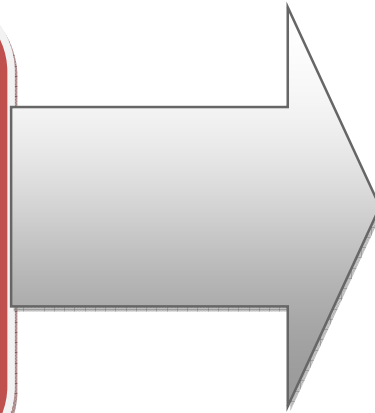


**BANKING:
TREASURY
MANAGEMENT**



**Only study guide for
BAN3702**

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Printed and published by the University of
South Africa Muckleneuk,
Pretoria

BAN3702/1/12018-2024

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ORIENTATION

1 Welcome

Dear Student

It is a great pleasure to welcome you to this module: Banking: Treasury Management (BAN3702) for the degree BCom Banking. To make sure that you share our enthusiasm about this field of study, we urge you to read this overview thoroughly. Refer back to it as often as you need to since it will certainly make studying this module a lot easier.

The field of treasury management is extremely dynamic and challenging. The learning content and activities contained in this learning guide will therefore provide you with opportunities to explore the latest developments in this field and help you to discover the field of treasury management as it is practised today. We hope that you will enjoy the module.

2 Purpose of the module

The purpose of this module is for students to acquire the requisite knowledge and application skills in Banking: Treasury Management necessary to obtain the BCom Banking degree. The Banking: Treasury Management (BAN3702) module enables students to understand how the treasury functions are structured and managed in banks. The module assumes knowledge of the earlier module -Banking: Introduction to Treasury Management- offered at level 2 of the degree programme.

3 Module outcomes

Broadly, the learning outcomes of the course are to enable you to:

- Understand the broad operations of the financial services sector;
- Perform treasury trading activities;
- Utilize asset-liability management and hedging techniques; and
- Manage central bank liquidity.

Under each study unit, there are specific outcomes outlined which expand on the above broad outcomes.

4 Learning package for the module

The learning material for this module is this Study Guide and the prescribed textbook by Peter S. Rose and Sylvia C. Hudgins entitled: Bank Management & Financial Services, 8th Edition, McGraw-Hill International Edition 2010, and various tutorial letters that will be sent to you by your lecturers during the course of your study.

5 ONLINE STUDENTS' RESOURCES

The website http://highered.mcgraw-hill.com/sites/0073382434/student_view0/ provides students with the following resources related to the prescribed textbook.

[Excel Templates](#)

Discussion in the boardroom' exercises intend to apply many of the key concepts presented in the text to broader issues.

[Weblinks](#)

A list of useful websites to complement the book.

[Multiple Choice Quizzes](#)

A selection of multiple choice questions to test your knowledge.

TOPIC 1: OVERVIEW OF THE BUSINESS OF BANKING

1.1 AIM OF THE TOPIC

This topic gives an overview of the business of banking learnt in earlier modules. It further discusses the measurement and evaluation of the performance of banks. It commences with an overview of the changing financial services sector tracing the powerful forces reshaping the industry.

The second theme of the topic explores the financial statements of banks and their principal competitors and examines the measuring and evaluating of their performance.

1.2 CONTENTS OF THE TOPIC

Study Unit 1: An Overview of Banks and Operations

Study Unit 2: Measuring and Evaluating the Performance of Banks

STUDY UNIT 1

AN OVERVIEW OF BANKS AND OPERATIONS



LEARNING OUTCOMES

On completion of this study unit, you should be able to

- understand forces reshaping the financial service industry

- understand the relationship between the financial system and competing financial-service institutions

- identify old and new services offered to the public

- identify key trends affecting all financial-service firms.

1.1 OVERVIEW OF THE UNIT

The Study Unit revises many of the concepts you have studied in earlier banking modules. It explores some developments in the financial services sector. While your prescribed textbook has a USA focus the developments have been global, affecting all financial institutions throughout the world in a more or less similar fashion. If you live in South Africa you will notice the similarities of developments with those of the USA. For instance, the issue of what exactly is a bank.



Chapter 1 of the prescribed textbook gives an overview of the changing financial services sector. Read the chapter guided by the following headings:

- What is a Bank?
- The Financial System and Competing Financial Service Institutions

- Services Banks and their closest Competitors
- Key Trends Affecting all Financial Service Firms

1.2 ACTIVITIES

Multiple Choice Questions Quiz

Attempt questions in the internet resources (student edition) for chapter 1.



The internet provides solutions to the questions which you have attempted.

1.3 SELF-ASSESSMENT

1. What is a bank? How does a bank differ from most other financial-service providers?
2. Why are some banks reaching out to become one-stop financial - service conglomerates? Is this a good idea, in your opinion?
3. Which businesses are competitors to banks? What services do they offer that compete directly with banks' services?
4. What different kinds of services do banks offer the public today? What services do their closest competitors offer?
5. Why do banks and other financial intermediaries exist in modern society, according to the theory of finance?
6. What do you think the financial - services industry will look like 20 years from now? What are the implications of your projections for its management today?

Answers to Assessment Questions

1. A bank should be defined by what it does; in this case, banks are generally those financial institutions offering the widest range of financial services. Other financial

service providers offer some of the financial services offered by a bank, but not all of them within one institution.

2. There are two reasons why banks are increasingly becoming one-stop financial service conglomerates. The first reason is the increased competition from other types of financial institutions and the erosion of banks' traditional service areas. The second reason, for the USA, is the Financial Services Modernization Act which has allowed banks to expand their role to be full service providers.
3. Among a bank's closest competitors are savings associations, credit unions, money market funds, mutual funds, hedge funds, security brokers and dealers, investment banks, finance companies, financial holding companies, and life and property-casualty insurance companies. All of these financial service providers are converging and embracing each other's innovations. In the US the Financial Services Modernization Act has allowed many of these financial service providers to offer the public one-stop shopping for financial services.
4. Banks offer the widest range of services of any financial institution. They offer savings deposits to encourage saving and cheque (demand) deposits to provide a means of payment for purchases of goods and services. They also provide credit through direct loans, by discounting the notes that business customers hold, and by issuing credit guarantees. Additionally, they make loans to consumers for purchases of durable goods, such as automobiles, and for home improvements, etc. Banks also manage the property of customers under trust agreements and manage the cash positions of their business customers. They purchase and lease equipment to customers as an alternative to direct loans. Many banks also assist their customers with buying and selling securities through discount brokerage subsidiaries, the acquisition and sale of foreign currencies, the supplying of venture capital to start new businesses, and the purchase of annuities to supply future funding at retirement or for other long-term projects such as supporting a college education. All of these services are also offered by their closest competitors. Banks and their closest competitors are converging and becoming the financial department stores of the modern era.
5. There are multiple approaches to answering this question. The traditional view of banks as financial intermediaries sees them as simultaneously fulfilling the financial-service needs of savers (surplus-spending units) and borrowers (deficit-spending units), providing both a supply of credit and a supply of liquid assets. A newer view sees banks as delegated monitors who assess and evaluate borrowers on behalf of their

depositors and earn fees for supplying monitoring services. Banks also have been viewed in recent theory as suppliers of liquidity and transactions services that reduce costs for their customers and, through diversification, reduce risk. Banks are also critical in the payment system for goods and services and have played an increasingly important role as a risk management role for customers.

6. There appears to be a trend toward continuing consolidation and convergence. There are likely to be fewer financial service providers in the future and many of these will be very large and provide a broad range of financial services under one roof. In addition, global expansion will continue and will be critical to the survival of many financial service providers. Management of financial service providers will have to be more technologically astute and be able to make a more diverse set of decisions including decisions about mergers, acquisitions and global expansion as well as new services to add to the firm.

1.5 SUMMARY

Recap your understanding of the study unit by reading the Summary at the end of Chapter 1 of the prescribed textbook.

STUDY UNIT 2

MEASURING AND EVALUATING THE PERFORMANCE OF BANKS



LEARNING OUTCOMES

On completion of this study unit, you should be able to

- understand the financial statements of financial institutions
- identify the nature of financial flows and stocks
- compare and contrast financial statements of banks and nonbanks
- evaluate the performance of banks using financial ratios
- measure credit risk, liquidity risk, market risk and other bank risks
- evaluate the performance of competing financial firms

2.1 OVERVIEW OF THE UNIT

The study unit examines the financial statements of financial firms and evaluates their performance using ratio analysis. It consolidates the concepts you learned in earlier banking modules. You may find that much work you will go through is mainly revision.



In order to achieve the above learning outcomes you are required to study two chapters of your prescribed textbook – Chapter 5 and Chapter 6 – and perform the following activities

2.2 ACTIVITIES

2.2.1 Multiple Choice Questions Quiz

Attempt questions in the internet resources (student edition) for chapter 5 and chapter 6.

2.2.2 Internet Excel Exercises

Perform excel exercises provided in the internet resources.



The internet provides solutions to the questions which you have attempted.

2.3 SELF-ASSESSMENT

1. What are primary reserves and secondary reserves and what are they supposed to do?
2. Suppose that a bank holds cash in its vault of R1.4 million, short-term government securities of R12.4 million, privately issued money market instruments of R5.2 million, deposits at the South African Reserve Bank of R20.1 million, cash items in the process of collection of R0.6 million, and deposits placed with other banks of R16.4 million. How much in primary reserves does this bank hold? And how much in secondary reserves?
3. What are off-balance-sheet items and why are they important to some financial firms?
4. What are the key features or characteristics of the financial statements of banks and similar financial firms? What are the consequences of these statement features for managers of financial-service providers and for the public?
5. Suppose a bank reports that its net income for the current year is R51 million, its assets total R1.144 billion, and its liabilities amount to R926 million. What is its return on equity capital? Is the ROE you have calculated good or bad? What information do you need to answer this last question?

6. What is the return on assets (ROA), and why is it important? Might the ROA measure be important to banking's key competitors?
7. Why do the managers of financial firms often pay close attention today to the net interest margin and noninterest margin? To the earnings spread?
8. Suppose a banker tells you that his bank, in the year just completed, had total interest expenses on all borrowings of R12 million and noninterest expense of R5 million, while interest income from earning assets totalled R16 million and noninterest revenues totalled R2 million. Suppose further that assets amounted to R480 million, of which earning assets represented 85 percent of that total while total interest-bearing liabilities amounted to 75 percent of total assets. See if you can determine this bank's net interest and noninterest margins and its earnings base and earnings spread for the most recent year.
9. Suppose a bank reports net income of R12, pre-tax net income of R15, operating revenues of R100, assets of R600, and R50 in equity capital. What is the bank's ROE? Tax-management efficiency indicator? Expense control efficiency indicator? Asset management efficiency indicator? Funds management efficiency indicator?
10. If a bank has a net interest margin of 2.50%, a noninterest margin of -1.85%, and a ratio of provision for loan losses, taxes, security gains, and extraordinary items of -0.47%, what is its ROA?

Answers to assessment questions:

1. Primary reserves consist of cash, including a bank's vault cash and cheque deposits held with other banks or any other funds such as reserves with the central bank that are accessible immediately to meet demands for liquidity made against the bank.
Secondary reserves consist of assets that pay some interest (though usually pay returns that are much lower than earned on other assets, such as loans) but their principal feature is ready marketability. Most secondary reserves are marketable securities such as short term government securities and private securities such as commercial paper.

Both primary and secondary reserves are held to keep the bank in the position to meet demands for cash (liquidity) from whatever source those demands may arise.

2. The bank holds primary reserves of:

Vault Cash + Deposits at the central bank + Cash Items in Collection + Deposits With
Other Banks

= R1.4 mill. + R20.1 mill. + R0.6 mill. + R16.4 mill.

= R38.5 million

The bank has secondary reserves of:

Short-term Government Securities + Private Money-Market Instruments

= R12.4 mill. + R5.2 mill.

= R17.6 million

3. Off-balance-sheet items are usually transactions that generate fee income for a bank (such as standby credit guarantees) or help hedge against risk (such as financial futures contracts). They are important as a supplement to income from loans and to help a bank reduce its exposure to interest-rate and other types of risk.
4. The financial statements of financial-service firms exhibit three main characteristics that have important consequences for managers of these firms and the public.

The first characteristic of these firms is that they have lower operating leverage. They have small amounts of buildings, equipment and other fixed assets. Operating leverage adds risk to the firm and firms with large amount of operating leverage can face large fluctuations in net income and earnings per share for small changes in revenues.

Financial-service firms do not have this problem. However, financial service firms have large amounts of financial leverage. Financial leverage comes from how the firm

finances their assets. If a firm borrows a lot, they have larger financial leverage and have a larger amount of risk as a result. Financial service firms finance approximately 90% of their assets with debt and therefore face significant financial leverage.

Small changes in revenues can lead to large changes in net income and earnings per share as a result. In addition, changes in interest rates can have significant effects on the net income and capital position of financial firms. Finally, most of the liabilities of financial firms are short term. This means that financial firms can face significant liquidity problems. A sudden demand by depositors for funds can lead to large problems for financial firms.

5. The bank's return on equity capital should be:

$$\text{ROE} = \frac{\text{Net Income}}{\text{Total equity Capital}} = \frac{\text{R51 million}}{\text{R1,144 mill.-R926 mill.}} = 0.234 \text{ or } 23.39\%$$

In order to evaluate the performance of the bank, you have to compare the ROE to the ROE of some major competitors or some industry average.

6. Return on assets is the ratio of Net Income/Total Assets. The rate of return secured on a bank's total assets indicates the efficiency of its management in generating net income from all of the resources (assets) committed to the institution. This would be important to banks and their major competitors.

7. The net interest margin (NIM) indicates how successful the bank has been in borrowing funds from the cheapest sources and in maintaining an adequate spread between its returns on loans and security investments and the cost of its borrowed funds. If the NIM rises, loan and security income must be rising or the average cost of funds must be falling or both. A declining NIM is undesirable because the bank's interest spread is being squeezed, usually because of rising interest costs on deposits and other borrowings and resulting increased competition.

In contrast, the noninterest margin reflects the banks spread between its noninterest income (such as service fees on deposits) and its noninterest expenses (especially salaries and wages and overhead expenses). For most banks the noninterest margin is negative. Management will usually attempt to expand fee income, while controlling

closely the growth of noninterest expenses in order to make a negative noninterest margin less negative.

The earnings spread measures the effectiveness of the bank's intermediation function of borrowing and lending money, which, of course, is the bank's primary way of generating earnings. As competition increases, the spread between the average yields on assets and the average cost of liabilities will be squeezed, forcing the bank's management to search for alternative sources of income, such as fees from various services the bank offers.

8. The bank's net interest and noninterest margins are:

$$\begin{array}{lcl} \text{Net Interest} & = & \frac{\text{R16m} - \text{R12m}}{\text{R480m}} \\ \text{Margin} & & = 0.00833 \end{array} \qquad \begin{array}{lcl} \text{Noninterest} & = & \frac{\text{R2m} - \text{R5m}}{\text{R480m}} \\ \text{Margin} & & = -0.00625 \end{array}$$

The bank's earnings spread and earnings base are:

$$\begin{array}{lcl} \text{Earnings} & = & \frac{\text{R16 m}}{\text{R480m} * 0.85} - \frac{\text{R12 m}}{\text{R480m} * 0.75} \\ \text{Spread} & & = 0.0392 - 0.0333 \\ & = & 0.0059 \end{array}$$

$$\text{Earnings Base} = \frac{\text{R480m} - (\text{R480m} * 0.15)}{\text{R480m}} = 0.85 \text{ or } 85 \text{ percent}$$

9. Return on equity capital is the ratio of net income over total equity capital. It represents the rate of return earned on the funds invested in the bank by its stockholders. They expect to earn a suitable profit over the risk of their investment.

Return on equity capital can also be calculated using the return on assets as follows:

$$\text{ROE} = \text{ROA} \times \frac{\text{Total assets}}{\text{Total equity capital}}$$

This ROE–ROA relationship illustrates the fundamental trade-off between risk and return.

The bank's ROE must be:

$$\text{ROE} = \frac{\$12}{\$50} = 0.24 \text{ or } 24 \text{ percent}$$

Its tax-management, expense control, asset management, and funds management efficiency indicators are:

$$\text{Tax Management Efficiency Indicator} = \frac{\$12}{\$15} = 0.8 \text{ or } 80 \text{ percent}$$

$$\text{Expense Control Efficiency Indicator} = \frac{\$15}{\$100} = 0.15 \text{ or } 15 \text{ percent}$$

$$\text{Asset Management Efficiency Indicator} = \frac{\$100}{\$600} = 0.1667 \text{ or } 16.67 \text{ percent}$$

$$\text{Fund Management Efficiency Indicator} = \frac{\$600}{\$50} = 12x \text{ (12 times)}$$

Alternative calculation for ROE:

$$= 0.8 \times 0.15 \times 0.1667 \times 12$$

$$= 0.24 \text{ or } 24 \text{ percent}$$

10. The bank's ROA must be:

ROA = Net interest margin + Noninterest margin – Ratio of provision for loan losses, taxes, security gains, and extraordinary items

$$\text{ROA} = 2.5 \text{ percent} + (-1.85 \text{ percent}) - (-0.47 \text{ percent}) = 1.12 \text{ percent}$$

2.4 SUMMARY

Recap by reading summaries given at the end of chapters 5 and 6. This study unit completes Topic 1. The next topic is on treasury trading activities.

TOPIC 2: TREASURY TRADING

2.1 OVERVIEW OF THE TOPIC

This topic examines some common treasury activities. It is related to concepts of liquidity management which you learned in the second level module – Banking: Introduction to Treasury Management (BAN2602). Treasury department trades in various instruments. In order to trade in the financial markets dealers must understand the quoting method, which side to trade on if a price is asked for and settlement instructions.

Trading profits and losses arise from trading a financial instrument, such as an inter-bank deposit (money market deal), \$/R spot (foreign exchange market deal), selling of R153 Government bond (capital market deal) and the sale of a gold futures contract (derivative market deal).

Buying low and selling high in any market create profits. It is not always possible to make a profit in dealing; losses do occur. If the selling price is higher than the buying price, then the trader makes a profit. The difference between the buying and selling prices may simply be the bank's spread or it may be due to movement in market prices over the period between buying and selling or vice versa.

1.2 CONTENTS OF THE TOPIC

Study Unit 3: Money Market Trading

Study Unit 4: Capital Market Trading

Study Unit 5: Foreign Exchange Trading

STUDY UNIT 3

MONEY MARKET TRADING



LEARNING OUTCOMES

On completion of this study unit, you should be able to

- Demonstrate an understanding of the features of money market instruments
- Demonstrate an understanding of the practical trading aspects of money market instruments

3.1 INTRODUCTION

This study unit will primarily focus on the dealing activities of treasury in the money market, a market that provides investors and borrowers with an opportunity to invest or borrow money at a specified interest rate for a period shorter than 12-months. Money market instruments and their key characteristics are discussed. Dealers and treasury managers must have a solid understanding of the key features of the different money market instruments before they trade in them. Dealers associated with different desks continuously quote two-way prices (bid/offer) to clients, dealers from other banks and occasionally to central banks.

3.2 MONEY MARKET INSTRUMENTS

Money-market instruments are essentially *IOUs*; they are issued by governments, financial institutions and large corporations. These instruments are liquid and active markets have developed in them.

Most money market securities are issued and traded on a *discount basis* and redeemed at *par* on the maturity/value date. This simply means that when such an instrument is initially issued or bought in the *secondary market* (market where securities are traded after its initial issue in the primary market) before its maturity date, it is worth less than the nominal value of the security. The nominal value of discount instruments is also referred to as par value, maturity value, principal or face value. The nominal value is therefore reduced by the discount, the

latter being determined by the discount interest rate. The amount received by the issuer (or paid by the investor) is called the *consideration*. Because these instruments are bought at a discount, the true return (expressed as a yield) to the investor always exceeds the discount rate.

The following notation is used here for all discount securities:

N = Nominal Value

i = discount rate (in % p.a.)

d = days left to maturity (also called tenor or currency)

p = total price (in rand %)

y = yield (in % p.a.)

3.2.1 Treasury bills (TB)

TB are short-term debt instruments issued by the National Treasury for periods of either 91 or 182 days. The purpose of TB issues is to enable the government to raise short-term funds in the money market to fund say previously issued TB that mature. Treasury bills are issued on an *auction basis* by the Financial Markets Department of the SARB every Friday morning, on behalf of National Treasury.

