it will be useful to address the impact of the Reserve Bank's capital adequacy guidelines on the pricing of bank loan products. Although the focus of the guidelines is on risk (credit and market risk), the Reserve Bank measures do impose an implicit cost on banks' lending operations.

Although the measures address both on and off balance sheet items, it is possible to develop an equation for estimating the required breakeven price of a product adjusting for its risk weight. However, it should be stressed that the following equation only works for individual products and allows comparison between products. It does not, however, offer the opportunity to review the return on all products in aggregate.

Beginning from the premise that—

$$A = RAC + L \tag{7.1}$$

where

A	—	assets
RAC	—	risk adjusted capital

L — liabilities

For simplicity, it has been assumed (in equation 7.1) that all off balance sheet commitments are classed as "assets". We can write the equation for determining the return on risk weighted capital employed for a product as:

$$r_A \times A = r_C \times RAC + r_D \times D \tag{7.2}$$

where

r_C — pre-tax rate of return on risk weighted capital employed
r_A — rate earned on assets
r_D — rate paid on deposits
D — deposits

It is further assumed (in equation 7.2) that deposits comprise all of a bank's liabilities. Equation 7.2 oversimplifies the situation, since "A" should include both on and off balance sheet assets. Accordingly, the equation does not universally hold true. However, if we only use this analysis for individual product comparison purposes the above equation is still valid, where there are no off balance sheet items. Moreover, it will be shown that the above equation is not essential for analyses of off balance sheet items, as all variables dependent upon D can be ignored.

Rewriting 7.2, we get—

$$r_C \times RAC = r_A \times A - r_D \times D \tag{7.3}$$

then

$$r_c = \frac{r_A \times A - r_D \times D}{RAC} \tag{7.4}$$

Now

$$RAC = g \times w \times A \tag{7.5}$$

where

g — capital ratio
w — risk weighting factor applied to a particular asset class

Equation 7.4 can then be re-written as—

$$r_c = \frac{r_A \times A - r_D \times D}{g \times w \times A} \tag{7.6}$$

From equation 7.2, we can get—

$$D = A - RAC \tag{7.1.1}$$

Equation (7.1.1) can be re-written as—

$$D = A - g \times w \times A$$

and (7.7)

$$D = A \times (1 - g \times w)$$

Replacing equation 7.7 in equation 7.6 gives—

$$r_C = \frac{r_A \times A - r_D \times A \times (1 - g \times w)}{g \times w \times A} \tag{7.8}$$

Simplifying, we get—

$$r_C = \frac{r_A - r_D \times (1 - g \times w)}{g \times w} \tag{7.9}$$

Equation 7.9 is the same as that developed by Canning, Pitman and Williams (1988). From equation 7.9 we can obtain the breakeven rate required on an asset category, given a required rate of return on risk weighted capital. This is given as—

$$r_A = g \times w \times r_C + r_D \times (1 - g \times w) \tag{7.10}$$

Equation 7.10 can be further expanded to take account of the impact of holding prime assets (PAR) and non callable deposits with the Reserve Bank (NCDs). Using equation 3.3 from Chapter 3, we can expand equation 7.10 to take account of PAR and NCD effects. In this example and for the remainder of this chapter, we have assumed a 3% PAR ratio and a 1% NCD ratio. Hence,

$$r_A = \frac{g \times w \times r_C + (r_D \times (1 - g \times w) - 0.03 \times r_{PAR} - 0.01 \times r_{NCD})}{0.96} \tag{7.11}$$

where

r_{PAR}	—	rate earned on PAR assets
r_{NCD}	—	rate earned on NCD deposits

Equation 7.11 relates specifically to cash funded loans. For non cash funded on balance sheet assets, such as bankers' acceptances, banks need only to raise sufficient funds to fund the purchase of PAR and NCD assets (refer Appendix 7A, equation 7.21). Coincidentally, banks are able to use the surplus capital to fund other assets (such as PAR assets, other

loans, etc). Accordingly, for non cash funded on balance sheet assets, the appropriate equation is:

$$r_A = g \times w \times r_C + \frac{(0.04 \times (r_D \times (1 - g \times w) - 0.03 \times r_{PAR} - 0.01 \times r_{NCD}))}{0.96} - g \times w \times r_x \quad (7.12)$$

where

r_x — return on the alternative cash funded asset.

Simplifying,

$$r_A = g \times w \times (r_C - r_x) + \frac{(0.04 \times (r_D \times (1 - g \times w) - 0.03 \times r_{PAR} - 0.01 \times r_{NCD}))}{0.96} \quad (7.13)$$

For off balance sheet assets, the equation simply reduces to 7.14, since no deposits are required:

$$r_A = g \times w \times (r_C - r_x) \quad (7.14)$$

Equations 7.10 and 7.14 represent marginal pricing formulae, that is, they represent the required return from adding an extra unit of a particular asset class to the bank's balance sheet and assume that no extra capital is required (that is, banks do not need to raise capital).

In reality banks are continually raising capital through either internal means (retained earnings) or external means (share placements, etc). The above equations do not specifically take account of this factor and substantial iteration would be required.

A simpler equation which can be applied in all instances is based on the following identity:

$$\text{REQUIRED RETURN ON ASSETS} = \text{RETURN ON CAPITAL EMPLOYED} + \text{COST OF FUNDS} - \text{PAR ASSETS} - \text{NCD ASSETS}$$

Hence for cash funded loans, the equation becomes:

$$r_A = g \times w \times r_C + \frac{(r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD})}{0.96} \quad (7.15)$$

for non cash funded on balance steet assets, the equation becomes:

$$r_A = g \times w \times r_C + \frac{(0.04 \times (r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD}))}{0.96} \quad (7.16)$$

and for off balance sheet assets, the equation becomes:

$$r_A = g \times w \times r_C \quad (7.17)$$

Equations 7.15 to 7.17 overstate the "true" breakeven return on assets, but provide a fair approximation for comparison purposes (since the error would be small).

[711] We can gauge the impact of the risk weightings on the required returns on various asset classes by way of example. The following assumptions can be made:

- the bank's required before tax rate of return is 25%, implying an after tax rate of 16% (assuming a 36% tax rate).
- The bank will at all times hold the minimum required risk adjusted capital ratio of 8%.
- The rate earned on NCD and PAR assets is 5% below and 0.5% below the cost of funds respectively.

Table 7.3

Impact of risk weightings on required returns

		Risk weight %	*Required return %*	*Implied margin %*
Case 1: Cost of Funds at 7.5%				
(i) Funded assets	(a)	100	9.57	2.07
	(b)	50	8.57	1.07
	(c)	20	7.97	0.47
(ii) Non funded assets on balance assets	(a)	100		2.30
	(b)	50		1.30
	(c)	20		0.70
(iii) Non funded assets off balance assets	(a)	100		2.00
	(b)	50		1.00
	(c)	20		0.40
Case 2: Cost of funds at 5.0%				
(i) Funded assets	(a)	100	7.07	2.07
	(b)	50	6.08	1.08
	(c)	20	5.47	0.47
(ii) Non funded assets on balance assets	(a)	100		2.20
	(b)	50		1.20
	(c)	20		0.60

Table 7.3—*continued*

		Risk weight %	*Required return %*	*Implied margin %*
(iii) Non funded assets				
off balance assets	(a)	100		2.00
	(b)	50		1.00
	(c)	20		0.40

Two cases will be studied. One will assume a cost of funds of 7.5% and the other a cost of funds of 5%. The varying impact of funded and unfunded assets as well as off balance sheet assets will be analysed. Appendix 7B provides the detailed estimates.

The table above provides the results.

The above analysis provides some interesting conclusion. These are:

- that major product rationalisation will need to continue to occur if banks are to achieve a reasonable return on equity;
- the present PAR and NCD arrangements impose an extra charge on all balance sheet assets which must be recovered through increased margins; and
- those non cash funded on and off balance sheet assets with 100% risk weighting, such as bill acceptances, bill endorsements and guarantees are most adversely affected.

The above returns assume that the margins stated above are available in the market. As an example, it may not be possible to achieve a return of 230 basis points on bankers' acceptances, since corporate customers may prefer alternative funding sources (for example, promissory notes). Indeed, it could be argued that the capital adequacy guidelines accelerated the move towards disintermediation.

It should be stressed again that equations 7.15 and 7.17 refer to marginal pricing of bank products. If banks were to continue to concern themselves with the average return on individual products, they would need to load in the cost of providing the transaction of business on a fully absorbed basis plus provide a charge for interest rate exposure. Such an approach would require banks to apportion overheads between products.

Conclusion

[712] The above review provides some background into the issues facing bankers in their loan pricing decisions. In practice, they clearly do not attempt the level of disaggregation presented in this chapter. Nonetheless they should be aware of the various alternative strategies and the implications of their actions.

The Reserve Bank's capital adequacy guidelines add an additional, but measurable cost, to the pricing problem. But in the final analysis, the choice essentially comes down to whether bankers wish (or indeed are able) to pass on the full "cost" of their operations to borrowers or whether they wish to absorb part of these "costs", which is reflected in reduced margins.

From a purely economic rationale, bankers should pass on the full cost to the borrower as this will ensure an efficient allocation of financial resources within the economy. But as we all know, pure economic rationale is hardly ever implemented.

APPENDIX 7A

Impact of Holding Prime Assets and Non-Callable Deposits on Product Pricing

Banks are currently required to hold a proportion of their aggregate Australian dollar denominated on balance sheet assets *less* their capital base (defined as both Tier 1 and Tier 2 capital) in Non Callable Deposits (NCDs) with the Reserve Bank.

As a further requirement, banks must hold a proportion of their Australian dollar denominated on balance sheet assets *less* their capital base as Prime Assets (PAR).

PAR and NCD ratios are variable at the discretion of the Reserve Bank. In Appendix 7 **A** we have assumed a PAR ratio of 3% and an NCD ratio of 1%. Hence for every $100 of total AUD assets, banks must hold at least $1 in NCDs and $3 as Prime Assets.

Ignoring capital adequacy criteria a bank's loan product will break even if:

$$\begin{matrix}\text{COST OF}\\\text{FUNDS}\end{matrix} = \begin{matrix}\text{EARNINGS ON}\\\text{ASSET CLASS}\end{matrix} + \begin{matrix}\text{EARNINGS ON}\\\text{PAR ASSETS}\end{matrix} + \begin{matrix}\text{EARNINGS}\\\text{ON NCDs}\end{matrix}$$

or

$$r_D \times D = r_A \times A + r_{PAR} \times PAR + r_{NCD} \times NCD \quad (7.18)$$

where

D	—	deposits held to fund the assets
A	—	asset class in question
r_D	—	rate paid on deposits
r_A	—	rate charged on assets
r_{PAR}	—	rate earned on PAR assets
r_{NCD}	—	rate earned on NCD deposit

Simplifying, we get—

$$r_D = 0.96 \times r_A + 0.03 \times r_{PAR} + 0.01 \times r_{NCD} \quad (7.19)$$

Re-writing, we get—

$$r_A = \frac{r_D - 0.03 \times r_{PAR} + 0.01 \times r_{NCD}}{0.96} \quad (7.20)$$

Those on balance sheet assets not funded by deposits, such as bankers' acceptances, are still subject to PAR and NCD requirements. In this case the bank will only need to raise sufficient deposits to purchase PAR and NCD assets.

Accordingly, for every \$100 of non cash funded assets, \$4 of deposits will need to be raised to finance purchases of PAR and NCD assets (with total assets increasing by \$104).

Essentially 4% of the growth in assets will be allocated to PAR and NCD assets. Therefore, for non cash funded assets:

$$\begin{array}{c}\text{Total}\\ \text{net return}\end{array} = 0.96 \times \begin{array}{c}\text{return on}\\ \text{non cash}\\ \text{funded assets}\end{array} - 0.04 \times \left(\begin{array}{c}\text{Cost of}\\ \text{deposits}\end{array} - \begin{array}{c}\text{return on PAR}\\ \text{and NCD}\\ \text{assets}\end{array} \right)$$

if net return = 0, then

$$\begin{array}{c}\text{Return on}\\ \text{non cash}\\ \text{funded assets}\end{array} = \frac{0.04 \times \text{cost of deposits} - \text{return on PAR \& NCD assets}}{0.96}$$

Equation 7.20, therefore reduces to:

$$r_A = \frac{0.04 \times (r_D - 0.03 \times r_{PAR} + 0.01 \times r_{NCD})}{0.96} \tag{7.21}$$

This is a close approximation since the actual result is only achieved through iteration.

