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Summary notes

Study unit 1 - The investment setting

- Explain the concept of required rate of return and discuss the components of an investor's required rate of return

What is the required rate of return?
The required rate of return is the minimum return an investor should accept from an investment to compensate him for deferring consumption which means not consuming.

What are the three components of an investor's required rate of return?
The three components of an investor's required rate of return of the following:

- The time value of money during the period of the Investment
- The expected rate of inflation during the period
- The risk involved

- Differentiate between the real risk-free rate of return and the nominal risk-free rate of return and calculate both return measures

The time value for money here refers to the real risk-free rate of return which is the price charged for the exchange between current goods(consumption) and future goods(consumption). RRFR is the starting point to determine an investor's required rate of return. To determine the required return the Investor has to determine the nominal risk-free rate of return and address premiums to compensate for risks associated with the investment.

What are the two factors that influence the nominal risk-free rate?
They are namely the expected rate of inflation and the conditions in the capital market.

What is the NRFR and RRFR equation?

NRFR = [(1 + RRFR)(1 + EI) - 1 * 100

RRFR = $[\frac{(1 + NRFR)}{(1 + EI)} - 1] * 100$

- Explain the risk premium, the associated fundamental sources of risk, and why these sources are complementary to systematic risk

What is a risk premium?
An increase in the required rate of return over the NRFR is known as a risk premium (RP). We required RP is a composite of the following major sources of risk:

- Business risk
- Financial risk
- Liquidity risk
- Market risk
- Political risk
- Scalability risk
- Convertibility risk

Discuss business risk
Business risk refers to the extent of certainty or lack thereof about a firm's cash flows as a result of the nature of its business. Companies of firms who are the sole proprietors are in a monopoly and have a greater certainty about their income and cash flows. They require lower risk premiums than cyclical firms.

Discuss financial risk
Financial risk refers to the financial leverage employed by a firm. The greater the extent to which debt in relation to equity is used to finance the firm, the greater the financial leverage the greater the financial risk. People are just worried if the Firm can pay its bills.

Discuss liquidity risk
Liquidity risk refers to the speed of a transaction which means time needed to convert an asset to cash as well as the price at which an investment can be sold. Liquidity risk refers to the effort and certainty of trading a specific investment instrument in the secondary financial markets. For example liquid Investments are like government bonds which are easy to trade therefore they charge a price or a liquidity premium in contrast to things like property.

Discuss market risk
Market risk refers to adverse moments in the value of equities currencies interest rates and commodities. Currency risk for example refers to the probability of receiving a reduced amount of a domestic currency when investing in a security that makes payments in a currency other than the portfolio's legal tender.

Discuss political risk
Political risk which is also called country risk comes from international and domestic political risk. For example for international investors they could expropriate assets and foreign exchange controls and domestic political risk arises from changes in legislation and taxes.

Discuss callability risk
Callability risk refers to the variability of return that derives from the possibility that Barns or preference shares may be called by the issuing firm.

Discuss convertibility risk
Convertibility risk is that part of the total variability of return of a convertible Bond or a convertible preference share that reflects the possibility that the Investment may be converted into the issuer's ordinary shares at times or under terms which prevent the Investor from achieving his required rate of return.

Discuss total risk
Total risk may be divided into two parts known as non systemic risk sometimes called company-specific or diversifiable risk and systemic risk sometimes called market or non-diversifiable risk. Therefore total risk is equal to non systematic risk + systemic risk

Discuss non systemic risk
Non systemic risk relates to events that affect individual companies such as the implementation of strategies such as innovation market development diversification and other activities unique to an individual firm because these events occurred somewhat independently, they can be largely diversified away.

Discuss systemic risk
Systemic risk includes general economic conditions, the impact of monetary and fiscal policies, inflation and political and other events that affect all firms. Therefore the only risk that a well diversified portfolio has a systemic risk.

- Comprehend the trade-off between risk and return (risk/return principle)

Define the required rate of return
This is the compensation of payments the Investor is willing to accept for the money he or she invests. The Investor takes into account time value of money/ time period of the investment, the inflation rate as well as the risk involved

What is the HPR

HPR which means the holding period return is one of the measures of the change and wealth resulting from an investment.
HPR = and value of Investments / beginning of investment

- A value greater than one indicates an increase in wealth or a positive rate of return.
- A value of nil would indicate the loss of all of one's money

What is the HPY
This is the holding. Yield which expresses their holding period return in percentage
HPY = HPR - 1

Assume an investment cost R1000 and is worth R1450 after 3 years full stop calculate the HPR and HPY
Answer:
HPR = End value of investment / Beginning value of investment = 1450/1000 = 1.45
Annual HPR = $1.45^{1/3}$ = 1.1319
Annual HPY = 1.1319 - 1 = 13.19% rounded to 13.2%

Discuss the distinction between the required rate of return and the expected rate of return
The required rate of return is the minimum rate of return that one should accept from an investment to compensate for the time value of money inflation and risk. The expected return is a weighted average of all possible expected Returns where the weights are the probabilities assigned to each potential that could be achieved.

- Calculate historical returns by means of the holding period return and holding period yield
- Calculate the expected return for an individual investment

How do you calculate the expected return
The expected return is calculated by multiplying the probabilities of occurrence by the associated outcomes.

Expected Return = Sum of all Weighted value
Weighted value = (Probability of state occurring * Associated rate of return)

- Calculate the variance and standard deviation for an individual investment

What is standard deviation
The standard deviation is a measure of total risk. It measures how tightly the probability distribution is centred around the expected value.

How do you calculate the standard deviation

First you need to calculate the Variation

	A = Associated rate of return	B = Expected return of Company x	A - B	B **2 * Probability of state occurring	Answer
1					
2					
3					
					Sum of column = Variation (σ ** 2)
				Standard deviation = square root of Variance	

What does “the bigger the spread of distribution” mean?
The bigger the spread of the distribution, the larger the standard deviation. In other words, the larger the standard deviation the larger the risk.

When is standard deviation a good measure and when is it not?
The standard deviation is a good measure for a non diversified portfolio. For a diversified portfolio it is not the appropriate measure.

- Calculate the coefficient of variation as a measure of risk per unit of return

What is the Coefficient of variation?
The Coefficient of variation is a measure of relative dispersion that is useful in comparing the risk of assets with different expected returns

How do you calculate the Coefficient of Variation and if the CV is lower what does that mean?
CV = standard deviation / expected return
Assuming the investor is risk averse, they would prefer the asset with a lover CV because that would mean it has less risk per unit.

- Explain diversification and its effect on the systematic risk of a portfolio

Explain diversification…
Diversification refers to a method of reducing the unsystematic risk of a portfolio by investing in various assets classes.

What is the single most important determinant of return of a portfolio?
Asset allocation

- Define asset classes and distinguish between various kinds of asset classes

What are the main asset classes?
The main asset classes are equity investments(dividend-earning investments), bonds (interest earning investments), real estate (rent earning investment) and cash. They can be divided into two groups, real assets and financial assets.

What are the characteristics of real assets and financial assets?

- It does not have the same liquidity as a financial asset. Liquidity here refers to the ability to convert the asset to cash relatively quickly at the price close to fair market value
- Information on its value is not always readily available.
- Characteristics of financial assets are the opposite.

What are financial assets?
Financial assets represent legal claims to some future benefit and are also called financial instruments and securities.

What are bonds?
Bonds are securities (contracts) that raise debt financing for private firms or public utility firms.

Name the different kinds of bonds?

- Secured bonds
- Mortgage bonds
- Collateral trust bonds
- Equipment trust certificates
- Debentures
- Bonds - Senior or subordinated
- Income bonds
- Convertible bonds
- Treasury bonds
- Zero-coupon bonds

What are secured bonds?
Secured bonds off assets as collateral should the issuing firm not be able to meet its obligation.

What are mortgage bonds?
Mortgage bonds are backed by liens(a right to keep possession of property belonging to another person until a debt owed by that person is discharged.) on specific assets, such as land and buildings. In the event of bankruptcy, the assets will be sold and the proceeds will be used to pay off the mortgage bondholders.

What are Collateral trust bonds?
Collateral trust bonds are mortgage bonds of a kind, except that the assets backing the bonds are financial assets, such as shares and high-quality bonds.

What are equipment trust certificates?
Equipment trust certificates are mortgages bonds secured by specific equipment, such as the aircraft of an airplane.

What are debentures?
Debentures are promises to pay interest and principle, but they pledge no specific assets as collateral in the event of the firm not fulfilling its promise.

What are bonds that are senior or subordinated?
A senior secured bond has the lowest risk of distress or default, because investors in these bonds have higher priority claims to the assets in case the borrower goes bankrupt.
Subordinated bonds are similar to debentures but in the case of default subordinated bondholders enjoy claims to assets of the Firm only after the Firm has satisfied the claims of all senior secured Bond and debenture holders.

What are income bonds?
Income bonds stipulate interest payments schedules, but the interest is due and payable only if the borrower earns income to make the payment by the stipulated dates. If the firm cannot pay it

is regarded as arrears. So when the money is earned the interest must be paid off. This is not as safe as a mortgage bond so there is an added risk premium.

What are convertible bonds?
Convertible bonds have the interest and principal features of other bonds with the added characteristic that the bondholder has the option to return them to the firm in exchange for ordinary shares.

What are treasury bonds?
Treasury bonds are government securities with maturities of more than ten years that pay interest periodically. Sometimes these government bonds are also called gilts.

What are Zero-coupon bonds?
Zero-coupon bonds promise no interest payments during the lifetime of the bond, but only the principal at maturity. So if the bond is promising to pay R100 000 in five years from now at a required return of 8% and assuming semi-annual compounding, the bond with have to be sold at R67 556.43
FV = R100 000
4 I/YR
N = 10
Compute PV

- Distinguish between unit trusts, investment trusts and hedge funds as investment alternatives

What are unit trust companies and how do they ensure that they are adequately diversified?

- Unit trust companies receive investors' money, usee sub-shares(units) to investors, pool the money and invest it on the behalf of unit holders in diversified portfolios consisting of various securities.
- To ensure that unit trusts are adequately diversified, unit trust managers are required to invest no more than 5% in any security.

What are investment trusts?
Investment trusts receive investor's money after selling ordinary shares of the company to them. The investors' money is pooled and invested on their behalf in various securities

What are the differences between unit trusts and investment trusts?

Unit trusts	**Investment trusts**
May not invest more than 5% in any security	Freedom to invest in accordance with the

	investment strategy of the trust
Not listed on an exchange	Listed share on the JSE
Price determined by trust deed and depends on value of underlying securities	Price determined by supply and demand

Describe a Hedge fund?
Hedge funds may be described as a pool of private capital structured as a limited partnership with the objective of consistently achieving returns exceeding market returns under all market conditions by investing in any asset class and by using any investment strategy, including leverage, derivatives and arbitrage.

Who are the participants of a hedge fund?
Participants in a hedge fund consists of the investors (called the limited partners) and the investment manager(called the general partner).

What are the differences between unit trusts and hedge funds?

Unit trusts	**Hedge fund**
May not invest more than 5% of its assets in any one security	Freedom to invest in accordance with the investment strategy of the fund
Managed by a fund manager, who gets paid regardless of whether investors gain or lose	Managed by a general partner who earns fees based only on investors 'profits, not losses
Allowed to advertise	Not allowed to advertise
Available to the general public	Available to high-net-worth individuals and institutions (satisfying certain requirements) by a confidential offering memorandum and partnership agreement
Traded daily	Illiquid, may not be able to redeem at any time
Small fee to redeem	Usually a lock-in period to prevent aborting an strategy
No limit on the number of investors who can invest in the fund	A private pool of investment capital, limited to the partners.