If the TB discount rate is known then the consideration is calculated as follows:

$$\text{Consideration} = N - (N \times i/100 \times d/365)$$

The second term (in brackets) on the right-hand side of the above formula represents the discount amount; it represents the difference between the nominal value and the consideration amount, thus:

$$\begin{aligned} \text{Discount} &= N - \text{Consideration} \\ &= N \times i/100 \times d/365 \end{aligned}$$

For example, the mathematics that applies to a TB with a nominal value of R1 million, issued for a period of 91 days and at a discount rate of 9.25% is as follows:

$$\begin{aligned}\text{Consideration} &= 1\,000\,000 - (1\,000\,000 \times 9.25/100 \times 91/365) \\ &= 1\,000\,000 - 23\,061.64 \\ &= R976\,938.36\end{aligned}$$

In this case the investor pays R976 938.36 for the TB and receives R1million from the issuer (National Treasury) after 91 days, thus earning R23 061.64 (discount amount) over the period. It is sometimes convenient to express the discount and consideration in terms of a standard nominal value of R100. This is referred to as the price of the security and is written in price per cent format. In the above example, the formula for calculating the price of a TB is the following:

$$\text{Price} = 100 - (i \times d/365) \text{ (expressed in rand per cent format)}$$

Example:

$$\begin{aligned}\text{Price} &= 100 - (9.25 \times 91/365) \\ &= 100 - 2.306\,164 \\ &= R97.693\,836\% \text{ (i.e. R97.693\,836 is paid for every R100 of nominal value)}\end{aligned}$$

It should be obvious that the total price is equal to R97.693 836% and that the discount price, which is calculated as $100 - p$, amounts to R2.306 164%. The price per cent format is used when tendering for TB at the weekly auction, but only three decimal places are required.

The TB discount rate does not reflect the actual per annum effective return or yield of such an investment; the yield is calculated as follows:

$$y = (\text{discount amount} / \text{consideration}) \times (365/d) \times 100$$

From the above example it follows that $y = (23\ 061.64/976\ 938.36) \times (365/91) \times 100 = 9.47\%$. The actual return or yield is therefore higher than the discount rate, which is only 9.25%. This is because the yield is based on the nominal value less the discount amount, whereas the discount rate is based on the full nominal value.

In practice, data on discount instruments are often published on a *yield basis*. It is therefore also convenient to know how to convert a yield into a discount rate.

$$i = y / [100 + (y \times d/365)] \times 100$$

Example:

$$i = 9.47 / [100 + (9.47 \times 91/365)] \times 100 = (9.47 / 102.3610) \times 100 = 9.25\%$$

Effectively, the return on TB (or the TB yield) is the difference between the purchase price and maturity value. TBs are non-coupon bearing, that is, they do not pay any interest between the time of issuance and maturity.

With regard to TBs, a distinction is made between the discount rate and the yield. The discount rate is the amount of discount from the face value expressed as an annualised percentage of its face value. However, because the discount is received at the beginning of the investment period, it is always less than the corresponding yield for the full investment period, which also takes into account the time value of money. The discount rate can therefore be regarded as the present value of the yield. Because TB yields are more related to yields or rates on other money market instruments, they are more generally used in analyses of money market rates than the discount rates.

TB yields are influenced by the following factors:

- Expectations of future interest rates.
- The demand for liquid assets. TB qualifies as statutory liquid assets. Therefore, as banks' liquid asset requirement increases, for example as their balance sheets grow over time, there is a corresponding increase in the demand for TB, putting downward pressure on yields. Although long-term government bonds also qualify as liquid assets, banks

generally prefer to keep a certain portion of their liquid asset portfolio in short-term securities.

- The supply of liquid assets. The supply of TB depends on the size of the government's budget deficit as well as the composition of instruments with which this budget is financed. A change in the supply of alternative liquid assets, such as Reserve Bank debentures, may also affect TB yields.
- The term for which TB are issued. 182-day TB yields are normally higher than 91-day TB yields

TB has some advantages for investors, namely:

- More affordable for smaller investors than government bonds because they are issued in denominations of R100 000
- TB are very liquid and an active secondary market exists
- TB is considered to be the safest (*risk-free*) investments because they are short-term securities issued by the government
- Exempted from income taxes.

However, the main disadvantage of TBs for investors is that they offer a lower return than other money-market instruments with similar maturities because of their risk-free nature.

The following is an example of a TB quote in the secondary market:

Bid/ Offer

11.85%/11.70%

Note that this implies that the price maker is prepared to buy TBs at 11.85% and sell them at 11.70%. The quoted rates are discount rates. The reason the bid rate is higher than the offer rate is that the higher the TB discount rate, the lower the price and vice versa. For example, if in the above case the quotes were for secondary market TBs with 45 days left to maturity, the above bid would translate into a price of *R98.54%* while the offer would be *R98.56%* . Therefore, as with second-hand cars, the selling price is higher than the buying price. In the secondary market, however, TB quotes are usually given in terms of discount interest rates. Buyers who want to compare the yields on different financial instruments have to verify whether the instrument is quoted on a discount or yield basis, and do their own calculations prior to the purchasing of such securities.



Activity 3.1

Two different price makers supply the following 45-day secondary market TB quotes (bid – offer). Compare Bank A and Bank B.

Bank A	Bank B
11.80 – 11.50	11.75 – 11.60

Remember, market makers buy at their bid rate and sell at their offer rate.



FEEDBACK

You as the price taker should always buy TBs from the bank with the higher offer rate (lower price). In this case it is Bank B and you should always sell your TBs to the bank with lower bid rate (higher price), which is Bank A. Price takers should buy high and sell low.

3.2.2 Reserve Bank debentures (RBD)

A RBD is a money-market instrument issued by the SARB to drain excess liquidity from the market; in other words it is issued or sold by the SARB to bank's treasuries. The RBD rate is the rate that investors earn by purchasing the debentures issued by the SARB. To date, the Bank has issued only 28-day and 91-day debentures although, theoretically, any maturity up to 12 months can be issued. Like TBs, RBDs also qualify as statutory liquid assets. Therefore, most of the factors that influence TB yields also have an impact on debenture rates.

The primary issues of RBDs (in contrast to TBs) require that they have to be auctioned on a yield basis. The mathematics is even simpler than for TBs. If a bank buys R30 million worth of 28 day RBDs at an interest rate of 9.63%, the bank that tenders will have to pay the SARB

exactly R30 million on the settlement date and will receive R30 million plus the interest on the maturity date. A practical example will illustrate this (as seen from the buyer's side):

Example:

Amount invested	=	R30 million
Issue date	=	23 January 2011
Maturity date	=	20 February 2011
d	=	28 days
i	=	9.63% p.a.

Consideration at maturity (MV) = R30 million x $[1 + (28/365) \times 9.63/100]$ = R30 221 621.91. The therefore has to pay the investor, at the end of the period, an amount of R30 million plus interest of R221 621.91.

Barring a few minor details, the administrative procedures regarding tenders, transfers, etc for RBDs are virtually the same as those for TBs. The SARB issues an invitation, via the electronic news services (Reuters) to tender for RBDs. The invitations for the regular weekly tenders are usually issued at around 08:00 on the morning of the tender. Bank treasuries will tender for RBDs.

Bids for the regular weekly tenders must be submitted on the designated form issued by the SARB or via SWIFT message. Tender forms must also be submitted to the SARB branches in Johannesburg, Cape Town or Durban. Unlike TBs, RBDs have to be settled on the same day as the auction, i.e. settlement is on a t + 0 basis.

Also, because they are auctioned on a yield basis, the debentures are allocated in ascending order of yields bid, implying that banks who are prepared to earn the lowest interest will get the most debentures. Note that the minimum tender amount is R1 million and that only multiples of R1 million are accepted thereafter.

3.2.3 Negotiable Cash Deposits (NCDs)

NCDs are instruments issued by commercial banks to obtain funding, which are an acknowledgement of deposits received for a fixed period and at a fixed interest rate. However, NCDs differs from normal fixed deposits in that they can be sold in the secondary

market before the maturity date. The quoted rate is presumably a fixed rate as it is a negotiable instrument. Liquidity in this market is limited since banks reluctantly quote buy-back prices on NCDs.

NCDs are usually issued in bearer form and occasionally in the name of the original depositor. NCDs may be issued for periods of up to three years. When issued for periods of less than one year, interest is usually payable at the end of the period. When issued for longer than one year, interest may be payable either at the end of the period or six-monthly in arrears, but usually the latter. NCDs are also issued at variable rates, usually linked to the wholesale prime rate. NCDs may be issued in any amount, but are usually issued in denominations of R1 million and at times of R500 000 and, infrequently, R100 000 denominations when part of a larger parcel.

Demand for NCDs arises from a wide array of institutions including other banks (Bank A for example will buy NCDs issued by Bank B), pension funds, insurance companies, commercial companies, municipal authorities, public corporations and individuals.

An active secondary market is important for a number of reasons:

- Providing investors in NCDs the assurance that they will be able to dispose of such NCDs if they so desire;
- A secondary market provides the basis for determining the yields that have to be offered on new issues;
- A secondary market registers changing market conditions rapidly, thereby indicating the receptiveness of the market for new primary issues;
- An active secondary market enables investors to adjust their portfolios of NCDs in terms of size, maturity and quality.

Any NCD issued to bearer is transferable by delivery alone. If an NCD is issued repayable to a particular depositor, it is transferable by delivery plus his or her endorsement on the reverse of the certificate. On maturity date the holder of an NCD must present the certificate to the issuing bank, which will issue a cheque for the face value plus the accrued interest, i.e. the maturity value.

3.2.4 Promissory notes (PNs)

PNs are also a form of debt very similar to NCDs that an institution issues to raise money. Typically, an investor agrees to lend money to the institution for a set period of time. In exchange, the institution promises to pay the investor a fixed return on investment/principal plus annual interest.

3.2.5 Repurchase agreements (Repo)

A repurchase agreement is a sale of securities with an undertaking by the seller to repurchase the same securities after a stipulated period of time at a price (yield) determined at the time of the sale. The essence of a repurchase agreement is to adjust the original maturity of a particular money market asset to suit the needs of an investor.

The terminology related to repurchase agreements is often confusing to those not involved in the money market. A repurchase agreement is a repurchase agreement only to the maker of such an agreement. A synonym for a repurchase agreement is a *buy-back agreement*. The buyer is said to be making a "carry" or resale agreement, or "warehousing" the particular financial asset.

3.2.6 Banker's acceptance (BA)

A banker's acceptance (BA) is a bill of exchange or time draft drawn on and accepted by a bank. It is the accepting bank's obligation to pay the holder of the draft at maturity. Banker's acceptances are usually short-term instruments with maturities of 90 to 120 days that are used to finance outstanding trade receivables, payables and the preparation of goods prior to export trade.

Banks themselves may initiate the creation of banker's acceptances when approached by investors seeking short-term investment opportunities. They would approach large financially sound companies and offer them acceptance credit at relatively attractive terms. The banker's acceptances, so created, earn income for the bank in the form of acceptance commission, and in the secondary market the bank also earns income on BA dealings by quoting two-way prices (bid – offer).

Characteristics of a BA in South Africa:

- A BA is a money market instrument issued at a discount and redeemed at par. It is a very liquid security, its secondary market being the most active of all money market instruments in South Africa.
- Tenure: BAs are usually issued for 90-day and 120-day periods.
- Denomination: Most common denomination is R1 million and splitting is done as a rule.

- Transferability: BAs payable to bearer are transferable by delivery alone. BAs payable to order are transferable by the endorsement of the holder.
- Main secondary market participants: Banks, insurance companies, pension funds, mining houses and certain brokers.
- Stamp duty: 5c for every R100 or part thereof.
- Commission: Varies from bank to bank and influenced by the drawer's financial standing. Usually between 0.5% p.a. and 1.5% p.a. of nominal value.

The interest rate charge the customer referred to as the all-in-rate consists of the discount rate plus the acceptance commission. In general, the all-in-rate for acceptance financing is lower than prime-based borrowings. Since the banker's acceptance is a marketable instrument with an active secondary market, the rates on acceptances usually fall between the rates on short-term Treasury bills and the rates on commercial paper.

Formulae used in BA calculations:

1. Formula for calculating proceeds or consideration:

$$\begin{aligned} \text{Proceeds (consideration)} &= \text{Nominal Value} - \text{Discount} \\ &= N - (N \times i/100 \times d/365) \end{aligned}$$

Where: N = Nominal value
 i = Discount Rate
 d = BA contract period in days.

2. Formula for calculating BA discount and yield:

$$\begin{aligned} \text{BA discount} &= N \times i/100 \times d/365 \\ \text{BA yield} &= (\text{discount/consideration}) \times 365/\text{days} \times 100 \end{aligned}$$



ACTIVITY 3.2

Determine the discount, consideration and yield of a BA with the following details:

Nominal value : R1 000 000

Tenure (Maturity) : 90 days
Discount rate : 12.5%



FEEDBACK

$$\begin{aligned}\text{Discount} &= N \times i/100 \times d/365 \\ &= 1\,000\,000 \times 12.5/100 \times 90/365 \\ &= R30\,821,92 \\ \text{BA consideration} &= N - (N \times i/100 \times \text{days}/365) \\ &= 1\,000\,000 - (30\,821.92) \\ &= R969\,178.08 \\ \text{Yield} &= (\text{discount}/\text{consideration}) \times 365/\text{days} \times 100 \\ &= (30\,821.92/969\,178.08) \times 365/90 \times 100 \\ &= 12.90\% \text{ p.a.}\end{aligned}$$

3.3 SELF-ASSESSMENT

1. You have to prepare a TB tender on behalf of your bank's treasury department. You are given the following information:

Yield required: 91 day bills: 7.5%; 182 day bills: 7.8%; 273 day bills: 7.9%
Amount to tender respectively: R10 million; R15 million; and R20 million.

- (1) Calculate the discount rate and tender price for each maturity.
- (2) Assume all three of your bank's bids are accepted. Calculate the consideration for each maturity.

2. Given the following particulars about a BA, determine (i) the discount, (ii) commission, (iii) stamp duty, (iv) all-in cost and proceeds of the BA.

Nominal value	= R600 000
Tenure of BA	= 90 days
Discount rate	= 20.00%
Acceptance commission	= 1.5% p.a. of nominal value paid in advance
Stamp duty	= 5c for every R100 or part thereof.

Answers to self-assessment:

Question 1

(1) Discount rate

$$\begin{aligned} \text{a) i} &= y/[1+(y \times d/365)] \\ &= 0.075/[1 + (0.075 \times 91/365)] \\ &= 0.0736 \\ &= 7.36\% \end{aligned}$$

$$\begin{aligned} \text{b) i} &= 0.078/[1 + (0.078 \times 182/365)] \\ &= 0.0751 \\ &= 7.51\% \end{aligned}$$

$$\begin{aligned} \text{c) i} &= 0.079/[1 + (0.079 \times 273/365)] \\ &= 0.0746 \\ &= 7.46\% \end{aligned}$$

(2) Tender price

$$\begin{aligned} \text{a) p} &= 100 - (i \times d/365) \\ &= 100 - (0.0736 \times 91/365) \\ &= 98.165\% \end{aligned}$$

$$\begin{aligned} \text{b) p} &= 100 - (0.0751 \times 182/365) \\ &= 96.255\% \end{aligned}$$

$$\begin{aligned} \text{c) p} &= 100 - (0.0746 \times 273/365) \\ &= 94.420\% \end{aligned}$$

(3) Consideration

a) Consideration $=N-(N \times i/100 \times d/365)$
 $=10000000 - (10000000 \times 0.0736 \times 91/365)$
 $=R9816504.11$

b) Consideration $=15000000 - (15000000 \times 0.0751 \times 182/365)$
 $=R14438293.15$

c) Consideration $=20000000 - (20000000 \times 0.0746 \times 273/365)$
 $=R18884065.75$

Question 2

Discount charges $= R600\,000 \times 20/100 \times 90/365 = R29\,589.04$

Commission $= R600\,000 \times 1.5/100 \times 90/365 = R2\,219.18$

Stamp duty $= R600\,000 \times 0.05/100 = R300$

All-in cost $= R32\,108.22$

Proceeds $= R600\,000 - R32\,108.22 = R567\,891.78$

All-in-rate $= 32\,108.22/600\,000 \times 365/90 \times 100$

It can also be calculated as: $[20\% + 1.5\% + (0.05 \times 365/90)\%]$
 $= 21.7\%$

Note that if the bank after discounting the BA on behalf of a client immediately sells the BA in the secondary market, the cost would consist of the discount rate only, and would receive a consideration of $R600\,000 - R29\,589.04 = R570\,410.96$.

3.5 SUMMARY

Recap your understanding of this study unit by reading a recommended textbook: Understanding South African Financial Markets edited by Van Zyl et al. (2008), Chapter 9 – The Money Market.

STUDY UNIT 4

CAPITAL MARKET TRADING



LEARNING OUTCOMES

On completion of the study unit you should be able to:

- Identify different capital market instruments
- Understand the pricing of fixed interest bearing bonds or securities
- Understand the quotation of fixed interest bearing securities

4.1 INTRODUCTION

Fixed income securities are traded in the capital market with longer-term (longer than 3 years) maturities than money market instruments. The capital market desk therefore trades different long-term *debt instruments*.

The issue of a debt instrument requires the issuer (borrower) to repay to the lender (investor) the principal sum borrowed plus *coupon interest* at fixed (or floating) interest rates over a specified period of time. A typical bond issued will specify the fixed maturity date on which the principal amount is repayable, the face (nominal) value and the fixed coupon interest rate. The principal amount borrowed is referred to as the capital or principal, whereas the contractual rate of interest is called the coupon rate.

Bonds that are issued by governments are called gilts. This originates back to the times when such certificates were 'gilt-edged'. Various names exist for government bonds in other countries. For example, in Germany they are called bunds and in the United States they are known as treasuries. In South Africa they are known as bonds.

4.2 FEATURES OF CAPITAL MARKET INSTRUMENTS

Fixed interest bearing securities (US) or bonds (SA), either government, semi-government or corporate, are traded in the capital market by bank's treasuries. A bond has certain distinguishing features. A bond has a specific code for identification and trading purposes. In

South Africa the letter “R” in front of a number refers to a specific bond issue and is purely an identification number to distinguish one bond from another. For example, in the case of the R153 it refers to a 13% bond maturing on 31 August 2011, which is when the SA Treasury has to repay the principal amount to the holders of such a bond.

A government bond is defined as a fixed interest bearing security that pays a fixed coupon interest at regular (six monthly) intervals. Governments issue bonds for the purpose of funding government expenditure issue bonds. A government bond is classified as a capital market instrument because of the long-term maturity structure associated with it. A bond issued by a corporate institution is known as a corporate bond. There are certain concepts and terminologies associated with bond trading. The most important ones are discussed below.

4.2.1 Maturity

Each bond issued has a final expiration or maturity date. On this day the bond ceases to exist (no trading) and the issuer will redeem the bond at par (face value) as well as pay the final coupon interest payment.

4.2.2 Coupon interest

Fixed coupon bonds are also known as straights or bullet bonds. The coupon concept coupon originates from the older days when an attachment representing a voucher for half a year’s interest, was fixed to the bond certificate. The holder of the bond simply clipped a new coupon each time an interest payment became due and presented it to the issuer for payment. An important aspect of the coupon is that it is linked to the face value of the bond, not the price paid for it or the current market price. There is no simple or practical way the issuer can administer the interest payments due to bondholders on the basis of the current market price or the price paid by the various buyers. As already mentioned, the R153 has a coupon of 13% and twice a year interest is paid to registered holders of the bond. So for every R1 million nominal of the R153 the investor receives two six-monthly instalments of R65 000 each. In the case of the R153, interest is paid annually on 28 February and 31 August with the last payment on 31 August 2011.

4.2.3 Yield to maturity

Yield to maturity, commonly expressed as YTM, is the market rate at which the bond is traded and represents the return on the bond, if the investor holds the bond until it matures. It is also the rate at which the future cash flows of the bond, i.e. the nominal value and coupons are discounted in order to calculate the market value or consideration. It is expressed as a percentage, to two decimal points, i.e. 15.36%. When the YTM rises from 15.36% to 15.40% it is reported as a 4 basis point move.

4.2.4 Nominal value, face value, par value, principal

These concepts all mean one and the same thing. They refer to the nominal rand amount assigned to a bond by a SA issuer. It is the amount to be repaid to the investor when the bond matures. In South Africa government bonds usually have a face value of R1 million or multiples of R1 million. Note however, that bonds may be split into smaller denominations, each with a nominal value of say, R100 000. The principal is also the reference amount when the price of a bond is quoted.

4.2.5 Price quotations, premiums and discounts

The price of a bond is usually stated as a percentage of its face value (or principal, nominal value, etc). For example, a price of R100% (which we read as 100 rand percent) means that the price is 100 percent of the nominal value, that is you would pay R1 million to buy a bond with a nominal value of R1 million (100% x R1 million). Such a bond is said to be trading at *par*. If the price of a bond with nominal value of R1 million is R98%, the buyer would have to pay R980 000 for the bond (98% x R1 m). Such a bond is trading at a *discount* to par. On the other hand if the price of a bond with a nominal value of R1 million is R108%, the amount needed to pay for the bond is R1 080 000 (108% x R1 m). Such a bond is trading at a *premium*.

4.3 DIFFERENT TYPES OF BONDS

4.3.1 Plain vanilla or fixed interest rate bonds

Fixed rate bonds have a fixed coupon rate and a single maturity date. Fixed rate bonds make up most of the world's bond markets.