APPENDIX 7B

Impact of Capital Adequacy Guidelines on the Required Return on Assets

The equations used are as follows:

(1) Funded assets.

$$r_A = g \times w \times r_C + \frac{(r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD})}{0.96} \tag{7.15}$$

(2) Non funded on balance assets:

$$r_A = g \times w \times r_C + \frac{(0.04 \times (r_D - 0.03 \times r_{PAR} - 0.01 \times r_{NCD}))}{0.96} \tag{7.16}$$

(3) Non funded off balance assets:

$$r_A = g \times w \times r_C \tag{7.17}$$

then,

Case 1: Cost of funds at 7.5%

(1) Cash funded assets

(a) Risk weighting is 100%

$$\begin{aligned} r_A &= 0.08 \times 0.25 + \frac{(0.075 - 0.03 \times 0.07 - 0.01 \times 0.025)}{0.96} \\ &= 9.57\% \end{aligned}$$

(b) Risk weighting is 50%

$$\begin{aligned} r_A &= 0.08 \times 0.5 \times 0.25 + \frac{(0.075 - 0.03 \times 0.07 - 0.01 \times 0.025)}{0.96} \\ &= 8.57\% \end{aligned}$$

(c) Risk weighting is 20%

$$\begin{aligned} r_A &= 0.08 \times 0.2 \times 0.25 + \frac{(0.075 - 0.03 \times 0.07 - 0.01 \times 0.025)}{0.96} \\ &= 7.97\% \end{aligned}$$

(2) Non funded on balance assets

(a) Risk weighting is 100%

$$r_A = 0.08 \times 0.25 + \frac{(0.04 \times (0.075 - 0.03 \times 0.07 - 0.01 \times 0.025))}{0.96}$$
$$= 2.30\% \text{ or } 230 \text{ basis points}$$

(b) Risk weighting is 50%

$$r_A = 0.08 \times 0.5 \times 0.25 + \frac{(0.04 \times (0.075 - 0.03 \times 0.07 - 0.01 \times 0.025))}{0.96}$$
$$= 1.30\% \text{ or } 130 \text{ basis points}$$

(c) Risk weighting is 20%

$$r_A = 0.08 \times 0.2 \times 0.25 + \frac{(0.04 \times (0.075 - 0.03 \times 0.07 - 0.01 \times 0.025))}{0.96}$$
$$= 0.70\% \text{ or } 70 \text{ basis points}$$

(3) Non funded off balance assets

(a) Risk weighting is 100%

$$r_A = 0.08 \times 0.25$$
$$= 2.00\% \text{ or } 200 \text{ basis points}$$

(b) Risk weighting is 50%

$$r_A = 0.08 \times 0.5 \times 0.25$$
$$= 1.00\% \text{ or } 100 \text{ basis points}$$

(c) Risk weighting is 20%

$$r_A = 0.08 \times 0.2 \times 0.25$$
$$= 0.40\% \text{ or } 40 \text{ basis points}$$

Case 2: Cost of funds at 5.0%

(1) Cash funded assets

(a) Risk weighting is 100%

$$r_A = 0.08 \times 0.25 + \frac{(0.05 - 0.03 \times 0.045 - 0.01 \times 0.00)}{0.96}$$
$$= 7.07\%$$

(b) Risk weighting is 50%

$$r_A = 0.08 \times 0.5 \times 0.25 + \frac{(0.05 - 0.03 \times 0.045 - 0.01 \times 0.00)}{0.96}$$
$$= 6.08\%$$

(c) Risk weighting is 20%

$$r_A = 0.08 \times 0.2 \times 0.25 + \frac{(0.05 - 0.03 \times 0.045 - 0.01 \times 0.00)}{0.96}$$
$$= 5.47\%$$

(2) Non funded on balance assets

(a) Risk weighting is 100%

$$r_A = 0.08 \times 0.25 + \frac{(0.04 \times (0.05 - 0.03 \times 0.045 - 0.01 \times 0.00))}{0.96}$$
$$= 2.20\% \text{ or } 220 \text{ basis points}$$

(b) Risk weighting is 50%

$$r_A = 0.08 \times 0.5 \times 0.25 + \frac{(0.04 \times (0.05 - 0.03 \times 0.045 - 0.01 \times 0.00))}{0.96}$$
$$= 1.20\% \text{ or } 120 \text{ basis points}$$

(c) Risk weighting is 20%

$$r_A = 0.08 \times 0.2 \times 0.25 + \frac{(0.04 \times (0.05 - 0.03 \times 0.045 - 0.01 \times 0.00))}{0.96}$$
$$= 0.60\% \text{ or } 60 \text{ basis points}$$

(3) Non funded off balance assets

(a) Risk weighting is 100%

$$r_A = 0.08 \times 0.25$$
$$= 2.00\% \text{ or } 200 \text{ basis points}$$

(b) Risk weighting is 50%

$$r_A = 0.08 \times 0.5 \times 0.25$$
$$= 1.00\% \text{ or } 100 \text{ basis points}$$

(c) Risk weighting is 20%

$$r_A = 0.08 \times 0.2 \times 0.25$$
$$= 0.40\% \text{ or } 40 \text{ basis points}$$

APPENDIX 7C

Should the Price Decision be Based on Average or Marginal Costs?

This was an issue of heated debate amongst bankers during the 1980s. Economic theory provides a basis for resolving this issue. Industry economics indicates that companies will maximise their profits when they set their prices at the point where the marginal price of selling an extra unit of product is equivalent to the marginal cost of producing that product. This can be shown graphically as follows.

Figure 7.2 shows the average cost (AC) and marginal cost (MC) curves for a firm. If the firm is the only producer in the industry (a monopolist), it will be able to set its own price for the products it sells. Because its demand curve DD is downward sloping, the slope of its marginal revenue curve (MR) is steeper. If the firm is in a competitive industry it cannot materially alter the price of the product from the prevailing industry price. Hence, their demand curve (DD) and marginal revenue curve are one and the same.

Fig 7.2

Industry pricing policy

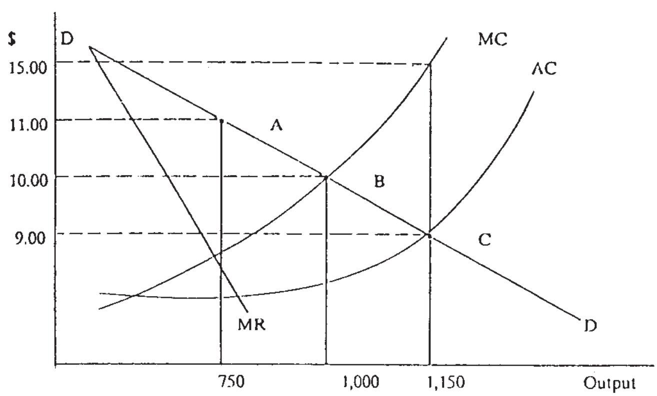


Table 7.4 provides the relevant price and cost data associated with Figure 7.2.

Table 7.4

Industry pricing data

Output			*Pricing for monopolist*		*Pricing for perfect competitor*
	Average cost	Marginal cost	Marginal revenue	Price	Price = marginal revenue
Units	$	S	$	$	
750	8.20	8.00	8.00	11.00	
1,000	8.30	10.00			10.00
1,150	8.50	15.00			9.00

Referring back to Figure 7.2, the monopolist will obtain maximum profits by selling at $11.00 per unit. This will result in a demand level equivalent to point "A" and result in 750 units being produced. The monopolist would generate profits of $2,000 (obtained by multiplying 750 units by the profit margin ($11.00 - $8.20) = $2.80).

The perfect competitor would sell its product for $10.00, it being the industry price. It would produce 1,000 units given his demand level of "B". Its profit would be $1,700 (being 1,000 x ($10.00 - $8.30)). Interestingly, the cost of the 1,000th unit produced is $10.00, such that it only breaks even on the last unit.

If either producer produced at the level where average costs equal demand—point "C", then profit would be $575 = (1,150 x ($9.00 - $8.50)). In this case, the last unit (1,150th) would cost $15.00 to produce, yet the firm would only receive $9.00 on sale. This is why it is rational to base pricing decisions on marginal cost and not average cost considerations.

8

Other Bank Management Functions

Strategic planning

[801] The economic turbulence and rapid technological advances of the past two decades have engendered broad recognition and agreement that to be successful bank management needs to develop comprehensive plans of where their banks will be in the near future.

The purpose of strategic planning is to prepare the firm for appropriate business responses to the changing markets in which it operates.

Strategic planning is an ongoing process to assist management to allocate resources to achieve stated objectives by specified dates in the future. It is a horizon expanding process, a path finding to probable alternative futures.

While the planning process may not always provide ready answers it should be able to generate the right questions, identify key elements of change, the issues these raise and the impacts they create for the firm.

Strategic planning may not eliminate risk, or even reduce risk, but it does have the function of preparing business units for the potential risks involved, heightening their awareness and preparedness to risk events under different sets of alternatives.

The essential ingredient of strategic planning is the need to develop a plan today of where the bank will be in five years time.

In this way, we are saying banks' management must recognise that decisions taken today may have significant long term ramifications. Only if management recognises this factor will they be in a position to visualise the possible risks they, or more correctly their bank, may encounter in the future.

Hence, to be effective, strategic plans need to be sufficiently broad as to cover the major functions of the bank, yet sufficiently flexible as to recognise the dynamic nature of the banking and finance industry. A strategic plan that does not cover all of the major operations of the bank may expose that bank to unnecessary risks. This could be especially so if the planners have not devoted sufficient time and energy to analysing the possible future scenarios affecting all operational areas of the bank.

[802] The strategic planning process can be divided into four segments.

- outlining the bank's present position, its strengths and its weaknesses;
- identifying where the bank would like to be at the end of the planning horizon (say five years time);
- indicating how it is proposed to achieve these objectives; and
- constantly reviewing how well the bank is performing in achieving these objectives and whether a review of objectives is necessary.

[803] Outlining the bank's present status. This is a relatively easy phase of the planning process. There are two dimensions to this appraisal process or situation analysis, notably an internal and external dimension.

(a) Internal appraisal—consists of identification of the firm's strengths and weaknesses utilising a checklist covering such areas as management, operations and financial considerations.

(b) External appraisal—requires the identification of factors in the domestic and international environments which may constitute *threats* to the organisation's competitive stance, its survival or the attainment of its objectives; and factors which may present *opportunities* for the greater accomplishment of objectives. It may be helpful to construct an environment profile in terms of two time zones—immediate and distant.

The SWOT analysis (short for Strengths, Weaknesses, Opportunities and Threats) as it is often termed should review and comment on the following:

- *An identification and analysis of the industry in which the firm competes.* A major issue to be addressed by management is to define the core business(es) of the institution and, thereafter, decide the industry within which the institution is operating (say, whether the bank is operating only within the banking industry as defined by the *Banking Act* 1959, the Australian financial services industry or the international banking industry). The plan should review the attractiveness of the whole industry, since this will be an important determinant for the success of the company itself.

The plan should also assess how the industry might change in the future, taking account of such factors as technological changes, government policy and demographic factors.

- *Sources of competitive advantage.* The plan should be able to highlight the firm's competitive advantages over its competitors, whether it be superior technology, its distribution network, quality of the customer base, and/or management capability. The organisation should make every effort to reinforce these competitive advantages and use them to secure its market position.
- *An analysis of existing and potential competitors* which might affect the firm and its competitive advantage. Unless the firm is aware of what its competitors are doing, it can lose that advantage. In a real world a firm's competitive advantage is always changing, since it is heavily dependent upon the actions of its competitors as well as its own. Hence it is essential that the planning process includes a review of each competitor (both existing and potential) and their possible strategies. In this way the firm can develop alternative scenarios from which it can test the rigorousness of its own plan.

[804] Setting objectives. This phase involves establishing objectives that the bank would like to achieve over the planning horizon. This phase can be facilitated by the development of a "Mission Statement"—a concise statement of the overriding purpose or the prime objectives of the organisation.

In addition to the Mission Statement there is a vital need to establish realistic objectives which specify a future state or preferred position that the organisation seeks to attain. The objectives should be easily identifiable by all staff and not simply broad statements of intent. Moreover, it is essential that all staff be fully aware of the objectives so that they can be encouraged to actively participate in their achievement.

Desirably, such objectives should be ranked according to priority, specified where possible in quantitative terms and accompanied by a time frame for their individual achievement. Quantification is stressed because it implies measurability and represents a standard against which performance is to be measured.

Possible areas where the bank's management may wish to establish strategic objectives could include:

- *Financial objectives*—this may take the form of statements regarding increasing shareholder wealth, return on assets and equity, profit retention rates, after tax profit performance, gearing ratios, free reserve ratios, etc.

- *Corporate objectives*—generally these cover the bank's position within the community and the industry in which it operates, its profile amongst the business and household sectors, and may include comments on the market share and required returns per dollar invested by product and/or sector.
- *Operational objectives*—which could involve broad plans of future branch design and telling functions as well as data processing and information distribution activities.
- *Structural objectives*—this might cover such areas as rationalisation of existing functions and diversification into other quasi-banking functions.

Having defined the broad objectives of the strategic plan, it is useful to establish Key Performance Indicators (KPI) which will help to measure the extent to which the strategic plan is being achieved. These KPIs can be either quantitative or qualitative measures of performance.

During this phase the strategic planner may find it instructive to develop simulation models to assess the achievability and compatibility of the objectives in the context of different economic scenarios.

At this point it is useful for the bank to define the particular business model that will be used by the organisation in attempting to achieve the strategic plan. The available models are many and varied but broadly extend from a distribution, production, process and/or technology driven basis. Hence a distribution based business model is primarily focused upon selling to the customer, with all other processes subordinated to that particular function. Whilst at the time of reviewing the strategic plan it is useful to also review the business model, in practice the business model is rarely changed, although during periods of significant industry restructuring it may indeed be appropriate to alter the operating business model.

[805] Action plan. This is the most difficult phase of the planning process, both because of the complexities involved and the risks associated with the possibility of external developments over which the bank has no control.

The action plan will involve the preparation of a series of forecasts for the bank including balance sheet forecasts and income statements, given a number of different scenarios, so that the planners can gain an insight into the interdependence of the bank's objectives and whether given certain economic and financial constraints they are in fact achievable. Quite often this phase of the planning process may result in a reassessment and possible review of the bank's objectives, or the development of a new direction in achieving particular objectives.

To be effective, the action plan should consider a number of alternative scenarios, both adverse and advantageous, so that management can ascertain the degree of difficulty in achieving the objectives.

Finally, it is important that the plan be communicated throughout the organisation so that staff are aware of their responsibilities in achieving the plan.