- Explain the benefits, constraints and costs of international diversification

What are the benefits of international diversification?
Solnik and Mcleavey (2014) identify the following two benefits of international diversification:

- Risk is reduced
- The risk-adjusted return of the portfolio is improved

What are the constraints and costs of international diversification?
Solnik and McLeavey (2014) also identify the following constraints and costs of international investment:

- Unfamiliarity with foreign markets
- Regulations.
- Market efficiency
- Risk perception
- Cost

- Explain the investment management process

Explain the investment management process

The Investment Management Process has 6 Steps

1. Establish investment objectives and constraints
    a. The investment objective depends on the investor. If the investor is an individual the objective is influenced by the phase of his or her life cycle. Generally, there is an inverse relationship between age and risk tolerance.
2. Establishing investment policy
    a. An investment policy statement (IPS) is a written statement which guides and controls investment decision making because it represents the long term objectives of the investor, with due cognisance of the objective and constraints of the investor.
3. Selecting a portfolio strategy
    a. An active portfolio strategy uses information and forecasting techniques to seek a better performance than would be expected from a well diversified portfolio of securities. A passive portfolio strategy involves minimal expectational input and relies instead on diversification to match the performance of some market index like the JSE.
4. Selecting assets

    a. This involves the construction of an efficient portfolio. An efficient portfolio is one that provides the greatest return for a given level of risk. The assets may be selected based on fundamental and technical analysis.
5. Measuring and evaluating performance
    a. This involves measuring the portfolio performance and comparing it to an appropriate benchmark. Normally the benchmark(s) would be indicated in the IPS.
6. Start again

Self-assessment questions

investment may be regarded as buying:

a. Ordinary shares for the sake of enjoying risk and accepting any return
b. Ordinary share in the hope of making a quick profit based on a presumption
c. Real estate, ordinary share and bonds based on fundamental analysis in order to increase one's wealth over the long term
d. Real estate for its liquidity and availability of information about its value.

C is the answer. Investment may be regarded as buying real estate, ordinary shares and bonds based on fundamental analysis in order to increase one's wealth over the long term.

The most important determinant of wealth creation is:

a. Fundamental analysis
b. Technical analysis
c. Asset allocation
d. Portfolio management

C - Asset allocation is the most important determinant of portfolio performance..

The beginning value of an investment in the Satrix 40 share is R500. After 3 years the ending value is R760. The annual holding yield (HPY) is closest to:

a. 1.52%
b. 14.96%
c. 20.48%
d. 26.00%

B - The annual holding period yield is closest to 14.96%.
HPR = 760 / 500 = 1.52
Annual HPR = 1.52**⅓ = 1.1498
Annual HPY = 1.1498 - 1 = 0.1496 = 14.98%

The real risk-free rate of return (RRFR) is 3% and the expected rate of inflation (EI) is 4.5%. The nominal risk-free rate of return (NRFR) is equal to:

a. 1.500%
b. 7.635%

c. 9.259%
d. 13.500%

B - NRFR = [(1 + 0.03)(1 + 0.045) - 1] * 100 = 7.635%

A retired investor has R1.2 million to invest. The investor should invest in:

a. Ordinary shares only
b. Ordinary share, art and antiques
c. Real estate and money market funds,
d. ordinary shares, warrants and antiques.

C - The investor should invest real estate and money market funds (based on capital preservation and liquidity needs at this stage of the life cycle).

Evaluate the riskiness of the following two investments by calculating the following for each of the alternatives:

a. The expected return
b. The standard deviation
c. Coefficient of variation (CV)

Investment A	**Probability**	**Associated return**
Boom	0.3	25%
Normal	0.4	20%
Recession	0.3	10%

Investment B	**Probability**	**Associated return**
Boom	0.3	16%
Normal	0.4	12%
Recession	0.3	8%

Investment A - a) 18.5% b) 5.9371710435 c) 0.3209281645
Investment B - a) 12% b) 3.098386677 c) 0.2581988897

Your rate of return expectations for the shares of Gray Disc Company during the next year are:

GRAY DISC COMPANY	
Possible rate of return %	**Probability %**
–10	25
00	15
10	35
25	25

Calculate the expected return on this investment, the variance of this return and its standard deviation.
ER = 7.25%
Variation = 0.0164
Standard deviation = 0.128

Under what conditions can the standard deviation be used to measure the relative risk of two investments?
Standard deviation can be used as a good measure of relative risk between two investments that have the same expected rate of return.

Under what conditions must the coefficient of variation be used to measure the relative risk of two investments?
The coefficient of variation must be used to measure the relative variability of two investments if there are major differences in the expected rates of returns.

Your rate of return expectations for Kayleigh Computer Company during the next year are:

KAYLEIGH COMPUTER COMPANY	
Possible rate of return %	**Probability** %
–60	15
–30	10
–10	5
20	40
40	20
80	10

Calculate the expected return on this investment, the variance of this return and its standard deviation.
ER = 11.50%
Variation =0.16225
Standard deviation = 0.403

On the basis of expected return alone, discuss whether Gray Disc or Kayleigh Computer is preferable. Gray ER = 7.25% -- Kayleigh ER = 11.50%
Based on the ER alone, Kayleigh's shares are preferable because of the higher return available.

On the basis of standard deviation alone, discuss whether Gray Disc or Kayleigh Computer is preferable. Gray SD = 0.128 -- Kayleigh SD = 0.403
Based on the standard deviation alone, Gray's shares are preferable because of the likelihood of obtaining the expected return.

Note: A high **standard deviation** shows that the data is widely spread (less reliable) and a low **standard deviation** shows that the data are clustered closely around the mean (more reliable).

Calculate the coefficient of variation (CVs) for Gray Disc and Kayleigh Computer and discuss which share return series has the greater relative dispersion.
Gray
ER = 7.25%
Variation = 0.0164
Standard deviation = 0.128

Kayleigh
ER = 11.50%
Variation =0.16225
Standard deviation = 0.403

Gray CV = 1.77
Kayleigh CV = 3.50
Based on CV, Kayleigh's return has approximately twice the relative dispersion of Gray's return. Gray has less risk per unit of expected return than Kayleigh

Assume the expected rate of inflation is 6% and the real risk-free rate is 7%. Calculate the nominal risk-free rate of return (NRFR).
13.47%

What is a warrant?
Warrants are derivative securities that give the holder the right to buy a stated number of ordinary shares of the issuing company at a specific price, called the exercise price, during the life of the warrant. Warrants (called warrants only) are issued by a company whose own ordinary shares are the underlying asset. Upon exercise, new shares are issued by the company, diluting the value of existing shares. This is in contrast to covered warrants (call, put and exortic warrant structers), which are issued by large financial institutions over the share of other companies. No new shares are issued.

Name the fundamental principles of investing.
The fundamental principles of investing are the time value of money, risk and return, and diversification.

Which of the following statements is FALSE?
1. Hedge funds are not allowed to advertise.
2. Unit trusts are managed by fund managers whose payment is dependent on whether investors have a gain or lose in their portfolio
3. Hedge funds have a private pool of investment capital limited to the partners.
4. Investment trusts have the freedom to invest in accordance with the investment strategy of the trust.

2 - Unit trusts are managed by fund managers who are paid regardless of whether investors gain or lose.

What type of risk/s does a portfolio that is not well-diversified have?
1. Systematic risk
2. Non-systematic risk
3. Liquidity risk
4. Systematic and non-systematic risk

4 - Systematic and non-systematic risk

- Systematic risk includes general economic conditions i.e., the impact of monetary and fiscal policies, inflation and political and other events that affects all firms.
- Non-systematic risk related to events that affect individual companies for example the implementation of strategies on innovation, market deployment and other activities unique to an individual firm.
- Systematic risk remains whether a portfolio is formed or not. The only risk a well-diversified portfolio has is systematic risk. Hence contribution of any security to the risk of a portfolio constitutes its systematic risk.

Study unit 2 - Organisation and functioning of securities markets

- Describe the characteristics of a well-functioning securities market

What is a market?
A market is simply the means by which buyers and sellers are put in contact with one another for the purpose of trading goods and/or services.

What is a securities market?
A securities market enables buyers and sellers to trade securities (financial assets).

What are the characteristics of a well-functioning securities market?

1. Availability of information
    a. In order to determine an appropriate price, participants must be able to timeously and accurately determine the volume and prices of past transactions and all current bids and offers. Well-functioning markets offer timely and accurate information on the price, volume and prevailing bid and ask prices.
2. Liquidity and price continuity
    a. Liquidity here refers to assets which can be bought and sold quickly at a price close to the prices of previous transactions. Price continuity means prices do not change much from one transaction to the next unless substantial new information becomes available. This required depth which means numerous potential buyers and sellers must be willing to trade at prices above and below the prevailing market price.

3. Transaction cost
    a. In a well-functioning market, transactions can be concluded at low costs, including the cost of reaching the market, the actual brokerage cost and the cost of transferring the asset.
4. External efficiency (information efficiency)
    a. In a well-functioning market, prices rapidly adjust to new information. The prevailing prices are regarded as fair because they reflect all available information about the assets and hence the expected returns implicit in the current price of each security will reflect its risk.

How is a market informationally efficient?
A market is informationally efficient if the following apply:

- A large number of competing, profit-maximising, independent participants analysis and value securities.
- New information arrives randomly
- The competing investors attempt to adjust prices rapidly to reflect the new information

- Distinguish between exchange markets, over-the-counter markets and other related markets

What are over-the-counter markets?
The “Third market” describes OTC trading of listed shares by involving a broker. This market may be used by investors to trade shares that are either suspended on the exchange or while the exchange is closed.

What is the “Fourth Market”?
Fourth Market describes directing trading of securities between two parties with no intermediary broker. This simply involves the sale of securities directly between individuals or institutions at a mutually acceptable price (normally the prevailing price on the exchange).

- Distinguish between primary and secondary capital markets, and explain how secondary markets support primary markets

What do primary markets sell?
A primary market sells newly issued securities of companies (“new issues”) and is also involved in initial public offerings (IPOs).

What is the secondary market?
The financial market serves as a secondary market once the shares are traded among investors.

How do the secondary markets support primary markets?
The secondary market supports the primary market by giving investors liquidity, price continuity and depth. The secondary market also supports the primary market by providing information about current prices and yields

- Compare and contrast the characteristics of South African securities markets, including membership and types of orders

How does one become a member of the JSE?
To become a member of the jSE one must satisfy the requirements laid down by the Rules and Directives of the Exchange and by the Stock Exchange Control Act 1985 (as amended)
A broker must also be a member of the South African Institute of Stockbrokers. To qualify for membership, applicants must, *inter alia*

- Be at least 21 years of age
- Have passed the membership exam
- Be fit and proper in terms of criteria as determined by the Institute
- Have been continuously employed by a member of the JSE for at least six months

What are the five major types of transactions that investors can enter into?