4.3.2 Zero coupon bonds

Zero-coupon bonds have no coupons attached to them. These bonds therefore generate only cash payment, which is the nominal or principal amount, on the maturity date. They are issued and traded at a large discount and redeemed at face value on the maturity date. Zeros are therefore, except for their maturity, similar to treasury bills.

4.3.3 Floating or variable rate bonds

Floating rate bonds are bonds on which the coupon interest varies with some predetermined benchmark rate.

4.3.4 Inflation linked bonds

Inflation linked bonds are government bonds that will offer investors an inflation-protected investment opportunity by compensating holders for inflation. The inflation-linked bonds that have been issued by the South African government are indexed to headline inflation, with interest adjusted after a three-month lag.

Governments issue inflation-linked bonds mainly to reduce their borrowing costs. This is because conventional long-term bonds, due to the uncertainty of future inflation, include a *risk premium*. If this risk premium can be decreased or eliminated, bonds can be issued at a lower yield, which then reduces the interest costs of the government. The issue of inflation linked bonds also puts pressure on governments to ensure that their policies are aimed at reducing inflation or to maintain it at low levels.

4.3.5 Strips

Strips stands for separate trading of registered interest and principal of securities. The process of stripping involves separating a standard coupon bond into its constituent interest and principal payments, so that they can be separately held or traded. This will be done to enhance the liquidity of government securities. It is also done to provide benchmark rates for maturities where no government bonds are available.

4.4 INVERSE RELATIONSHIP BETWEEN PRICE AND YIELD

Before attempting to explain bond yield concepts it is appropriate to discuss a very important relationship associated with financial instruments and one that often causes confusion. A

fundamental negative relationship exists between the price of any financial security and its market price. It has in fact already been illustrated in the section on money market instruments. However, this relationship is best explained by using fixed rate bonds as an example.

Consider a fixed rate bond that has been issued at par with a nominal or face value of R1 000. The coupon interest rate is fixed at 10% per annum, implying that an investor receives a fixed R100 per annum (it is usually split into two bi-annual interest payments of R50, but that is irrelevant now) for as long as the investor keeps the bond. The fact that the bond is issued at par implies that the market interest rate (YTM) was also 10% (the same as the coupon rate) at the time of issue.

Note that both the coupon rate and the nominal value are fixed. Assume that the ruling market interest rate for similar investments increases to 20%. Clearly, nobody would be interested in buying this bond which yields only 10% per annum if 20% per annum could be obtained on alternative investments. Note also that the coupon interest is fixed at R100 per annum. The only variable that can change in order to render a return of 20% on this investment is the price of the bond. In other words only if the price of this bond decreases to R500 will the bond offer a 20% per annum yield. The formula to calculate the return (or simple yield) is:

Return (or yield) = (interest income received)/(price paid) x 100.

The only value of P that will satisfy the simple equation is R500 since $(100/500) \times 100 = 20\%$.

The opposite, however, is also true – if interest rates move lower to say 5% per annum the price must rise to R2 000 to satisfy the equation, i.e. $\text{yield} = (100/2000) \times 100 = 5\%$. The following table illustrates the inverse relationship.

Return or simple yield (%)	Price or value of the R1000 bond
20	R500
10	R1 000
5	R2 000

4.5 BOND PRICES AND YIELDS

The return on any investment in government bonds (or other fixed rate securities) consists of three elements. They are

- Periodic coupon interest payments
- Compounding effect of re-investing the periodic interest payments (i.e. the interest on interest)
- *Capital gain* (if bought at a discount) or loss (if bought at a premium) if the bond is kept until maturity. For example, if a bond with a nominal or maturity value of R1 000 is purchased for R925 (a discount), a capital gain of R75 arises if the bond is held to maturity. Conversely, when a bond is purchased at a premium a capital loss will result at maturity.

Note, however, that a capital gain or loss may also be realised if a bond is sold in the secondary market before maturity. This is due to the inverse relationship between price and yield. For example, if the market interest rate on the selling date is lower than what it was on the purchase date, the seller will earn a capital profit because the bond will be sold at a higher price

4.5.1 Coupon rate

The simplest (non-realistic) measure of return on bond investments is the coupon rate. It represents the annual payout as a percentage of the bond's nominal value. It is a fixed rate of interest paid by the issuer of the bond to the investor. The coupon value is simply equal to the coupon rate x nominal value.

Example: A bond with a nominal value of R1 million and a coupon rate of 12% pays an annual coupon of R120 000. Coupon payments on government bonds take place on a semi-annual basis in South Africa.

The coupon rate is not an adequate measure of the effective return on a bond unless the investor purchases the security at a price equal to its par value, the borrower meets all the promised payments and the investor redeems the security at par. In practice, the prices of fixed interest securities fluctuate with market conditions and bonds rarely trade at par.

4.5.2 Current yield (CY) or running yield

The second more useful (but still imperfect) measure of return is the current yield. The CY represents the annual payout as a percentage of the current market value paid. It is calculated by simply dividing the coupon rate by the market price (in R%) of the bond, or the annual coupon income by the market value, and expressing it as a percentage.

Example: The running yield on a bond with a 13% coupon rate and selling at a price of R95.85% is calculated as follows:

$$\text{CY} = \text{coupon rate} / \text{price} \times 100 = 13/95.85 = 13.56\%, \text{ or alternatively}$$

$$\text{CY} = \text{annual income} / \text{market value} \times 100 = 130\,000/958\,500 \times 100 = 13.56\%$$

4.5.3 Yield to maturity (YTM)

The yield-to-maturity is the best measure of the return on a bond investment, since it includes all three elements of the investment, namely:

- Coupon interest
- Interest on the interest
- Capital gain or loss at maturity

To understand the principle under which the YTM is determined, one needs to understand the concepts of present value, compounding and discounting. It is actually very simple as illustrated by the following example:

If investor X invests R100 at 10% interest per annum he will receive back an amount equal to:

$100 \times (1 + 0.10) = R110$ one year from now. If he invests it for two years at 10% p.a. he will receive:

$100 \times (1 + 0.10)^2 = R121$. In 3 years' time it will be equal to R133.10, etc. This is known as *compounding*.

The opposite of compounding is discounting. If X wants to have R100 in one year's time and the current market rate is 10% then he will have to invest the following amount for one year:

$100/(1 + 0.10) = R90.91$. If he wants R100 only in 2 years' time, he will have to invest:

$100/(1 + 0.10)^2 = R82.64$. Similarly, if he wants to wait 3 years he only has to invest R75.13 now at 10% pa. This is known as *discounting*. Note it is assumed that the interest rate remains constant throughout. It should now be clear that the *present value* of an amount of R100 that will accrue in two year's time at 10% pa, is equal to R82.64.

The formula to calculate yield to maturity (*i*) is as follows:

$$P = \frac{C}{(1+i)^1} + \frac{C}{(1+i)^2} + \dots + \frac{C}{(1+i)^n} + \frac{M}{(1+i)^n}$$

Where P = market value (purchase price) of bond

C = coupon value (interest amount)

n = number of periods to maturity

M = maturity value

Try to form a mental picture of what this equation is saying. The right side represents n+1 different compound interest elements, all starting out now, and each one ending at the

moment that the payout (transaction) it corresponds to, takes place. Most of these values will be quite small because they only grow to a value of C , the coupon payment. However, the very last element will be much larger because it will end up at the par value M . The sum of the present values of all these elements (the right side of the equation) will be exactly equal to the purchase price of the bond (the left side). It should now be fairly easy to understand that a bond's YTM is defined as follows:

YTM is that interest rate (discount rate or internal rate of return) at which the present value of the maturity amount (face value) and of all the future coupon interest payments is equal to the price of a bond.

If the market price of a bond is known, the yield to maturity can be calculated using a trial and error process or using bond tables where yields to maturity for given market prices, coupon payments and maturities are provided.

Activity 4.1

Suppose a bond is selling for R950 and has a coupon rate of 12%, it matures in 4 years, and the par value is R1 000. What is the YTM?



The coupon payment is R 120 (12% of R1000), so the equation to satisfy is

$$950 = \frac{120}{(1+i)^1} + \frac{120}{(1+i)^2} + \frac{120}{(1+i)^3} + \frac{120}{(1+i)^4} + \frac{1000}{(1+i)^4}$$

The easiest way to solve for i (the YTM) is with a financial calculator. Using such a calculator a YTM = 13.71% was obtained for the above bond. Note that the current yield is equal to $120/950 \times 100 = 12.63\%$ p.a. and that the bond was purchased at a discount to par. Note also that coupon interest is usually paid semi-annually. In such a case the above formula is simply adjusted by dividing the coupon by 2 and doubling the number of payment periods.

However, in South Africa all bonds are quoted and traded in yield, but settled in price. This means that the YTM's are always available and that only the bond prices have to be calculated.

4.5.4 Bonds trading at par, discount or premium

Bonds can either trade at a discount, at par or at a premium. Comparing the coupon rate with the YTM can easily derive whether a bond is trading at a discount or at par, as indicated by the following diagram.

A bond trading at . . .	Satisfies this condition
Discount	Coupon Rate < Current Yield < YTM
Par	Coupon Rate = Current Yield = YTM
Premium	Coupon Rate > Current Yield > YTM

If bonds are issued above par (therefore at a premium), it reduces the interest cost for the issuer, which is the same as the return for the investor.

4.5.5 Trading of bonds between interest dates

In the YTM calculations above it has always been assumed that the transactions were executed on a coupon interest date. This is rarely the case and most secondary market bond transactions take place either before or after a specific coupon interest date. Also, as most bonds pay coupons on a semi-annual basis, it implies that such deals are concluded on a date that falls between two interest dates. Because the (six monthly) coupon interest dates are fixed for the entire lifespan of the bond, it implies that, for example, should a bond be sold three months before a coupon date, the next coupon will have to be split between the seller and the new buyer. Such interest is referred to as *accrued interest* and it is dealt with by adjusting the price that the new buyer pays for the bond.

There are therefore two prices applicable in all bond transactions. One is the *clean price*, which is the price estimated by the market, and which is based on a number of variables including the general level of interest rates, maturity date, credit quality, and other factors. This is the price that has been discussed up to now. The second is the *all-in price* (sometimes called dirty price), which refers to the actual amount that an investor pays for a bond. To calculate the all-in price both the clean price and the accrued interest need to be known. The exact relationship between these two prices will, however, only be understood once the concepts of ex-interest and cum-interest are explained.

Ex-interest and cum-interest

For all listed bonds issued it is required that a register is kept of all bond owners, so that the issuer knows to whom the regular interest payments should be made. This register usually closes anything between ten and thirty days before the interest payment date. If this register closing date is, say, 30 days before the coupon date, then whoever holds the bond on that date receives the next coupon, i.e. the total amount on interest for the previous six months. The bond therefore goes ex-interest on that date and remains ex-interest until the next coupon date which is 30 days later. If the bond is traded during this ex-interest period, the seller (previous holder) will receive the full coupon, as he or she owned it on the date that the register closed. The buyer (new owner) may therefore have owned the bond for, say, 15 days before the next coupon date and must be compensated in terms of interest accrued for those 15 days. Making him/her pay less for the bond does this. The seller therefore indirectly refunds the buyer by receiving a slightly lower price for the bond on the settlement date. Thus, for a bond that trades ex-interest the all-in price is calculated as follows:

All-in price = clean price – accrued interest (for ex-interest deals)

On the other hand, should a bond be traded during the period before the register closes, that is, from the first day after a coupon date up to the day before the bond goes ex-interest, the next coupon will go to the buyer (new owner) and the bond is said to be trading *cum-interest*. In this case the buyer actually receives part of the interest that has accrued to the seller and must therefore compensate the seller by paying a little more for the bond on the settlement date. Thus, for a bond that trades cum-interest the all-in price is calculated as follows:

All-in price = clean price + accrued interest (for cum-interest deals)

Needless to say, for any transaction that is settled on a coupon date, **all-in price = clean price**.

Note that since November 1997 the practice in the South African fixed income securities market has been that *settlement* takes place on a rolling settlement basis on the third working day after the day of trade (**t + 3**). Settlement valuations are therefore based on the YTM prevailing at the specific time on the transaction date. Coupon interest on the other hand, accrues from the settlement date, and not from the transaction date.

For example, if a bond is traded in the secondary market at a YTM of 11.50% on the date of trade, that rate is used to calculate the consideration on the settlement date three days later - not the new rate which prevails on the settlement date, which might often be significantly higher or lower than 11.50%.

Accrued interest is calculated as follows:

Accrued interest = coupon rate per annum x d/365

Where

d = number of days from last interest date to settlement date for a **cum-interest** deal,
and

d = number of days from settlement date to next interest date for an **ex-interest** deal.

Activity 4.2

A bond that trades cum-interest:

Nominal value:	R5 million
Coupon rate:	15% p.a.
Coupon payment dates:	30 June and 31 December

Register closing dates: 31 May and 30 November

Issue date: 1 July 2000

Maturity date: 30 June 2008

Suppose that the above bond is traded for settlement on 15 July 2002 at a yield of 13.5%. The all-in-price is R106.603 351%. Note that because this bond trades after the 30 June interest date but before the register closes on 30 November, it trades cum-interest.



The accrued interest should be calculated. The number of days since the previous interest payment is 15.

$$\begin{aligned} \text{Accrued interest} &= \text{coupon rate per annum} \times d/365 \\ &= 15\% \times 15/365 \\ &= \text{R}0.616\ 438\% \end{aligned}$$

As mentioned above this transaction is cum-interest, which implies that the interest, which has been accrued for the 15-day period, should be *deducted* from the all-in price in order to calculate the clean price.

$$\begin{aligned} \text{Clean price} &= \text{All-in price} - \text{accrued interest} \\ &= \text{R}106.603\ 351\% - 0.616\ 438\% \\ &= \text{R}105.986\ 913\% \end{aligned}$$

However, because the all-in price which applies to every R100 of nominal value, is R106.603 351%, the buyer of the bond actually has to pay a consideration of $\text{R}5\ 000\ 000 \times \text{R}106.603\ 351/100 = \text{R}5\ 330\ 167.55$

4.6 FACTORS THAT AFFECT BOND YIELDS

It was mentioned earlier that bonds are traded on a yield basis in South Africa, and that the yield determines the price of the bond. The important question to ask now is what determines

the interest rate or yield on bonds. The following factors are considered the major determinants:

4.6.1 Market interest rate levels

The interest rate on a particular bond cannot be out of line with other interest rates on other financial assets in the financial market. Market interest rate levels are determined by several factors such as inflation expectations, exchange rate considerations and tax policies. When these factors change, they affect the prices and yields of all financial instruments in a similar way.

4.6.2 Maturity

The maturity of a bond is an important factor affecting the yield on a bond. The relationship between the maturity of a bond and the yield is called the term structure of interest rates. This relationship can be graphically illustrated by the so-called yield curve. For example, if the yield curve slopes upwards to the right, it means that (for a specific type of bond) the longer the term to maturity, the higher the yield on bonds. This ascending slope of the yield curve reflects the liquidity premium. Investors may require a premium to convince them to invest in longer term bonds while issuers may be willing to pay this premium because the uncertainty concerned with the interest rates at which debt can be rolled over in future, is decreased. However, yield curves do not always have a normal (upward) slope. At times the slope may be falling, have a hump, or be flat. This indicates that there are also other factors, except liquidity, that affect the yield on bonds. These may include expectations and market forces.

4.6.3 Expectations

When interest rates are expected to increase, people will not be eager to buy long-term bonds, because they think that they might soon be able to buy these bonds at a higher rate (lower price). Those wishing to sell long-term bonds now will therefore have to offer a premium to convince investors to buy their long-term bonds now, causing an upward-sloping yield curve. Conversely, when interest rates are expected to fall, people will be unwilling to invest in short-term bonds and will prefer to buy long-term bonds. Those wishing to sell short-term bonds will therefore have to offer a premium, resulting in a downward-sloping yield curve.

An expectation of higher interest rates may also persuade floating rate bond owners to fix their interest rates via the swap market, which will, in turn, force market-makers in such instruments to sell fixed rate bonds as a hedge, resulting in an increased supply of such bonds and therefore a higher interest rate.

4.6.4 Market forces

These forces affect the prices of specific bonds. For example, when there is an increased demand for short-term bonds, the price of these bonds will increase and therefore the yield on them will decrease. Many factors may affect the demand for and supply of certain bonds. Some investors, such as short-term insurers, may prefer to invest only in short-term bonds while other may prefer longer term bonds. Whenever investors with such preferences are active in a specific market segment, they may affect the prices and yields in that market segment. Uncertainty concerning future interest rate movements may convince some investors to prefer short-term instruments and others to prefer long-term interest rates, once again affecting demand in those specific markets. Another interesting observation is that in recent years the number of new issues of government bonds in South Africa has decreased. This decrease in supply has, at times, contributed to the downward pressure on bond yields. The shortage of government bonds has given more scope for corporate debt issues.

4.6.5 Issuer

An important factor that affects the yield on bonds is the issuer, because this affects the risk associated with the bond. The higher the quality of the borrower or issuer, the lower the risk of default associated with the bond. Therefore, an investor can expect a lower risk premium or yield on that bond. Conversely, borrowers of lower credit-quality must pay investors a higher rate of interest to compensate for the additional risk they bear.

4.7 QUOTATION OF BONDS

Although virtually all bonds in South Africa are traded in terms of YTM and settled in price, there are financial centres (such as the USA and the UK) where bonds are traded in terms of price. The yield quotation, however, makes it much easier to compare interest rates on alternative investments in different markets.

Like money market securities, bonds are priced in terms of a bid / offer rate - a two way (double) price. A typical price quotation for a bond will be as follows:

Bid	–	Offer
11.50%	-	11.46%.

The bid or buying rate is 11.50% and the offer or selling rate is 11.45%. The difference between the bid and offer rate is 4 basis points. This is known as the spread. The mid rate is the yield between the bid and the offer yield, being 11.48% in the example. The reason the bid rate is higher than the offer rate is that the higher bid yield reflects a lower price and the lower offer yield reflects a higher price. The difference between a price maker and a price taker has also been explained in the study unit on money market securities. If a price taker calls a dealer for a price, the price taker will buy bonds from the dealer at the latter's *offer* yield. On the other hand, the price taker will sell bonds to the dealer at the latter's *bid* yield.

Note that one price maker's quote will virtually always differ slightly from another's at any particular moment. The reason for this is that different dealers might have different views and positions (long, short or square). The price taker will always sell bonds to the best bid yield (lowest bid) and buy bonds at the best offer yield (highest offer).

4.8 TRADING AND SETTLEMENT OF BONDS

The trading of bonds takes place between two counterparties - the buyer and the seller. The buyer of the bond has to compensate the seller by paying a price in monetary terms. Normally the seller of the bond has to provide the buyer with physical bond. Settlement therefore refers to the flow of physical bonds from the seller to the buyer and the money flow from the buyer to the seller. However, in contrast to the money market where securities trade OTC, virtually all bonds in South Africa are traded on a formal exchange, called the Bond Exchange of South Africa.

Bond Exchange of South Africa (BESA)

In June 1989 a majority of bond-trading firms in South Africa established a voluntary association. In May 1996 the South African regulatory authorities approved a licence for a new financial exchange, established to regulate the previously over-the-counter bond market in South Africa. This new exchange, known as the Bond Exchange of South Africa, is a self-regulatory body operating within the framework of the Financial Markets Control Act 1989 and a set of Rules and Directives approved by the Financial Services Board.

The objectives of the Bond Exchange are to

- set world-class standards in its self regulatory oversight of the South African bond market;
- provide at optimum cost a stable, secure and efficient environment for the listing, trading and settlement of debt securities and derivatives; and
- reduce the financial risks of trading through the exchange.

Although primarily a government bond market, BESA also lists rand denominated debt securities issued by local government, public enterprises and major corporates. Amongst its strategic initiatives for the future is the deepening (i.e. making it larger) of the corporate bond market and the establishment of a viable infrastructural and municipal debt market in South Africa. The members of the Exchange are the bond-trading institutions. Trading of listed bonds by member firms may take place on a 24-hour basis, Monday through to Friday. The open outcry-trading floor, originally situated in Johannesburg, was closed in late 1998 and trading now takes place on BESA's **Bond Automated Trading System (BATS)** or via telephone or inter-dealer screen. Investors can be sure that all transactions are executed in an open and competitive market.

To ensure a secure bond market, the Exchange pays close attention to investor protection. BESA has based its investor protection mechanisms on the principles of full and fair disclosure, the adherence to minimum standards and appropriate guarantees in the event of member default. All member firms must adhere to a prescribed code of conduct in respect of their bond trading and the advertising of services and there are minimum admission standards for memberships, which includes capital requirements and conditions pertaining to management and trading staff. BESA maintains a Guarantee Fund to ensure, as far as

possible, the performance of transactions entered into on the Exchange. The Fund provides members and clients with price-risk cover against a member default, to a maximum aggregate of R225 million. Thus if a member has sold bonds to a company that cannot honour the transaction, and those bonds have to be resold at a lower price, BESA's Guarantee Fund will cover the difference. Since inception, no settlement default or claims on the Fund have been recorded.