[806] **Review.** The planning process does not end with the completion of the plan. The planning staff should regularly assess the performance of the existing plan and decide whether it needs alteration. At the same time the strategic planners can utilise the information and knowledge they have gained from the relative performance of the existing plan in helping to construct the next strategic plan.

Quite often the review process can be facilitated by the creation of "Strategic Controls". These controls are concerned with the establishment of monitoring and measurement systems to provide feedback and measure actual performance of the organisation in relation to the strategic plan and stated objectives. The control process generates information for the purpose of review and amendment of plan where necessary.

[807] Another feature of the review process often involved the identification of Critical Success Factors. These are factors identified by management which, if not achieved, will result (either individually or in tandem with another factor) in the failure of the plan. By focusing on, say, ten Critical Success Factors, management can ensure that the bulk of the plan will have every chance of success. Strategic planning is not a passive management system but rather a dynamic one where management needs to constantly assess the potential and means for achieving objectives.

Strategic plans may well overlap one another, although hopefully they will be mutually consistent, involving the refinement of an earlier theme.

Personnel Policies

[808] Personnel policies between the banks and financial institutions can differ significantly. Bearing in mind that there are currently 50 banks, over 100 merchant banks and some 70 other financial institutions operating in Australia, it will be appreciated that a description of all the relevant policies cannot be accomplished in a concise summary. Accordingly, this section will provide a general overview of some personnel policies that may be implemented by the larger banks.

Staffing represent around half of total bank operating expenditure. Little wonder, then, that management endeavours to keep staffing costs down, particularly in a climate of very strong competition.

With the emphasis being placed more and more on technology over the past 15 years, in particular the power of the computer, it could be argued that this electronic "monster" assumes top priority. People are, however, the most valuable resources in a banking organisation. Without people to operate and develop new technology, the computer would be useless. Banks are largely labour-intensive organisations, notwithstanding the huge amounts of capital that have been ploughed into technological development. The viability of a bank is dependent to a large extent on the willingness and ability of its staff to provide a competitive service in the market place.

[809] The changing nature of employee education levels. The image of a bank as a place to work has changed over the past 30 years. In the 1960s when unemployment was low and the economy booming, banks struggled to retain staff and attract new people. It would be reasonable to suggest that during that time, many people saw a bank as a place to work if they could not get a job somewhere else. Bank's recruitment also concentrated on school leavers, with little thought or inclination given to attracting young people with tertiary qualifications from universities and colleges.

With very few exceptions, all senior positions were filled from within the organisation. Banking was a career industry where the young recruit could aspire to the top jobs without the threat of an outsider being appointed to senior positions. To a large extent, this is still the case, although there have been notable "outside" appointments to the highest level of all banks in recent years.

Banks have always encouraged their staff to undertake further study at technical colleges and universities, but those holding tertiary qualifications still make up only a small percentage of total staff.

The complexities of modern day banking have seen a high demand for staff with specialist academic training. Eventually it became apparent that, as more and more school leavers were undertaking full time tertiary study, it would be necessary to recruit more staff direct from tertiary institutions. This would ensure that sufficient resources would be available to fill specialist positions as well as providing an adequate pool of future managers.

Although recruitment of university graduates has stepped up, banking still provides a worthwhile career for school leavers. Some appointments to senior management, particularly specialist appointments, are made from outside but generally speaking the senior jobs are filled from within the organisation. However, it would be reasonable to assume that the very top jobs will be occupied by tertiary trained people in the future.

[810] Bank work practices. Deregulation of financial markets and increased technologies together with a plethora of new banking products have meant that greater skills are required today than was the case in the past. Younger staff are now taking on more responsibilities. What is more, greater responsibility is being placed on more experienced bankers who have to manage a generally younger office staff.

In the banking industry 30 years ago, staff were generally well trained and could comfortably cope with the workload. The massive expansion of the branch network since then, combined with the development of new products, has meant that larger scale recruitment has taken place. And so, as the ranks of experienced bankers have spread, less experienced people have been asked to do their jobs.

In most large banking organisations there has been a significant focus on enhanced selling skills throughout the retail network. The reasoning for this emphasis stems from efforts to increase the range of services sold to each retail client so as to increase the profitability of each customer.

Another development in personnel policies being adopted by banks is in performance measurement and a remuneration aligned to individuals' performances. The banks are increasingly setting "Key Result Areas" for each position so that an individual's performance can be measured in terms of his or her contribution to the bank's overall performance.

[811] Competition for skilled staff. It was at one time considered appropriate that a rounded banker had to have a general perspective towards banking with experience in a wide range of areas. The complexity of banking today has resulted in the need for greater specialisation. This is evident in EDP operations and other areas such as corporate banking and bank treasury functions and increasingly in retail banking, with specialist client services staff attuned to selling, specialist lending staff with skills in credit assessment, and financial advisory staff with skills in providing personal financial advice. It is likely that banks will concentrate on recruiting and maintaining specialist staff in key bank functions in future and that they will develop screening systems to assist in positioning new recruits into the appropriate areas.

The mushrooming of the financial services market has led to a proliferation of demand for staff with specialist banking skills, be it credit assessment, relationship banking, advisory work, etc. This has placed increasing pressure on banks and other financial service .providers to concentrate on internal and where appropriate external training programmes to boost the pool of individuals with these specialist skills.

[812] Part-time employment in banking. There has been a noticeable tendency for all financial service providers to employ people on a part-time basis for the clerical and less skilled functions performed by banks (including telling and operations and processing functions). This move towards part time employment has been the result of increased competition within the industry and the rapid changes in computer technology. New entrants into the market and the blurring of functions between banking and insurance and funds management has forced all organisations to focus on reducing operating costs. Coincidentally, rapid advances in computer technology has allowed back office processing functions to be streamlined and centralised. These factors have essentially lowered the skill requirements for a number of bank functions, allowing the banks to employ part time staff. A key benefit of this trend is to increase the servicing time that banks can operate. As an example, customer service help lines are generally available by phone seven days a week and for extended hours throughout the day. A number of banks provide banking services on Saturdays and after traditional business hours. The spread of part time employment has enabled the banks to restrict increases in staffing costs whilst at the same time maintaining a satisfactory standard of service to customers. It is likely that this trend towards part-time employment will accelerate over time.

This policy has some good points. Definite savings in operating costs are apparent and it gives scope for banks to employ more mature people who wish to re-enter the work force after raising a young family. On the other hand, it is important that the banks keep the ratio of full and part-time staff in perspective. Considerable difficulties can arise in a branch or other operational areas if too many part-time employees make up total staff numbers, especially during those occasions where work pressures may necessitate longer working hours.

[813] Staff training. Training programmes have been implemented on a mass scale to assist staff with their jobs. The major banks have residential staff training colleges where staff attend courses from a few days to three to four weeks. To broaden the experience of more senior bankers, Australian banks lend strong support to management training programmes operated by various schools of management in both Australia and overseas.

Training centres established by banks also provide courses for the more junior staff, such as telling training.

[814] The need to keep staff informed. Communication is important. Banks have moved towards greater communication through such avenues as video networks and visits by personnel liaison officers. Management at the operational level should also keep their staff informed of important developments.

[815] Perception from the staff's viewpoint. The Personnel Departments of banks (and indeed all organisations) are often subject to severe criticism from its staff and of course a number of banks' staff think they can run their Personnel Departments better than the people currently in personnel functions. Personnel comes under the watchful eye of the staff because their policies affect everyone more than the work of other departments.

Perhaps the most important aspect of personnel practice is to ensure that policies are implemented which are fair to all staff. In other words, decisions about one individual or group of individuals should not be made without taking into account wider ramifications such as other staff being disadvantaged on a relativity basis. This is not easy.

Electronic Banking

[816] The past two decades have witnessed a rapid acceleration of technological developments in the banking industry. The increased competition fostered by deregulation of the banking industry has resulted in a plethora of technological innovations. Indeed, the Australian banking industry is currently at the forefront worldwide in introducing new banking technology. The technology represents an improvement in both customer service and management information systems.

[817] The evolution of Electronic Funds Transfer (EFT) has received considerable attention, both within and outside the banking industry. The reason for this is not hard to find. EFT is widely recognised as one of the greatest agents of change in the banking industry.

The term "Electronic Funds Transfer" is used broadly to cover any system involving the transfer of amounts or authorisation of payment by electronic means, that is, without the movement of paper. These systems are computer based and in many cases utilise on-line networks.

Six broad categories of EFT can be identified:

- on-line systems;
- automatic tellers/cash dispensers;
- point of sale systems;
- automated clearing houses;
- internet banking; and
- money transfer networks.

[818] On-line systems. As the name implies, on-line systems represent terminals that are connected to a central computer. Information is immediately transmitted between the terminals and the central computer system.

In Australia, with its vast distances between major population centres, the use of on-line systems for data transmission is particularly effective. The four major banks, each with in excess of 1,000 branches, all use on-line systems. In this way deposits, loans and other customer information which are input at the branch level are automatically updated and stored at a central location. Account records are usually posted simultaneously and the flow of paper from one point to another is eliminated or reduced.

The use of on-line systems gives banks the added advantage of communicating directly with the branch networks. Administrative departments can send messages to branches via the on-line system, thereby increasing the speed of communication. As an example, the Commonwealth Bank provides both exchange rate and interest rate information to its branches via its on-line network. In this way, the Bank's latest interest and/or exchange rates can be quoted to customers more quickly and efficiently.

[819] Automatic tellers/cash dispensers. Automatic telling machines (ATMs) are customer activated on-line terminals. The terminals offer customers a variety of functions including the ability to deposit or withdraw funds, transfer funds between various accounts, pay Bankcard, and in some cases automatic bill paying facilities are also offered. The major advantage of ATMs is that they allow customers to effect these transactions without the assistance of bank staff. Cash dispensers are less sophisticated machines which only permit customers to withdraw funds from their accounts.

ATMs are usually located on the outside walls of branches or in a lobby located at the front of the branch, facilitating customer usage after normal banking hours. Recently, banks have moved to introduce ATMs away from branches, such as shopping centres, factories, registered clubs and airport terminals.

A major factor to be considered before installing ATMs is the capital outlay involved. Initially, the four major banks hastened to install as many terminals as possible. The result was an array of ATMs available from different banks often located along a single street in many suburban centres. Unfortunately, customers could only access their own bank's ATM. It was not unusual, therefore, to see a queue of customers at one ATM, with other ATMs only a short distance away lying idle.

Recently, the banks have moved to rationalise their ATM networks, announcing a number of agreements to link each other's ATM networks. Moreover, links have also been established with building societies, credit unions and other non-bank financial institutions. At the time of writing, all major ATM networks operating within Australia had reached broad agreement on inter-connectivity. It is likely that by mid 1998 customers will be able to withdraw money from any ATM in the country. This rationalisation of ATM resources provides a more efficient use of ATMs as customers are able to go to any ATM, not necessarily that belonging to their particular bank, to conduct their business.

Accompanying this rationalisation, customers are increasingly being charged for accessing another bank's ATM (since the bank is itself charged by the bank whose ATM is being accessed by the customer). In this way a more efficient system of ATM usage and installation will evolve to the overall benefit of the Australian economy.

[820] Point of sale systems. In recent years the words EFTPOS has been splashed across newspapers and magazine articles. EFTPOS stands for Electronic Funds Transfer at Point of Sale. These systems refer to the service whereby a customer can electronically debit his or her bank account and the proceeds are immediately credited to the retailer's counter. The transaction merely involves the customer utilising a plastic card to activate the transfer of funds.

The four major banks had originally proposed a "gateway" system for EFTPOS transactions, wherein all transactions had to pass through the bank's gateway network. In this way EFTPOS transactions involving not only bank but also non-bank customers would have to pass through the gateway for processing. The banks argued that such a system was necessary to ensure both security and universal access to the system.

Both the retailers and non-bank financial institutions had argued that the gateway network would give the four banks an unnecessary advantage and control of EFTPOS.

The retailers pushed for an "open" system whereby a customer's account is debited immediately, irrespective of whether the customer banks with a bank or non-bank institution. It is argued that this is a more direct and therefore efficient method for activating EFTPOS transactions.

[821] In late 1985 a major breakthrough for the gateway concept emerged following the agreement between Westpac, the Commonwealth Bank and the Australian Federation of Credit Unions (AFCU). Under the agreement, credit union customers were able to use Westpac and/or Commonwealth Bank EFTPOS terminals at various retail outlets to effect their transactions. The AFCU agreed to an agency arrangement whereby credit union customers' transactions are processed via the bank's computers before proceeding to the credit union's computer network.

A further development occurred in later July 1986 when the major banks together with the Retail Traders' Associations in every State agreed to introduce a common EFTPOS system utilising the gateway system proposed by the banks.

Figure 8.1 describes the existing EFTPOS linkage arrangements. It is based on the banks' preferred "gateway" concept, with the major banks acting as clearers for the rest.

A comprehensive industry standard for electronic funds transfer has been developed under the sponsorship of the Standards Association of Australia.

The main advantages of EFTPOS to both customers and retailers is the reduced need to hold cash or process cheques to effect transactions. The system therefore offers improved security to both individuals and businesses. Additionally, the retailers benefit from improved cash management as their funds are immediately credited to their bank accounts. Similarly, banks benefit from a reduced need to maintain cash balances on cheque clearances. Overall, therefore, EFTPOS should herald a more efficient means for transmitting the flow of funds within the economy, at least at the household level.

The major issue facing the EFTPOS arrangement is the charging system to be employed between banks. Australia is rather unique in the world in that the bank whose customer uses an EFTPOS terminal pays a transaction fee to the bank whose merchant effected the sale. In all other countries, it is the merchant's bank which pays the transaction fee. The Australian development has effectively enabled merchants to install EFTPOS at less than the true economic cost, with the result that banks will seek to be reimbursed by the retail customer. This is the major explanation for the rapid proliferation of EFTPOS terminals throughout the country. Indeed, Australia has one of the highest coverage of EFTPOS in the world on a per capita basis. It remains to be seen whether, in time, Australia alters the means of charging to the more rational international system or persists with its own peculiar model.