- Market orders
    - Orders to buy and sell securities at the best prevailing price. Investors often indicate “sell at best” or “buy at best” for these transactions.
- Limit orders
    - Specify the buy or sell price.
- Short sales
    - Short sales involve the sale of shares the investor does not own with the intention of buying them back at a lower price at a later stage. He would have to borrow them from another investor, sell them in the market and subsequently replace them at (hopefully) a price lower than the price at which he sold them. Usually only be made on the uptick trade.
- Special orders
    - Special orders include a stop loss order and stop buy orders. A stop loss order is a conditional market order that directs the trade should the share price decline to a predetermined level.
- Margin transactions
    - MArgin transactions involve the use of borrowing (leverage) to pay for shares purchased, while the balance is paid for in cash.Buying on margin means the investor pays for the shares with some cash and borrows the rest from the broker while making the shares available as collateral.

- Contrast equity market indices and bond market indices

What are the five markets the JSE offer?
The JSE offers five financial markets, namely:

- Equities
- Bonds
- Financial derivatives
- Commodity derivatives
- Interest rate derivatives

What are the principle requirements for a listing on the JSE (june 2016)?
Criteria for the main board

- MInimum subscribed capital - R50 million
- Minimum equity shares issued - 25 million
- Percentage held by the public 20%
- An audited profit history for the previous three years of which the last shows a profit before tax of at least R15 million

- Distinguish among the composition and characteristics of the three predominant weighting schemes used in constructing market indices

What are secondary market indices used for?
Secondary market indices are used for the following purpose:

- As a benchmark to evaluate the performance of professional portfolio managers. Any investor should be able to randomly select shares and bonds and earn a return comparable to the market return.
- To create and monitor an index fund. The objective of an index fund is to track the performance of the specified index over time and to at least achieve similar rates of return.
- To measure market rates of return in economic studies.
- To predict future market movements.. Technical analysts believe past price changes can be used to predict future movements.
- As a proxy for the market portfolio of risky assets when calculating the systematic risk of an asset.

What are the factors used in constructing an index?
The factors used in constructing an index are the following:

- The size, breadth and source of the sample. The sample should be representative of the total population.
- The weight given to each constituent of the sample. The weighing scheme may be price-weighted series ro a value-weighted series or an equally weighted series.

- The calculation procedure, whether it is an arithmetic average or geometric average of the constituents, or an index that reflects all changes reported in terms of the basic index.

The weighting scheme may be one of the following.

- A value-weighted series calculated by determining the initial total market capitalisation of all shares used in the series:
    - MARKET CAPITALISATION = NUMBER OF SHARES ISSUED * PRICE PER SHARE
- A price-weighted series in an arithmetic average of current prices, which means that index movements are influenced by the differential prices of the constituents. The price index is defined as the total market capitalisation divided by the index divisor, referred to as the k-factor
    - INDEX VALUE - TOTAL MARKET INDEX / INDEX DIVISOR
- An equally weighted series (or unweighted series) in an index of shares where each share carries an equal weight regardless of its price or market value.

- Explain the major changes that have occurred in global securities markets

What are the major changes that have occurred during the past two decades in the global securities markets?

- Negotiated (competitive) commissions
- The influence of block trades
- The influence of share price volatility
- New exchanges and consolidations
- Increased automation.

A market is efficient if:

a) Timely and accurate information is available
b) A large number if participants analysis and value and value securities
c) Price continuity does not prevail
d) A & B above

D - A market is efficient if, *inter alia,* timely and accurate information is available and a larger number of participants analyse and value securities.

The trading of securities directly between two institutions take place in the :

a) Primary market
b) Secondary market
c) Third market
d) Fourth market

D - SHare are traded directly between institutions in the so-called fourth market.

Mr A L calls his broker and instructs that 1000 Old M shares be sold at 1660. ASsume Old M shares are currently trading at 1650. Mr A L expects the share price to decline to 1600 and borrows the share from RMB Asset Managers. This is an example of

a) Limit order
b) Short sale
c) Margin transaction
d) Special order

B - It is an example of a short sale

A market index may be used for ….. and should be ……

a) benchmarking l representative of the population
b) Predicting movements; reflective of all changes in the economy
c) Measuring rates of return representative of the sample
d) Creating an index fund registered with the Financial Services Board

A - A market index may be used for benchmarking and should be representative of the population.

“Soft dollars” refers to the:

a) Weakening of the dollar against the pound sterling
b) Paying of higher brokerage by a fund manager so that his clients may receive investment research reports.
c) Paying of higher brokerage by an investor so that his fund manager may obtain investment research reports
d) Weakening of the dollar against the rand.

C - “Soft dollars” means an investor pays higher brokerage so that his fund manager may receive investment research reports from the broker.

Define *market* and briefly discuss the characteristics of a good market.

A market is a means whereby buyers and sellers are brought together to aid in the transfer of goods and/or services. While it generally has a physical location, it need not necessarily have one. Secondly, there is no requirement of ownership by those who establish and administer the market. They need only provide a cheap, smooth transfer of goods and/or services for a diverse clientele.

A good market should provide accurate information on the price and volume of past transactions, and current supply and demand. Clearly, there should be rapid dissemination of this information. Adequate liquidity is desirable so that participants may buy and sell their goods

and/or services rapidly, at a price reflecting the supply and demand. The costs of transferring ownership and middleman commissions should be low. Finally, the prevailing price should reflect all available information.

Define liquidity and discuss the factors that contribute to it. Give examples of a liquid and an illiquid asset, and discuss why they are considered liquid and illiquid.

Liquidity is the ability to sell an asset quickly at a price not substantially different from the current market price, assuming no new information is available. A share of Anglo American PLC (ANG) is very liquid, while an antique would be a fairly illiquid asset. A share of ANG is highly liquid since an investor could convert it into cash within a fraction of a percentage point of the current market price. An antique is illiquid since it is relatively difficult to find a buyer, and then you are uncertain as to what price the prospective buyer would offer.

If you place a stop-loss order to sell 100 shares of ABSA at R55 when the current price is R62, how much will you receive for each share if the price drops to R50?
The stop-loss ensures a selling price close to R55.

Which one of the following orders is most useful to short sellers who want to limit their potential losses?

1. Limit order
2. Restricted order
3. Limit-loss order
4. Stop-buy order

4 - The stop-buy sets a certain buy-back price to limit the potential loss from a short-sale.

Study unit 3 - Developments in investment theory

Learning outcomes

- Define and discuss an efficient capital market

Define an efficient market…

An efficient market may be defined as one which the prices of securities adjust rapidly to the arrival of new information. This implies that the current prices of securities reflect all the information about a security.

What are the assumptions of the efficient market?

- It requires a large number of independent, competing, profit-maximising participants who analyse and value securities.
- New information regarding securities comes to the market in a random fashion. The timing of the announcements is independent.
- The competing investors attempt to adjust security prices rapidly to reflect the effect of the new information. It is also assumed that the adjustment is unbiased.

- Describe and contrast the forms of the efficient market hypothesis (EMH)

Name and describe the forms of the efficient market hypothesis (EMH)...
There are three forms of the efficient market hypothesis:

- **The weak**
  - The weak form assumes that the current security prices fully reflect all security information. Security information includes security prices trading volume and rate of return.
- **The semi-strong**
  - The semi-strong form assumes that security prices adjust rapidly to all public information. It encompasses the weak form because all the market information is considered to be public.
- **The strong**
  - The strong form assumes security prices fully reflect all information, from both public and private sources.

What is public information?
Public information is regarded as market information plus information such as economic and political news, as well as news about mergers and acquisitions, earnings and dividend announcements.

- Explain the implications of efficient markets for the portfolio management process and the role of the portfolio manager

Explain the implication of an efficient market for the portfolio management process and the role of the portfolio manager.
The efficient market theory has implications for investment analysts and portfolio managers. Portfolio managers can either manage portfolios actively or passively (buy-and-hold). Normally the passive strategy is pursued if the portfolio manager does not have superior analysis, nor the time and ability to do asset allocation in order to be a superior investor. In that event the portfolio manager would have to…

- Establish risk preferences and construct a portfolio that matches the acceptable risk level
- Completely diversify so that the portfolio performance moves in live with the market.
- Minimise transaction costs by minimising taxes, liquid securities (to avoid losses due to illiquid securities). Liquid securities are normally those included in the calculation of indices.

Given the above-mentioned considerations, is that the equity portfolio manager without superior analysis, time and ability to do asset allocation should set up an index fund also called a market fund.

What is an index fund?
An index fund is a portfolio designed to duplicate the composition and performance of a selected market index series such as the ALL Share Index, the Financial Index (FINI), the Gold Index (GLDI) or Industrial Index (INDI) of the JSE.

- Explain the rationale for investing in index funds
- Define risk aversion

What does the security market line (SML) reflect?
The SML reflects the best combinations of risk and return available on alternative investments.

What are the 3 changes which may occur with respect to the SML?
The three changes that may occur with respect the SML:

- **Movement along the SML**
    - Would be due to a change in the perceived risk of an investment.
    - The consequence is that an investment is now required to generate a higher return if it is to remain an attractive investment alternative.
- **Changes in slope of the SML**
    - This is caused by the change in the return required per unit of risk.

    - The change occurs because the market risk premium is not consistent over time. If the market risk premium changes, this will affect the required return for every risk asset even if there is no change in each asset's risk profile
- **Parallel shift in the SML**
    - Will occur if there was a change in the nominal risk-free rate.
    - This shift would affect the return required on all assets.

- List the Markowitz Portfolio Theory's assumptions about individuals's investment behavior

What is the Markowitz efficient frontier?
The Markowitz efficient frontier represents that set of portfolios (of risk investments) that has the maximum return for every given level of risk, or the minimum risk for every level of return.

What are the two most common theories about asset pricing?
The capital asset pricing model (CAPM)
The arbitrage pricing theory (APT)

What is the Capital asset pricing model?
THE CAPM indicated the return an investor should require from a risk asset assuming that he is exposed only to the asset's systematic risk as measured by beta. The rationale is that for any level of risk, the SML indicates the return that could be earned by using the market portfolio and the risk-free asset.

What are the assumptions of capital market theory?

- Investors are risk averse and rational. Each investor wants to invest somewhere on the efficient frontier in line with his required risk and return levels.
- Investors can borrow or lend any amount at the risk-free rate (Rf)
- Investors have homogeneous expectationsL in other words, they estimate identical probability distributions for future rates of return.
- Investors have the same one-period time horizon, which could be a month, six months or a year.
- Investments are infinitely divisible. This means one is able to buy or sell fractions of an asset or portfolio.

- There are no taxes or transaction costs involved in buying or selling assets.
- There is no inflation or any change in interest or inflation rates is fully anticipated.
- Capital markets are in equilibrium; in other words, all assets are properly priced in line with their risk levels.

- Describe the efficient frontier and explain the implications for incremental return as an investor assumes more risk
- Define the security market line (SML) and discuss the factors that cause movements along, changes in the slope of, and shifts of the security market line
- List the assumptions of the capital market theory
- Explain what happens to the expected return, standard deviation and returns, and possible risk-return combinations when a risk-free asset is combined with a portfolio of risky assets
- Identify the market portfolio and describe the role of the market portfolio in the formation of the capital market line (CML)
- Define systematic risk and unsystematic risk
- Describe the capital asset pricing model (CAPM), draw a diagram of the security market line (SML) and define beta(β)

What is the equation used in CAPM?
The equation used in CAPM is:
Required return = Rf + βi (km - Rf)
Rf = the risk-free rate of return
βi = beta of asset i
Km = return on the market portfolio

How do you find the market risk premium?
Return on the market portfolio - the risk-free rate of return

What is the equation for the beta of an individual security
Beta = Systematic risk of security i / Market risk

What is the beta of a portfolio and how can it be calculated?

The βp is the weighted average of the individual betas.