Relationship between BESA, the Clearing House and the Central Depository

- **The Clearing House**

The Universal Exchange Corporation Limited (**UNEXcor**) is the approved **clearing house** for the BESA. In this capacity, UNEXcor performs a number of functions; inter alia, matching of trades, confirmation and establishment of settlement positions.

When two members trade, each reports the trade independently to the BESA system. As the trades are reported and matched, UNEXcor immediately updates the settlement positions for each participant affected by the trade. All BESA members and settlement agents have on-line real time access to this information to see how settlement positions are built up as trades are matched. Each BESA member only has access to the trades reported by that Member. Each settlement agent only has access to those positions it is responsible for settling. This ensures confidentiality of information.

On settlement day, UNEXcor triggers settlement at the interbank level once the Settlement Agents have committed themselves to the process, with the South African Reserve Bank settling the funds and the **Central Script Depository** settling the "scrip". UNEXcor co-ordinates this settlement exercises on behalf of the BESA and ensures that the settlement is completed successfully.

The role of the Settlement Agents (SAs)

Recognised settlement agents (the major clearing banks) do settlement of "electronic" scrip and funds for participants in the bond market. Each BESA member has to appoint a SA and have at least one settlement account. Some participants, who may not wish to settle directly through a SA, may settle through a BESA member's client settlement account. Settlement accounts are recorded on the BESA system. When a member reports a trade, the member stipulates the SA through which the trade is to be settled.

After the BESA system matches trades, the settlement position is immediately updated. This information is available in real-time to both the member and the SA. On settlement day, the SA:

- Ensures that the client has sufficient scrip or funds to complete the settlement; and
- Commits itself irrevocably to the net settlement positions for both scrip and funds.

Irrevocable commitment is the guarantee to effect settlement at the client level. The Central Depository (CD) and South African Reserve Bank guarantee to effect the interbank settlement.

Once interbank settlement at CD and SARB is complete, UNEXcor advises the SAs and BESA, that settlement of committed position has taken place. At this stage the BESA deems settlement to have taken place and there is thus confirmed delivery versus payment.

- **The central securities depository**

As mentioned earlier in the section on the money market BESA utilises an effective and fully computerised custodial service for securities, known as the **Central Depository (CD)**, which was set up in 1992. It holds scrip in custody and facilitates transfer of ownership electronically within the depository system. It is independent of the BESA and is owned by the clearing banks. Virtually all the **listed bonds** in South Africa (government, semi-government and private sector) have already been immobilised in the CD.

The main functions of the CD are the following:

- Immobilisation of scrip
- Electronic netting of settlement of scrip
- Payment of interest and redemption via **settlement agents** of the CD, and
- Electronic pledging of scrip.

Settlement takes place electronically when the relevant scrip accounts of the **settlement agents** are debited and credited by the CD.

Role of the South African Reserve Bank

The SARB as the central bank, settles the funds balance flowing from electronic settlement. The SARB holds the clearing accounts of the appointed / recognised SAs through which settlement takes place.

4.9 SELF-ASSESSMENT

1. Calculate the accrued interest and clean price of the following bond that trades cum interest:

Principal:	R10 000 000
Coupon rate:	15%
Coupon payment dates:	30 June and 31 December
Register closing dates:	31 May and 30 November
Issue date:	1 July 2000
Maturity date:	30 June 2012
All-in-price	R103.102369%

The bond is traded for settlement on 15 July 2010 at a yield of 13.5%.

2. Calculate the accrued interest and clean price of the following bond that trades ex interest:

Principal:	R5 000 000
Coupon rate:	15%
Coupon payment dates:	30 June and 31 December
Register closing dates:	31 May and 30 November
Issue date:	1 July 2000

Maturity date:	30 June 2012
All-in-price	R97.761280%

Answers to self-assessment:

1. Since the bond settles after the 30 June interest date but before the registers closes on 30 November, it trades cum interest. The all-in price reflects the true present value of all the future cash flows of the bond. However, a portion of the first coupon has already accrued as interest to the seller of the bond. The number of days since the previous interest payment is 15.

$$\begin{aligned}
 \text{Accrued interest} &= \text{coupon rate p.a.} \times d/365 \\
 &= 0.15 \times 15/365 \\
 &= 0.00616438 \text{ or } R0.616438\%
 \end{aligned}$$

Since the transaction is cum interest, the accrued interest should be deducted from the all-in price to arrive at the clean price.

$$\begin{aligned}
 \text{Clean price} &= \text{all-in price} - \text{accrued interest} \\
 &= R103.102369 - R0.616438 \\
 &= R102.48593\%
 \end{aligned}$$

Because the all-in price which applies to every R100 of the nominal value of the bond is R103.102369%, the buyer of the bond has to pay a consideration of $R10\,000\,000 \times R103.102369 = R10\,310\,236.90$

2. Since the bond settles after the 31 May register closing date but before the coupon payment date on 30 June, it trades ex interest. The all-in price of R97.761280% reflects the true present value of all the future cash flows of the bond. However, the seller will receive all the interest, but the portion of the interest for the period from the settlement date to the coupon payment date accrues to the buyer. The number of days between the settlement date and the coupon payment date is 10.

Accrued interest = coupon rate p.a. x d/365

$$= 0.15 \times 10/365$$

$$= 0.00410959 \text{ or } R0.410959\%$$

Since the transaction is ex interest, the accrued interest which accrues to the buyer for the ten-day period should be added to the all-in price to arrive at the clean price.

Clean price = all-in price + accrued interest

$$= R97.761280\% + R0.410959\%$$

$$= R98.172239\%$$

Because the all-in price which applies to every R100 of the nominal value of the bond is R97.761280%, the buyer of the bond has to pay a consideration of $R5\,000\,000 \times R97.761280 = R4\,888\,064.00$

4.10 SUMMARY

Recap your understanding of this study unit by reading a recommended textbook:

Understanding South African Financial Markets edited by Van Zyl et al. (2008), Chapter 10 – The Bond Market.

STUDY UNIT 5

FOREIGN EXCHANGE TRADING



LEARNING OUTCOMES

On completion of the study unit you should be able to:

- Demonstrate an understanding of the different types of foreign exchange transactions
- Demonstrate an understanding of the nature and the participants in the foreign exchange market
- Demonstrate an understanding of how dealers quote exchange rates in the market
- Demonstrate an understanding of how dealers in the treasury department trade in the spot, forward and swap market
- Understand the role of treasury in the foreign exchange market
- Identify the factors affecting exchange rates

5.1 DEFINITIONS AND CONCEPTS

5.1.1 Foreign exchange

Foreign exchange can be defined as the legal tender or currency of other countries, other than local currency. The US dollar is classified as foreign exchange in South Africa, whereas the rand is classified as foreign exchange in America. In other words, different currencies are traded in the foreign exchange market at a certain conversion or exchange rate. International currencies have different values in terms of one another.

Foreign exchange and the exchange of one currency for another is a vital element of international trade and international trade finance. International currencies are traded in the foreign exchange market according to specific currency codes, known as *ISO 4217* codes

The following diagram illustrates the international ISO 4217 currency codes.

INTERNATIONAL ISO 4217 CURRENCY CODES

Currency	ISO codes and symbols
Australian dollar	AUD, A\$
American dollar	USD, \$
British pound (sterling)	GBP, STG, £
Japanese yen	JPY, ¥
Canadian dollar	CAD, CAN\$, C\$
Swiss franc	CHF, SWFR, SFR
Euro	EUR, €

Most of the actively traded international currencies also have associated symbols, such as the \$ (US dollar), € (Euro) and £ (British pound) symbol.

5.1.2 Foreign exchange market

There is no universally accepted or standardized definition related to the foreign exchange market. The following are some of these definitions:

- Market in which foreign currencies are bought and sold at exchange rates determined by the market.
- An informal network of banks' dealers, brokers, and other price takers buying and selling currencies on an over-the-counter (OTC) basis via phone or electronic trading network.

The foreign exchange market cannot be physically identified; it has no central location where trading takes place worldwide on a 24-hour basis. International currency trading starts in the morning in the Far East (i.e. Tokyo and Sydney) and then moves westwards to Hong Kong and Singapore. Trading in the Far East begins at about the time dealing activities close in San Francisco. As the Far East market closes, trading in the Middle East and Europe starts. Major New York banks also have an early shift to cater for the 5-6 hour time differential with Europe. By the time New York trading commences it is midday in Europe.

Foreign exchange and the foreign exchange market play an important role in the international trade finance process. When funds flow across borders for international payments, then conversions of currencies take place. For example, if a South African importer is invoiced in US dollars, then the latter must exchange rands (sell rands) for US dollars (buy dollars)

through an authorised dealer. A South African exporter, on the other hand, will have to convert US dollars to rands. Exchange rate movements could have an important impact on international trade finance and therefore importers and exporters need to be familiar with dealings in the foreign exchange market.

5.1.3 Exchange rate

An exchange rate is defined as the price (value) of the currency in terms of another currency. Therefore, if the exchange rate of the US dollar is R6, it means it costs R6 to buy one US dollar, or the alternatively, US \$0.167 to buy one Rand.

Exchange rates can be expressed in different terms. A distinction has to be made between nominal, effective and real effective exchange rates. Currencies could either be quoted on a direct or indirect quotation basis. If the quotation is on an indirect basis, it will be quoted as the price of one unit of the domestic currency in terms of a variable amount of a foreign currency. If a currency is directly quoted, the opposite applies.

The exchange rate that is quoted at any given moment is called the **nominal** exchange rate between two currencies. Foreign exchange rates on television and newspapers are represented as nominal spot rates. On 12 January 2009 the \$/R nominal rate was R9.9500 per US dollar at 11:50. This rate is not static-on 9 December 2004 it was R5.8540.

An **effective exchange rate** measures the external value of a currency against a basket of currencies (consisting of the currencies of a country's main trading partners). Each currency in the basket is assigned a specific weight according to its importance in the trade ratio. Effective exchange rates are calculated from a specific base year and the measurement is on an index basis. A **real effective exchange rate** measures the effective exchange rate in real terms - adjusting the effective exchange rate by the inflation differential between a country and its main trading partners. Real effective exchange rates are measured from a specific base year and could either be constant, falling or rising.

Real effective exchange rates are closely linked to the purchasing power parity theory (PPP) which states that currencies with higher inflation rates than those of their trading partners should depreciate over a period of time. The opposite situation should lead to an appreciation of the domestic currency.

When the rand's real effective exchange rate is constant, it indicates that the nominal effective value of the rand is depreciating at the same rate as the inflation rate differential between South Africa and its trading partners. When the rand's real effective exchange rate is improving, it indicates that the nominal effective value of the rand is depreciating at a slower rate than the inflation rate differential between South Africa and its trading partners. When the rand's real effective exchange rate is weakening, it indicates that the nominal effective value of the rand is depreciating at a faster rate than the inflation rate differential between South Africa and its trading partners. Falling real effective exchange rates therefore reflect an undervalued currency.

Market forces bring about an appreciation of a currency against another. A revaluation, on the contrary, is brought about by an official announcement by government and occurs only under fixed exchange rate systems. Both measures result in a stronger domestic currency, i.e. the rand moves from say R9.1500 to R9.1200 against the dollar.

Market forces bring about a depreciation of a currency against another currency. Devaluation, on the contrary, of a currency against another currency is brought about by an official announcement by government, and only occurs under a fixed exchange rate regime. Both measures result in a weakened domestic currency, i.e. the rand moves from R9.1500 to R9.1800 against the dollar.

5.1.4 Foreign exchange transactions

There are various transactions that take place in the foreign exchange market. The three most prominent transactions are:

- Spot
- Forward
- Swap

These transactions will be discussed in this study unit.

5.2 FACTORS INFLUENCING EXCHANGE RATES

There are numerous factors that could influence exchange rates at a particular moment in time; it should be remembered that exchange rates are relative, expressed as a comparison of the currencies of two countries.

An exchange rate will change whenever the value of either of the two currencies changes. A currency will tend to become more valuable (it will strengthen or appreciate against another or basket of currencies) whenever the demand for it is greater than the available supply; it will become less valuable when demand is less than supply. A currency will tend to lose value, relative to other currencies, if the level of inflation is relatively higher or if there is political uncertainty.

The type of exchange rate system has an important impact on the magnitude of exchange rate movements. As long as there are fixed exchange rates, rates could - barring a devaluation or revaluation - not go beyond the respective lower and upper intervention limits. Exchange rate volatility is less under fixed exchange rate regimes and reduces currency risk. Floating exchange rates, on the contrary, fluctuate with changing market conditions and pose more currency risks.

The supply of a foreign currency comes from exports and capital inflows. The demand for foreign exchange originates from the payment for imports and the outflow of funds from a country. A surplus on the overall **balance of payments** means that the supply of foreign exchange exceeds its demand, while a deficit reflects just the opposite. A surplus balance of payments position should strengthen the local currency against other currencies while a deficit should weaken the domestic currency.

Good **economic growth** prospects could induce foreign investors to invest in such a country rather than other non-performing economies. Such actions will cause an inflow of foreign capital, which should strengthen the domestic currency.

Interest rates, inflation and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact on inflation and currency values. Higher interest rates offer lenders in an economy a higher return relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise (to appreciate or strengthen). The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. The

opposite relationship exists for decreasing interest rates-that is, lower interest rates tend to lower (depreciate) the international exchange value of the domestic currency. When short-term interests are higher in one market than in another, investors could be motivated to shift funds say from New York to London if interest rates are higher in London. However, to convert currencies, an exchange rate exposure arises. But, if the exchange rate between the US dollar and pound is stable during the investment period, the investors will gain the interest rate differential by shifting funds from New York to London. If the pound appreciates against the US dollar during the investment period, investors will reap additional profits. However, if the pound depreciates, the investor will incur additional losses so that it may partially or more than offset the gain from higher interest rates in London.

To eliminate the exchange rate risk associated with funds flowing from low to high interest rate centres, investors could **cover/hedge** against the exchange loss by selling pounds in the forward £/\$ foreign exchange market. This practice is called *interest arbitrage*- linking the two national money markets and the forward £/\$ foreign exchange market.

High inflation could lead to a weakening of a currency compared to a low inflation country. For various reasons, however, exchange rates quite often either “overshoot” or “undershoot” the level indicated by inflation differentials. Purchasing power parity (*PPP*) is a theory that states that exchange rates between currencies are in equilibrium when their purchasing power is the same in both countries. However, if inflation in Country A rises more than inflation in Country B, then Country A’s exchange rate should depreciate against the currency of Country B in order to return to its PPP level.

The basis for PPP is the "law of one price". For example, a particular TV set that sells for R750 in South Africa should cost US\$500 in America if the exchange rate is US\$1 = R1.50. If the price of the TV in South Africa is R700, consumers in America would prefer buying the TV set in South Africa. If this arbitrage process is carried for a period of time, the US consumers buying South African TV sets will eventually result in a stronger rand, thus making South African TV sets more costly to Americans. This process will continue until the TV sets again have the same relative value in terms of dollars.

Exchange control regulations also impact on exchange rates

It must be borne in mind that market participants not only act on the basis of known facts and figures - they also incorporate expectations. Countries could engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, countries with large public deficits and debts are less attractive to foreign investors. A large sovereign debt position (the IMF sees a level in excess of 3% of GDP as large) could spill over into higher inflation, and if inflation is high, then, in the future, the debt will be serviced and ultimately paid off with a cheaper real local currency.

5.3 PARTICIPANTS IN THE FOREIGN EXCHANGE MARKET

A market maker is essential for the smooth functioning of any market by quoting a two-way price, namely a bid and offer (ask) price for foreign exchange. The dealers in a bank's dealing room are market makers in foreign exchange, quoting such prices to corporate clients, dealers from other banks (inter-bank market) and brokers. Therefore, dealers "make" a market by quoting bid/offer prices for different currencies.

The role of a central bank in the foreign exchange market primarily centres round **intervention**; the purchase/sale of foreign exchange to influence the exchange rate of the domestic currency, actions to smooth out undue exchange rate movements or to provide liquidity to the market. Central banks are not involved in the day-to-day functioning of the foreign exchange market by quoting prices.

Central banks would have to decide on how the local money market liquidity position will be affected by its intervention operation. In such, intervention can either be sterilised or non-sterilised. A non-sterilised intervention campaign will accept the given money market impact of the foreign exchange market interventions. Sterilised intervention, on the contrary, neutralises the money market impact of foreign exchange interventions.

Large multi-national companies with international branch and subsidiary networks have large foreign exchange exposures. Corporate companies mainly consist of importers and exporters. Importers are usually buyers of foreign exchange, whereas exporters supply foreign exchange to the domestic market. When domestic import contracts are invoiced in foreign currencies, importers need to take precautionary hedging transactions in the foreign exchange market against a possible depreciation of the domestic currency. Exporters, if their receivables are

invoiced in a foreign currency, need to protect themselves against a possible appreciation of the domestic currency.

Foreign exchange brokers service the currency needs of price makers. The brokers' role is to get the best rates for their banking in the spot, forward and swap foreign exchange markets. Foreign exchange brokers need access to a comprehensive information service, which provides real-time (“live” and immediate) exchange rates to their clients. Foreign exchange brokers perform an important role in the foreign exchange market by getting competitive rates from market makers willing to trade and then to match inter-bank buying and selling orders. Brokers therefore fulfil a very important function in the inter-bank market, bringing buyers and sellers together without market makers having to call other banks until they find a suitable price. Brokers are paid a **commission** to bring buyers and sellers together.

Speculation is essential in that it provides liquidity in the foreign exchange market. If the speculator correctly predicts (in other words, his view is correct) the market, a profit will be made. Market makers also act as speculators when trading positions are created for their own account.

Foreign exchange arbitrage refers to the purchasing of a foreign currency in a centre where its price is low and selling it where the price is high. Arbitrage operations in different markets have become less prominent due to the progress made with price dissemination dealing systems. Interest arbitrage refers to the transfer of funds from one monetary centre and currency to another to take advantage of higher interest rates.

5.4 CURRENCY QUOTATIONS

The term **quoted currency** can be interpreted as the currency that is variable in an exchange rate quotation. The term **base currency** reflects the currency that is fixed. If $£1 = \$1.9000$, sterling is the base currency and the US dollar the quoted or variable currency. If $\$1 = R 9.8000$, then the US dollar is the base currency and the rand the quoted currency.

In the foreign exchange market, currency trading is always done in **currency pairs**, such as EUR/USD or USD/JPY. Accordingly, all trades result in the simultaneous buying of one currency and the selling of another. The base currency is the “basis” for the buyer or the seller.

Whenever a foreign exchange dealer (price maker) is asked for a foreign exchange quotation, the dealer will not only quote one rate, but two. The first rate quoted is the price at which the dealer is prepared to buy the foreign currency – the **bid rate**. The second price quoted is the price at which the dealer is prepared to sell the foreign currency – the **offer rate**. The participants in the international foreign exchange market normally quote a two-way price (i.e. \$1 = R 9.8000-90). This converted (direct) way of writing the rate shows that the bank will buy dollars (sell rand) at R 9.8000 and sell dollars (buy rand) at R 9.8090. The lower rate is the buying rate (bid) and the higher rate the selling (offer) rate for the base currency (US dollars).

When trading, dealers do not quote the full spot or forward rate- only the third and fourth decimals (00 and 90). The **mid-rate** in the \$/R exchange quotation is R 9.8045 (R 9.8090-R 9.8000) resembling the mid-point between the bid and offer rate.

The difference between the buying and selling rate is called the **spread**. In the above example it is R0.0090, being 90 points. The lower the spread is, the lower the profit margin of the market maker. In the quotation of 1\$ = R 9.8000-90, 9.80 is known as the **big figure**. No reference is made to the big figure in the price making procedure between the price maker and the price taker, because it should be a known variable.

The conventional quotation needs explaining when the 'big figure' is **straddled**. Assume a buying rate of R 5.9995 for dollars and a selling rate of R6.0010. The big figure is straddled around 6. Normal market convention is to write this quotation as 5.9995/10. The big figure on the left is R5.99; on the right it is the next 'figure' up, R6.00.

There are no written rules about the size of foreign exchange trading amounts, but there is a norm among large international banks that prices are good for up to US\$5 million. If a price taker needs a foreign exchange price for a larger amount, the amount should be mentioned to the price maker because it could have an important influence on the price that is made. If a price taker only wants to enquire about a price level, he should mention it to the price maker. On the other hand, if he intends to deal, a firm price should be asked for.

5.5 CROSS RATES

A cross rate is defined as an exchange rate that is calculated from two currencies, using the

dollar as the link. For example, the R/ CHF exchange rate can be derived from the prevailing US\$/R and US\$/ CHF exchange rates.