[822] Automated clearing houses (direct entry systems). These systems allow organisations which regularly make numerous payments to bank accounts or regularly draw on bank accounts to provide the transaction details electronically for processing by the bank.

The electronic transmission of data eliminates the need for the organisations to prepare detailed paper entries for delivery to the banks. Similarly, banks benefit by receiving the necessary data in an acceptable form so that it can be automatically processed by the bank's computer. This results in a reduction in both paper flow and manual processing.

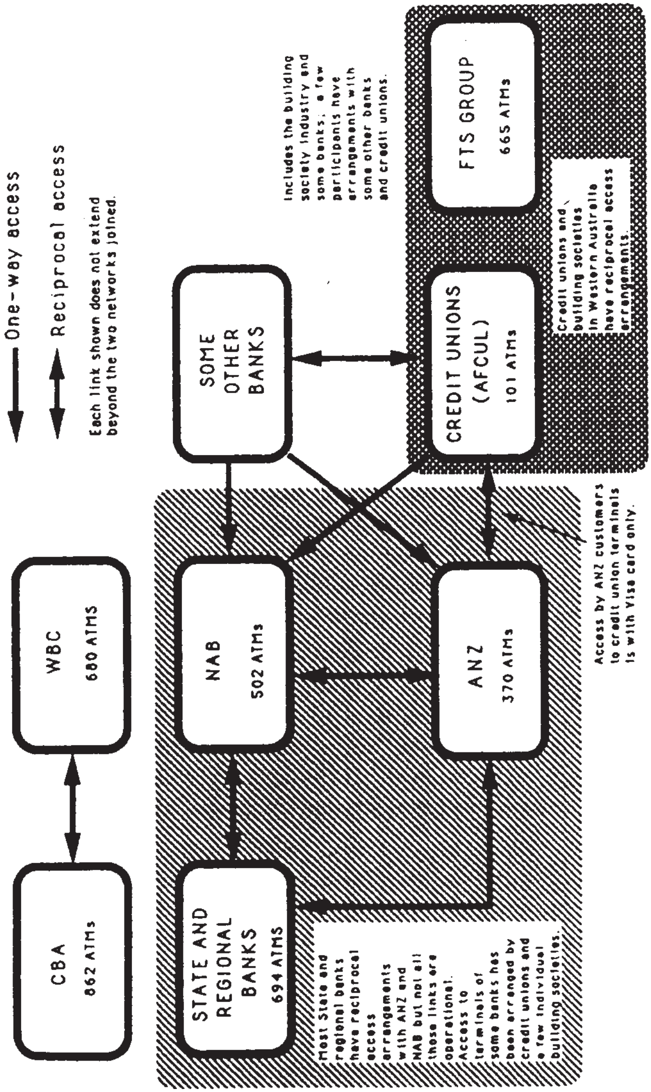
A major area where this system has exhibited rapid growth is in the direct entry of salaries. Organisations provide a bank electronically details of salaries to be paid to individual employees, the employee's bank and account number to be credited with the funds. This saves the organisation the problem of having to credit individual employees' accounts at different branches and different banks.

Similarly, organisations who receive regular payments from a large pool of customers can electronically provide each customer's name and bank and the account number to be debited. Such a system is particularly well suited to customers of public instrumentalities.

In November 1987, the four major banks established an automated electronic system for the secure and immediate transfer of high value funds such as large money market and foreign exchange transactions denominated in Australian dollars. Funds transferred via BITS (Bank Interchange and Transfer System) are irrevocable in the hands of the recipient.

Fig 8.1

EFTPOS system linkage arrangements



Source: G J Thompson Reserve Bank *Bulletin* September 1989.

[823] Internet banking. The internet banking system is similar to the ATM and EFTPOS system, except that in this instance, the customer can access the bank's computer via his or her own micro-computer. Access to the bank's computer is achieved by first accessing the world wide web by using a modem (which effectively links the two systems together using the domestic telephone system). Once into the internet, the various internet banking systems can then be accessed. Security is a key issue for such systems and users generally have to traverse a range of password protocols before they can access their bank account information.

Customers can conduct a wide range of banking functions on the internet banking system, including transferring funds between accounts, determining account balance and obtaining information on interest rates and exchange rates. Eventually, customers will be able to have their bills paid by this medium and even order their shopping and pay for it from the convenience of their own home.

Phone banking has also grown rapidly over the past few years. Phone banking involves customers contacting a bank's computer using a touch-tone telephone and thereafter activating the bank's computerised voice mail system. As with internet banking the customer is required to steer through a password system before entering the phone banking system. Thereafter, the customer is directed through an array of menus which are activated by the touch phone. The customer can effect similar transactions/enquiries as provided through internet banking services.

[824] Money transfer networks. These are special on-line transmission systems which transfer information without maintaining account records. Australian banks are, for example, connected to an international payments and message switching system called SWIFT. The swift network services over 1,200 banks in more than 50 countries and allows fast, secure and relatively inexpensive transmission of banking messages.

[825] Apart from introducing banking technology which will improve the provision and speed with which banks provide services to their customers, banks have also been introducing improved management information systems.

Electronic banking is bringing with it greater efficiency, more information, faster communication and better customer service. However, technology does not come cheap, involving in most cases considerable capital outlay and potentially a loss of employment in the banking industry. Certainly it could be argued that Australian banks have hitherto introduced new technology at too rapid a pace, without due regard to the economic benefits to be derived from a mutually consistent approach. However, it appears that after the initial spate of euphoria a more thoughtful attitude is developing, with increased concern being given to the economic benefits to be derived from greater co-operation between banks and other non-bank institutions.

Auditing and Control

[826] Any organisation has limited resources with which to achieve its goals. Auditing is one of the processes by which an organisation attempts to ensure an effective use of these resources.

Most people would consider that auditing aims to achieve effective use of resources by attempting to eliminate fraudulent activities. This is a very narrow view of the audit function. An audit not only provides the opportunity of verifying that adequate controls exist but it also provides the basis for assessing whether procedures are both efficient and effective.

[827] **Level of audit.** An organisation's control system can be audited on three distinct levels. These are:

[828] *Level 1—Verification audit.* This is the most common and well understood of the three audit levels. It involves the appraisal not only of the established financial controls, but also a check on whether these controls are being exercised in practice. It is not unusual to find employees innocently "by-passing" established controls, either in the belief that they are making operations more efficient, or due to staffing pressures.

While this form of "by-passing" is undertaken with the most admirable of intentions, it effectively removes, from senior to junior management, the decision as to what should be the appropriate amount of resources devoted to auditing.

Of course, senior management are in a better position to consider the relative costs/benefits to the organisation arising from the audit function.

[829] *Level 2—Efficiency audits.* Apart from merely verifying and assessing the adequacy of existing control systems, the auditors can take their audit one step further and appraise how efficiently existing procedures are in attaining their desired purpose. A level two audit requires a clearer understanding of the audited procedures than that sought for a level one audit.

Cost savings from a level two audit can be substantial as any cost-saving will continue to be reaped each time a procedure is repeated.

[830] *Level 3—Effectiveness audits.* Even though an organisation may operate extremely efficiently, it does not mean that it is effectively achieving its goals. To perform a level three audit, the auditors must assess how the audited process contributes to the achievement of the organisation's goals. As organisational goals are fairly nebulous and are set at senior levels of management, the auditors involved in this audit need to have regular contact with senior management. Accordingly, such audits are conducted only by the more senior auditors.

The fact that an audit is being undertaken does not necessitate a system review on all three audit levels. Management must decide whether cost savings arising from each audit level justify the additional cost of such an audit.

Under a cost benefit analysis, it is usually quite easy to justify fairly frequent level one audits as these audits are more people audits and people's behaviour can alter fairly rapidly. However, cost justification is not as easy for level two and three audits as they are based more on technological and broad policy factors, which do not alter quickly. Accordingly, level one audits occur far more frequently than level two and three audits although this is in no way a reflection of their relative importance.

[831] **Internal and external auditors.** Internal auditors are employees of the organisation whose role is to assess the organisation's control systems for management. On the other hand, external auditors are employed by shareholders to assess the validity of published reports.

Obviously, internal auditors operate more closely with the organisation's control systems and are therefore more likely to be involved in level two or three audits. External auditors are mainly involved in level one audits.

While both sets of auditors examine the quality, efficiency and effectiveness of an organisation's control system, external auditors cannot rely completely on the work of internal auditors as they constitute part of the control system they are examining. However, the higher the quality of work performed by the internal auditors, the less test checking is required by external auditors.

[832] **Audit as a subset of management control.** It is important to realise that the audit function is but one of the systems of control existing within an organisation. There also exists a series of both physical and financial controls which are designed to keep the organisation operating in a goal congruent manner. Auditing is a check on the integrity and quality of these control systems and in this manner becomes part of the overall control system.

Operation of the overall control system is usually placed in the hands of the company's financial controller. This position usually oversees the accounting, audit and electronic data processing functions of the organisation. Thus, the financial controller has responsibility for the design, operation and integrity of the firm's information systems although his or her role is one of providing information, rather than taking action on this information.

[833] Auditing and control in a banking environment. A maxim of auditing is that the more easily disposable an asset, the tighter the control mechanism. As money/bank deposits are the easiest form of asset to dispose of, control mechanisms must be extremely tight. Accordingly, control systems within banks tend to be tighter and more thorough than those operating in other organisations.

This thoroughness is evidenced in both physical and financial controls. Examples of physical controls would be:

- the requirement that an officer is not to enter a branch alone first thing in the morning;
- the use of two keys held by different officers to operate many of the locking devices; and
- the use of combinations known only to a particular officer.

Financial controls can probably best be illustrated by the role of branch examiners who are constantly checking that financial transactions have been properly recorded.

In operating any control system, it is important to remember that all these systems operate through people. It is therefore imperative, particularly in a banking environment, that a manager has a reasonable feel for the social influences affecting the people operating his or her control system.

[834] Banks and computer fraud. In order to remain competitive, banks have been forced, in more recent times, to offer a wide range of products. To be able to do so and still control overhead costs, banks have relied heavily on computerisation to reduce operating costs. However, with the advent of these large very technical computer programs a degree of computer fraud has developed. This has been possible because of the large amount of funds controlled by these programs and the highly technical manner in which they are written.

The classic example of computer fraud within a banking environment is where a program is written whereby all interest calculations are rounded down to the nearest cent and the difference is credited to the programmer's account. This may not appear to be a large amount of money but when this is multiplied many thousands of times, it can result in quite a considerable sum.

In an attempt to minimise this computer fraud, banks, like most large organisations, have significantly increased resources allocated to internal computer audit.

In particular, there has been a significant increase in the number of highly-paid computer technicians employed in the auditing field.

[835] The Reserve Bank and the audit function. The Reserve Bank requires each bank's external auditors to submit an annual report to the Bank which reviews the bank's observance of prudential requirements and the reliability of information supplied to the Reserve Bank. In addition, each year the Reserve Bank will direct the bank's external auditors to review a particular area of the bank's operations.

In addition to the above review, the Reserve Bank also requires each bank's chief executive to provide an annual attestation, endorsed by the board, that all risks have been appropriately identified within the organisation, systems designed to manage those risks are adequate and working effectively, and that the descriptions of these systems held by the Reserve Bank are current.

[836] Review. Auditing fulfils a greater role than merely the examination of operations to ensure compliance with authorised procedures. It also involves an assessment of the efficiency and effectiveness of these systems reflecting the integral role auditing plays within the organisation's overall control system.

As financial assets are so easily disposed of, control within banks must be of a higher standard than that enforced in other organisations.

Appendix of Questions and Answers*

*by KEVIN SHANAHAN.

MID-YEAR FINAL EXAMINATION 1990

Commercial Banking and Finance

Time allowed: Three hours + 10 minutes reading time

ATTEMPT FIVE (5) QUESTIONS ONLY

Total marks: 100

Question 1

(a) 'Clearly a bank requires adequate high quality liquid assets additional to the minimum PAR ratio to enable it to cover day to day fluctuations in its liquidity.' (Reserve Bank of Australia) State FIVE (5) items that would lead to a downturn in a bank's liquidity.

(b) 'For its part, the Reserve Bank aims to ensure that there are sufficient funds available in financial markets to meet the banking system's needs for liquidity assets.' (Reserve Bank of Australia)
What mechanisms are available to the Central Bank to achieve this objective and how do they work?

Question 2

Write brief explanatory notes on FIVE (5) of the following:

(a) treasury bills
(b) full service banking
(c) maturity transformation
(d) letter of comfort
(e) options
(f) convertible notes
(g) CEMTEX
(h) efficient markets hypothesis.

Question 3

Either

(a) List and briefly discuss the factors influencing interest rates.

Or

(b) 'Knowledge of risk can only be an aid to management if means for alleviating or controlling that risk exist.'

Outline in reasonable detail the most common tools of interest risk management.

Question 4

(a) Explain how the PAR ratio imposed by the Reserve Bank on trading banks differs from the LGS convention which it replaced. Discuss fully the composition of each formula.

(b) Outline the phasing in arrangements for non-callable deposit accounts as they apply to various banking groups.

Question 5

Either

(a) Discuss how interest rate swaps operate. What are the advantages of swaps?

Or

(b) Explain the advantages and disadvantages of financial futures.