The beta of the portfolio may be calculated as:
βp = (Security Value / Total Value of all securities * beta of asset i) + …...

Explain the graphical interpretation of beta

- If β = 1, the asset has the same systematic risk as the market
- If β = 0, the asset has no systematic risk
- If β > 1, the asset has more systematic risk than the market
- If β < 1, the asset has less systematic risk than the market

- Calculate and interpret using the SML, the expected return on a security and evaluate whether the security is undervalued, overvalued or properly valued

How is a security considered to be undervalued?
Any security with an estimated rate of return that plots above the SML is considered to be undervalued and vice versa.

- Describe the arbitrage pricing theory (APT)

What are the three major assumptions of the APT (arbitrage pricing theory)?

- Capital markets are always perfectly competitive
- Investors always prefer more wealth to less wealth
- The stochastic process generating asset returns can be presented as a k-factor model

Compare the CAPM and APT

CAPM	APT
Only considers one factor influencing an asset's return, namely the beta	Considers many factors that may influence an asset's return
Assumes that unique risk can be diversified away in a large portfolio	Issues that unique risk is diversified away in a large portfolio

Self assessment questions

For a portfolio consisting of two shares, the most preferred correlation coefficient between the two shares should be:

a) -1
b) 0
c) +0.5
d) +1

Answer: a - which is -1, because one would want to combine assets with a negative correlation

The SML depicts:

a) The market portfolio as the optimal portfolio of risk securities
b) A security's expected rate of return as a function of its systematic risk
c) The relationship between a security's return and the return of an index
d) The complete portfolio as a combination of the market portfolio and the risk-free asset.

Answer: b - the SML depicts a security's expected rate of return as a function of its systematic risk.

The covariance between share A and the market is 0.9 and the variance of the market is 0.8. The beta of the share equals:

a) 0.10
b) 0.20
c) 0.88
d) 1.13

Answer: D - 0.9 / 0.8 = 1.125 = 1.13

A security with a beta = 0 is an asset with:

a) More systematic risk than the market
b) Less systematic risk than the market
c) No systematic risk
d) The same systematic risk as the market

Answer: c - A security with a beta = 0 is an asset with no systematic risk

An analyst has gathered the following information:
Expected return on the market = 15%
Risk-free rate = 8%
Estimated rate of return of Nedcor share = 17%
Beta of Nedcor = 1.25
Based on the above-mentioned information, which of the following statements is correct> the Nedcor share is:

a) Properly valued
b) Overvalued by 0.25 percentage points
c) Undervalued by 1.40 percentage points
d) Undervalued by 0.25 percentage points

Answer: D - Required return = 8% + 1.25(15% - 8%) = 16.75%
Required return < estimated return, share is undervalued by 0.25 percentage points

Key concepts

- Arbitrage pricing theory (APT)
- Asset pricing models
- Beta (β)
- Capital asset pricing model
- Capital market line
- Capital market theory
- Efficient market
- Efficient frontier
- Efficient market hypothesis
- Fundamental analysis
- Investment theory
- Markowitz Portfolio Theory
- Overvalued
- Properly/fairly valued
- Risk aversion
- Risk and return
- Risk-free asset
- Security market line (SML0
- Semi-strong EMH
- Standard deviation
- strong -form EMH
- Systematic risk
- Technical analysis
- undervalued
- Unsystematic risk
- Weak-form EMH

Study Unit 4 - The time value of money

Draw the Adjustment to periods and interest payable arising from intra-year compounding table

Compounding during a one year period	**Adjustment to number of periods**	**Adjustment to interest rate**	**Explanation**
Semi-annually	N x 2	I/YR / 2	Instead of the nominal interest rate being paid once a year, one-half of the interest rate is paid twice a year
Quarterly	N x 4	I/YR / 4	Instead of the nominal interest rate being paid once a year, one-quarter of the interest rate is paid four times a year
Monthly	N x 12	I/YR / 12	Instead of the nominal interest rate being paid once a year, one-twelfth of the interest rate is

			paid twelve times a year
Weekly	N x 52	I/YR **/** 52	Instead of the nominal interest rate being paid once a year, one fifty-second part of the interest rate is paid fifty-two times per year
Daily	N x 365	I/YR **/** 365	Instead of the nominal interest rate being paid once a year, one three-hundred-and-sixty-fifth part of the interest rate is paid three-hundred-and-sixty-five times per year

What are the 2 types of annuity?

- Ordinary annuity
    - consists of amount received or deposited **at the end of each period**
- Annuity due
    - Consists of amounts deposited of received at **the beginning of each period**

Calculate the future value of R12 000 invested annually (at the end of each year) for 5 years in succession earning 15% annual interest
PMT -12 000
I/YR 15
N 5
FV 80908.58

How do you set your calculator to calculate an **annuity due**?
First you set the calculator to **BEG** so that it assumes the cash flows occur at the beginning of each period.

You have the opportunity to receive R1000 one year from now. If you can earn 16% by investing the amount, what is the present value?
1000 **FV** 16 **I/YR** 1 **N** **comp PV** = 862.07

What is a perpetuity?
A perpetuity is an annuity with an infinite life . The perpetuity never stops providing its holder make continual annual payments at the end of each year.

What are the variations of future and present value techniques?
The three variations are:

- The calculation of the deposits needed to accumulate a future sum
- The amortisation of loans
- The determination of interest or growth rates

R100 000 will be required five years from now. You wish to make annual end-of-year deposits in an account paying an annual interest of 12%. Calculate the annuity.
100 000 **FV** 12 **I/YR** 5 **N** **comp PMT** 15 740.97

A firm borrows R6 000 000 at 14% and agrees to make equal annual end-of-year payments over ten periods. Calculate the payments

6 000 000 **PV** 14 **I/YR** 10 **N** **comp PMY** -1 150 281.25

A firm borrows R6 000 000 at 14% and agrees to make monthly payments over a ten year period. Calculate the payments

6 000 000 **PV** 14/ 12 = 1.1667 **I/YR** 10 years * 12 month = 120 **N** **comp PMY** 93 161.30 monthly payments

What is important to remember when calculating FV with your calculator?
That PV and PMT must be input as a negative

Determine the growth rate of the following stream of dividends received

Year	**Cash flow(cents)**
2009	160
2008	150
2007	145
2006	135

2005 161

Answer: -101 **PV** 160 **FV** 4 **N** **comp I/YR** 12.1888

How do you calculate NPV and IRR with a calculator?
For NPV you enter the I/YR and press down before comp and for IRR you simply comp after pressing cash

Self assessment

1. R10 000 is invested in a savings account at 20% p.a. Compound interest for ten years. Calculate the end value of the investment.

-10000 **PV** 20 **I/YR** 10 **N** **comp FV** 61 917.36

2. You invest R3600 per year for ten successive years (at the end of each year) in a savings account at 15% p.a. compound interest. What will be the end value in the savings account.

-36000 **PMT** 10 **I/YR** 20 **N** **comp FV** 73093.39

3. R10 000 is invested in a savings account for ten years at 20% p.a. compound interest, but the interest is calculated semi-annually. What is the end value of the investment?

-10 000 **PV** 10 **I/YR** 20 **N** **comp FV** 67 275(rounded)

4. Calculate the difference between the following investment proposals:
    a. R1000 is invested annually for 5 successive years at 10% p.a.
    b. R2051.85 is invested for 5 years at 20% p.a. compound interest.

A -1000 **PMT** 10 **I/YR** 5 **N** **comp FV** 6105.10
B -2051.85 **PV** 20 **I/YR** 5 **N** **comp FV** 5105.66

Difference is 999.44

5. You are to receive an amount of R1700 eight years from now. However if you could have received the amount right now and invested it you would have been able to earn 8% interest p.a. On the amount. What would the amount be worth if ouyd could receive it now instead of waiting eight years?

1700 **FV** 8 **I/YR** 8 **N** **comp PV** -918.46

6. Calculate the present value of R25000 received annually for ten successive years using a discount rate of 17%.

25 000 **PMT** 17 **I/YR** 10 **N** **comp PV** 116 465.09

7. What amount must be invested annually (at the end of each year) for five successive years at 12% p.a. compounded interest in order to yield R25000?

25 000 **FV** 12 **I/YR** 5 **N** **comp PMT** -3 935.24

8. Calculate the growth rate of the following stream of cash flows: ---
9. 2006: R1517 -- 2005: R1312 -- 2004: R1210 -- 2003: R1080

-1 080 **FV** 1517 **FV** 3 **N** **comp I/YR** 11.99

10. A bank has granted you a loan of R20 000. It has to be repaid at the end of each year over a period of ten years. The bank charges 14% interest per year on the loan. What is the amount payable at the end of each year in order to pay back the loan?

20 000 **PV** 14 **I/YR** 10 **N** **comp PMT** -3 834.27

11. What is the difference between R1000 invested at 10% p.a. compounded interest for five years if:
    a. Interest is calculated annually?
    b. Interest is calculated semi-annually?

A - -1 000 **PV** 10 **I/YR** 5 **N** **comp FV** 1 610.51
B - -1 000 **PV** 5 **I/YR** 10 **N** **comp FV** 1 628.90

Learning outcomes

- Explain an interest rate as the sum of a real risk-free rate, expected inflation and premiums that compensate investors for distinct types of risk

- Define and calculate nominal and effective rates
- Calculate and interpret the effective annual rate, given the stated annual interest rate and the frequency of compounding
- Solve time value of money problems (TVM) when compounding periods are other than annual
- Calculate the present vale (PV) of perpetuity
- Calculate and interpret the future value (FV) and PV of a single sum of money, ordinary annuity, annuity due, or a series of uneven/mixed cash flows
- Draw a timeline, specify a time index and solve problems involving the time value of money as applied, for example, to mortgages (loan amortisation) and savings for college tuition or retirement (deposits to accumulate a future sum)
- Show and explain the connection between present values, future values and series of cash flows
- Determine growth rates
- Calculate and interpret the net present value (NPV) and the internal rate of return (IRR) of an investment

Key concepts

- Amortisation
- Annual compounding
- annuity
- Compounding frequency/interval
- Continuous compounding
- Effective interest rates
- Future value
- Growth rates
- Internal rate of return (IRR)
- Intra-year compounding
- Net present value (NPV)
- Nominal interest rates
- Perpetuity
- Present value
- Series of cash flows
- Single amount

Study unit 5 - valuation principles and practices

Learning outcomes

- Differentiate between par value, market value, book value and fair (intrinsic) value

Define valuation
Valuation refers to the process of finding the so-called fair value of an asset.

Explain the different types of valuation concepts

- **Par value**
  - Known as also the face value, is an arbitrarily assigned value of a financial asset. It is the value at which a financial asset is originally issued in the primary market.
- **Market value**
  - Once a share is traded on the secondary market, its value is determined by what people are willing to pay for it and what the holder is willing to accept.
  - Two concepts associated with market value are
    - Market value added - the amount by which the ordinary share of a firm have increased in market value over a certain period
    - Market capitalisation - the number of shares which have been issued by a firm multiplied by the market value per share
- **Book value**
  - Used for both non-current assets and ordinary shares
    - Book value for non-current assets is the value of assets such as land, buildings plant and equipment indicated on a firm's statement of financial position.
    - Book value of ordinary shares is the par value per share times the number of share issued, plus cumulative retained earnings, plus capital contributed in excess of par
- **Fair (intrinsic) value**
  - Intrinsic value of any asset by mean of the generic valuation model.

- Identify the required input variables for valuation purposes

What are the required input variables for valuation purposes?