Given:

$$\text{US\$1} = \text{CHF 1.1900}$$

$$\text{US\$1} = \text{R 5.8720}$$

Therefore:

$$\text{R5.8720} = \text{CHF 1.1900 (because both currencies is equal to 1\$)}$$

$$\text{R1} = \text{R1} \times \text{CHF1.1900} / \text{R 5.8720} = \text{CHF 0.2030}$$

$$\text{1 CHF} = \text{R 4.9260 (1/ 0.2030)}$$

5.6 SPOT FX TRANSACTIONS

A spot foreign exchange transaction is one where settlement takes place two working days after the day of initiation (**T+2**, where T represents the transaction date and 2 refers to the working days after T). A working day is defined as one in which both the clearing banks are open for business in both settlement centres. Consider a normal business week without holidays in Europe, South Africa and America. On Monday, the spot value date would be Wednesday, on Tuesday it would be Thursday, on Wednesday it would be Friday and on Friday it would be Tuesday. Whenever there are ineligible days, such as weekends, the normal market practice is to go forward to the next eligible business day.

The foreign exchange and money market business is of a global nature and as such it must overcome time differences of up to 12 hours. Therefore a standard spot value date of either the same day (T) or the following day (T+1) would not be practical. In addition, time must be allowed to properly process all the administrative procedures by both confirming parties. Banks executing the transfer of funds must be allowed to check important details defining the nature of cash flows.

Public holidays and weekends could result in a spot transaction being longer than T+2, i.e. T+4. If a FX transaction is done on a Wednesday (T), then T+ 2 will be Friday. If Friday is a holiday in one or both of the trading centres, then it becomes T+3, the Monday (remember Saturday and Sunday not eligible). The T+2 enable settlement and confirmations to take place

after T. Assume that Wednesday is a holiday in South Africa. All international money market transactions in rand on Monday would therefore be for value Thursday. Likewise, exchange transactions for US dollars against the rand would be for value Thursday. However, foreign exchange transactions for US dollars against European currencies on Monday would be for value Wednesday. The fact that financial institutions in South Africa are not open for business on Wednesday does not interfere with the settlement of US dollars and European currencies on that day.

It is also possible, though exceptional, to conclude foreign exchange transactions for settlement one business day after the conclusion of the deal (or even sometimes value the same day- on T). These transactions are not made at quoted spot rates, but at slightly different rates depending on the interest rates for the currencies concerned.

Example of a spot transaction:

Bank A (price maker) quotes US\$1 = R 5.8000 / 90 spot (T+2) to Bank B on Monday 6 December 2010. Bank B (price taker) replies: "At 90 I buy US\$3 million".

Before completing (either by hand or electronically) the dealing ticket, the dealer will say to his colleagues - We sell \$3 million against the rand at 90. The rest of the dealing team takes note that there could be buying of dollars going on in the market. They will therefore adjust the rate up, to say US\$1= R 5.8050 / R 5.8140. This adjustment is called **framing** the rate.

This transaction implies that the Bank A sold US\$3 million and bought R 17 427 000 (3million X 5.8090) for settlement at spot.

The following information will be recorded by Bank A after the conclusion of the transaction:

- Name counterparty = Bank B
- Transaction or dealing date = Monday (T)
- Settlement or value date = Wednesday (T+2)
- Currency sold = US\$ 3 million
- Currency bought = R 17 427 000

- Exchange rate = US\$1 = R 5.8090
- Settlement instructions = Account where rand must be paid in and account where dollars must be paid to Bank B.

The back office completes the following:

- Recording of the transaction in the books.
- Confirm transaction details with Bank B's back office.
- After confirmation from Bank B is received, and all elements of the transaction is verified, accounts are affected.

Foreign exchange dealers create FX positions by buying or selling currencies. When Currency A is bought, a long (indicated by a + sign) is created. By buying Currency A, Currency B is sold (short position created indicated by a – sign). There are three types of foreign exchange positions that could emerge during the course of a trading day:

- Square position: Purchases = Sales
- Long position: Purchases > Sales
- Short position: Purchases < Sales

5.7 FORWARD FX TRANSACTIONS

A forward foreign exchange contract is an agreement between two parties to exchange one currency for another currency at some future date at a pre-determined rate. The rate at which the exchange takes place, the value date and the amounts involved are determined at the time of the agreement; no money flows takes place until the settlement date.

It is important to note that forward rates are neither intended nor designed to forecast future exchange rates. Forward foreign exchange rates are calculated based on a specific formula, which is simply the spot rate plus a cost of carry. The calculation of forward foreign exchange rates is primarily based on an interest rate parity theory.

The forward price for a currency could be identical to the spot exchange rate. However, the forward price is usually either higher (premium) or lower (discount) than the spot price;

interest rate differentials determine the margin between spot and forward prices. Although forward rate calculations incorporate the spot rate, it ultimately is a function of the interest rate differential between the two currencies. This implies that the forward **premium or discount** (of the base currency) will approximate or equal the interest rate differential that would be earned on deposits over the period in the respective money markets. If domestic interest rates are higher than that of the foreign currency, the domestic currency trades at a forward discount. On the other hand, if domestic interest rates are lower, the domestic currency will trade at a forward premium.

Forward prices are quoted in terms of **points** reflecting the interest rate differential between two currencies. Each point is equal to 1/10 000 of 1%. Interest rate differentials determine the margin between spot and forward prices.

The addition or subtraction of the forward points is determined by the order of the bid and offer points quoted by market makers. A forward foreign exchange dealer can readily determine whether a currency is traded at a forward premium or discount by merely looking at how the bid and offer prices are quoted. If the forward bid points are lower than the forward offer points, then the foreign currency is traded at a premium. If the forward bid points are higher than the offer points, then the foreign currency is at a discount and the domestic currency at a premium.

Currencies earning a higher rate of interest are traded at a forward rate below the spot rate (discount) whereas currencies with lower interest rates are traded at a premium. The forward price of the lower interest currency is always above the spot rate (premium).

Foreign exchange traders are continuously alert to forward exchange rates edging out of line with corresponding interest rate differentials, in order to profit from arbitrage opportunities. Trading activity that results from arbitrage opportunities forces forward rates and interest rate differentials into line.

The following formula illustrates how the forward exchange rate between the dollar and the rand is determined:

$$FP = \left[\frac{1+(i_{SA} /100) \times (T /365)}{1+(i_{USA} /100) \times (T /360)} - 1 \right] \times SR$$

Where	FP =	Forward points
	SR =	Spot rate
	i _{SA} =	Interest rate in South Africa for period T
	i _{US} =	Interest rate in America for period T
	T =	Period
	365=	Day convention for rands
	360=	Day convention for dollars

The formula to determine the forward points between the rand and the dollar shows that rand interest rates are divided by dollar interest rates indicating that rand interest rates are higher than dollar interest rates. The formula's answer is in terms of points and should be added to the spot US\$/R spot rate to determine the forward US\$/R outright forward rate.

International deposit business is based on a 365:360-day year. This implies the exact number of days divided by 360. Most currencies use a 360-day year for forward rate calculations. The exception is sterling and rand, which is based on a 365:365-day year.

Assume the spot US\$/R exchange rate is US\$1 = R6.5020 – R6.5220 and the three months forward points are US\$1 = R0.0600 - R0.0750. To calculate the three-month outright forward bid rate, the bid forward points must be added to the bid spot rate. To calculate the three-month outright forward offer rate, the offer forward points must be added to the offer spot rate. Therefore, the forward rate is: US\$1 = R6.5620 /6.5970

To hedge or cover a foreign exchange position against a possible adverse exchange rate movement involves a cost. If a South African exporter anticipates a weaker dollar (stronger rand), he could sell dollars forward against the domestic currency. Such a hedging action results in a cost or income and can be determined as a percentage.

5.8 SWAP FX TRANSACTIONS

A swap transaction is a single contract involving two transactions negotiated today between two parties. One transaction is an exchange of currencies on a spot basis, whereas the other is a forward transaction. The second transaction is a reverse of the same currencies on some specified future date, at an agreed swap rate. A foreign exchange swap can be regarded as being composed of two transactions with the same amounts, with different value dates and in different ways.

Therefore, a foreign exchange swap has a value date ahead and another behind and two agreed exchange rates. In the foreign exchange swap, the customer and the Bank convert a currency into another as per agreed exchange rate and make settlement of funds on the first value date and in accordance with another agreed rate convert the two currencies in opposite directions and make settlement of funds on the second value date.

There are two types of foreign exchange swap deals:

- The simultaneous spot purchase (B = BUY) of currency A (spot sale of currency B) and the forward sale (S = SALE) of the same amount of currency A (forward purchase of currency B) at an agreed spot and forward foreign exchange rate.

B+S Currency A = Borrowing A

S+B Currency B = Investing B

- The simultaneous spot sale of currency A (spot purchase of currency B) and the forward purchase of the same amount of currency A (forward sale of currency B) at an agreed spot and forward price.

S+B Currency A = Investing A

B+S Currency B = Borrowing B

Forward outright transactions are normally not dealt in the inter-bank foreign exchange market. Market makers therefore do not deal with one another on a forward outright basis; such transactions are normally dealt between the bank and a client. For this reason, forward outright transactions are on a full rate basis (spot + or - pips). Swap prices are quoted as bid and offer prices.

5.9 SELF-ASSESSMENT

1. Assume that a U.S. bank's bid price for Canadian dollars is \$0.7938 while its offer price is \$0.81. What is the bid/offer percentage spread?
2. An importer of computers into South Africa wants to take forward cover for his dollar payments to his US suppliers in 91 days, since he will need to pay rands for these dollars. Dollar interest rates for this period are 3 % and rand rates are 7%. The current spot rate for USD/ZAR imports is 6.6500 and the forward margin for 91 days is quoted to him at 700 points. These points are positive, and thus he will have to pay 6.6500 + 700 points to fix a rate for his forward purchase of dollars = 6.7200, i.e. a higher price. Is this fair?

Answers to self assessment

1. Bid/offer percentage spread = $(\$0.81 - \$0.7938)/\$0.81 = 0.02$ or 2%
2. Forward rate =
$$\frac{6.6500 \times 1 + 0.07 \times 91/365}{1 + 0.03 \times 91/365}$$
$$= 6.7158 = 6.7200 \text{ (to nearest 2 decimal points)}$$

So the price is fair.

5.10 SUMMARY

Your understanding of this study unit should be reviewed against your ability to perform various exchange rate calculations in addition to grasping the concepts. These include the ability to calculate the real exchange rates, direct and indirect quotations, cross rates, forward rates and swap points. Furthermore, you should be able to use this information in determining forward exchange contracts and currency swaps.

Recap your understanding of this study unit by reading a recommended textbook:

Understanding South African Financial Markets edited by Van Zyl et al. (2008), Chapter 12 – The Foreign Exchange Market.

TOPIC 3: ASSET-LIABILITY MANAGEMENT TECHNIQUES

3.1 AIM OF THE TOPIC

This topic introduces you to the collection of managerial techniques known as asset-liability management that provides financial institutions with defensive weapons to handle business cycles and seasonal pressures. They also provide offensive weapons to shape portfolios of assets and liabilities in ways that promote the institution's goals.

3.2 CONTENTS OF THE TOPIC

Study Unit 6: Duration Gap Management

Study Unit 7: Using Derivatives in Asset-Liability Management

STUDY UNIT 6

DURATION GAP MANAGEMENT



LEARNING OUTCOMES

On completion of the study unit you should be able to:

- Understand techniques for hedging against interest rate changes
- Understand the concept of duration as a risk management tool
- Utilise duration for hedging against interest rate risk
- Understand the limitations of duration gap management

6.1 OVERVIEW OF THE UNIT

This study unit is a continuation of study unit 4 on interest rate management you did in the second level module BAN2602. You will recall that in that study unit your objectives were to be able to answer the following questions:

- What are asset-liability management strategies?
- Why interest rate risk is one of the greatest asset-liability management challenges?
- What are the goals of interest rate hedging?
- What is gap management?
- How to use gap management to hedge against interest rate risk?

You need to revise study unit 4 of BAN2602 before proceeding with this unit. This study unit introduces you to the concept of duration gap management.



You are required to read sections 7.4, 7.5, 7.6 and 7.7 of chapter 7 of your prescribed textbook and perform the following activities.

6.2 ACTIVITIES

6.2.1 Multiple Choice Questions Quiz

Attempt questions in the internet resources (student edition) for chapter 7.

6.2.2 Internet Excel Exercises

Perform excel exercises provided in the internet resources.

6.2.3 Internet Exercises

Perform internet exercises provided in chapter 7 of the prescribed textbook.



The internet provides solutions to the questions which you have attempted.

6.3 SELF-ASSESSMENT

1. Explain the concept of gap management.
2. When is a financial firm asset sensitive? Liability sensitive?
3. Suppose Carroll Bank and Trust reports interest-sensitive assets of R570 million and interest-sensitive liabilities of R685 million. What is the bank's rand interest-sensitive gap? What is its relative interest-sensitive gap and interest-sensitivity ratio?
4. What is duration?
5. What are the advantages of using duration as an asset-liability management tool as opposed to interest-sensitive gap analysis?
6. What are the principal limitations of duration gap analysis? Can you think of some way of reducing the impact of these limitations?
7. Suppose that a thrift institution has average asset duration of 2.5 years and average liability duration of 3.0 years. If the thrift holds total assets of R560 million and

total liabilities of R467 million, does it have a significant leverage-adjusted duration gap? If interest rates rise, what will happen to the value of its net worth?

Answers to assessment questions:

1. Gap management requires the management to perform analysis of the maturities and repricing opportunities associated with interest-bearing assets and with interest-bearing liabilities. When more assets are subject to repricing or will reach maturity in a given period than liabilities or vice versa, the bank has a GAP between assets and liabilities and is exposed to loss from adverse interest-rate movements based on the gap's size and direction.

2. A financial firm is asset sensitive when it has more interest-rate sensitive assets maturing or subject to repricing during a specific time period than rate-sensitive liabilities. A liability sensitive position, in contrast, would find the financial institution having more interest-rate sensitive deposits and other liabilities than rate-sensitive assets for a particular planning period.

3. Rand Interest-Sensitive Gap = Interest-Sensitive Assets – Interest Sensitive Liabilities

$$= R570 - R685 = -R115$$

$$\text{Relative Gap} = \frac{\text{R IS Gap}}{\text{Bank Size}} = \frac{-R115}{R570} = -0.2018 \text{ or } -20.18 \text{ percent}$$

$$\text{Interest-Sensitivity Ratio} = \frac{\text{Interest-Sensitive Assets}}{\text{Interest-Sensitive Liabilities}} = \frac{R570}{R685} = 0.8321$$

4. Duration is a value- and time-weighted measure of maturity that considers the timing of all cash inflows from earning assets and all cash outflows associated with liabilities. Duration measures the average time needed to recover the funds committed to an investment. It is a direct measure of price risk.

5. Interest-sensitive gap only looks at the impact of changes in interest rates on the bank's net income. It does not take into account the effect of interest rate changes on

the market value of the bank's equity capital position. In addition, duration provides a single number which tells the bank their overall exposure to interest rate risk.

6. There are several limitations with duration gap analysis. It is often difficult to find assets and liabilities of the same duration to fit into the financial-service institution's portfolio. In addition, some accounts such as deposits and others don't have well defined patterns of cash flows which make it difficult to calculate duration for these accounts.

Duration is also affected by prepayments by customers as well as default. Duration gap models assume that a linear relationship exists between the market values (prices) of assets and liabilities and interest rates, which is not strictly true. Finally, duration analysis works best when interest rate changes are small and short and long term interest rates change by the same amount. If this is not true, duration analysis is not as accurate.

$$\begin{aligned}
 7. \text{ Duration Gap} &= D_A - D_L * \frac{\text{Liabilities}}{\text{Assets}} = 2.5 \text{ yrs.} - 3.0 \text{ yrs.} \left(\frac{\text{R467 million}}{\text{R560 million}} \right) \\
 &= 2.5 \text{ years} - 2.5018 \text{ years} \\
 &= -0.0018 \text{ years}
 \end{aligned}$$

This bank has a very slight negative duration gap; so small in fact that we could consider it insignificant. If interest rates rise, the bank's liabilities will fall slightly more in value than its assets, resulting in a small increase in net worth.

6.4 SUMMARY

Recap your understanding of the study unit by reading the Summary at the end of Chapter 7 of the prescribed text book.

STUDY UNIT 7

USING DERIVATIVES IN ASSET-LIABILITY MANAGEMENT



LEARNING OUTCOMES

On completion of the study unit you should be able to:

- Understand the use of derivative contracts in asset-liability management
- Utilise financial futures contracts, interest-rate options, and interest-rate swaps in managing interest rate risk
- Utilise interest-rate caps, interest-rate floors and interest-rate collars in managing interest rate risk
- Understand regulations and accounting rules for bank futures and options trading

7.1 OVERVIEW OF THE UNIT

The tools of asset-liability management you have so far learned are designed principally to control the threat of significant losses due to unexpected changes in the interest rates in financial markets. This study unit explores some widely used weapons for dealing with a financial institution's exposure to interest rate risk, viz: financial futures contracts, interest-rate options, interest-rate swaps, and the use of interest-rate caps, collars and floors.



You are required to study chapter 8 of your prescribed textbook and perform the following activities.

7.2 ACTIVITIES

7.2.1 Multiple Choice Questions Quiz

Attempt questions in the internet resources (student edition) for chapter 7.

7.2.2 Internet Excel Exercises

Perform excel exercises provided in the internet resources.

7.2.3 Internet Exercises

Perform internet exercises provided in chapter 7 of the prescribed textbook.



The internet provides solutions to the questions which you have attempted.

7.3 SELF-ASSESSMENT

1. A futures contract on Eurodollar deposit is currently selling at an interest yield of 4 percent, while yields on 3-month Eurodollar deposits currently stand at 4.60 percent. What is the basis for the Eurodollar futures contracts?
2. Suppose a bank wishes to sell R150 million in new deposits next month. Interest rates today on comparable deposits stand at 8 percent, but are expected to rise to 8.25 percent next month. Concerned about the possible rise in borrowing costs, management wishes to use a futures contract. What type of contract would you recommend? If the bank does not cover the interest rate risk involved, how much in lost potential profits could the bank experience?
3. What kind of futures hedge would be appropriate in each of the following situations?
 - a. A financial firm fears that rising deposit interest rates will result in losses on fixed-rate loans?
 - b. A financial firm holds a large block of floating-rate loans and market interest rates are falling?
 - c. A projected rise in market rates of interest threatens the value of a firm's bond portfolio?

4. How can financial-service providers make use of interest rate caps, floors, and collars to generate revenue and help manage interest rate risk?

5. Suppose a bank enters into an agreement to make a R10 million, three-year floating-rate loan to one of its best corporate customers at an initial rate of 8 percent. The bank and its customer agree to a cap and a floor arrangement in which the customer reimburses the bank if the floating loan rate drops below 6 percent and the bank reimburses the customers if the floating loan rate rises above 10 percent. Suppose that, at the beginning of the loan's second year, the floating loan rate drops to 5 percent for a year and then, at the beginning of the third year, the loan rate increases to 12 percent for the year. What rebates must be paid by each party to the agreement?

Answers to assessment questions:

1. The basis for the Eurodollar future contracts is currently 4.60% – 4% or 60 basis points.

2. At an interest rate of 8 percent:

$$R150 \text{ million} \times 0.08 \times \frac{30}{360} = R1 \text{ million}$$

At an interest rate of 8.25 percent:

$$R150 \text{ million} \times 0.0825 \times \frac{30}{360} = R1.0313 \text{ million}$$

The potential loss in profit without using futures is R0.0313 million or R31.3 thousand. In this case the bank should use a short hedge.

3.
 - a. The rising deposit interest rates could be offset with a short hedge in futures contracts (for example, using Eurodollar deposit futures).

 - b. Falling interest yields on floating-rate loans could be at least partially offset by a long hedge in Treasury bonds.

- c. The firm's bond portfolio could be protected through appropriate short hedges using Treasury bond and note futures contracts.
4. Banks and other financial institutions can generate revenue by charging up-front fees for interest rate caps on loans and interest rate floors on securities. In addition, a positive net premium on interest rate collars will add to a bank's fee income. Caps, floors, and collars help manage interest rate risk by setting maximum and minimum interest rates on loans and securities. They allow the lender and borrower to share interest rate risk.
5. The rebate owed by the bank for the third year must be:
 $(12\% - 10\%) \times R10 \text{ million} = R200 \text{ 000}$.

The rebate that must be forwarded to the bank for the second year must be:
 $(6\% - 5\%) \times R10 \text{ million} = R100 \text{ 000}$.

7.4 SUMMARY

Recap your understanding of the study unit by reading the Summary at the end of Chapter 8 of the prescribed text book.

TOPIC 4: CENTRAL BANK LIQUIDITY MANAGEMENT

4.1 AIM OF THE TOPIC

This topic introduces you to some treasury activities carried out by the central bank. These activities are discussed with reference to the South African Reserve Bank (SARB).