ANSWERS TO MID-YEAR EXAMINATION 1990

Question 1

(a) The items are:
- withdrawal of deposits
- increases in demand for loans
- increased use of unused overdraft facilities
- timing differences in the maturity pattern of assets and liabilities
- shortfalls in projected cash inflows
- unplanned expenditures.

(b) Mechanisms are:
- Open market operations (OMO), whereby the Reserve Bank purchases government securities on the open market, injecting funds into the financial sector.
- Reduction in the Prime Assets Requirement (PAR) ratio. This is an indirect measure as the overall level of liquid assets is not changed immediately. To the extent that it increases the margin of the liquidity, it serves a similar purpose to an injection of liquidity.
- Reduction in the Non-Callable Deposits (NCD) ratio. This would inject liquidity directly into the banking system as banks would withdraw cash from these accounts with the Reserve Bank.

Question 2

(a) Treasury bills are Commonwealth Government paper which is issued only to Commonwealth Trust Funds and the Reserve Bank. They are used to cover the overnight or extremely short-term illiquid position of the government, which must conduct its accounts with the Reserve Bank on a credit basis.

(b) Full service banking means the provision of other than conventional banking services. These include interest rate and currency futures, trust and nominee services, portfolio management, share brokerage, corporate advice, equity and debt underwriting, and life and general insurance.

(c) Maturity transformation is the process whereby banks borrow short and lend long, taking advantage of an upward-sloping yield curve (where interest rates are lower for shorter terms to maturity and higher for long terms). Australian householders historically are the largest domestic providers of funds and have a decided preference for the ready availability of their deposit funds. Australian corporations and the Federal government are inveterate borrowers, generally over the longer term.

Because of the sheer size of their operations, banks are able to accommodate the longer term needs of borrowers from a pool of short-term deposits which continually turn over. This is the crux of maturity transformation.

(d) A letter of comfort is a formal letter addressed to the lender, indicating the parent company's awareness of a loan made to its subsidiary and stating its intention not to change its interest in the borrower subsidiary during the currency of the loan. The degree of comfort this letter affords is in direct proportion to the integrity and creditworthiness of the parent company.

The letter is not a guarantee and, as brought out in court cases in recent years, the letter may not be worth the paper it is written on.

(e) An option is a right to buy or sell securities, for example, shares in a listed company, at a specified date and price. In return for a fee or option premium, the writer or grantor of the option gives the option taker the right to buy (a call option) or sell (a put option) the given security at a nominated price within a specified expiry period. Option takers wish to ensure that they are not adversely affected by interest rate movements or price changes and they will only exercise the contract if it is profitable for them to do so. If not exercised within the expiry period the option lapses. Put and call options are traded on the Australian options market in the same way as other securities.

(f) Convertible notes are written acknowledgements of indebtedness by a company, not unlike debentures, which carry a fixed rate of interest. Notes may be converted into ordinary shares within a certain time period, or else redeemed at maturity by the note holder. The terms and conditions of each issue of these securities are specified in the documentation prepared by the borrower company.

The holder speculates that the market price of the shares will exceed the price paid for the notes, allowing cheap entry into the share market some time or other before maturity. Because of the conversion option, the notes are generally a cheaper way of raising funds than straight debt; in addition the company obtains a tax deduction for interest payments.

(g) This stands for Central Magnetic Tape Exchange, which was established in 1974 for the purpose of operating a fully automated clearing system between banks for magnetic tapes covering periodic debits and credits to customers' accounts, for example, insurance and finance company payments and social security pensions. No paper entries are involved. As with other clearing systems, banks' positions are consolidated daily and appropriate entries are passed by the Reserve Bank to each bank's Exchange Settlement Account.

(h) The Efficient Markets Hypothesis of economic theory states that, given perfectly and instantaneously disseminated costless information, it is generally not possible to generate a strategy yielding super-normal returns. Put simply, this postulates that it is not possible in practice for a bank to insulate itself from interest rate risks even with perfect market intelligence. (The prescribed textbook disputes this.)

Question 3

(a) Factors affecting interest rates are:
- The supply of and demand for funds. If demand increases relative to supply it will place upward pressure on interest rates. If supply outstrips demand, interest rates will tend to fall.
- Household saving patterns. A higher level of household savings would be expected to ease pressure on interest rates, while a reduction will have the opposite effect.
- Inflation and inflationary expectations. The current rate of inflation is often used as an important determinant of the expected rate of inflation. If investors expect inflation to rise they will demand a higher nominal rate of interest to compensate them for the higher expected inflation rate.
- Overseas interest rates. The effect of overseas interest rates on domestic rates is thought to be less than before deregulation in 1983, but there is still evidence of a direct impact from time to time, particularly for longer term securities.
- Regulation and official intervention. Although virtually free of interest rate controls, banks must meet the Prime Assets Requirement (PAR) ratio, a major component of which is government securities. This permanent level of demand from the banks makes government securities yields lower than if market forces operated freely.

(b) The tools of interest risk management are:
- Asset portfolio management. A bank can rearrange its portfolio of readily marketable assets such as bills and government securities. It does this by selling off assets with high interest rate exposure and purchasing assets with low interest rate exposure.

- Liability management. Banks try to avoid maturity dates on certificates of deposit where rollover costs (interest rates) will be high. They prefer to issue debt with maturity dates falling in periods of easy liquidity and resultant lower interest costs.
- Pricing policy. In trying to correct a chronic mismatch of, say, long-term assets and short-term debt, a bank may adjust term deposit rates to induce depositors to lodge funds for terms which reduce the bank's interest rate exposure, or at least with maturity dates which avoid periods of acute liquidity pressure. With loan approvals, it is possible to use price to induce borrowers to draw down for preferred maturities. A more direct approach is to approve loans for the bank's desired terms.
- Prepayment/redemption penalties. Penalties could be imposed on borrowers who seek to repay loans when interest rates are falling and re-finance at lower rates. Similarly, penalties could be imposed on term depositors who redeem term deposits when interest rates are rising and reinvest at higher rates.
- Decreased reliance on interest margins. This speaks for itself. There has been a marked swing in banking to greater emphasis on fee income rather than net interest margins.

Question 4

(a) The LGS (Liquid Assets and Government Securities) ratio comprised:
- notes and coin
- cash with Reserve Bank (Exchange Settlement Accounts)
- treasury bills and notes
- other Commonwealth Government securities

as a percentage of a trading bank's Australian deposits.

The LGS convention, as it was called, was a gentleman's agreement between banks and the Reserve Bank—it had no statutory basis. The convention was that each bank undertook to direct its policy to ensuring that its LGS ratio did not fall below the agreed minimum agreed upon (established in 1962 at 18% but subsequently changed), if necessary borrowing from the Reserve Bank at penalty rates to maintain the ratio. This 'lender of last resort' facility was extended by the Reserve Bank only to banks and authorised dealers in the Short-Term Money Market. Since deregulation, the facility is no longer available to banks.

Under the Prime Assets Requirement (PAR), each Australian bank has undertaken to maintain a minimum proportion of its balance sheet in specified high quality liquifiable assets. The numerator of the PAR ratio comprises:
- notes and coin
- balances with the Reserve Bank (Exchange Settlement Accounts)
- treasury notes
- other Commonwealth Government securities
- loans to authorised money market dealers secured against Commonwealth Government securities.

The denominator of the PAR ratio comprises all liabilities (other than capital and balances with the Reserve Bank) invested in dollar assets within Australia. For ease of measurement, the PAR ratio is calculated on the basis of each bank's total Australian dollar assets within Australia, less:
- capita] base as defined in the risk-based capital guidelines, ie a bank's Tier 1 and Tier 2 capital
- favourable overnight settlement balances.

The PAR ratio was set at 10% from September 30, 1988. Funds held in non-callable deposits (NCDs), up to 1% of the PAR denominator, would be counted as prime assets. If a bank looked in danger of breaching the minimum PAR ratio it had to take prompt action to cover the situation, under the supervision of the Reserve Bank Any assistance from the Reserve Bank for this purpose would be at its discretion.

In February 1989 the Reserve Bank announced that the PAR ratio would be cut from 10% to 6% by the beginning of May. The three stage reduction involved the immediate removal of

NCDs from the group of assets which made up the ratio. This was to be followed by a 1% reduction in March 1990 and a further 2% reduction on May 1, 1990.

(b) Phasing-in arrangements were:

- SRD ratio was reduced to zero in September 1988 and statutory reserve balances were transferred to non-callable accounts
- banking groups which at the outset had non-callable deposit balances above the 1% requirement (most trading banks) would have the excess returned to them by the Reserve Bank in monthly steps over a three year period (subject to the needs of monetary policy)
- banking groups which at the outset had non-callable deposit balances below the 1% requirement (some trading banks) would bring their balances up to that level progressively over the following two years
- banking groups which began with 'nil* balances in their non-callable accounts (stand-alone savings banks) would bring the balances up to 1 % progressively over three years.

Question 5

(a) Swap transactions are agreements between two parties that involve the exchange of payment commitments at defined future dates. An interest rate swap involves two parties exchanging interest rate obligations denominated in the same currency. Normally, one party will pay a fixed rate of interest and the other a floating rate based on a market benchmark.

The floating rate benchmark is generally the 90 day bank bill rate (BBR). The fixed rate depends on term to maturity and market conditions, but generally is a margin above the government bond rate for the same term. Principal amounts are not exchanged, and therefore there is no impact on the balance sheets of the parties concerned.

In practice, swaps are arranged through a financial intermediary. This removes the need for exact matching of principal amounts and saves investigation costs (of each other) for the swap parties.

The advantages are that borrowers can change their interest rate obligations (or receipts) from a fixed interest rate to a floating rate, or vice versa, as desired. The cost of swap transactions is extremely low and there is a deep, liquid and competitive market.

(b) Advantages of financial futures are:

- They are a simple instrument to use. Market spreads are small, price information is readily available and the market is very deep.
- Party A can buy a contract from Party B on the trading floor of the Sydney Futures Exchange and then sell it to Party C, and eliminate credit risk as well as interest rate risk.
- The International Commodities Clearing House (ICCH) guarantees performance on all contracts, so credit risk is transferred from the counterparty for any futures contract to the ICCR. One party can deal safely on the floor with another party up to any amount acceptable to the Exchange.

Disadvantages are:

- The contracts trade only for delivery on specific dates, effectively once per quarter. This involves risk where an anticipated security purchase or sale is to occur on a date substantially remote from any contract delivery settlement date.
- Contracts are currently traded only in two securities. This leads to risk between available contracts and securities of substantially different maturities and credit risk.
- Trading is generally confined to the closest contract months so there is little market in distant contracts.
- There can be tax problems in using futures, especially in the case of 10-year bond futures.

FINAL EXAMINATION 1990
Commercial Banking and Finance
Time allowed: Three hours + 10 minutes reading time
ALL QUESTIONS TO BE ATTEMPTED
Total marks: 100

Question 1

(a) in raising new capital, most banks have to consider the same basic factors as those considered by any public company raising new capital.'
Discuss these factors briefly.

(b) List the items which form part of banks' capital base.

(c) Explain the purpose of the ratio of capital to risk adjusted assets. What is the major drawback of this ratio?

Question 2

(a) Write an explanatory note on interest rate exposure.

(b) Name and explain the three types of interest rate exposure.

Question 3

(a) It is generally agreed that bank capital has three major functions. List and discuss these functions briefly.

(b) List and discuss the six (6) different types of deposit classifications.

Question 4

You are required to calculate the gearing ratio of XYZ Bank Ltd at the end of years 1 and 2, given the following assumptions:

Initial capital base	$ 1 000 m
Initial asset base	$20 000 m
Asset growth rate	15%
Before tax return on assets	1.8%
Tax rate	39%
Dividend payout ratio	25%.

Question 5

Write brief explanatory notes on five (5) of the following:

(a) exchange settlement account
(b) treasury notes
(c) money supply (M3)
(d) subordinated debt
(e) free reserve ratio
(f) efficiency audits
(g) interest rate swap
(h) PAR ratio.

Question 6

Either

(a) Name and discuss, in brief, the major aspects of project risk from a banker's viewpoint.

Or

(b) Discuss the following types of bank risk:
- credit risk
- investment risk
- liquidity risk
- operating risk
- fiduciary risk.

ANSWERS TO FINAL EXAMINATION 1990

Question 1

(a) Factors include:
- the market's assessment of the attractiveness of a bank's stock from both a dividend and capital gains perspective
- the market's assessment of the bank's relative profit performance
- market perception of future industry performance
- size of the the issue
- relative attractiveness of equities as opposed to other forms of investment
- the likelihood of other new capital issues also being sought at the time of issue
- whether it is better to delay raising capital until a more favourable investor climate exists.

(b) Items which form part of banks' capital base include:

Tier 1—Core capital
- paid-up ordinary shares
- non-payable share premium account
- general reserves
- retained earnings
- non-cumulative irredeemable preference shares
- minority interests in subsidiaries

Tier 2—Supplementary capital
- general provisions for bad and doubtful debts
- asset revaluation reserves
- cumulative irredeemable preference shares
- mandatory convertible notes and similar capital instruments
- perpetual subordinated debt
- redeemable preference shares and term subordinated debt.

Note: There are restrictions on the extent to which some of these components are included in capital.

(c) This ratio relates the risk associated with the bank's differing asset portfolios to its ability to absorb unexpected losses, ie its capital. This risk depends on the composition of these assets, for example, loans to corporates are obviously riskier than government securities. The problem in using such a ratio is deciding the risk weightings and whether these weightings should alter over time.