- Cash flows (returns)
- Timing
- Discount rate

How can the growth rate be calculated?
g = ROE * retention ratio
g = ROE * (1 - payout ratio)

What is the Yield to maturity and how do you calculate it with an equation and a calculator (YTM)?
Yield to maturity refers to the rate of return investors earn if they by a bond at a specific price and hold it until maturity

Approximate yield = I + ([M - DB0] / n)
I = the annual interest (as an amount)
M = the par value
DB0 = the current value of the bond
N = the years to maturity

With calculator
N = input number of years
PMT = input the amount of interest
FV = input maturity value (normally trading at)
+- PV = input the present value (normally issued at)
comp I/YR

What is the equation to determine the value of a preference share & when should an investor consider buying it?
Vp = Dp / kp

Vp = value of preference share
Dp = dividend of preference share
Kp = required rate of return on preference share

An investor should consider buying the share if it trades at a price below the Vp.

Apply the generic model to ordinary shares:

$$\sum_{t=1} \frac{DPS_t}{(1+k)^t}$$

What is the Constant growth model
The constant growth model is also known as the Gordon growth model or dividend discount model (DDM):

Value of share = DPS1/(k - g)
Where:
DPS1 = dividends per share expected one year from now

k = required rate on return of ordinary share
g = constant annual growth rate

What are the limitations to the DDM(dividend discount model)?

- It is relevant only to firms growing at a constant and perpetual rate
- As the growth rate (g) converges with the discount rate (k), the value goes to infinity
- In line with the above, if the growth rate (g) exceeds the required rate of return (k), the value of the share cannot be determined.

When is the DDM(dividend discount model) appropriate for valuation?
The DDM is appropriate for the valuation of a firm that has the following features:

- Stable earnings growth rate at or below the nominal growth rate in the economy
- Well-established dividend payout policy that is likely to continue into the future.
- A payout ratio consistent with the assumption of stability
- Stable leverage and beta

What provisions does the two-stage dividend discount model make and how do you calculate?
This model makes provision for two stages of growth:

- An initial phase of extraordinary growth
- A subsequent steady state of no growth or stable growth

To calculate

STEP 1: Determine the expected future cash flows

D0 = 15
D1 - 15(1.12) = 16.80
D2 - 16.80(1.12) = 18.82
D3 - 18.82(1.12) = 21.08
D4 - 21.08(1.10) = 23.19 - the year after expected

P3 = Cash flow of year expected / (dividend percentage beginning - dividend percentage when it drops)
P3 = 23.19 / (0.15 - 0.10)

STEP 2: Calculate the intrinsic value
CF0 = 0
CF1 = year 1 cash flow
CF2 = year 2 cash flow ….
CF(last) = last year + P3
Then cash

I/YR = Shareholder required return
Then comp NPV

What are the limitations of the two-stage DDM and when is it best suited?
The limitations of the two-stage DDM are:

- Defining the length of the high-growth period is problematic
- Unrealistic growth assumptions are made
- The value estimate is highly sensitive to assumptions about the stable growth rate

This model is best suited to firms experiencing high growth, but where the sources of high growth are expected to disappear.

How do you calculate the three-stage DDM?
Same as the 2 stage DDM but you include the growth rate that is expected to drop in calculator calculations and P is the amount from the constant percentage.

Define and show equation for the No-growth model
Since no growth is expected the value of the firm is the discounted value of the perpetual stream of earnings.
V = E/k
V= value of firm
E = perpetual stream of income (normally earnings per share)
k = required rate of return

What are the measures of relative value?

- The P/E ratio
    - price/earnings
    - P/E = Current market price / Expected 12 month earnings per share
    - P/E = ([Payout ratio(1 + g)] / [k - g])
- The P/BV ratio
    - price/book value ratio
    - P/BV = market price of share / book value of share
    - Mainly used for the valuation of bank shares
- The P/S ratio
    - price/sales ratio
    - P/S = P (price of share in period) / (S + 1) (expected sales per share)
- The P/CF ratio
    - price/cash flow ratio

- P/CF = P (price of share in period t) / CF (the expected cash flow per share of firm t +1)

What does the Net asset value (NAV) measure and how is it calculated?
The NAV measures the market value of an investment company's assets (which consists of mainly financial assets) after deducting all liabilities, divided by the number of shares issued.

NAV = (Total assets - Total liabilities) / Number of shares issued

A firm with substantial assets but with low profits may trade at a discount to NAV. A discount may indicate…

- Divided cover is excessively high. In other words, investors are of the opinion that the firm retains too much of its earnings for reinvestment in assets instead of paying them out as dividends.
- The firm is experiencing financial difficulties, impling an asset market value below book value - as the firm's financial position deteriorates, so NAV increases in importance to shareholders.
- Return on assets are low
- Recent investments have not yet improved the profitability of the firm
- Poor management

What are warrants?
Warrants are equity call options sold by a company whose shares are the underlying asset of the options. Warrants do not pay dividends.

Self-assessment questions

1. The key inputs to the valuation process are
   (i) cash flows
   (ii) timing
   (iii) required return
   (iv) depreciation
   a. i and ii
   b. i and iii
   c. i, ii and iii
   d. ii , iii and iv

2. J Stern acquires an asset that is expected to generate cash flows of R2200, R0, R4400 and R11 000 at the end of years 1, 2, 3 nad 4 respectively. J Stern's required rate of return is 18%. The value of the asset equals:
    a. R10219
    b. R14432
    c. R17600
    d. R31154
3. Momentum investments have a required rate of return of 15%. It is considering investing in SABMiller bonds which will be issued at a par value of R1000 with a coupon interest rate of 12 % (paid annually) and an initial maturity of 10 years. The value of the bond is approximately:
    a. R247
    b. R602.28
    c. R849.28
    d. R1000
4. Citizen bank is expected to pay an annual dividend of 90 cents per share indefinitely and the required rate of return equals 18%. The value of the share equals:
    a. R0.16
    b. R5.00
    c. R10.62
    d. R16.20
5. The constant rate of dividend growth for RA Investments is 8%. The firm is expected to pay an annual dividend (D1) of R2.50 next year. The required rate of return (k) equals 18%. The value of the share (P0) equals:
    a. R9.64
    b. R13.89
    c. R25.00
    d. R31.25
6. I&J is expected to have earnings per share of R2.50 next year. The average P/E ratio for firms in the food sector is 18. The value of the firm's ordinary share is …… each.
    a. R7.20
    b. R13.89
    c. R20.50
    d. R45.00
7. I&J have a beta of 1.2, while the market return equals 18% and the risk-free rate of return equals 12%. The firm is expected to pay a dividend (D1) of R8.64 next year. The firm's ordinary shares are worth ….. Each.
    a. R10.37
    b. R45.00
    c. R48.00
    d. R72.00
8. Assume Liberty Ltd's most recent dividend (D0) was 20 cents per share. The dividends are expected to increase by 15% annually over the next 3 years. At the end of the 3

years the growth rate is expected to drop to a 12% annual growth rate for 2 years. The growth rate after the first 5 years is expected to remain constant at 10% per annum indefinitely. The firm's required return is 15%. The fair (intrinsic) value of a Liberty share is closest to:

a. R5.26
b. R9.59
c. R10.99
d. R15.59

9. Lonfin Ltd has issued 10 000 000 ordinary shares and the firm's shares are trading at R5.50 each. The firm's total assets amount to R100 000 000 and total liabilities to R60 000 000. Further assume that investment trust companies similar to Lonfin normally trade at a premium of R20% to NAV. The NAV of Lonfin Ltd shares is:
    a. 150 cents
    b. 300 cents
    c. 400 cents
    d. 550 cents
10. Assume the ordinary shares of RMB Holdings Ltd trade at R9.80 and the firm's book value of shares is R0.82 per share. The firm has an earnings yield of 7% and a dividend yield of 3.9%. The P/BV ratio is closest to:
    a. 0.08
    b. 10.9
    c. 12
    d. 16

- Explain the components of an investor's required rate of return (ie the real risk-free rate, the expected rate of inflation and a risk premium)
- Calculate the growth rate(g), incorporating the return on equity (ROE) and the earnings retention rate (RR)
- Determine the value of a bond
- Approximate and calculate the yield to maturity (YTM) of a bond
- Calculate the value of preference shares and common shares using the various dividend discount models (ie no-growth, constant-growth, two-stage and three-stage models)
- Use relative valuation models (ie P/E ratio, P/BV ratio, P/S ratio and P/CF ratio) for ranking shares of similar firms from the same sector
- Determine the value of investment trusts using the net asset value (NAV) method
- Explain the determinants of the value of warrants

Key concepts

- Approximate yield

- Bond
- Book value
- Cash flows
- Constant growth model
- Discount rate
- Dividend discount models (DDM)
- Exercise price
- Fair (intrinsic) value
- Growth rate
- Intrinsic value
- Investment trusts
- Market price
- Market value
- Net asset value
- No growth model
- Ordinary shares
- Par value
- Preference shares
- Price/book value
- Price/cash flow
- Price/earnings
- Price/sales
- Relative valuation models
- Required return
- Retention rate (RR)
- Return on equity(ROE)
- Three-stage DDM
- TIme to maturity
- Timing
- Two-stage DDM
- Valuation
- Warrants
- Yield to maturity

Study unit 6 - Fundamental analysis

Learning outcomes

- Define fundamental analysis

The three-step valuation process of fundamental analysis triangle

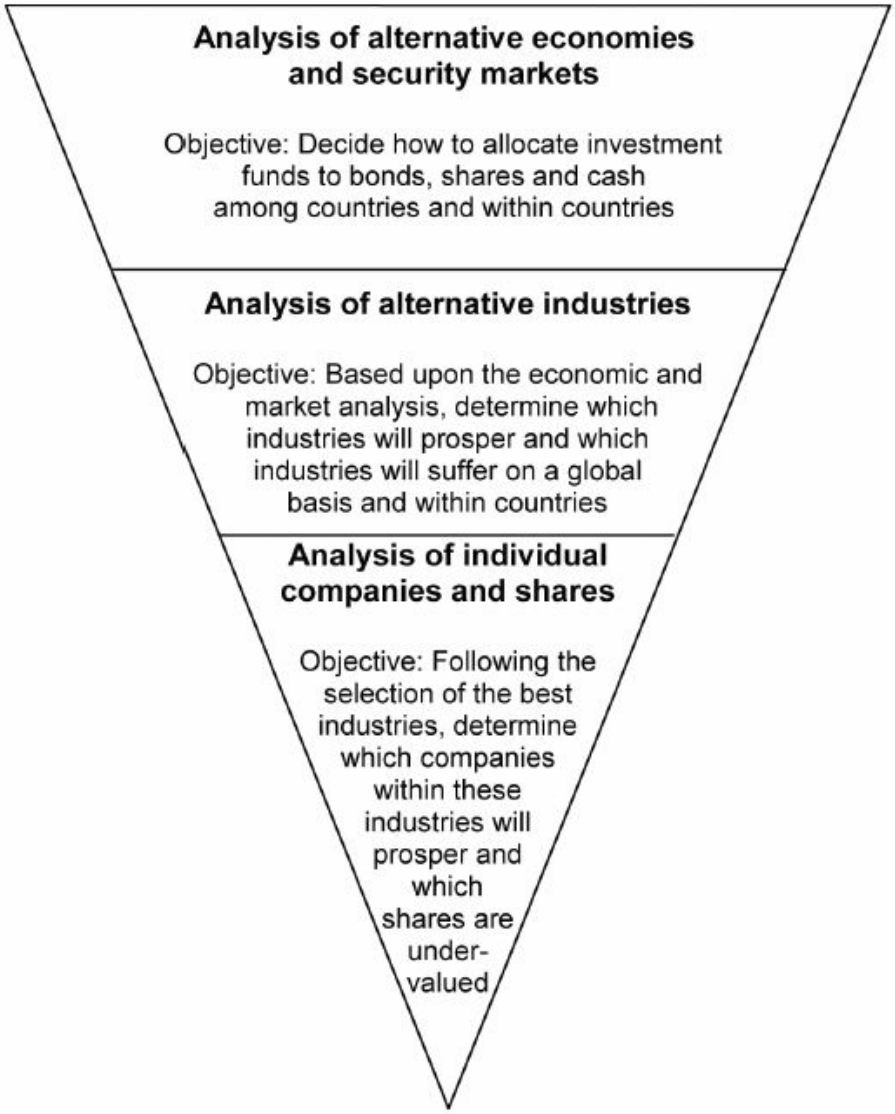
Analysis of alternative economies and security markets
Objective: Decide how to allocate investment funds to bonds, shares and cash among countries and within countries
Analysis of alternative industries
Objective: Based upon the economic and market analysis, determine which industries will prosper and which industries will suffer on a global basis and within countries
Analysis of individual companies and shares
Objective: Following the selection of the best industries, determine which companies within these industries will prosper and which shares are under-valued

FIGURE 6.1

- Explain the three-step valuation process (top-down approach to the security valuation process) and its underlying logic

What is the three-step valuation process?
THe three-step valuation process requires an analysis of the macroeconomic prospects, followed by industry analysis and company analysis.