4.2 CONTENTS OF THE TOPIC

Study Unit 8: Gold Trading

Study Unit 9: Intervention in Foreign Exchange Markets

Study Unit 10: Managing International Liquidity and Foreign Reserves

STUDY UNIT 8

GOLD TRADING



LEARNING OUTCOMES

By the end of the study unit you should be able to:

- Understand the fundamental nature of the gold exchange market
- Understand how spot and forward gold prices are determined
- Evaluate the different gold trading instruments

8.1 HISTORICAL PERSPECTIVE

Gold played an important role in the development of the international monetary system over the years. However, changes in the international monetary system have fundamentally altered the role of gold in the system. The monetary role of gold and its pivotal position in the international monetary system came about partly because of its scarcity over the long run, and its ability to maintain purchasing power in terms of other commodities.

From time to time countries have undertaken major reorientations of their exchange rate systems. Four main exchange rate systems have existed since the 1870s, namely the Gold Standard (1870-1914), Gold Exchange Standard (1925-31), Bretton Woods Standard (1945-1971) and a more floating exchange rate regime since then.

Gold performed an important role during the period 1870-1971 as a commodity and monetary unit, fulfilling a monetary role. The contemporary position is that the monetary role of gold has been reduced and that fiat money (legal tender in different countries, i.e. US dollar in America and ZAR (Rand) in South Africa) is used.

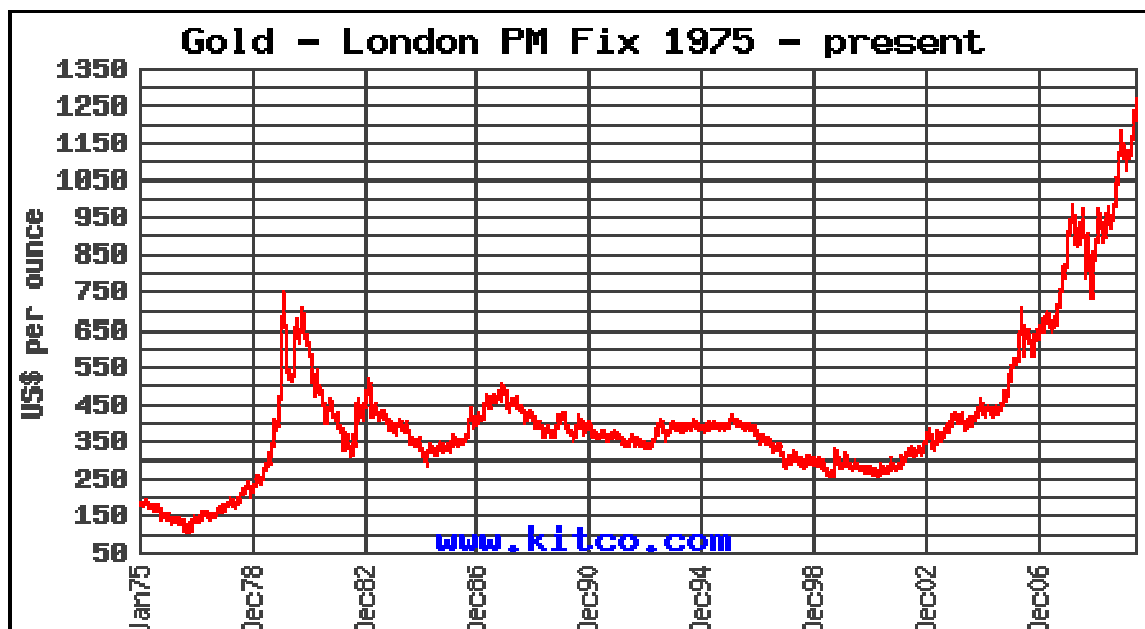
8.2 GOLD'S MONETARY AND COMMODITY FEATURES

Gold has a unique combination of physical and chemical features which have made it a coveted object for various applications and uses. Gold is chemically inert and indestructible,

which explains why its radiance is forever. Gold is immune to the effects of weather, water and oxygen.

Gold is classified as a precious metal. Precious metals are those metals which on account of their low affinity to oxygen remain unchanged in moist air. There are various precious metals, with gold and silver being classified as ancient precious metals. The other precious metals consist of platinum, palladium, rhodium, iridium, osmium and ruthenium.

For many years before 1934 the value or price of gold was fixed at US\$20.67/ ounce. Since 1934 the gold price was fixed by law at US\$35/ ounce. On March 17, 1968, because of a gold crisis, a two-tier pricing system was established whereby gold was still used to settle international accounts at the fixed price of US\$35/ounce price while the price of gold on the private market started to react to market conditions and was therefore allowed to fluctuate. Since 1968, the price of gold on the free market has fluctuated widely, reaching a high during January 1980. Since 2006 the gold price reached new peaks and has since then continued to increase, reaching \$1 200/oz in June 2010. See graph below.



Source: http://www.kitco.com/scripts/hist_charts/yearly_graphs.plx

The price of gold is expressed in terms of mostly the US dollar, but its price could also be expressed in different currencies by taking the US dollar/foreign currency exchange rate into

consideration. For example, the ZAR gold price is derived by multiplying the US dollar gold price with the US dollar/ZAR exchange rate.

Because of gold's versatility, it can be used in many applications, creating a demand for it. The demand for gold originates from mostly jewellery, dentistry, manufacturing and investment.

8.3 THE GOLD MARKET

Central banks use the gold market to mobilise their reserves. The gold market cannot be identified with a particular place. It is a linked market between different financial centres where gold is traded continuously between market participants. Gold can be traded on a 24-hour basis between different financial centres. There are various market participants which have an interest in the gold market. The producers (mines and mining companies) need to sell their gold to other users such as manufacturing jewellers and private investors (bar hoarding or EFT instruments). Furthermore, market makers make a market in gold by quoting two-way prices according to specific specifications, fineness and weights.

There are various gold trading markets in the world. The London market has the honour of being the oldest gold market in the world and the one with the richest traditions. The London market has close links with the Bank of England where most international gold trading banks and bullion houses have settlement accounts. Most gold trading banks have physical gold, in 12.5 kg gold bars with a purity of 995, stored at the Bank of England. There are also other important gold markets such as the Zurich, Hong Kong and New York.

8.4 GOLD TRADING

8.4.1 Gold trading unit

The traditional trading unit for gold is the fine *troy ounce*. The term troy ounce is derived from the French town of Troyes where this unit was first used during the medieval times. For trading purposes it is important to know that 1 troy ounce is equal to 31.1034768 grams (or 31 000 ounces equal 1 ton).

8.4.2 Gold fineness

Fineness is a measure of the proportion or content of gold in a gold object, such as a gold bar or a gold coin. It therefore defines the *purity* of a gold object. *Assaying* is the process by

which the fineness of a gold object is determined. The gold fineness in different gold objects is expressed in different terms. For example, the fineness of gold jewellery is expressed in terms of *carats*. The carat scale ranges from 1 to 24 so that an 8-carat jewellery item represents 750 particles of fine gold out of 1000. It is therefore not 100% pure gold.

8.4.3 Good delivery gold bars

For a traded gold bar to qualify as a London *Good Delivery bar* it must have a minimum fineness of 995.0 and a gold content of between 350 and 430 fine ounces.

8.4.4 Currency units

The price of gold is generally quoted in terms of US dollars per ounce. Quotations in other currencies are also available. To convert a US dollar price of say \$630/oz to a rand equivalent, the latter has to be multiplied with the US\$/R exchange rate. If the US\$/R is 6, 8900, then the rand gold price is R 4 340.70/oz.

8.4.5 Settlement and delivery of gold

When gold trading transactions are concluded, the two parties have to inform each other of the settlement location. If gold is settled in London (at the Bank of England), then it is a *loco London* transaction. If the gold has to be settled in Frankfurt, then it will be a loco Frankfurt deal.

Loco therefore refers to the location where the gold is physically held and settled. The basis for settlement of the loco London quotation is delivery of a standard London Good Delivery bar at the London vault nominated by the dealer selling gold.

Gold can be moved to destinations around the world at prices inclusive of transportation and insurance cost. The loco London and loco Frankfurt prices will therefore be different. Prices related to other gold centres may be at a discount or premium to the loco London price - reflecting demand and supply dynamics.

The large gold trading banks have *allocated gold accounts* for each of their customers specifying the gold according to name, weight and bar codes. The client has full title to the gold. The bank is only the custodian. To avoid any doubt, gold in an allocated account is not part of the custodian bank's inventory and the cost of insurance is for the client's account.

Clients' holdings will be identified in a *weight list* of bars showing the unique bar number, weight and the assay or fineness of each bar. If the client sells gold bars, it will be removed from the client's account and transferred to the buyer's account, which might be elsewhere. An allocated account cannot be overdrawn.

Unallocated or metal accounts involve monetary entries in the form of credits and debits, without physical gold movements. The simplicity of an unallocated account arrangement is reflected in the fact that transactions may be settled without any physical transfers of gold. For example, if customer A, who has an unallocated gold account with Bank X, buys 1 ounce of gold from Bank X at a price of \$600/oz, the account of the customer will be debited by \$600. If the client now decides to sell 1 ounce of gold at a price of \$620/oz, the account will be credited by the Bank to the value of \$610. The balance (\$10) represents the indebtedness between the two parties. A credit balance on the account does not entitle the customer of Bank X to any specified gold bars, but are only backed by the gold stock of Bank X. The client in this scenario is an unsecured creditor of Bank X.

8.5 THE GOLD SPOT MARKET

When one party enters into a spot transaction with another party, it implies that the payment for and delivery of gold takes place on the second business day after the conclusion of the transaction ($T+2$, where T represents the transaction date). If gold is bought on, say, Monday, it implies that the buyer has to pay the equivalent US dollar amount to the seller on Wednesday, whereas the seller of gold has to locate the gold to the buyer's specified gold account on that day.

Major players in the gold market usually trades in lots of 8 000 ounces (equivalent to 20 bars) in the spot market at market related prices. The main participants in the gold market are in frequent telephonic contact with bullion dealers throughout the world. If a participant calls a market maker for a spot price, the latter will show a two-way price, which includes a bid and offer price.

If the price taker wants to sell gold, the bid price will be dealt on. The offer price of the price maker will be hit if the price taker wants to buy gold. Under normal conditions there is a US\$0, 50 cent *spread* between bid and offer price. The size of the spread is influenced by

market conditions. For any transaction larger than 8 000 ounces an acceptable price to both parties needs to be agreed upon.

The spot gold price on Friday 28 June 2008 will be quoted as US\$631,00 - US\$631,50 for value Tuesday 1 August 2008. The bid (buying) price is US\$631,00 and the offer (selling) price is US\$631,50/oz (the *mid price* is equal to the spread, divided by two, which is then added to the bid price). In the above quotation the mid gold price is US\$631, 25.

The above quotation is from the price maker's point of view. The price taker will buy gold from the price maker at US\$631,50/oz and sell gold at US\$631,00/oz. The price is fixed on the transaction date and stays fixed for the two day settlement period. On the settlement or value date the flow of funds (mostly dollars) and the flow of gold will take place.

8.5.1 Gold fixing

The gold fixing is the procedure by which the price of gold is set on the London market by the five members of the London Gold Pool. London's position as a primary gold trading and settlement centre dates back to the origin of the Gold Standard. It is designed to fix a price for settling contracts between members of the London bullion market, but informally it provides a recognised rate that is used as a benchmark for pricing the majority of gold products and derivatives throughout the world's markets. The gold fixing is conducted twice a day by telephone, at 10:30 GMT and 15:00 GMT.

After the First World War gold mining countries, including South Africa, and other interested parties wanted their sales to take place in a more open fashion. This resulted in the formation of the fixing of the gold price on a daily basis. The first gold fixing took place on *12 September 1919* among the five principal gold bullion traders and refiners of the day. The gold price was then four pounds 18 shillings and nine pence (GBP 4.9375). Due to wartime emergencies, the London gold fixing was suspended between 1939 and 1954.

In addition to the two-way bid and offer quotations available in the over-the-counter (OTC) market, London is home to the unique services of the London gold and silver fixings. The guiding principle behind the gold fixing is that all business, whether for large or small amounts, is conducted solely on the basis of a single published price. Clients around the world wanting to buy or sell gold may do so at the fixing price, upon which a small

commission is generally charged. These fully transparent benchmark gold prices are globally accepted as the basis for pricing a variety of transactions.

There are *five members* (all market making members of the LBMA) present at the fixings. The current members of the gold fixing are Scotia-Mocatta, Barclays Capital, Société Generale, Deutsche Bank AG and HSBC. Clients place orders with the dealing rooms of the fixing members who then net all orders before communicating the net interest to their representative at the fixing. The gold price is then adjusted up and down until all sell and buy orders are executed on the basis of that price. Transparency at the fixing is served by the fact that customers may be kept advised of price changes, together with the level of interest, while the fixing is in progress and may cancel, increase or decrease their interest based on this information.

8.6 THE GOLD FORWARD MARKET

Three types of transactions provide the basic tools for risk management of gold by central banks. These facilities include loans and deposits, outright forwards and gold swaps. Central banks and other participants use these traditional hedging gold instruments to manage their gold portfolios.

8.6.1 Gold deposits

Gold pays no interest if it is stockpiled, but gold can be placed on deposit with a counterparty by doing a transaction known as a gold deposit, which entitles the depositor to earn interest. In gold market terms, such transactions are referred to as lease transactions. The interest rate applied to such lending operations is referred to as the *lease rate*. Central banks, through their lending of gold, provide additional liquidity to the gold market.

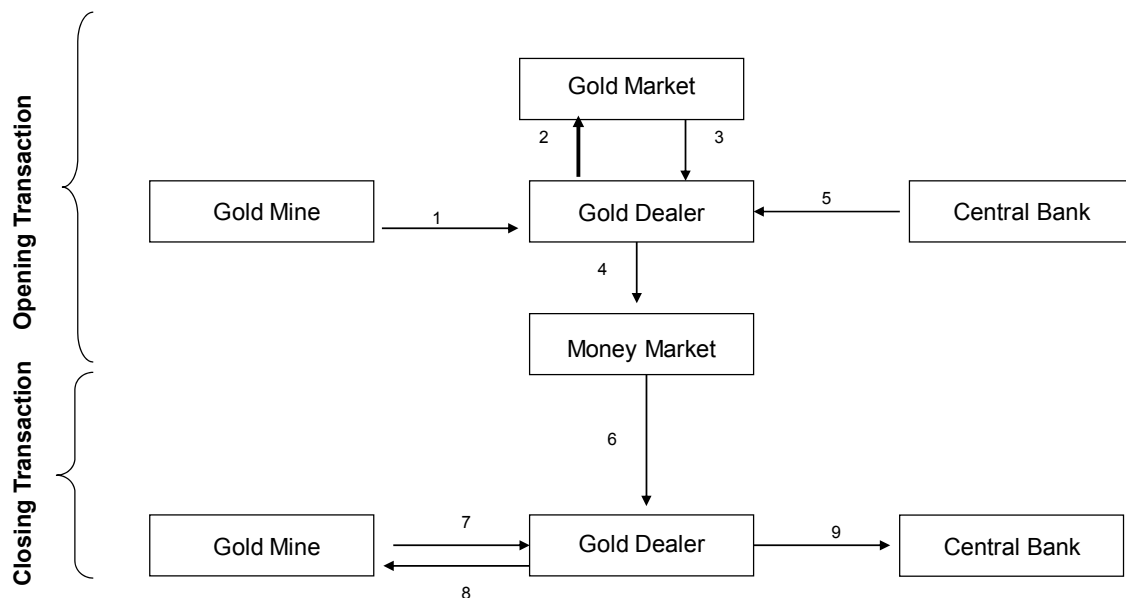
8.6.2 Gold forward transactions

A forward gold transaction implies the obligation to buy or sell a specified quantity of gold at a future date at a price contractually agreed upon today. Various market participants, including central banks, *hedge* some of their gold positions through the gold forward market.

If a gold mine expects the gold price to fall in the future, a forward gold sales contract can be established. The forward selling price will be fixed for the forward period thereby distinguishing the seller of the contract from a fall in the gold price. No additional profit

participation is generated should the spot market price at the end of the forward sales contract period be higher than the contracted forward price. If market participants expect a higher future gold price, they could buy gold in the forward gold market (if there is an underlying commitment to buy gold in the future). If expectations on future gold price movements are correct, then the forward market provides an effective gold hedge. Figure 8.1 below illustrates the features of hedging and gold lending operations.

Figure 8.1: Hedging and gold lending operations



Opening transaction :

1. Gold mine sells forward
2. Gold dealer simultaneously sells gold spot
3. ... and receives cash
4. Cash deposited in money markets by dealer
5. Dealer covers spot delivery commitment by borrowing gold from central bank

Closing transaction :

6. **Cash plus accrued interest withdrawn from money market**
7. Gold delivered by gold mine...
8. ... in exchange for cash
9. Borrowed gold (plus interest) returned to the central bank

Gold spot and forward prices are not the same. In general, forward gold prices are mostly higher than spot prices; the size of the difference is known as the *contango* (premium). If the spot gold price is higher than the forward gold price, it is called a *backwardation* (discount) market.

Customers, including central banks, could buy or sell gold forward. If a central bank sells gold forward to a bullion bank, say for six month, the latter will have a price risk exposure, whereas the central bank secures a fixed six months gold price. The central bank is therefore

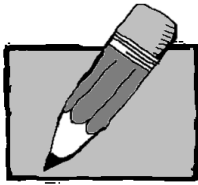
hedged against a fall in the gold price. The bullion bank will usually cover this long six month forward position by selling the gold immediately in the spot gold market for US dollars. The newly established long US dollar position will be invested at a certain interest rate. At the end of the six month period the bullion bank will sell the US dollar investment plus interest and use the proceeds to buy gold in order to deliver it to the central bank.

If the central bank decides to buy gold six months forward from the bullion bank to lock in a price, the latter will buy gold in the spot market to cover the short forward position. The bullion bank will then have to borrow the equivalent amount of US dollars that it needs to purchase the gold in the spot market. The US dollar borrowing costs will be included in the forward price quoted by the bullion bank to the central bank. At maturity, the central bank will pay the bullion bank US dollars to buy the gold. The bullion bank will then use the US dollar proceeds to settle the equivalent borrowing amount.

The size of the premium is determined by the difference between US dollar money market interest rates and gold lease rates, which is known as the *gold swap or GOF rate*. The spot rate is then adjusted with the gold swap rate and the time period involved. Furthermore, gold swap rates are mostly lower than US dollar interest rates. This implies that the calculated adjustment is added to the spot price, so that the forward price exceeds the latter. The premium earned in the forward market is therefore equal to the difference between US dollar money market interest rates and the gold swap rate.

If there is an excess of gold for lending by central banks, it implies a lower lease/lending rate and higher gold swap rate (if US dollar money market rates stay the same), which results in a higher forward price. Conversely, if there is a shortage of gold for lending by central banks, it implies a higher lease/lending rate and lower gold swap rate (if US dollar money market rates stay the same), which results in a lower gold forward price.

Forward gold prices are also quoted in terms of a bid and offer price. Assume that a bullion bank quotes a three-month forward gold rate in terms of a bid and offer gold swap rate (in interest rate terms) of say 1.75% - 2.25% (mid rate is 2% with a spread is 0.5% or 50 basis points). The bullion bank is therefore prepared to buy gold forward at a rate of 1.75% and sell gold forward at a rate of 2.25%.



ACTIVITY 9.1

Determine a three month (91 days) forward gold price based on a gold swap rate of 2% (mid rate) given a spot price of US\$631/oz.



FEEDBACK

Forward price : $US\$631 \times (1 + 2/100 \times 91/360)$
US\$634.19/oz (Contango = US\$3.19)

8.7 THE GOLD SWAP MARKET

Outright forward gold and swap markets are inextricably linked, as both products are linked to gold lease interest rates for calculation purposes. The only difference between the two gold trading instruments is that an outright forward has no spot leg (although the spot price is used as a basis to calculate the forward price), whereas the gold swap transaction has both a spot and forward leg. A gold swap therefore combines the spot and forward gold market into one market, known as the swap market. A gold swap transaction therefore involves two legs – a spot and forward market leg.

From a borrowers perspective a gold swap can be defined as the buying of spot gold in the spot market and simultaneously selling the same amount of gold in the forward market (written as $B + S$ – where B refers to the first leg indicating that spot gold is bought and S referring to the second leg indicating that gold is sold forward). If a $B + S$ swap is done, it relates to the borrowing of gold and the simultaneous investment of US dollars.

From a lenders perspective a gold swap can be defined as the selling of gold in the spot market and simultaneously buying the same amount of gold in the forward market (written as

$S + B$ – where S refers to the first leg indicating that gold is sold spot and B referring to the second leg indicating that gold is bought in the forward market). It could be said that this type of gold swap relates to the investment of gold and the simultaneous borrowing of US dollars. Central banks at times need a facility to use part of their gold reserves to raise currency without selling gold in the spot market. The central bank will then do an $S+B$ gold swap to raise say US dollars.