Question 2

(a) Interest rate exposure refers to the problems of having one side of the balance sheet based largely on rate-sensitive (or floating rate) items and the other side on rate-insensitive (or fixed rate) items. It arises whenever a bank provides or accepts funds for a specific period at a specified rate. Both the bank and its customer are gambling explicitly or implicitly on the likely movement in interest rates over the period agreed upon.

(b) The three types of interest rate exposure are:

- Direct interest rate risk, which refers to the extent to which a bank's asset and liability interest rate reset dates are mismatched. If a bank has mainly longer term fixed rate deposits and floating rate assets, a rise in interest rates will result in a favourable movement in interest rate margins and thus income. A fall in interest rates has the opposite effect.
- Indirect interest rate risk, which arises from a change in customers' behavioural incentives and a change in customer circumstances. The first effect takes place when personal instalment loan customers prepay loans when interest rates fall and refinance at lower rates. Similarly, when rates rise customers with fixed deposits may seek to prepay these deposits and reinvest at a higher rate.

  The customer circumstances effect arises because changes in interest rate levels are often strongly correlated with the level of activity in the economy and therefore the level of loan defaults.
- Basis risk, which refers to exposure to movements in relative, rather than absolute, price/interest rate levels. It arises where it becomes necessary to pay higher rates on deposits from one segment of the market, or accept lower rates on assets from a segment of the market.

Question 3

(a) The three major functions of bank capital are:

- to provide funds for the development and expansion of the bank's infrastructure
- to provide a buffer against unexpected loan losses in order to protect depositors' balances
- to contribute to the bank's capital.

With respect to the first point, it is generally agreed that a bank's infrastructure (fixed assets, investment in subsidiaries, etc) should be financed exclusively from capital. This is not as difficult for a bank as for, say, a manufacturing concern, as fixed assets are only a small proportion of a bank's assets. To fund long-term assets from relatively short-term borrowings from depositors is to expose a bank to unnecessary liquidity risk.

Regarding the second point, it is necessary for a bank to have a strong capital base to absorb unexpected losses from unprofitable trading, poor lending and other causes. Loss of customer confidence could cause a 'run' on the bank and its possible closure. The stronger the capital base, the more confidence customers will have in the bank's ability to withstand any financial setback.

As to the third point, retained earnings after dividends and taxation are cost-free, as opposed to the costs of raising deposits. The higher the level of retained earnings, therefore, the higher the profit expectation (given a normal trading climate).

(b) The six different types of deposit classifications are:

- Retail v professional—Household (retail) funds are sought and acquired at cheaper than professional rates. Accordingly, lower rates of interest are able to be offered on housing loans. Competition for household savings is severe from NBFIs, and increasing awareness of higher market rates has steadily increased the cost of retail funds.
- Variable v fixed—Most savings bank funds are raised on a variable rate and are mostly at call. Interest rate changes therefore have a material effect on banks' profitability.

  A high proportion of trading bank funds, on the other hand, are fixed (term) deposits. Changes to interest rates affect new, but not existing, deposits. This assists banks' profitability when interest rates rise, but not vice versa.
- Domestic v overseas—In recent years Australian banks have borrowed funds overseas at very favourable interest rates to fund their overseas assets. At the same time, the banks have been able to use some of these funds to supplement domestic funds raising. Foreign

currency raising can be converted into AUD by buying AUD on foreign markets, or by entering into currency swap agreements.

Question 4

The formula is:

$$GR_1 = \frac{C_O + [A_O \times (1 + AGR)] \times BTROA \times (1 - T) \times (1 - D)}{A_O \times (1 + AGR)}$$

Where:

GR_1	=	gearing ratio in the next period
C_0	=	capital base in the previous period
A_0	=	asset base in the previous period
AGR	=	asset growth rate
BTROA	=	before tax return on assets
T	=	tax rate
D	=	dividend payout rate.

Using the assumptions given, the gearing ratio at the end of year 1 is:

$$GR_1 = \frac{1000 + [20\,000 \times 115\% \times 1.8\% \times 61\% \times 75\%]}{20\,000 \times 115\%}$$

$$= 5.17\%$$

At the end of year 2, the gearing ratio is:

$$GR_2 = \frac{1189.4 + [23\,000 \times 115\% \times 1.8\% \times 61\% \times 75\%]}{23\,000 \times 115\%}$$

$$= 5.32\%$$

Question 5

(a) This is a non-interest bearing account conducted with the Reserve Bank by banks which process cheques through the Clearing House. Banks settle accounts with each other on a next day basis by drawing cheques on or depositing funds to these accounts.
Also passing through the accounts are purchases or sales of currency, settlements for Commonwealth Government securities transactions, variations in non-callable deposits, etc.

(b) Treasury notes are a short-term government security with 13 and 26 week maturity. They are issued at a discount on their face value. Once purchased, these notes may be held until maturity, or sold at a somewhat penal rate (rediscounted) to the Reserve Bank. Alternatively, they may be rediscounted to the official and non-official short-term money market. Since 1979 treasury notes have been issued through periodic competitive tenders arranged by the RBA. Treasury notes are an important tool of monetary policy. Through transactions with authorised dealers, the Reserve Bank can alter the volume of money available in the market, which in turn affects interest rates.

(c) M3 consists of currency (notes and coin held by the public) plus trading and savings bank deposits from the non-bank private sector. Because it covers only the deposit liabilities of the domestic banking system, it was replaced after deregulation by 'broad money'.

(d) Subordinated debt refers to debt which ranks behind all other creditors of the bank. Should a bank default, all other creditors would be ranked above subordinated debt for repayment of funds, but subordinated debts will still rank above shareholders' equity. Accordingly, subordinated debt provides a pool of funds from which to absorb unexpected losses, thus protecting general creditors.

(e) This ratio subtracts investments in fixed assets and subsidiaries from the capital base and then compares this 'free reserve' figure to total assets. The reason for this approach is that capital which funds these infrastructure items is not available to meet unexpected losses, as liquidation of these assets could force the closure of the bank.

(f) Efficiency audits are designed to check the accuracy and reliability of accounting data, promote operational efficiency and encourage adherence to prescribed managerial policy. It focuses primarily on existing procedures but may also recommend changes to these procedures to streamline operations.

(g) An interest rate swap is a contract between two parties under which they agree to exchange interest payments. Generally this involves fixed interest payments being exchanged for floating rate payments. This allows a party with a loan or investment at a fixed (or floating) rate to convert its interest exposure to a floating (or fixed) rate. There is no exchange of principal amounts under an interest rate swap.

(h) The Prime Asset Requirement (PAR) ratio is designed to ensure that banks maintain a minimum proportion of their balance sheet in specified high quality, liquifiable assets. The numerator comprises notes and coin, balances with the Reserve Bank, treasury notes, other Commonwealth Government securities and loans to authorised money market dealers secured by Commonwealth Government securities. The denominator comprises total AUD assets in Australia, less capital base (Tier **1** and Tier **2** capital) and favourable overnight settlement balances.

Question 6

(a) This topic has been deleted from the current edition of the textbook.

(b)
- Credit risk refers to the possibility of default or delay in receiving payments from insolvency. A percentage of loans will always result in normal losses. Credit risk really refers to unexpected abnormal losses. A proper appraisal of applications and a good deal of after-care are necessary to reduce these risks.
- Investment risk refers to losses arising from a fall in either value or income flow not due to default or delay by the payer. It could relate to any mismatch position by way of an interest rate or foreign exchange position. The end result is operating losses of either capital or revenue, which can be quite serious.
- Liquidity risk refers to the probability of losses arising from the need to pay penalty interest rates on raising short-term deposits or incurring penalty costs on asset sales required to meet short-term liquidity problems.
- Operating risks relate to the possibility of unexpected losses arising from errors and inefficiencies of bank staff and management. These should be minimised by strong internal financial controls.
- Fiduciary risk covers the possibility of losses arising from underwriting commitments, provision of letter of credit facilities, bill endorsements and other contingent liabilities. While these are 'off balance sheet' items which increase return on assets, their growth itself carries risks.

MID-YEAR FINAL EXAMINATION 1991
Commercial Banking and Finance
Time allowed: Three hours + 10 minutes reading time
PART A—COMPULSORY
PART B—ATTEMPT EIGHT (8) QUESTIONS ONLY
Total marks: 100

PART A—COMPULSORY

Question 1

The following is the balance sheet of XYZ Bank Ltd as at 31 May, 1991

LIABILITIES $ BILLION		**ASSETS** $ BILLION	
Core capital (shareholders' funds)			
Ordinary shares	10	Cash	3
Retained earnings	30	Exchange settlement account	—
General reserves	20	Treasury notes maturing less than six months	60
Supplementary capital	20		
	80	Australian government securities	60
Other liabilities		Semi-government securities	10
(Australian dollar denominated)	920	Local Government Securities	10
		Non-callable deposits	10
		Commercial loans maturing less than 1 year	200
		Commercial loans maturing greater than 1 year	200
		Housing loans	220
		Bills receivable	200
		Premises	20
		Other assets	7
	1000		1000

(a) You are required to calculate (show workings):
 (i) PAR
 (ii) NCD ratio
 (iii) risk-adjusted asset ratio
 (iv) ratio of core capital.

(b) Comment on the adequacy or otherwise of these ratios, mentioning the minimum ratios stipulated by the Reserve Bank/legislation.

PART B—ATTEMPT EIGHT (8) QUESTIONS ONLY

Question 2

Briefly explain the following broad categories of electronic fund transfer:

(i) on-line systems
(ii) automatic teller machines
(iii) point of sale systems
(iv) automated clearing houses
(v) money transfer networks.

Question 3

There are five major reasons that banks perform a financial intermediation role. Briefly discuss each reason.

Question 4

Interest rate exposure can be disaggregated into three types. Name and describe each type.

Question 5

Explain the following:
(i) subordinated debt
(ii) CEMTEX
(iii) efficient market hypothesis
(iv) securitisation
(v) money supply (M3).

Question 6

'Clearly a bank requires adequate high quality liquid assets additional to the minimum PAR ratio to enable it to cover day-to-day fluctuations in liquidity.' (Reserve Bank of Australia)
State five (5) items that would lead to a downturn in a bank's liquidity.

Question 7

Discuss the alternatives available to a bank to offset a projected deficit in the overnight settlement account.

Question 8

'For its part, the (Reserve) bank aims to ensure that there are sufficient funds available in financial markets to meet the banking systems needs for liquidity assets.' (Reserve Bank of Australia)
What mechanisms are available to the central bank to achieve this objective and how do they work?

Question 9

As a tool for managing interest rate risks, forward rate agreements (FRAs) have certain advantages over financial futures, but certain disadvantages as well. List both the advantages and disadvantages.

Question 10

An examination of the financial statements of a customer is a useful management tool for the analysis of credit risk. In this context, explain the advantages of analysing financial statements and the possible pitfalls.

ANSWERS TO MID-YEAR FINAL EXAMINATION 1991

Question 1

(a) (i) PAR = notes and coin
plus
exchange settlement account balances
plus
treasury notes
plus
other Commonwealth government securities
plus
secured loans to the official STMM
divided by
Australian dollar assets less capital (Tier 1 and Tier 2) and favourable overnight settlement balances

$$= \frac{(3 + 0 + 60 + 60 + 0)}{920}$$
$$= 13.4\%.$$

(ii) NCD $= \dfrac{\text{non-callable deposits}}{\text{AUD assets } \textit{less} \text{ capital } \textit{less} \text{ ESA}}$

$$= \frac{10}{920}$$
$$= 1.09\%.$$

(iii)

	\$b	*Weights*	*Weighted amount*
Cash	3	0%	0
Exchange settlement a/c	—	—	—
Treasury notes	60	0%	0
Australian govt securities	60*	10%	6
Semi-govt securities	10	10%	1
Local govt securities	10	20%	2
Non-callable deposits	10	0%	0
Commercial loans	400	100%	400
Housing loans	220	50%	110
Bills receivable	200	100%	200
Premises	20	100%	20
Other assets	7	100%	7
	1000		746

*Assuming maturities beyond one year

Risk-adjusted asset ratio $\dfrac{80}{746}$
10.7%.

(iv) Ratio of core capital $\dfrac{60}{746}$
8.04%.

(b) Minimum PAR ratio is 6%; ratio of 13.4% is more than adequate.
NCD ratio is 1%; ratio of 1.09% is in excess of requirements.
RAR (risk-adjusted ratio) of 10.7% shows a good buffer over the required 8%.
Ratio of Tier I (core) capital is 8.04%, double the 4% requirement.

Question 2

(i) On-line systems comprise a number of terminals linked to a central computer. Deposits, withdrawals and loan transactions are input at branches and stored in the central computer.

(ii) Automatic teller machines are customer-activated on-line terminals. The terminals enable customers to deposit or withdraw funds, obtain balances, transfer funds between various accounts and, in some cases, use automatic bill-paying facilities.

(iii) These refer to a service whereby a customer can debit his or her bank account electronically and the proceeds are credited immediately to the retailer's account in consideration for goods and services purchased at the shop counter. The customer uses his or her plastic card to activate the transfer of funds.

(iv) These systems allow organisations to make direct entries to bank accounts, eg for payment of salaries, social security benefits, or to draw regularly on bank accounts for periodical payments. The mechanism is magnetic tape which is handed over to the banks for processing.

(v) These are special on-line transmission systems which transmit payment instructions, particularly in relation to foreign currency transactions, between banks and overseas branches/correspondent banks.