What is fundamental analysis regarded as and what does it assume?
Fundamental analysis assumes that the risk and return of investments are strongly influenced by macroeconomic conditions, such as growth in gross domestic product (GDP), interest rates, inflation and exchange rates. It is regarded as a top-down approach.

- Explain the three methods which may be used for economic forecasting

What are the three methods that may be used for economic forecasting?

- An index of leading economic indicators
    - Provides a composite statistic composed of a number of variables that have historically changed prior to similar moves in the general business cycle. E.g net gold reserves, gold ore milled, number of new motorcars sold...
- Economic forecasting models
    - Employ the relationships among variables that are theoretically valid and whose parameters can be determined using various forms of regression analysis.
- Market signals
    - Provide clues about upcoming economic events from real-time market data.

- Explain the key macroeconomic variables which need to need to be analysed for the purpose of fundamental analysis

What are the key factors in macroeconomic analysis?
- Gross domestic product
- Interest rates
- Inflation
- Budget deficit of the government
- Balance of payments

- Exchange rates
- Unemployment rates

Explain GDP…

- Reflects the total market value of all final goods produced domestically during a specified period.
- NOT synonymous is gross national product (GNP)
- There is nominal and real GDP. Real GDP adjusts for changes in inflation. By means of the GDP deflator
- The GDP deflator is a price index that reveals the cost of purchasing the items included in the GDP period, relative to the cost of purchasing these same items during a base year.
- Real GDP = planned C(planned consumption) + I(planned investment) + G(planned government expenditure + X(planned net exports)

The estimation of GDP is not straightforward. What are some of the problems experienced?
Some of the problems experienced are:

- It's difficult to estimate the value of goods and services not sold in the market, for example goods made by the government and sold at cost.
- Unrecorded economic activity such as that of the informal sector is difficult to establish.

Explain interest rates and the role of commercial banks…
Interest rates refer to the rate of compensation agreed to between borrowers and lenders of money. Commercial banks act as intermediaries between savers(depositors) and borrowers. They cannot lend out all of their available funds because they are required by legislation to keep some of their funds in cash to meet demand for payments by depositors.

The central bank attempts to control the money supply by means of monetary policy. Not olnt does it enforce a certain reserve requirement (cash ratio), it also:

- Acts as the lender of last resort to the banking sector and influences interest rates by raising or lowering the rate at which the central bank lends to the commercial banks (this rate is known as the repo rate).
- Reduces the level of money supply in the economy by issuing treasury bills, which then absorbs some of the money in circulation
- Rediscounts bills and other short-term instruments on behalf of commercial banks.
- Acts as the government's banker by managing the country's gold and foreign reserves.

Explain inflation…

Inflation refers to the rate at which the general level of prices is rising. Result in a decline in the purchasing power of money.

Draw a table of the tools used to affect monetary policy…

Tool	**Expansionary monetary policy**	Restrictive monetary policy
Reserve requirements	Reduce reserve requirements	Raise reserve requirements
Open market operations	Purchase additional government securities, which releases funds into the economy and expands the money supply	Sell previously bought government securities, which will reduce the money supply
Repo rate	Lower the repo rate, which will encourage more borrowing from the central bank	Increase the repo rate, which will discourage borrowing from the central bank

Explain a budget deficit of the government
A budget deficit means government spending exceeds tax revenues and the deficit has to be financed by means of debt. This means an increase in demand for funds and if the supply does not increase, this will lead to an increase in interest rates.

Explain the balance of payments and what the account reflects…
The balance of payments is a summary of the value of economic transactions between residents from the reporting country and residents of other countries for a certain period (a quarter or a year). The account reflects all payments and liabilities to foreigners and all payments and obligations received from foreigners.

What does a current account deficit mean?
A current account deficit means a country imports more than it exports while a surplus means a country exports more than it imports.

Explain the exchange rate…

The exchange rate is the rate at which one unit of domestic currency can be converted into a foreign currency.

What is the difference between a fixed exchange rate and a floating exchange rate?
A fixed exchange rate is an exchange rate that is set at a fixed rate by the government policy. A floating exchange rate exists if the value of the currency is determined by market forces.

What are the factors that cause a change in a floating exchange rate?

- Differences in the growth of income of countries
- Differences in rate of inflation
- Changes in real interest rates.

A shift to a more restrictive fiscal policy leads to what?

- Domestic currency appreciates due to reduced aggregate demand, economic slowdown and decreased inflation
- Domestic currency depreciates du to a fall in real interest rates caused by reduced government borrowing

Explain unemployment rates and how to be classified as unemployed.
Unemployment rates indicate the percentage of the labour force seeking employment. To be classified as unemployed a person must be:- actively seeking employment; or
Waiting to begin or return to a job. In SA you need to be 15 and older to be included in the workforce.

Who does the labour force consist of?
The labour force consists of those who are either employed by firms or self-employed.

How do you calculate the unemployment rate?
Number of persons employed / Civilian population

\
How do you calculate the labour force participation rate?
Labour force participation rate = Civilian labour force / Civilian population

What are the three types of unemployment?

- Frictional unemployment
    - Imperfect information, which means that employers are not fully aware of all available employees and their qualifications and/or available employable people are not aware of job opportunities
- Structural unemployment
    - Occurs when job opportunities exist but the skills required by employers differ from those of the employed workers.
- Cyclical unemployment
    - Is due to recessionary business conditions and insufficient aggregate demand for labour.

- Explain briefly the concept of industry analysis

Briefly explain the concept industry analysis
Industry analysis involves an assessment of the risk and return characteristics of various Industries as part of fundamental analysis. The goal of industry analysis is to distinguish between industries that are expected to experience growth and those that will decline as a result of the macroeconomic prospects.

- Explain briefly the concept of company analysis

Briefly explain the concept of company analysis
Company analysis involves an assessment of the risk and return characteristics of specific companies. A company's ability to generate cash flows from operating activities as opposed to financing and investment activities is of particular importance.

Self-assessment questions

1. Fundamental analysis is a top-down approach because it:
    a. Studies top management first, followed by an analysis of its influence on the profitability of the firm.
    b. Studies macro economic prospects followed by an analysis of industry prospects and Company prospects
    c. Studies top management first followed by an analysis of its influence on middle management
    d. Applied valuation models first then uses technical analysis for timing purposes
    e. Studies top management first followed by an analysis of its influence on middle and lower management

B - fundamental analysis is a top-down approach because it studies macroeconomic prospects followed by an analysis of industry prospects and company prospects.

2. Real GDP is determined by:
    a. Planned consumption and government expenditure
    b. Planned consumption, the budget deficit and net import
    c. Actual consumption interest rates and exchange rates
    d. Planned consumption investment government expenditure and net exports
    e. None of the above

D - Real GDP is determined by planned consumption, investment, government expenditure and net exports

3. Expansionary monetary Policy leads to:
    a. Lower taxes increased consumption and higher imports
    b. Lower interest rates increased consumption and higher net exports
    c. Lower interest rates increase consumption and lower net exports
    d. Lower interest rates increased consumption and an appreciation of the domestic currency
    e. None of the above

C - expansionary monetary policy leads to lower interest rates, increased consumption and lower net exports

4. Restrictive fiscal policy leads to:
    a. Lower consumption private investment and government spending
    b. Increased consumption private investment and government spending
    c. Global consumption and government spending and a depreciation of the domestic currency
    d. Liver consumption and an increase in inflation
    e. Lower consumption lower private investment and an increase in interest rates

A - restrictive fiscal policy leads to lower consumption, private investments and government spending

5. Unemployment is caused by:
    a. A lack of information about job opportunities
    b. A lack of skills
    c. Imports
    d. Recessions
    e. All of the above

E - All the statements indicate reasons for unemployment

Key concepts

- Balance of payments
- Budget deficit
- Company analysis
- Consumer price index (CPI)
- Economic forecasting
- Exchange rates
- Forecasting models
- Fundamental analysis
- Gross domestic product (GDP)
- Gross national product (GNP)
- Industry analysis
- Inflation
- Interest rates
- Leading economic indicators
- Macroeconomic analysis
- Market signals
- Production price index (PPI)
- Repo rate
- Reserve requirements
- Three-step valuation process
- Top-down approach
- Unemployment rates

Study unit 7 - industry analysis

Learning outcomes

- Explain the effect of the global economy on local industries
- Explain the effect of exchange rates on imported and domestically produced goods

Explain the effect of exchange rates on imported and domestically produced goods.
For South africans a falling exchange rate favours exports, while an appreciation exchange rate favours imports.

- Relate the importance of the domestic economy and macroeconomic environment to industry analysis

What is an important factor in forecasting the performance of the market and what can it lead to?
An important factor in forecasting the performance of the market is the assessment of the status of the economy as a whole. The ability to forecast the macroeconomy can lead to higher-than-average investment performance.

- Explain how the business cycle may influence industry sectors

What is a business cycle?
A business cycle is the recurring pattern of recession followed by recovery.

What are the transition points across Cycles?
The transition points across Cycles are called pics and troughs. A peak is the transition from the end of an expansion to the start of a contraction. A trough occurs at the bottom of a recession just as the economy enters a recovery.

Explain how the business cycle may influence industry sectors…
As the economy passes through different stages of the business cycle the relative profitability of different industry groups might be expected to vary. At a trough just before the economy begins to recover from a recession one would expect that cyclical Industries(those with above-average sensitivity to the state of the economy) would tend to outperform other Industries.

What does “Marking the cycle” mean?
“Marking the cycle” refers to investors ability to determine exact points in time when a recession is expected. It is commonly assumed that a recession occurs when real GDP, the most inclusive measure of economic output, declines for two consecutive quarters.

What does Time the cycle mean?
TIming the cycle refers to investors’ ability to use their knowledge of recession times to switch out of specific investment securities, like shares, into other investment securities like treasury bills and then return to share when prospects for recovery look good.