Just like outright gold forward price quotations, gold swaps are also quoted on an interest rate basis based on a bid and offer rate. Assume a bullion bank (price maker) quotes a central bank (price taker) a gold swap for three months at 5.00% (bid) – 5.50% (offer). If the central bank wants to create US dollar liquidity, it will have to $S+B$ gold (which is the same as $B + S$ US dollars on a swap basis). The question now is at what rate will the price maker trade – at 5.00% or 5.50%. If the central bank has $S + B$ gold, then the bullion bank has to $B+S$ gold. The gold swap price always refers to the last leg of the price takers swap price; in this case the central banks want to buy gold forward. The bullion bank will therefore trade at its offer price of 5.50%. The bullion bank would have traded at 5% if the central bank wanted to $B + S$ in terms of the gold swap.

8.8 SUMMARY

The study unit has examined the nature of the gold market in an international setting, why it is considered a good store of value and how it is traded in the spot, forward and swap markets.

8.9 SELF-ASSESSMENT

1. Assume you are a gold trader quoting prices (Price maker):

Deal date: 16 October 2006

Spot price: US\$591.90 - US\$592.40

- (a) Determine the spot value date.
- (b) At what price will you sell gold spot?
- (c) At what price will you buy gold spot?
- (d) Calculate the spread.
- (e) Calculate the middle spot price.

8. Answer true or false

- (a) The gold market is a 24-hour market.
- (b) Central banks lend gold to bullion banks for an interest return
- (c) The gold spot price is determined by demand and supply factors.
- (d) The forward gold price is not based on a gold interest rate.
- (e) The gold price is currently fixed three times a day.
- (f) Gold finesse refers to the quantity of gold in an object.
- (g) The gold price can be determined only in US dollars.

Answers to self assessment

1.

- (a) Wednesday 18 October 2006
- (b) US\$592.40
- (c) US\$591.90
- (d) US\$0.50
- (e) US\$592.15

2.

- (a) True
- (b) True
- (c) True
- (d) False
- (e) False
- (f) True
- (g) False

STUDY UNIT 9

INTERVENTION IN FOREIGN EXCHANGE MARKETS



LEARNING OUTCOMES

On completion of the study unit you should be able to:

- Understand the rationale for central bank intervention in the foreign exchange market
- Explain the difference between sterilised and non-sterilised intervention
- Understand the different intervention techniques

9.1 INTRODUCTION

Intervention in the foreign exchange market could either be done by a country's central bank or Treasury (in South Africa it is the task of the SARB). Intervention in the foreign exchange market occurs under fixed and floating type exchange rate systems. Intervention refers to the deliberate buying and selling of foreign exchange for policy objectives. Under a floating exchange rate system a central bank may want to intervene to smooth out random, temporary, unwanted exchange rate fluctuations. In other words, the central bank may be keen to dampen if not eliminate fluctuations which are least reflective of the fundamentals of the prevailing situation in the foreign exchange market. This could, for instance, mean that the central bank wishes to intervene to smooth out fluctuations stemming from short-term capital movements such as leads and lags influences.

It is also generally accepted that any intervention by a central bank in the foreign exchange market should not follow actions by the Bank which seek to manipulate the exchange rate in a particular direction, which is contradictory to market fundamentals. In other words, if the central bank, for instance, raises interest rates as an anti-inflationary measure and the exchange rate appreciates, the central bank should not then normally intervene and sell its own currency in an effort to weaken (depreciate) the exchange rate. Such action would be inflationary, and would be in conflict with the initial move to tighten monetary policies.

Some economists and market professionals argue that a central bank should not intervene at all in the foreign exchange market under floating rate conditions on the grounds that this would eliminate the need to hold foreign reserves which yield relatively low returns. Indeed, the net returns are negative if the central bank does not have any owned reserves, and its holdings of foreign exchange in effect constitute borrowed reserves. One example of a monetary authority that does not intervene in the foreign exchange market is the central bank of New Zealand.

On the other hand, if a central bank does not hold any foreign reserves and is not in a position to intervene in the foreign exchange market, the country's currency could prove to be highly volatile (random swings, up and down, in the exchange rate) in the foreign exchange market, and the country's international credit rating (ratings are done by rating agencies such as Moody's and Fitch IBCA) could suffer, thereby raising the costs (higher interest rates) of foreign borrowing by the government and other entities. There is also the danger that if a central bank has not intervened in the foreign exchange market for a long time, it would find it exceedingly difficult to intervene secretly without the market discovering its presence in the market and making it known to the public.

9.2 TECHNIQUES OF FOREIGN EXCHANGE INTERVENTION

The main forms of foreign exchange intervention by any central bank are intervention in the spot foreign exchange market and intervention in the forward foreign exchange market. There are, moreover, other ways in which a central bank can affect the exchange rate without intervening directly in the foreign exchange market. Such indirect forms of intervention comprise interest rate changes and exchange controls.

9.2.1 Intervention in the spot market

A central bank is potentially able to exercise greater influence over the say US dollar/ZAR rate during periods when the ZAR is appreciating (strengthening) since it is able to intervene by buying US dollars and selling ZAR. In principle this can be carried out indefinitely bearing in mind the potentially inflationary implications of an expanding money supply (the central bank sells ZAR to banks which increases the ZAR liquidity/money supply).

On the other hand, when the ZAR is depreciating the central bank is constrained in selling US dollars in the spot market by the size of the gold and foreign exchange reserves. Under these

circumstances the central bank may be forced to accept the verdict of the market to a large degree. The turnover on a daily basis in local foreign exchange markets also influences the scope of intervention.

The most immediate indicator of the magnitude of any central bank intervention in the spot market is the level or changes of the gross foreign exchange reserves. Other things remaining equal, a fall in the gross holdings of gold and foreign exchange indicates that the central bank has been selling say US dollars in the foreign exchange market in an attempt to curb a fall in the external value of the local currency.

However, gross foreign reserves are an imperfect indicator of intervention, because it is possible for a central bank to intervene in the spot market using 'borrowed reserves'. To boost its scope for intervention, the central bank can take advantage of credit lines it has with international banks and other central banks. When the central bank deems it to be unsuitable to further reduce the level of its gross foreign reserves, it can decide to draw on these credit lines, and therefore borrow dollars in order to intervene in the spot foreign exchange market.

For this reason the best indicator of the level of intervention in the spot foreign exchange market by central banks is the level of the net reserves (gross foreign reserves *less* liabilities related to reserves).

9.2.2 Intervention in the forward market

A central bank can also influence the domestic currency exchange rate by intervening in the forward foreign exchange market. By furnishing outright forward cover by quoting attractive forward rates at which banks and private companies can buy dollars forward, the central bank can provide say US dollars to the market without affecting the gross or net foreign reserves.

In practice intervention in the forward market by central banks does not normally take place via outright forward cover. Instead, intervention normally takes place through *swaps* with authorised foreign exchange dealers which in effect mean that intervention effectively takes place via the forward market.

This can be illustrated by an example. For purposes of supporting the rand the Reserve Bank can on its own initiative undertake swap transactions with the banks involving the purchase

of spot dollars and the sale of forward dollars. Alternatively, the banks themselves may approach the Bank to undertake the swaps since they need to cater for the requirements of their clients who want to buy dollars forward. Thereafter, the Bank can sell the dollars in the spot market. In these circumstances the transactions undertaken by the Bank mean that its foreign reserve position remains unchanged, while its short dollar position (sold position) on its forward book increases. Although such actions by the Bank are regarded as (spot) exchange rate neutral it means that the Reserve Bank has in effect intervened via the forward market, and its commitment to sell dollars forward increases.

Intervention via the forward market instead of the spot market alone can be done in circumstances where the central bank wishes to avoid any reduction in its foreign reserves as well as drawing upon its foreign credit lines. This can have negative implications for losses on the forward exchange account, since the forward commitments of the central bank to sell dollars are greater.

9.2.3 Interest rate policies

Intervention to affect the value of a domestic currency does not have to take the form of operations by the central bank in the spot and/or forward exchange markets. It can take indirect forms, and in particular the use of the interest rate weapon. By changing its key benchmark interest rate, which affects the whole structure of short term interest rates in the economy, the central bank can quickly influence the level of foreign capital inflows and outflows, while in the longer term such changes can also affect the current account (account reflecting mostly trade related flows) of the balance of payments. Other things remaining equal, a rise in interest rates makes investments in a country more attractive to foreign investors, leading to higher capital inflows and upward pressures on the local currency against other currencies in the foreign exchange market.

Higher domestic interest rates can also deter speculation against the local currency, since they raise the cost of borrowing domestic funds (speculators need to borrow the currency which they anticipate will weaken and invest in expected stronger currencies). A rise in interest rates can also lead to a fall in domestic aggregate demand, and thereby cause the import bill to decline, and the current account of the balance of payments to strengthen, which again benefits the local currency. Conversely, opposite forces are at work if interest rates are lowered.

It should also be remembered, however, that rises in domestic interest rates can precipitate lower economic growth, which could act as a deterrent to foreign capital inflows. On the other hand, a fall in rates may lead to higher economic growth which could attract foreign capital.

It is therefore not always easy to accurately forecast the net long-term outcome of a change in interest rates on the balance of payments. For example, if a large amount of foreign capital is invested in interest bearing domestic assets (i.e. money market instruments), then higher local interest rates may actually increase the outflow of factor payments on the current account which may partially offset the inflow of foreign capital on the financial account of the balance of payments.

9.2.4 Exchange controls

Intervention to affect a currency can also be in the form of quantitative restrictions when exchange controls (if a country utilises it, like South Africa) relaxes or tightens it. Such controls limit the demand for foreign currency and thereby affect the exchange rate and the foreign reserves, although the degree of effectiveness of such controls can be limited. This instrument for influencing the ZAR has significantly diminished in importance since the middle 1990s, when the monetary authorities have committed themselves to a process of gradually phasing out the remaining exchange controls on residents.

9.3 STERILISED AND NON-STERILISED INTERVENTION

As part of any discussion of intervention in foreign exchange markets by central banks it is important to distinguish between sterilised and non-sterilised intervention. Sterilised intervention refers to intervention by a central bank which does not affect the money supply of the country, while non-sterilised intervention refers to intervention which does exert an impact on the money supply.

9.3.1 Non-sterilised intervention

When a central bank intervenes in the foreign exchange market its holdings of foreign assets will change along with its domestic liabilities to commercial banks.

If, for example, the central bank buys foreign currency in the market from local banks its foreign assets rise along with its liabilities since the deposits held by commercial banks with the central bank rise by a similar amount. At the same time the domestic money supply expands (because the central bank pays to buy foreign exchange with the local currency), *ceteris paribus* (other things remaining equal). In effect, the central bank pays for the foreign currency by writing out a cheque in favour of the commercial bank which has sold the foreign currency to the central bank. This amounts to non-sterilised intervention.

Alternatively, if the central bank sells foreign currency its foreign assets decline along with its domestic liabilities, and the money supply falls. Under these circumstances the customer buying the foreign currency writes out a cheque in favour of the central bank, and the latter then debits the account kept with it by the commercial bank which is the banker for the customer buying the foreign currency. In this way aggregate deposits held by commercial banks with the central bank fall which means that the liabilities of the latter decline. The commercial bank suffering a fall in its deposits at the central bank then debits the account of the customer, thereby ensuring that total deposits held at commercial banks fall, along with the domestic money supply. This again amounts to non-sterilised intervention.

9.3.2 Sterilised intervention

The impact of intervention by a central bank on the domestic money supply, however, can be neutralised by an offsetting transaction by the central bank in domestic assets which equals the initial transaction in foreign assets. For example, if the central bank has initially bought foreign currency in the market and thus boosted the money supply, it can offset this through an open market sale of domestic assets which reduces the money supply. The overall result will then be an unchanged money supply, while the total assets and liabilities of the central bank will also remain the same. When foreign exchange market intervention by a central bank is combined in this way with open market operations it is said to be sterilised intervention.

The impact of foreign exchange intervention on the domestic money supply will not always be welcome to central banks. They may already have been quite happy with the money stock before they began their intervention in the foreign exchange market. Moreover, the desire to maintain stability in financial markets other than the foreign exchange market may prompt a central bank to follow up intervention in the currency market by intervention in other

markets. For instance, if the currency weakens against the US dollar significantly, the central bank could sell dollars for domestic currency, and thereby reduce the money supply. At the same time, however, the weakness of the currency could precipitate weakness of bonds in the domestic capital market, due to fears that the falling currency will lead to higher inflation. In an effort to stabilise the bond market the central bank may therefore buy government bonds in the market, and thereby add liquidity to the banking system.

- **The effects of intervention on other economic variables**

There is virtually unanimous agreement among economists that non-sterilised intervention can have a lasting effect on the exchange rate. It does so by changing the stock of base money (i.e. notes and coin plus deposits held by commercial banks with the central bank) and the money supply, which in turn affects interest rates, asset prices and the demand for goods and services. In other words, the purchase of foreign exchange by a central bank which is not sterilised by offsetting actions by the monetary authority in the domestic markets boosts the money supply and can lead to a fall in interest rates which in turn stimulates capital outflows which helps to weaken the exchange rate. The purchase of foreign exchange by the central bank which amounts to non-sterilised intervention can also generate market expectations that the exchange rate will fall, and this could by itself stimulate capital outflows which renders the expectations of a weaker exchange rate self-fulfilling. By weakening the exchange rate and depressing interest rates non-sterilised intervention by a central bank may also stimulate domestic economic activity.

Conversely, the sale of foreign exchange by a central bank which is not sterilised reduces the money supply and can lead to a rise in domestic interest rates which stimulate capital inflows which in turn helps to strengthen the exchange rate. In addition, such intervention could generate market expectations of a rise in the exchange rate, which encourages inflows of foreign capital and pushes the exchange rate higher. By strengthening the exchange rate and pushing up interest rates non-sterilised intervention by a central bank may reduce economic growth.

In the case of sterilised intervention, however, the economic effects are much less certain. Sterilised intervention leaves the monetary base and the money supply unchanged, and consequently it cannot influence the exchange rate over time through the 'monetary channel' since domestic interest rates will probably remain unchanged. Sterilised intervention may still

affect the exchange rate by changing market expectations, but the chances of this happening are lower than in the case of non-sterilised intervention since it will be less clear whether the central bank is aiming for a weaker exchange rate, and the market may well harbour no expectations of a fall in interest rates.

Although the effects on the exchange rate are much less certain, central banks, especially the major central banks, often conduct sterilised intervention operations. A central bank may, for instance have intervened extensively to buy foreign currency in circumstances where its exchange rate is appreciating in an effort to stem the rise while simultaneously building up its foreign reserves. It could, however, be concerned about the monetary stimulus generated by the intervention, and thus decide to conduct open market operations designed to drain liquidity from the banking system, even though this could run the risk of causing the exchange rate to appreciate.

9.4 SUMMARY

The study unit has introduced you to the rationale for central bank intervention in the foreign exchange markets and the techniques that are utilised. The next study unit will expand on the issues by discussing how international liquidity is managed.

9.5 SELF-ASSESSMENT

1. List the different types of Intervention techniques.
2. Explain the difference between sterilised and non-sterilised intervention

Answers to self-assessment

1.
 - Intervention in the spot market
 - Intervention in the forward market
 - Interest rate policies
 - Exchange controls

2.

- **Non-sterilised intervention**

If, for example, the central bank buys foreign currency in the market from the public its foreign assets rise along with its liabilities since the deposits held by commercial banks with the central bank rise by a similar amount. At the same time the domestic money supply expands other things remaining equal. In effect, the central bank pays for the foreign currency by writing out a cheque in favour of the party which has sold the foreign currency to the central bank. This cheque is then deposited by the customer with a commercial bank which credits its account, and in this way the domestic money supply increases. The commercial bank then presents the cheque with the central bank which credits the account of the commercial bank which the latter keeps with the central bank. This in turn leads to an increase in the liabilities of the central bank in the form of higher deposits held by commercial banks with the monetary authority. This amounts to non-sterilised intervention.

- **Sterilised intervention**

For example, if the central bank has initially bought foreign currency in the market and thus boosted the money supply, it can offset this through an open market sale of domestic assets which reduces the money supply. The overall result will then be an unchanged money supply, while the total assets and liabilities of the central bank will also remain the same. When foreign exchange market intervention by a central bank is combined in this way with open market operations it is said to be sterilised intervention.

STUDY UNIT 10

INTERNATIONAL LIQUIDITY AND FOREIGN RESERVES



LEARNING OUTCOMES

The aim of this study unit is to give you an understanding of the concept of international liquidity and how it is managed by central banks. By the end of the study unit you should be able to:

- Understand the concepts of international liquidity
- Identify the types of reserve assets held by the central banks
- Identify the determinants of reserve asset needs
- Understand the respective need for reserves under fixed and floating exchange rates
- Distinguish between gold, foreign exchange reserves and SDRs
- Understand the role of the dollar

10.1 NATURE OF INTERNATIONAL LIQUIDITY

International liquidity refers to the total amount of money available to service international trade in goods and services as well as capital movements. Central banks across the globe mostly manage international liquidity and foreign reserves. There are various factors that influence the international liquidity position of the world, such as international debt levels, cross-border capital and trade flows, balance of payments positions, exchange rates, exchange controls and macroeconomic policies.

10.2 ACCUMULATION OF FOREIGN RESERVES

Most countries have adopted the definition of foreign reserves as suggested in the guidelines of the IMF. IMF defines foreign reserves as all external assets that are controlled and managed by monetary authorities (e.g. the SARB in South Africa and the US Treasury in America) for the **direct financing** of external balance of payments imbalances (i.e. deficits) and/or for the **indirect regulation** of the magnitudes of such imbalances through intervention (direct sale/purchase by central bank to influence the exchange rate for macroeconomic

purposes) in local/foreign exchange markets to influence exchange rates or foreign reserve levels.

Foreign reserve assets are primarily created through trade and investments, driven by mostly exports and foreign portfolio/direct investments. But, foreign reserves could also be created if a country (i.e. government, central bank and the private sector) borrows foreign denominated currencies in the international markets. A creditworthy country is better able to borrow abroad during times of financial distress in order to increase foreign reserve levels. Refer to the SARB Quarterly Bulletins available on www.resbank.co.za for more details.

If a country, for example, exports more than what it imports, then that country's foreign reserves position should increase (*ceteris paribus*). Furthermore, the accumulation of foreign reserves is bolstered through foreign direct (i.e. buying of a factory by non residents in South Africa) or portfolio (i.e. buying of shares/bonds by non residents in South Africa) investments. The inflow of foreign capital increases the foreign reserve level of a country, whereas an outflow reduces its size.

Many Asian countries, including Japan and China, have accumulated vast amounts of mostly US dollar reserves via intervention in the international foreign exchange markets. This intervention's focus was on buying US dollars to limit an appreciation in their local currencies external values. These dollars, as well as foreign exchange earned through higher exports, enabled China to become the world's largest holder of foreign reserves (US\$925 billion June 2006), compared to the second largest holder Japan (US\$870 billion). During the last three years, the foreign reserves of China increased at an even faster rate, surpassing US\$2 trillion in 2009.

The foreign reserves of a country are accounted for in the balance of payments. Furthermore, the balance of payments is a reflection of the external wealth position of a country. Credit rating agencies also consider balance of payments and foreign reserve levels if and when they assign a specific credit rating to a country.

10.3 COMPOSITION OF CENTRAL BANKS' FOREIGN RESERVES

The composition and size of foreign reserves are a function of exchange rate policy/arrangements, degree of openness of an economy, trade patterns with dominant trade

partner/s and the composition/level of foreign debt. Many developing countries emerged from a debt crisis during the 1980s and were long burdened by overhangs of foreign financial obligations; this understandably influenced foreign reserve management operations by prioritising the funding of foreign debt management.

Monetary authorities must have confidence in a foreign reserve currency before decisions are made to include it in a foreign reserve portfolio. The world monetary system went over to a US dollar standard after the collapse of the Bretton Woods System in 1971. Subsequently, the US dollar became the most important international reserve asset. If America allows its large current account deficit to persist and its net foreign liabilities to rise, foreigners may become less willing to hold more US dollars. This could result in a substantial depreciation of the US dollar, creating higher inflation in America, and subsequently a lower demand for US dollar reserve assets.

10.3.1 Total world reserves

The composition of foreign reserve portfolios has changed over the years. There had been a marked shift from gold to foreign exchange in the composition of foreign reserve portfolios of central banks since the breakdown of fixed exchange rates in 1971. During the latter period the total value of international reserves equalled only US\$93 billion, which consisted of US\$37 billion in gold, US\$45 billion in foreign exchange (mostly US dollars) and the remainder in Special Drawing Rights (SDRs). The shift away from gold was partly brought about by a demonetisation process to limit the monetary role of gold. This process eliminated the transaction motive to hold gold. Furthermore, the mere fact that gold hoarding does not provide an interest return also facilitated such a diversification into foreign exchange investments. Central banks today hold more foreign currency and foreign currency denominated assets compared to gold.

10.3.2 Foreign exchange reserves

The composition of central banks' currency portfolio consists of international reserve currencies such as the US dollar, UK pound, Japanese yen and the Euro. In South Africa, for example, the ZAR is not classified as a foreign reserve currency, although foreign reserves are valued in rand terms for accounting purposes.