Question 3

The five reasons that banks perform a financial intermediation role are:

- Aggregation—Banks, particularly in the retail sector, aggregate small deposits into parcel sizes sought by borrowers.
- Maturity transformation—Australian investors are traditionally short-term depositors, while corporates and other borrowers have generally sought longer term debt. Banks provide a bridge between the two markets.
- Credit risk assessment—Banks have the expertise to assess potential borrowers' credit risk. It is thus safer for lenders to commit funds to banks as intermediaries, rather than lend direct to borrowers whose capacity to repay may be suspect.
- Credit risk management—Banks reduce the credit risk attaching to loans and advances by actively monitoring the progress of these outlays. In undertaking this special role, financial intermediaries can achieve economies of scale.
- Credit risk diversification—By investing in a spread of financial assets, financial intermediaries offer their depositors the benefit of their credit risk diversification.

Question 4

The three types of interest rate exposure are:

(i) Direct interest rate risk—This refers to the extent to which a bank's asset and liability interest rate reset dates are mismatched. If a bank has mainly longer term fixed rate deposits and floating rate assets, a rise in interest rates will result in a favourable movement in interest rate margins and thus income. A fall in interest rates has the opposite effect.

(ii) Indirect interest rate risk—This arises from a change in customers' behaviourable incentives and a change in customer circumstances. The first effect takes place when personal instalment loan customers prepay loans when interest rates fall and refinance at lower rates. Similarly, when rates rise customers with fixed deposits may seek to repay these deposits and reinvest at a higher rate. The customer circumstances effect arises because changes in interest rate levels are often strongly correlated with the level of activity in the economy and therefore the level of loan defaults.

(iii) Basis risk—This refers to exposure to movements in relative, rather than absolute, price/interest rate levels. It arises where it becomes necessary to pay higher rates on deposits from one segment of the market, or accept lower rates on assets from a segment of the market.

Question 5

(i) Subordinated debt refers to debt which ranks behind all other creditors of the bank. Should a bank default, all other creditors would be ranked above subordinated debt for repayment of funds, but subordinated debts will still rank above shareholders' equity. Accordingly, subordinated debt provides a pool of funds from which to absorb unexpected losses, thus protecting general creditors.

(ii) This stands for Central Magnetic Exchange, which was established in 1974 for the purpose of operating a fully automated clearing system between banks for magnetic tapes covering periodic debits or credits to customers' accounts, for example, insurance and finance company payments and social security pensions. No paper entries are involved. As with other clearing systems, banks' positions are consolidated daily and appropriate entries are passed by the Reserve Bank to each bank's Exchange Settlement Account.

(iii) The efficient market hypothesis of economic theory states that, given perfectly and instantaneously disseminated costless information, it is generally not possible to generate a strategy yielding super-normal returns. Put simply, this postulates that it is not possible in practice for a bank to insulate itself from interest rate risks, even with perfect market intelligence. (The prescribed textbook disputes this.)

(iv) Securitisation is a process by which banks or other financial institutions package a portfolio of illiquid loan assets (for example, housing loans) into marketable instruments which are offered to capital markets. Such instruments are known as asset-backed or mortgage-backed securities (depending on the type of financial asset concerned). The lending institution is able to reliquify itself and increase its lending to other clients. A strong secondary market is essential to the securitisation process. Bank-endorsed bills are an example of securitisation which exhibit one of the latter's positive features, ie it is off-balance sheet with no PAR ramifications.

(v) M3 consists of currency (notes and coin held by the public) plus trading and savings bank deposits from the non-bank private sector. Because it covers only the deposit liabilities of the domestic banking system, it was replaced after deregulation by 'broad money'.

Question 6

The items are:

- withdrawal of deposits
- increase in demand for loans
- increased use of undrawn overdraft facilities
- shortfalls in projected cash inflows
- unplanned expenditures

- timing differences in the maturity pattern of assets and liabilities.

Question 7

The alternatives for the bank are that it can:

- arrange an inter-bank loan from a bank with surplus funds in the Exchange Settlement Account
- 'call' any inter-bank loans in its favour
- 'call' its loans to official dealers
- enter into repurchase agreements with authorised dealers by selling government securities to the dealers for same day value
- rediscount treasury notes (and occasionally very short-dated Commonwealth Bonds) with the Reserve Bank.

Question 8

The mechanisms are:

(i) Open market operations (OMO), whereby the Reserve Bank buys government securities on the open market, injecting funds into the financial system.

(ii) Reduction in the prime assets requirement (PAR) ratio. This is an indirect measure as the overall level of liquid assets is not changed immediately. To the extent that it increases the margin of free liquidity (the margin of liquid assets held by banks above the PAR ratio), it serves a similar purpose to an injection of liquidity.

(iii) Reduction in the non-callable deposits (NCD) ratio. This could be used in much the same way as the Statutory Reserve Deposits (SRD) ratio to increase the liquidity of the banking sector.

It is stressed that neither (ii) nor (iii) has been used as a measure of monetary control in the (relatively) short period that they have been in operation.

Question 9

The advantages may be summarised as follows:

- FRAs are negotiated directly with the counterparty over the telephone, rather than on the floor of the clearing house. This removes the normal contractual obligation of both parties to the clearing house.
- FRAs are traded on a settlement basis only, ie no physical delivery of the underlying security is required by the contract.
- FRAs can be agreed for settlement on any day, whereas financial futures are traded only for delivery on specific dates.
- The tenor (term) of the underlying instrument is negotiable, unlike bill futures where a 90 day bill is specified.

The following are disadvantages:

- a futures borrower can buy and sell numerous times without incurring an outstanding contingent liability, or having to produce cash or stock on delivery (settlement date). An FRA dealer would have contingent liabilities equivalent to the deemed credit risk on each agreement for the life of those agreements. Also, on the agreed settlement date, the dealer must settle on each separate contract.
- FRAs are a short-term hedging instrument only at present, confined to a bank's commercial bill and bill futures trading.

Question 10

(This is a fairly broad question. Without placing stringent limits on students' responses, the following points should be covered. However, other reasoned arguments may also be accepted.)

An examination of financial statements shows:

- whether the borrower has a sound balance sheet and sufficient earning capacity to repay borrowings
- whether the working capital position is sufficiently strong and stable to enable the customer to continue operating as a going concern without undue difficulty
- the financial acumen and, to an extent, the managerial ability of the customer
- whether the usual financial ratios are within the accepted ranges.

The pitfalls are:

- financial statements more than three or four months old become less valuable as time passes
- one year's statements may not tell a great deal, so at least three years' statements should be sought
- unaudited statements should be treated with caution
- industry ratios are desirable to put performance into perspective
- paper value of assets may not accord with actual values.

FINAL EXAMINATION 1991
Commercial Banking and Finance
Time allowed: Three hours + 10 minutes reading time
ALL QUESTIONS TO BE ATTEMPTED
Total marks: 100

Question 1

The balance sheet of ABX Banking Corporation as at 31 October, 1991 was as follows:

LIABILITIES $ MILLION		**ASSETS** $ MILLION	
Shareholders 'funds			
Ordinary shares	10	Notes and coin	3
Retained earnings	30	Exchange settlement account	—
General reserves	10	Treasury notes	24
	50	Commonwealth government securities	40
Supplementary capital	20	Local government securities	10
Other liabilities		Non-callable deposits	10
(Australian dollar denominated)	930	Loans to official STMM (secured)	10
		Commercial loan	453
		Housing loans	220
		Bills receivable	200
		Premises	23
		Other assets	7
	1000		1000

After risk weighting the above assets using Reserve Bank criteria, the aggregate of risk-weighted assets is $800 million.

Using the information provided in the balance sheet, you are required to:

(a) Calculate the following ratios and state the minimum statutory/Central Bank requirements:
 (i) NCD
 (ii) PAR
 (iii) total capital
 (iv) Tier 1 capital.

(b) Calculate each of the above ratios again assuming that the bank attracted an additional $20 million of domestic deposits which it invested in either:
 (i) treasury notes
 (ii) local government securities.

Note: Show all mathematical calculations.

Question 2

The Ace Bank's overnight settlement position at the Reserve Bank at 29 September, 1991 was a deficit of $20 million, on which day it had the following readily liquifiable funds.

	$m	*Yield*
Notes and coin	2.0	—
Treasury notes	5.0	13%
Commonwealth bonds	10.0	11%
Loans to STMM	10.0	12%
Loans to BCZ Bank (overnight)	8.0	14%
	35.0	

Proceeds of a perpetual note issue for $25 million are expected on 30 September, 1991. Outline the steps that the bank might take to settle with the Reserve Bank on 29 September and eliminate its adverse settlement position. (Ignore PAR implications.)

Question 3

From time to time Australian banks have exhibited the 'urge to merge'. List five (5) reasons behind the mergers of major banking organisations in Australia during the 1980s.

Question 4

The Retreat Bank is committed to buying GDP 10 million in 30 days' time and wishes to cover its exchange rate exposure. Discuss in brief the mechanisms available to the bank and the risk attaching to each mechanism.

Question 5

Discuss the usefulness of the free reserve (resources) ratio as an indicator of capital adequacy. State the formula for calculating this ratio.

Question 6

Outline two advantages and two disadvantages of conducting large branch networks.

Question 7

Either

(a) List and briefly discuss the factors influencing interest rates.

Or

(b) Briefly describe the major limitations associated with the use of funds gap analysis techniques to the management of interest rate sensitive bank assets and liabilities.

Question 8

Write brief explanatory notes on five (5) of the following:
(a) options
(b) credit creation
(c) financial intermediation
(d) subordinated debt
(e) maturity transformation
(f) full service banking
(g) foreign exchange market.

ANSWERS TO FINAL EXAMINATION 1991

Question 1

(a) (i) NCD = 10 ÷ 930= 1.08%: minimum ratio is 1%
(ii) PAR = (3 + 0 + 24 + 40 + 10) ÷ 930 = 8.3%: minimum ratio is 6%
(iii) total capital = 70 ÷ 800 = 8.75%: minimum ratio is 8%
(iv) Tier 1 capital = 50 ÷ 800 = 6.25%: minimum ratio is 4%.
(b) (i) • NCD = 10 ÷ 950= 1.05%

- PAR = (3 + 0 + 44 + 40 + 10) ÷ 950 = 10.2%
- total capital = 70 ÷ 800 = 8.75%
- Tier 1 capital = 50 ÷ 800 = 6.25%.

(ii)
- NCD = 10 ÷ 950 = 1.05%
- PAR = (3 + 0 + 24 + 40 + 10) ÷ 950 = 8.1%
- total capital = 70 ÷ 804 = 8.71%
- Tier 1 capital = 50 ÷ 804 = 6.22%.

(Answer assumes that CGS mature 12 months or beyond, and that there is no immediate NCD effect.)

Question 2

Conceivably the bank could issue a certificate of deposit, but the strictly overnight requirement would rule this out. The most likely action for same day funds would involve:

- notes and coin $2 m—this is 'till money' and therefore is unavailable
- loans to STMM $ 10 m—these loans would be 'called' from the market as the STMM is merely a repository for surplus funds
- loans to BCZ Bank $8 m—this is overnight money and is readily liquifiable. Interest rate foregone is of no concern as it would fluctuate from day to day.

The remaining $2 m could come from:

- Loans from the inter-bank market (or unofficial STMM). If Ace Bank has an adverse settlement position, other bank(s) will have favourable positions.
- Sale of treasury notes or bonds, probably to the STMM, on a 24-hour repurchase arrangement. The choice of instrument is probably not important as the yield foregone would be the offered rate on the day for same day funds.

Question 3

The reasons for mergers include:

- rationalisation of operations
- a desire to expand deposit and market share to compete with larger financial institutions domestically and internationally
- acquisition of a larger capital base
- achievement of economies of scale
- provision of a safeguard against potential competition from foreign banks.

Question 4

The bank can:

- Buy spot sterling (GBP) and sell AUD. This eliminates foreign exchange exposure, but the bank is now bearing an interest rate mismatch exposure. This arises because of the timing difference in settlement dates (spot against 30 days' time).
- Buy sterling forward for 30 days and sell AUD forward. The bank would incur a forward exchange margin cost but would eliminate exchange risk.
- Convert its sterling exposure into some other currency exposure, say USD. This is done by buying GBP forward and selling USD forward, and is useful if the bank is over-invested in USD. As with the second option above, the exchange risk is nil, but a forward exchange margin is still payable.

Question 5

The ratio is:

$$\frac{\text{shareholders' funds} - \text{investment in associates} - \text{premises and equipment}}{\text{total assets}}.$$

This ratio proceeds on the assumption that capital which funds infrastructure items is not available to meet unexpected losses, as liquidation of these assets could force the closure of the bank. Free reserves represent a source of funds that do not result in a charge against the bank's revenue. The ratio is important as it gives an indication of the bank's ability to meet unanticipated- losses through current profits. It may also indicate the need for additional capital. The ratio is an internal measuring device only, as it is not part of the Reserve Bank's prudential measures.

Question 6

Advantages are:

- it builds up a sound customer base with future profitable business potential
- branches provide banks with their cheapest source of funds (cheque accounts and savings accounts)
- it builds up a steadily increasing lending portfolio with profitable interest-rate margins
- computer-related technology provides economies of scale.

Disadvantages are:

- the extended network makes it sometimes difficult and expensive to implement decisions or change direction quickly
- some branches will have a preponderance of low balances, high activity accounts which are unprofitable
- unless the situation is monitored constantly, the head office structure tends to become unwieldy and remote from the branches it services.

Question 7

(a) Factors affecting interest rates are:

- The supply of and demand for funds. If demand increases relative to supply it will place upward pressure on interest rates. If supply outstrips demand, interest rates will tend to fall.
- Household saving patterns. A higher level of household savings would be expected to ease pressure on interest rates, while a reduction will have the opposite effect.
- Inflation and inflationary expectations. The current rate of inflation is often used as an important determinant of the expected rate of inflation. If investors expect inflation to rise they will demand a higher nominal rate of interest to compensate them for the higher expected inflation rate.
- Overseas interest rates. The effect of overseas interest rates on domestic rates is thought to be less than before deregulation in 1983, but there is still evidence of a direct impact from time to time, particularly for longer term securities.
- Regulation and official intervention. Although virtually free of interest rate controls, banks must meet the Prime Asset Requirement (PAR) ratio, a major component of which is government securities. This permanent level of demand from the banks makes government securities' yields lower than if market forces operated freely.