- Define cyclical indicators and explain the significance and use of each

What are the cyclical leading indicators?

- Average weekly hours of production workers (manufacturing)
- Average weekly initial claims for unemployment insurance
- Manufacturers New orders (consumer goods and material industries)
- Vendor performance lower deliveries diffusion index
- Contracts and order for plant and equipment
- New private housing units authorised by local building permits
- Change in manufacturers' unfilled orders (durable goods industries)
- Change in sensitive materials prices
- Share prices, 500 ordinary shares
- Money supply (M2)
- Index of consumer expectations

What are cyclical coincident indicators?

- Employees on nonagricultural payrolls
- Personal income less transfer payments
- Industrial production
- Manufacturing and trade sales

What are cyclical lagging indicators?

- Average duration of unemployment
- Ratio of trade Inventories to sales
- Change in index of labour cost per unit of output
- Average prime rate charged by banks
- Commercial and industrial loans outstanding
- Ratio of consumer installment credit outstanding to personal income
- change in consumer price index for services

- Explain the methods used in determining the reference turning point of the business cycle in South Africa

Explain the methods used in determining the reference turning point of the business cycle in South Africa..

The lower reference turning point in the business cycle is determined using several methods. These include the calculation of composite leading and coincident business cycle indicators, the comprehensive historical diffusion index and the current diffusion index.

- Define an industry and industry analysis

Define industry analysis and an industry….

Industry analysis examines variables in a particular industry within an economy be it a domestic or global economy. Some of the variables are production indices, business cycles and the degree of operating leverage.
An industry is a collection of companies with similar products and/or distribution strategies.

- Elaborate on the sensitivity of a company's earnings to the business cycle with reference to sales, operating leverage and financial leverage

What are the three factors that determine the sensitivity of a company's earnings to the business cycle?

- Sensitivity to sales
- Operating leverage
    - Refers to the division between fixed and variable costs. Companies with high fixed cost are said to have high operating leverage.
    - Degree of operating leverage measures the sensitivity of profits to changes in sales.
    - DOL = Percentage change in profits / Percentage change in sales
- Financial leverage
    - Use of borrowing

- Describe the industry life cycle and identify an industry's stage in its life cycle

Describe the industry life cycle and identify an industry's stage in its life cycle..
A typical industry life cycle might be described as having four stages:

- a start-up stage characterized by extremely rapid growth.
    - Characterised by a new technology or product
    - Difficult to predict if company will be industry leader
- consolidation stage characterized by growth that is less rapid but still faster than that of the general economy
    - Industry leaders begin to emerge.
- a maturity stage characterized by growth no faster than that of the general economy
    - Products have reached their full potential for use by consumers.
    - Further growth is merely track growth.
    - More pressure for profits.
    - Companies are sometimes characterized as cash cows
- a stage of **relative decline** in which the industry grows less rapidly than the rest of the economy
    - Grow at rate less than the economy

- Describe the five determinants of competition (Michael Porter's industry forces model)

What are the five determinants of competition Micael Porter highlighted?

- Threat of entry from new competitors. Barriers can be:
    - The amount of capital needed to enter into specific industry may be great enough to deter entrants

    - The current participant in the industry may have product lines protected by patents
    - The switching costs for the company's customers may be great enough to pose a barrier to entry to a new firm
- Rivalry between existing competitors
- Price pressure from substitute products
- The bargaining power of suppliers and the bargaining power of buyers

- Define and elaborate on the three competitive strategies (i.e. strategic groups, Porter's generic competitive strategies and SWOT analysis)

What is competitive strategy?
Competitive strategy is the choice an organisation or business unit makes about how it is going to compete in its particular industry or market.

How does Porter see a firm can gain competitive advantage (Porter's generic competitive)?
Porter sees three ways in which a firm can gain a competitive advantage:

- Cost leadership
    - Which a firm strives for the lowest costs in the industry and offers its products or services to a broad market at the lowest price
- Differentiation
    - Tries to offer products or services with unique features that customers value.
- Focus
    - Either a cost leadership or differentiation strategy aimed at a narrow, focused market.
- Technically we have 4 different strategies
    - Cost leadership
    - Broad-market differentiation
    - Focus cost
    - Focus differentiation

Generic competitive strategies	
Cost leadership Characteristics: ● Low level of differentiation is required ● Aims for average customer ● Uses knowledge gained from past production to reduce production costs	**Focus (cost or differentiation)** Advantages: ● A company has power over buyers since focuser may be only source of supply ● Customer loyalty protects from new entrants and substitute produces

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- Adds new product features only after the market demands them

Advantages:
- Cost advantage protects from new entrants
- Can reduce price to protect from new entrants

Risks:
- Competitors may leapfrog the technology, nullifying the firm's accumulated cost reductions
- Competitors may imitate the technology (e.g. IBM clones in PC industry)

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- Easier to stay close to customer and monitor hsi needs

Risks:
- THe firm may be at the mercy of powerful suppliers since the focuser buys in small quantities.
- Small value means higher production costs(this is why it is important to be able to command a high price).
- Change in consumer tastes or a technological change could cause a focuser’s niche to disappear.
- Cost leaders or big differentiators may produce products that satisfy customers' needs. The focuser is subject to constant attack.

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Differentiation

Characteristics:
The key to differentiation is perceived quality, the actual product quality and after-sales service. Perceived quality differs from actual quality in that you need to create a belief in the customer’s minds that what they are buying is of good quality.
- Key is perceived quality (whether real or not)
- Actual product quality
- Service after sale

Advantages:
- Service after sale
- Perceived quality and brand loyalty insulate company from threats from any of the four forces:
  - Price increases from powerful suppliers can be passed on to customers who are willing to pay.
  - Buyers have only one source of supply
  - Brand loyalty protects from substitutes
  - Brand loyalty is a barrier to new entrants

Risks:
- Imitations are more of a threat today because of production technology
- How long can the firm sustain a particular differentiation advantage? The “shelf life” for such advantages is getting shorter and shorter.
- How high can the managers raise the firm’s price before customers will be willing to switch?
- Customer tastes may change and wipe out competitive advantage.

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What is the SWOT analysis?
It iis a business analysis tool.

- Strengths
  - Answers, what does my company do well?
- Weaknesses
  - Answers, what does my company do poorly?

- Opportunity
    - Answers, what new product or service is out there that my company has not grasped yet>
- Threats
    - Answers, what stands in the way of my company's success? Can be internal and external

Self-assessment questions

1. Modest sales growth and small or negative profits are characteristic of which phase of industrial development?
    a. Pioneering development
    b. Rapidly accelerating growth
    c. Mature growth
    d. Stabilization and market maturity
2. The decline stage of the industry life cycle is most likely to be characterised by:
    a. Slowly growing sales
    b. A search for product differentiation
    c. A rapidly increasing return on equity
    d. An emphasis on production efficiencies
3. Which of the following should result in a higher industry P/E?
    a. A higher required return
    b. A decrease in an industry's business risk
    c. A decrease in an industry's growth rate
    d. An increase in an industry's liquidity risk
4. Which of the following does not figure in the calculation of an industry's return on equity?
    a. Total asset turnover
    b. Profit margin
    c. Financial leverage
    d. Dividend payout
5. Which of the following will tend to depress profit margins in an industry?
    a. Little rivalry among existing competitors
    b. A large threat of substitute products
    c. Little bargaining power on the part of buyers
    d. Little bargaining power on the part of suppliers
6. The method of industry analysis that relies on finding relationships between industry sales and economic variables is called:
    a. Input-output analysis
    b. Industrial development
    c. Industry-economic techniques
    d. Micro-forecasting
7. Discuss the concept of an industry life cycle by describing each of its four phases

The concept of an industrial life-cycle refers to the tendency of most Industries to go through various stages of growth that to some extent resemble those of a person. Generally four stages are talked about with no uniformity in the length of each stage. The rate of growth, the competitive environment, profit margins and pricing strategies tend to shift as an industry moves from one stage to the next, although it is usually difficult to pinpoint exactly when one stage has ended and the next has begun.

The initial stage is characterized by perceptions of a large market and great optimism about potential profits. Little or no profits are usually achieved however in this stage and there is usually a high rate of failures. In the second stage of fin called rapid expansion or follow through growth is high and accelerating the markets are broadening unit costs are declining and quality is improving. The third stage usually called mature growth is characterized by decelerating growth caused by such things as maturing market and competitive inroads by other products. Finally, an Industry reaches a stage of full maturity in which growth slows or even declines.

Product pricing profitability and Industry competitive structure often (though not necessarily) vary by phase. Thus for example the first phase usually encompasses high product prices, high costs for marketing for example and a temporary monopolistic industry structure. In phase two new entrances appear and cost for rapidly due to the experience Curve. Prices generally do not fall as rapidly allowing profit margins to increase. In phase 3 growth begins to slow as the product or service begins to saturate the market and significant price reductions become less common. There is a choking out of competitors as quality and other non-price factors become more important as competitive tools. In the final stage industry cumulative production is also high and production costs have stopped declining, profit margins are thin assuming that competition exists and the Fate of the industry depends on the extent of replacement demand and the existence of substitute products or services.

Key concepts

- Bargaining power
- Business cycles
- Coincident indicators
- Competitive forces
- Competitive strategies
- Composite business cycle
- Consolidation stage
- Cost leadership
- Differentiation
- Diffusion index

- Domestic economy
- Exchange rates
- Focus strategy
- Generic strategies
- Global economy
- Industry
- Industry analysis
- Industry force model
- Industry life cycle
- Lagging indicators
- Leading indicators
- Maturity stage
- New entrants
- Reference turning point
- Relative decline
- Rivalry
- Start-up stage
- Statistical results
- Strategic groups
- SWOT

Study unit 8 - Company analysis

Learning outcomes

- Distinguish between capital costs and operational/revenue costs

How does a company classify its costs?
Costs may be classified as one of the follow:

- Capital costs, relating to buying or improving assets
- Revenue costs, relating to the sales in the period

Define capital expenditure….
Capital expenditure is an amount paid or a debt incurred for the acquisition, improvement or restoration of an asset.

What are examples of capital expenditure?

- Land and buildings (including transfer costs)
- Additions, alterations and improvements to any asset used buy the business
- Cost of material Labour and installation of capital assets
- Goodwill
- Expenditure to eliminate competition
- Expenditure to protect capital or asset, including rights

- Legal expenses referring to capital or assets

What is the purpose of the statement of financial position?
The purpose of the statement of financial position is to show the financial condition of an accounting entity at a particular date.

What are assets?
Assets are probable future economic benefits obtained or controlled by a particular entity as a result of past transactions or events.

What are liabilities?
Liabilities are probable future sacrifices of economic benefit arising from the present obligations of a business to transfer assets or provide services to other entities in the future as a result of past transactions or events.

What does the statement of cash flow summarise and what are the three primary categories?
The statement of cash flow summaries the flow of cash receipts (inflows) and cash payments (outflows) during a given period. Organises cash flows into three primary categories:

- Operating cash flows
    - Cash flows from operations equal cash received from sales of goods and services minus cash paid for operating goods and services.
- Investment cash flows
    - The acquisition of non-current assets, such as property, plant and equipment, usually represents a major ongoing use of cash.
- Financing cash flows
    - A firm obtains cash from short and long-term financing and equity issues. Cash is used to pay dividends, repay borrowings and repurchase shares.

What are the four basic steps of effective cash flow management?