The accumulation of foreign exchange reserves has to be invested in assets. For example, US dollar reserves could be invested in say American shares on the New York Stock Exchange. Furthermore, foreign currencies are also kept in different deposit accounts in foreign financial centres, which could be in the form of e.g. overnight or call deposits. The foreign currencies could, for example, also be invested in fixed interest high quality sovereign short and long-term debt securities (such as US Treasury bills and bonds) and corporate bonds. Central banks therefore have to decide on the risk/return profile of asset types. Central banks are traditionally more risk averse when it comes to investments, which influence the asset classes of their foreign investments.

The US dollar is still the most sought after or popular international reserve currency partly because of the vast trade conducted in dollars, the developed and liquid nature of American investment markets and economic status of the country. International central banks have accumulated US dollars as a safe haven investment. If central banks decide to diversify their US dollar holdings into gold or other foreign currencies, the US dollar could lose ground and depreciate substantially. Some countries (e.g. China) have suggested a more diversified foreign reserve portfolio, which could lower the demand for US dollars and positively influence gold. Such speculation sparked an interest in gold, which partly explains the surge in the gold price to post 1980 record levels of US\$1 200/oz during June 2010.

The Asian countries accumulated vast sums of mostly US dollar reserves after the 1997 financial crisis. The key objective to build-up foreign reserves by these countries was to be more self-sufficient and to rely less on foreign loans if such a shock had to occur again. The increase in foreign reserves by these countries came about as a result of intervention (mostly US dollars purchases by the monetary authorities) to weaken their domestic currencies, in order to become more competitive and to secure an export-led economic growth path. Subsequently, these countries have secured large current account surpluses, further strengthening their foreign reserve levels.

10.3.3 Gold reserves

Gold has been a key monetary and international reserve asset for many years, especially during the Gold Standard and Bretton Woods fixed exchange rate regimes. Central banks had no option but to have gold in their foreign reserve portfolios in order to secure the integrity

and functionality of the system. Furthermore, gold fulfilled a monetary role and was used as a payment vehicle between central banks.

During the 1970s the American government started a campaign to demonetise gold in order to bolster the US dollar. Many other central banks over the years have reduced the proportion of their foreign reserves which they keep in gold, and increased their foreign exchange holdings. For example, during the 1990s, many European central banks such as Belgium, Netherlands and Britain, sold gold. These gold sales were also followed by Canada and Australia. Furthermore, the IMF also sold some of its gold reserves during the 1970 and 1980s, and some anti-gold campaigners are still pressing for further central bank and other gold sales. On the contrary, gold supporters argue that central banks have been responsible for the poor performance of gold during the 1990s because of the “central bank overhang”, brought about by the low return and high storage cost of gold.

On the positive side, it could be argued that the “war chest” argument in favour of gold still holds. In times of war and geopolitical pressures (e.g. during the Iranian and North Korean nuclear initiatives in 2006) gold performs well, albeit not always. Furthermore, gold is still seen by some as an adequate store of value. Some gold bulls believe that the current gold price is undervalued, and that higher prices could be achieved if central banks diversify only a small portion of their foreign reserve portfolios into gold, especially if the US dollar starts to depreciate. Moreover central banks can increasingly manage their gold holdings to enhance returns through lending, swap and collateralised gold borrowing operations.

10.4 MOBILISATION OF GOLD RESERVES

Central banks are seeking ever more adventurous and ingenious methods of making profits from their gold hoards by mobilising their gold reserves more actively. This trend which began in the 1980s has meant that central banks increasingly have become involved in the derivative markets for gold, and in the process this has ensured that the physical market for gold does not exercise the same dominating influence on the price of gold as was previously the case.

In the wake of the growing differential between the official and free market prices of gold these entities put pressure on the major central bank holders of gold to freeze their holdings,

behaviour which at least created the superficial impression that official gold was of no further use for central banks, and was therefore being demonetised. During the mid-1980s, pressures also emanated to some extent from the poor performance of gold at that stage in terms of its price compared with the boom in 1979 and 1980. The value of gold as a hedge against inflation came to be questioned in an era of low inflation in the 1980s. Central banks increasingly sought means to mobilise and generate some kind of return from their gold holdings, although the pressures were not as great as they were in the case of foreign currency holdings.

10.4.1 Degrees of mobilisation of central banks' gold reserves

Central banks can be categorised into three different groups in respect of their mobilisation of gold reserves. Firstly, there is a group of central banks of gold producing countries, many of whom fulfil the role of being the centralised marketing channel for the gold produced in these countries. In other words, they buy gold from local producers in their countries and add it to their reserves, or sell it abroad for foreign currency. These central banks are to a considerable extent involved in the sale of gold in the spot market and to a limited extent with the sale of the metal on a forward basis, which not only takes the form of fixed forward sales but also spot deferred contract sales which amount to jobbing activities in the gold markets. Many of these central banks, however, now mobilise their gold reserves through the medium of gold swaps. These involve spot sales of gold to another party combined with simultaneous agreements to repurchase gold at agreed prices at specific future dates. On occasions the gold is sold on maturity rather than bought back, depending on the state of the gold market at the time and the foreign reserves position of the bank.

A second group of central banks are those of non-gold producing countries that have moderate, and in some cases substantial, gold reserves. This therefore includes some central banks in industrial countries. This group comprises central banks which are seeking to generate some return on their gold holdings in some cases through outright sales and purchases of the metal and hence the generation of jobbing profits, but much more often through the medium of lending their gold to interested parties in return for limited interest payments.

Over time this business on the part of central banks has mushroomed, with a greater

willingness to lend out for longer periods. Such gold loan activity has been associated in part during the past decade with a substantial expansion of gold mining capacity in Australia, Canada and America.

A third group, which comprises representatives of both the other two groups, namely central banks in gold producing countries and long term sizeable gold holders, is more sophisticated using all the instruments available to the others, but additionally the options and futures markets in gold. Various central banks in gold producing countries, for instance, have established a presence in the gold options markets by undertaking trades in limited amounts in their natural direction, i.e. by selling the right to buy gold from the central bank (call options), and buying the right to sell gold by the central bank (put options). Such central banks have in some cases also become involved in limited operations in the gold futures markets. By maintaining a presence in these various markets, both as a buyer and a seller, and taking advantage of fluctuations in the price of gold, these central banks can in effect earn additional foreign exchange income from gold. A drop in the gold price is potentially profitable for central banks just like a corresponding rise if it adopts a suitably flexible marketing strategy by correctly exploiting price swings in the futures and options markets. Fee (premium) incomes in any case are generated if a central bank issues (writes) option contracts. Increasing numbers of central banks are becoming sophisticated traders in the various gold markets.

The increasing use of gold swaps by central banks had by 1995 been reportedly reflected in a shift of gold previously kept by central banks at the Federal Reserve Bank in New York to other centres like the Bank of England. The reason is that the New York Federal Reserve Bank does not accept private sector deposits of gold; instead it accepts only deposits from government entities. In contrast, the Bank of England and some other centres will accept deposits of gold from investment and commercial banks, and other private sector organisations. Hence if a bank wishes to use its gold in a swap or options programme in which the ownership of the metal changes to its commercial counterparty, the gold must be transferred out of the New York Federal Board if it is stored there, which is costly and bothersome.

10.5 MOTIVES FOR HOLDING FOREIGN RESERVES

Countries are different in a number of ways, such as population size, state of economic and financial market development, market structure, economic policies, wealth, openness (import and export values as a ratio to GDP) and even between those who borrow exclusively in their domestic currency and those who also borrow in international capital markets. All countries hold foreign reserves, even those large self-sufficient or developed economies.

There are various factors that have an impact on the composition of a country's foreign reserves of which the type of exchange rate system (ranging from fixed to more market related systems) and policies related to the balance of payments, trade and financial flows (exchange controls and tariffs) are important determinants. If, for example, Country A only trades with America, then the US dollar will be a key foreign reserve asset in the composition of Country A's foreign reserves. The status of the US dollar as a reserve currency will further be enhanced if Country A has its foreign debt also denominated in the latter.

For any country, the reasons why foreign reserves are accumulated are important. Governments are pressurising central banks to increase the return on foreign reserve holdings, without taking on excessive risks. This consideration has a bearing on the methodology of reserve management and investment asset classes. Some central banks use experts to assist them in reserve management operations in order to increase returns. Subsequently, some central banks also resort to more risky investment assets, such as corporate bonds and equities.

The long-run upward trend in official holdings of reserves, overwhelmingly in the form of foreign exchange reserves, basically reflects a rising level of countries' international transactions – both current and capital account transactions – and it also reflects the variability in their external payments. Furthermore, countries normally tend to hold reserves in amounts that are in excess of the strictly operational level needed to meet their transaction needs and for day-to-day management of the foreign exchange markets. This provides a cushion to absorb unexpected shocks or a sharp deterioration in their terms of trade, or to meet unexpected capital outflows, which thereby helps to avoid, or at least mitigate, a reduction in output that might result from an external payments shock.

Foreign reserves could be held as a formal backing for the domestic currency. The recorded foreign assets should therefore cover the notes and coins in circulation, which is reflected on

the liability side of a central banks balance sheet. This has been a traditional motive to hold foreign reserves, especially gold reserves. The formal backing of a currency with gold reserves was at its height under the Gold Standard and Bretton Woods system.

Foreign reserves could be used as an exchange rate policy tool, especially for those countries that adhere to a fixed exchange rate arrangement. Foreign reserves can therefore be used to intervene in the foreign exchange market to maintain a predetermined fixed rate or to stabilise a floating rate. Under a completely free floating exchange rate system there will in theory be no need for the accumulation of foreign reserves, because exchange rate movements will ensure that the foreign exchange market is cleared (demand for and supply of foreign exchange is equal) on a daily basis. In effect there would be no buying or selling of foreign currency by the central bank in the foreign exchange markets. Clearly, the need for foreign reserve management would be at least very limited under such a system. In the case of a central bank that allows its currency to float freely, such a bank will be able to manage its reserves with relatively low levels of reserves.

If a country follows a managed floating exchange rate regime, the role of foreign reserves become more prominent, especially if the domestic currency is over or undervalued. Intervention in the foreign exchange market could facilitate a process to adjust the incorrect valuation of the domestic currency under such a system. Furthermore, central banks also need foreign reserves to smooth fluctuations in the exchange rate of the domestic currency.

In addition, countries may choose to use the foreign exchange markets to meet domestic monetary policy objectives, especially liquidity conditions in the money market. The buying or selling of foreign currencies affects the domestic money market liquidity and interest rate levels.

Central banks should consider the safety, availability and liquidity of their foreign reserves as a priority. If the transaction demand exceeds the foreign reserve level of a country, the central bank would have to buy foreign exchange in the market, which might be costly. Central banks are at times forced to buy foreign exchange in the local or international foreign exchange market to meet transaction demands as and when the need arises, but this might not be a course to pursue, for several reasons. Firstly, the timing to buy a foreign currency with the local currency might be wrong. For example, it could be expensive to buy say US dollars

when the domestic currency is weak. Secondly, the buying or selling of foreign exchange might create uncertainty in the local foreign exchange market and create additional currency risks. The continued emergency participation in the foreign exchange market by a central bank might reduce the credit rating agencies' confidence in the country as an issuer of debt and as a result both reduces the attractiveness of the country to lenders and increases the cost of foreign currency borrowings.

The traditional measure of the adequacy of reserves is the ratio of reserves to imports of goods and services measured in terms of weeks of imports. As regards to advanced industrial countries, the ratio of foreign reserves to imports, while having fluctuated to some extent since 1980, has on balance remained relatively stable at around 12 weeks of imports. For other groups of countries – in particular the emerging market countries and, since around 1990, for the developing countries – the ratio has risen relatively sharply to about 22 weeks. Given the long upward trend in these ratios, it seems likely that the long-term demand for foreign reserves will continue to rise approximately in line with the increase in countries' current account transactions.

A sufficient level of foreign reserves in excess of the operational level could provide a defence against an emergency/disaster. These reserves could be used to finance the costs associated with disasters. This is most likely to be appropriate for small countries that are not large enough to provide self-insurance; larger countries are more likely to fund recovery costs by borrowing in the international capital markets. But a small country may possibly be completely overwhelmed by a disaster; for example, a natural disaster which destroys the country's only export product, or a collapse in their terms of trade, or even a military disaster.

Some governments have become inclined towards generating more profits from foreign reserve holdings by central banks. Currently some countries follow a dual account basis for reserve recordings, which includes a liquidity and investment tranche. The investment tranche reflects the profit motive where a portion of the reserves is channelled into higher return/risk assets. Furthermore, outside fund managers are usually responsible to manage the investment portion of foreign reserves. It is not advisable that more than 50 per cent of the foreign reserve portfolio be invested in such a way. The Malaysian central bank followed a more aggressive reserve management campaign during the 1990s in order to increase the return on foreign investments. They did this by trading more on a speculative basis in the

foreign exchange markets, with dire consequences. The substantial positions they took in the foreign exchange market resulted in losses, which had to be financed by the Malaysian government.

Foreign reserves can be held as an investment fund, primarily to generate a financial return in the form of income and capital gains. Most countries, however, do not have strong economic reasons for investing large sums of money for speculative reasons. Allowing the economy to grow and financing the accompanying imports by using foreign reserves often makes better economic sense. On the other hand, there may be cases where the local economies cannot absorb greater growth and spending without fostering inflationary pressures and in such circumstances the accumulation of foreign reserves for investment can be preferred.

Central bank reserve management operations are complex and ranges from the management of risks associated with the holding of foreign reserves to enhanced returns. Decisions also have to be made whether the central bank should utilise outside fund managers or not to manage foreign reserves. It is generally accepted that central banks are fully entitled to so invest their reserves as to maximise returns. The main reason for active management is that it can be profitable, and these profits can offset the costs and risks associated with reserve management.

10.6 ADEQUACY OF RESERVES

The shift in emphasis in measuring the adequacy of reserves away from current and more towards financial account indicators, and in particular short-term debt, reflects the increased role of capital markets in financing balance of payments imbalances.

A country will experience financial difficulties if foreign capital is suddenly withdrawn and/or when capital markets are for whatever reason closed to classes of sovereign and private sector borrowers. The rise in the ratios of non-gold reserves to short-term debt since the early 1990s is an important reflection of the increased need for reserves in the emerging market and developing countries, and the growing importance of their ability to service debt and other capital market-related transactions.

An adequate level of foreign reserves will always be needed to finance current account transactions and to safeguard a country against external shocks. Furthermore, the

accumulation of foreign reserves is needed at times when a country is faced with potentially large and sudden changes in financial flows, and also to service debt obligations. The level of foreign reserves, taken in relation in particular to a country's short-term indebtedness, has become an important factor in the assessments by the markets – and in the assessments of the credit agencies of a country's creditworthiness and the degree of risk in continued lending to that country. Finally, the level of foreign reserves provides the monetary authorities with a margin to modify the setting of their macroeconomic policies in response to possible developing weakness in the country's external financial situation.

Smaller countries need foreign reserves that they own (i.e. non-borrowed reserves) more than larger countries, which are usually not so exposed to international trade. It could be said that an adequate level of foreign reserves held by the central bank is a prerequisite for almost every country that seeks to employ the savings of other nations to develop its economy, i.e. attract foreign capital inflows. There are strong grounds for arguing that a small country needs foreign reserves earned through its own productive efforts and accumulated through its own virtuous savings, before it will get access to the savings of other countries. In addition, each country should strive to acquire enough foreign reserves to cover the potential overall balance of payments variances that can be reasonably expected.

An internationally accepted and adequate level of foreign reserves will hopefully be sufficient to inspire confidence among foreign investors. The foreign credit rating of a country is influenced in part by the level of its foreign reserves, as well as the quality of those reserves. This is one of the problems, which have in the past beset South Africa. Such considerations help to explain the large increase in demand for foreign reserves by emerging market countries in recent years. Central banks have come to appreciate the fact that although the social cost of earning and holding an adequate level of net foreign reserves may seem to be high, it is in fact a key to attracting an inward flow of foreign capital for investment purposes, and deriving the benefits of access to international capital markets.

The following measurements are recognised as adequacy standards for foreign reserves.

- **Import cover ratio**

The most common and widely used foreign reserve adequacy measure relates to the comparison of foreign reserves and the value of monthly imports. This reserve adequacy measure states that the level of gross reserves of a country should at least be sufficient to

cover **three months** of imports. For example, if a country's monthly import bill is US\$1 billion, then an adequate level of reserves should be US\$3 billion. The monthly import bill for South Africa was about US\$4.7 billion in 2005, while the foreign reserves amounted to about US\$20 billion, which secured an import cover ratio of more than three months. In this regard South Africa's foreign reserves are adequate. Also refer to the SARB Quarterly Bulletins (www.resbank.co.za) for the latest information.

The import bill cover ratio is however an old fashioned criterion to use which has been utilised for many decades by many countries and it can be argued that it has a limited value in view of the fact that flows on a daily basis in the local foreign exchange market are dominated by capital movements. In an era of high mobility of foreign capital the ratio of foreign reserves to imports falls short as an accurate measure of the adequacy of foreign reserves. The foreign reserves/import ratio is also deficient in the sense that it makes no distinction between net and borrowed reserves, which is particularly important for central banks of smaller countries.

- **Money supply ratio**

The relationship between deposits and money supply is distinct - the higher the deposit base, the higher the money supply. It could be argued that the higher the deposit base, the higher the potential to diversify local currency deposits into foreign deposits. An outflow of local deposits into foreign denominated markets will constitute a capital flight. A higher level of foreign reserves would be needed to counter such capital outflows.

It is therefore important to judge the adequacy of foreign reserves in terms of the broad money supply of a country. This measure provides information of the extent to which monetary expansion is backed by foreign reserves. The growing recognition of the importance of capital flows has ushered a revolution in thinking about the adequacy of foreign reserves. The crises that have affected many emerging market countries in the 1990s highlighted the importance of capital flows on the balance of payments, which can be uncertain and subject to rapid reversal patterns. This in turn has focussed attention on the role of foreign reserves in preventing foreign exchange crises.

- **Short-term foreign debt ratio**

Over the last few years, and particularly in the light of large-scale private cross-border financial flows, increasing attention has been given to a country's net liability or short-term debt position, and its impact on the adequacy of reserves. Indeed, the adequacy of a country's level of reserves is being increasingly assessed in relation to its servicing obligations for external debt and to its overall external indebtedness. For many countries outside the group of advanced countries, and with varying degrees of access to international capital markets, the need to build up reserves has tended to increase in the light of their inherited external indebtedness. The increase in reserves is aimed not only to help safeguard against current account shocks, but also increasingly to provide a cushion in the event that the private sector cannot absorb such shocks because of limited participation in global markets, or if the country has relatively large-scale external debt obligations.

The adequacy of foreign reserves could also then be measured by the extent to which short-term foreign debt is covered by foreign reserves, which is known as the *Guidotti rule*. The rule of thumb is that the foreign reserves should be at least equal to short-term foreign debt levels of a country.

This reserve adequacy approach for evaluating foreign reserves has important implications for the management of such reserves, and in particular for the ideal composition of reserves in terms of currency, duration and instruments. This approach suggests that the currency composition of foreign reserves should focus on the currency composition of potential capital outflows rather than on the currency composition of the trade flows. Thus, if outflows due to debt repayments are likely to be in US dollars, the currency composition should be weighted towards the latter.

10.7 SUMMARY

The study unit has explained the nature of international liquidity, the reasons why central banks accumulate foreign reserves and the determination of their adequacy.

10.8 SELF-ASSESSMENT

1. Discuss the motives for holding foreign reserves.
2. Discuss the different measures of foreign reserve adequacy.

Answers to self assessment

1.

- Foreign reserves could be held as a formal *backing for the domestic currency*. The formal backing of a currency with gold reserves was at its height under the Gold Standard and Bretton Woods system.
- *Foreign reserves could be used as an exchange rate policy tool*, especially for those countries that adheres to a fixed exchange rate arrangement. Foreign reserves can therefore be used to intervene in the foreign exchange market to maintain a predetermined fixed rate or to stabilise a floating rate.
- Transaction purposes
- *Foreign reserves can be held as an investment fund*, primarily to generate a financial return in the form of income and capital gains. Most countries, however, do not have strong economic reasons for investing large sums of money in a speculative nature.

2.

- **Import cover ratio**

The most common and widely used foreign reserve adequacy measure relates to the comparison of foreign reserves and the value of monthly imports. This reserve adequacy measure states that the level of gross reserves of a country should at least be sufficient to cover three months of imports. For example, if a country's monthly import bill is US\$1 billion, then an adequate level of reserves should be US\$3 billion. The monthly import bill for South Africa was about US\$4.7 billion in 2005, while the foreign reserves amounted to about US\$20 billion, which secured an import cover ratio of more than three months. In this regard South Africa's foreign reserves are adequate.

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- **Short-term foreign debt ratio**

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