(b) Funds gap analysis has the following limitations:

- While simple, the model merely identifies the absolute size of the gap at any one time. The model can be extended by scheduling various assets and liabilities according to their interest rate reset (repricing maturity) dates over different time periods, say three-monthly. Even so, we are no wiser about the underlying interest rate risk.
- As the model deals in aggregates, a large timing mismatch can go unnoticed. For example, if \$50 m of liabilities mature early in the maturity period and \$50 m of assets mature later

in the same period, a rise in interest rates would have a negative effect on profit, even though there is no gap in the maturity period under consideration.

- The model assumes that interest rate margins remain unchanged. However, if an interest rate mismatch develops, there will be an unanticipated effect on cash flows and thus liquidity (in addition to profitability).

Question 8

(a) An option is a right to buy or sell securities, for example, shares in a listed company, at a specified date and price. In return for a fee or option premium, the writer or grantor of the option gives the option-taker the right to buy (a call option) or sell (a put option) the given security at a nominated price within a specified expiry period. Option takers wish to ensure that they are not adversely affected by interest rate movements or price changes and they will only exercise the contract if it is profitable for them to do so. If not exercised within the expiry period the option lapses. Put and call options are traded on the Australian options market in the same way as other securities.

(b) This is the process by which a bank builds up deposits by increased lending and investment activity. This expansion of credit is referred to as the money multiplier effect, the multiplier being the reciprocal of the reserve requirement ratios (NCD and PAR) imposed on banks. The latter ratios are a constraint on the process of credit creation.

(c) Financial intermediation simply means indirect financing by financial intermediaries such as banks, finance companies, building societies, etc. Financial intermediaries pool funds provided by savers (surplus units) and package them to end users (ultimate borrowers). Intermediaries are able to offer facilities of different maturity, liquidity and size to meet the preferences of both borrowers and lenders.

(d) Subordinated debt refers to debt which ranks behind all other creditors of the bank. Should a bank default, all other creditors would be ranked above subordinated debt for repayment of funds, but subordinated debts will still rank above shareholders' equity. Accordingly, subordinated debt provides a pool of funds from which to absorb unexpected losses, thus protecting general creditors.

(e) Maturity transformation is the process whereby banks borrow short and lend long, taking advantage of an upward-sloping yield curve (where interest rates are lower for shorter terms to maturity and higher for long terms). Australian householders historically are the largest domestic providers of funds and have a decided preference for the ready availability of their deposit funds. Australian corporations and the Federal government are inveterate borrowers, generally over the longer term.

Because of the sheer size of their operations, banks are able to accommodate the longer term needs of borrowers from a pool of short-term deposits which continually turn over. This is the crux of maturity transformation.

(f) Full service banking means the provision of other than conventional banking services. These include interest rate and currency futures, trust and nominee services, portfolio management, share brokerage, corporate advice, equity and debt underwriting and life and general insurance.

(g) A foreign exchange market comprises a myriad of buyers and sellers of foreign exchange. There is no physically defined location; buyers and sellers transact their business over the telephone, subsequently confirming details by telex. The most important centres are London, New York and Tokyo. There are four broad types of participants—market makers, brokers, clients (or price takers) and the Central Bank.

MID-YEAR FINAL EXAMINATION 1992
Commercial Banking and Finance
Time allowed: Three hours + 10 minutes reading time
EIGHT (8) QUESTIONS TO BE ATTEMPTED
PART A—ALL QUESTIONS TO BE ATTEMPTED
PART B—ANSWER TWO (2) QUESTIONS ONLY
Total marks: 100

PART A—ALL QUESTIONS TO BE ATTEMPTED

Question 1

(a) Explain the composition of the following measures of money supply in Australia:
   (i) MB
   (ii) M3
   (iii) BMY.

(b) List the factors that contribute to money base in Australia.

Question 2

(a) It is generally agreed that bank capital has three major functions. What are they?
(b) In raising new capital, most banks have to consider the same basic factors as those considered by any public company raising new capital. List these factors.

Question 3

Indicate in the form of a table which of the following liabilities are Tier 1 and which are Tier 2:

- asset revaluation reserves
- mandatory convertible notes
- general provision for doubtful debts
- perpetual subordinated debt
- retained earnings
- ordinary shares
- irredeemable non-cumulative preference shares
- term subordinated debt
- non-repayable share premium account
- cumulative irredeemable preference shares.

Question 4

Write explanatory notes on the following:
(a) treasury notes
(b) forward rate agreements
(c) SWIFT
(d) BITS
(e) home banking.

Question 5

(a) Discuss the purpose of Exchange Settlement Accounts (ESAs).
(b) Explain the terms 'same day funds' and 'next day funds', giving three examples of each.
(c) What is a 'repurchase agreement' and what is its purpose?

Question 6

Interest rate exposure can be aggregated into three types. Name and describe each type.

PART B—ANSWER TWO (2) QUESTIONS ONLY

Question 7

Write an essay on prudential supervision, particularly its aims and the mechanisms used in practice to achieve these aims.

Question 8

Discuss the major reasons that banks perform a financial intermediation role.

Question 9

Discuss how interest rate swaps operate. What are the advantages of swaps?

Question 10

Write an essay of around 200 words on the main functions of a bank's personnel department.

ANSWERS TO MID-YEAR FINAL EXAMINATION 1992

Question 1

(a) (i) MB: Notes and coins held by the private (non-official) sector plus bank deposits with the Reserve Bank plus Reserve Bank liabilities to the private (non-bank) sector.
(ii) M3: The above plus secondary creation by the banks.
(iii) BMY: M3 plus deposits lodged with non-bank financial institutions.

(b)
- Australia's foreign exchange transactions
- Commonwealth government's budget surplus/deficit
- Reserve Bank loans and advances to financial institutions and various statutory marketing bodies
- transactions involving CGS between the monetary authorities (official sector) and other individuals and institutions (non-official sector)
- the demand for funds.

Question 2

(a) Functions are:
- provision of funds for the development and expansion of the bank's infrastructure
- provide a buffer against unexpected losses so as to protect depositors' balances
- it contributes to a bank's profitability.

(b) Factors are:
- the market's assessment of the attractiveness of a bank's stock from both a dividend and capital gains perspective
- the market's assessment of the bank's relative stock price and profit performance
- market perception of future industry performance
- size of the issue
- relative attractiveness of equity and other forms of investment
- likelihood of other new capital issues being floated

- whether the investor climate is favourable.

Question 3

Tier 1	*Tier 2*
Retained earnings	Asset revaluation reserve
Ordinary shares	Mandatory convertible notes
Non-cumulative irredeemable preference shares	General provision for doubtful debts
Fixed-term subordinated debt	Perpetual subordinated debt
Non-repayable share premium account	Cumulative irredeemable preference shares

Question 4

(a) Treasury notes are government borrowing instruments with 13 and 26 week maturities. They are sold at a discount on their face value. Once purchased, these notes may be either held to maturity, rediscounted on the market or sold at a somewhat penal rate to the Reserve Bank. Since 1979, treasury notes have been sold through periodic competitive tenders arranged weekly by the Reserve Bank.

(b) These are a device to cover exchange rate risk by buying or selling foreign currencies on a forward basis, ie by agreeing that the future settlement of the transaction when it falls due will take place at a pre-determined exchange rate.

(c) This stands for Society for Worldwide Interbank Financial Telecommunications. It is a special on-line transmission system which allows fast, secure and relatively inexpensive transmission of banking payments and messages.

(d) The Bank Interchange and Transfer System (BITS) is an automated electronic system for the secure and immediate transfer of high value funds such as large money market and foreign exchange transactions.

(e) The home banking system is similar to the ATM and EFTPOS system except that the customer can access the bank's computer with his/her own micro-computer and by means of Telecom's Viatel network. Customers can transfer funds between accounts, obtain account balances, information on interest rates and exchange rates and pay domestic bills.

Question 5

(a) ESAs are conducted by banks and authorised STMM dealers with the Reserve Bank. The accounts are clearing accounts for bank/STMM/Reserve Bank transactions such as cheques, purchase/sale of CGS, etc. Any bank or dealer which is a net debtor to other institutions settles by drawing on its ESA, which must be in credit on a next day basis. Debtor banks may borrow overnight from creditor banks at interest.

(b) Same day funds are funds available from the liquification of assets with settlement on the same day as the transaction takes place. Examples are inter-bank loans, recall of STMM funds and rediscount and repurchase facilities.

Next day funds are funds available on the day following the date of the transaction. Examples are overnight loans to financial institutions, commercial bills, promissory notes, longer-dated government securities.

(c) With repurchase agreements, banks sell government securities to authorised STMM dealers for same day value with an agreement to repurchase the securities at some stipulated future date. This overcomes a bank's temporary liquidity problem while maintaining its CGS portfolio.

Question 6

Major aspects are:

- Resource risk—the risk that project surveys have overstated the amount or quality of the resources which are recoverable. Lenders will employ their own specialists to double-check the borrowers' estimates.
- Completion risk—the project's infrastructure and facilities may not be completed within the necessary timeframe, leading to further expenditure without compensating income.
- Marketing risk—demand for the output and the price obtained may fall short of the levels necessary to meet loan obligations.
- Political risk—this covers such things as changes in government support policies, expropriation of assets with inadequate compensation, bans on exports to certain countries, taxation policies, etc.
- Operating risk—these arise after operations have commenced and include inflation, labour costs, energy costs and industrial disputations.

Question 7

The Reserve Bank (s118 of the *Banking Act*) has responsibility for the prudential supervision of banks. This means to monitor and promote the adoption of sound practices by banks in relation to prudential matters. Monitoring includes the collection and analysis of data from banks, setting prudential standards and evaluating banks' adherence to those standards.

The Act defines prudential matters as practices relating to the conduct by a bank of its affairs in such a way as to:

- keep itself in a sound financial position
- avoid causing instability in the Australian financial system
- operate with integrity, prudence and skill.

The Reserve Bank's supervisory role has three primary objectives:

- preservation of confidence in the banking system
- stability and integrity of the banking system and of the domestic and international payments system
- protection of bank deposits.

The mechanisms used are:

- PAR and NCD ratios
- capital adequacy ratio (CAR) based on risk-weighting of assets against designated capital components
- monitoring of banks' large credit exposures—banks to report regularly the number and amount of exposures in excess of 10% of their capital base; exposures of 30% or more to receive close scrutiny and prior approval by the Reserve Bank
- Reserve Bank has power to conduct investigation of banks and to require information regarding specific customers.

Question 8

The five reasons are:

- Aggregation—Banks, particularly in the retail sector, aggregate small deposits into parcel sizes sought by borrowers.
- Maturity transformation—Australian investors are traditionally short-term depositors, while corporate and other borrowers have generally sought longer term debt. Banks provide a bridge between the two markets.
- Credit risk assessment—Banks have the expertise to assess potential borrowers' credit risk. It is thus safer for lenders to commit funds to banks as intermediaries rather than lend direct to borrowers whose capacity to pay must be suspect.

- Credit risk management—Banks reduce the credit risk attaching to loans and advances by actually monitoring the progress of these outlays. Financial intermediaries can achieve economies of scale in undertaking this special role.
- Credit risk diversification—By investing in a spread of financial assets, financial intermediaries offer their depositors the benefits of their credit risk diversification.

Question 9

The principle of swap transactions is that the cash flows are exchanged. With interest rate swaps, each cash flow represents a stream of interest payments on a certain principal sum over a certain period, in one instance at a fixed rate of interest and in the other at a variable interest rate. The advantage to borrowers is access to either fixed or floating rate funds at a cheaper cost than through conventional methods.

The floating rate index in swaps is generally the bank bill rate; the fixed rate depends on term to maturity and market conditions but generally is a margin above the government bond rate for the same term. Principal amounts are not exchanged, which avoids recording the implicit loan and borrowing on the balance sheet.

Advantages of interest rate swaps are:

- If a manager has an undrawn bank bill line with a variable rate but wants to raise fixed rate debt for interest rate risk management, he/she can use the bill facility and swap into a fixed interest rate.
- All parties benefit from the separation of the interest rate and funding decisions as it enables each party to issue paper only in that market in which its credit is relatively strongest.
- Swaps can be arranged quickly and easily (despite complex documentation sometimes). The market is becoming deeper and more sophisticated.
- Swaps are a flexible instrument, with possibilities of delayed or immediate start, in arrears or in advance payments, variable term, etc.

Question 10

(*This is an open-ended question but the following aspects should be covered in the answer.*)

- Recruitment—full-time staff, part-time staff; graduates, special and contract staff; recruitment for current and foreseeable future needs bearing in mind attrition, retirements, expansion or contraction in activities, etc.
- Allocation—branch/administration? placement in terms of skills/aptitudes/prospects
- Assessments—method and frequency of assessment; need for uniformity of standards in assessing officers
- Promotions—criteria for selection; promulgation; appeal system
- Management development—schemes for cadet executives, graduates, promising officers, etc.
- Training—responsibility for devising/approving internal and external training courses
- Industrial relations—negotiations with unions; resolution of disputes; disciplinary action; awards; approval of incentives; allowances; study bursaries; health and safety; anti-discrimination, etc.

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Index

[References are to paragraph numbers]

[References are to paragraph numbers]