1. Differentiate between cash flow, profits and sales.
2. Set up systems to monitor the flow of cash through the business.
3. Learn to recognise the warning signs of poor cash management, such as overextended receivables, large write-offs of bad debt, phone calls from irate suppliers asking for the ”promised check in the mail”, bank overdrafts and a lack of timely, reconciled bank statements.

4. Develop effective strategies to help the business cope with negative strategies to help the business cope with negative cash balances before a cash crisis arises.

- Describe the format of the income statement and describe the components of net income
- Describe the format and the components of the balance sheet and the format, classification and use of each component of the statement of shareholder's equity
- Identify the types of important information for investment decision making presented in the statement of cash flows
- Classify a particular transaction or item as cash flow from (1) operations, (2) investing or (3) financing

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- Distinguish between statistical analysis, subjective analysis and ratio analysis

What does a statistical analyst do?

- Perform financial and ratio analysis to determine dramatic deviations
- Use industry and economic standards to assist in determining the level of condition and trend
- Utilise bankruptcy risk and cash flow analysis.
    - It is imperative to determine the level of risk
- Evaluate contingencies to determine if the potential of material impact exists
- Find out if the company is in compliance with credit agreements and evaluate the risk of financing
- Investigate and assess footnotes for previous or current indictments of criminal fraud
- Be concerned about any substantial suit(s), lien(s) or judgement(s) that could have material impact on the company

What is subjective analysis?

Subjective analysis is a critical part of the analysis process. It involves the use of information which is not truly factual, arising mostly from observations of behavioural changes. Might be signs of impending difficulty .

Elaborate on ratio analysis…

Financial ratios are usually expressed in percentages or times. a ratio can be computed from any pair of numbers. there are several types of ratios which can be categorised into the following groups:

- Liquidity or short-term solvency ratios
- Leverage or long-term solvency ratios
- Activity or asset management ratios
- Profitability ratios
- Market value ratios

Ratio analysis

Ratio type	**Formulae**	**Explanation**
Liquidity ratios		
Current ratio	Current assets / current liabilities	Indicates the firm's ability to meet its short-term obligations

Quick ratio	(current assets - Inventory) / current liabilities	Also known as the acid-test ratio
Net working capital	Current assets - current liabilities	
Financial leverage ratios		
Total debt	(Total assets - Total equity) / Total assets	
Debt to equity	(Total assets - Total equity) / Total equity	
G earing	Long-term debt / (Long-term debt + equity)	
Times interest earnings	EBIT / Interest expense	
Cash coverage	(EBIT + Depreciation) / Interest expense	
Asset management ratios		
Inventory turnover	Cost of sales / Inventory	Measures how many times a firm has sold off its entire inventory
Days' sales inventory	365 / Inventory turnonver	Measures how long it took a firm to sell its current inventory
Debtor's turnover	Cost of sale / Debtors	Measures how fast a firm collects on the sales of inventory
Days' Sales in receivables	365 / Debotor's turnover	Measures how long it took a firm to collect its credit sales
Total assets turnover	Sales / Total assets	Measures how much work the firm got out of its total assets
Profitability ratios		
Net profit margin	Net profit / Sales	Measures how well a firm is managing its cost relative to its sales revenues
Gross profit margin	Gross profit / Sales	
Return on assets	Net profit / Total assets	Measures how hard a firm's assets are working
Return on equity	Net profit / Total equity	Measures how efficiently equity is being employed to generate profit
Market value ratios		
Earnings per share (EPS)	Net profit / Number of shares	Measures the return or profitability

		per share of invested capital
PRice/earnings (P/E)	Market price / Earnings per share	Measures how much investors are willing to pay per rand of current earnings
Book value per share	Total assets / Number of shares	
Market-to-book value	Market price / Book value per share	Measures the market value of the firm's investment relative to its historical costs.

Where can you find formulas for ratios in textbooks?
Chapter 8

- Calculate, interpret and discuss the uses of measures of a company's liquidity debt management (solvency), asset management (operating performance/activity), profitability and market value
- Calculate and interpret the various components of the company's return on equity using the DuPont model

What is the DuPont model, what does it tell usl and what are the formulas to calculate it?
The DuPont model is an expression that partitions a firm's return on equity (ROE) into three components. The model identity tells us that a firm's ROE depends on:

- Operating efficiency
- Asset use efficiency
- Financial leverage

ROE = (Profit after tax / Sales) * (Sales / Total assets) * (Total assets / Total equity)
or
ROE = Profit margin * Total assets turnover * Equity multiplier
or
ROE = Profit margin * Total assets turnover * (1 + Debt/Equity ratio)
or
ROE = (Profit after tax / Total assets) * (Total assets / Total equity)
or
ROE = ROA x Equity multiplier

If the firm is not expected to earn the required rate of return that its shareholders expect, the its P/B ratio will be less than 1.0

What are the major factors affecting the structure and performance of any firm?

- nature of the product
- The firm's customers
- Marketing strategy
- Production technology

- Define leasing, state the advantages of leasing and distinguish between operating leases and capital leases

What is leasing?

Leasing is a method of financing non-current assets, like equipment and vehicles, which normally give the company the use of the asset during the life of the lease period.

With regards to the advantages of leasing, businesses of every size are taking advantage of the wide variety of services that provide which following?

- Conservation of operating capital
- Improved expense forecasting and budgeting
- Enhanced financial ratios
- Tax advantages
- Convenience

Distinguish between operating leases and capital leases...

- Operating leases
    - Most operating leases are typically characterised by a fair market value purchase option to purchase the equipment at lease end. This option is particularly attractive to companies in a continual upgrade cycle who want to use equipment without ownership, but also want to return equipment at lease end and avoid technological obsolescence.
    - Usually result in the lowest payment of any financing alternative.
- Capital leases
    - Under capital lease arrangement, the lease transfers ownership of property of the lessee by the end of the lease term.

- Lease term contains a bargain purchase option
- Lease term is equal to 75% or more of the estimated economic life of the leased property.

Self-assessment questions

1. Operating profit margin is defined as:
    a. EBDIT/Sales
    b. EBIT/Sales
    c. EBT/Sales
    d. EAT/Sales
2. Which of the following is **not** subtracted from sales to arrive at net income?
    a. Depreciation
    b. Interest
    c. Dividends
    d. Taxes
3. A company that can earn rates of return greater than its required return is called a:
    a. Cyclical company
    b. Defensive company
    c. Growth share
    d. Growth firm
4. A speculative share is characterised by:
    a. A high probability of a very high rate of return
    b. A high probability of low or negative rates of return
    c. A low probability of low returns
    d. Being underpriced
5. Which of the following would allow a company to pursue a cost leadership strategy?
    a. Economies of scale
    b. Patents
    c. Volume purchasing
    d. All of the above
6. Which of the following is compatible with the idea of a growth company?
    a. Perfectly competitive markets
    b. Constant growth for an infinite period
    c. Non-competitive factors
    d. Equilibrium in product and financial markets
7. A company earns a positive rate of return on its investments but less than its required return. It should:
    a. Pay out more earning as dividends
    b. Retain more earnings
    c. Issue new shares
    d. Make more suck investments
8. In a negative growth model:
    a. Earnings are negative

b. Rates of return are negative
c. Earnings are growing but less than they should
d. Dividends are zero

9. In growths models, which of the following does not affect the capital gain component?
    a. Retention ratio
    b. The relation between the firm's rate of return and its required rate of return
    c. The time period for superior investments
    d. All of the above affect it
10. If one used the constant growth dividend discount model for a true growth firm:
    a. Its value would be negative
    b. Its value would be zero
    c. Its value would be infinite
    d. Its value would be finite but unknown
11. Which of the following is not assumed in the growth duration model?
    a. The market values shares in proportion to earnings
    b. Higher P/E imply higher growth rates
    c. The investment being compared have equal risk
    d. Dividends are used to purchase further shares
12. A defensive share is best characters as:
    a. Having low systematic risk
    b. Generally retaining a large portion of earnings
    c. Being heavily influenced by aggregate business activity
    d. Usually having an active rate than passive dividend policy
13. The incremental franchise P/E is a function of all of the following except:
    a. The expected return on new opportunities
    b. The ability of management
    c. The current cost of equity
    d. The current ROE on investment
14. Foleys(Pty) Ltd has a beta of 1.3 and a risk-free of 7%. Find Foley's required return of the expected market return is:
    a. 12%
    b. 14%

RR = 0.07 + 1.3(0.12 - 0.07) = 0.135 or 13.5%
RR = 0.07 + 1.3(0.14 - 0.07) = 0.161 or 16.1%

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Key concepts

- Asset management ratios
- Balance sheet
- Capital lease

- Cash flow
- Cash flow statement
- Debt management ratios
- DuPont model
- Financing cash flows
- Income statement
- Investment cash flows
- Liquidity ratios
- Market value ratios
- Operating cash flows
- Operating lease
- Profit
- Profitability ratios
- Ratio analysis
- Return on equity
- Solvency ratios
- Statistical analysis
- Subjective analysis

Study unit 9 - Company valuation

Learning outcomes

- Explain and distinguish between investment styles (e.g. growth share or earnings momentum, value investing)

What is growth share or earnings momentum investing?
An investment style that supports the premise that good companies are good investments. Often such companies are leaders in their industry, they have strong financial statements

What is value investing?
A style of investing that states that undervalued shares are good investments.

Discuss the difference between growth companies, growth shares, defensive companies, defensive shares, cyclical companies, cyclical shares, speculative companies and speculative shares.

- Growth companies are companies with management capability and the opportunity to undertake investment projects that produce rates of return greater than their weighted average costs of capital.

- Growth shares are shares with above-average expected rates of return given their risk. Generally undervalued.
- Defensive companies are companies not likely to react sharply to a decline in the general level of economic activity.
- Defensive shares are shares with low betas, regardless of the nature of the company
- Cyclical companies are companies whose sales and earnings tend to rise and fall sharply with fluctuations in the business cycle.
- Cyclical shares are high-beta shares whose returns risk and fall sharply in bull and bear markets.
- Speculative companies are firms whose business involves great risk
- Speculative shares are overpriced shares whose return might be abnormally low because of their overvaluation.

- Explain the use of measures of value added in company valuation

What is the use of measures of value added in company valuation?
These measures have been used in compensation arrangements, capital decision making and financial disclosures.

- Define economic profit

Define economic profit
When a firm has generated a profit in excess of the firm's cost of capital over time, this is referred to as economic profit

- Discuss economic value added (EVA)

What is economic value added (EVA)
EVA is the financial performance measure that comes closer than any other to capturing the true economic profit of an enterprise. Also the performance measure most directly linked to the creation of shareholder wealth over time.

Stone and Stewart developed EVA to help managers incorporate which two basic principles of finance into decision-making?

- The first is that the primary financial objective of any company should be to maximize the wealth of its shareholders.
- The second is that the value of a company depends on the extent to which investors expect future profits to exceed all fall short of the cost of capital

EVA is a model based on a company's accounting. Its mechanism is therefore like accounting:
Sale - Operating expenses - Tax

= Operating profit - Financial requirement
= EVA

The financial requirement is calculated as the defined capital(an adjusted statement of financial position) multiplied by a suitable WACC, or the expected “rate of return by investors”.

WACC uses the following formula:
WACC = KeWe + KdWd + KpWp
Ke = cost of equity
We = weight of equity in capital structure
Kd = cost of debt
Wd = weight of debt in capital structure
Kp = cost of preference shares
Wp = weight of preference shares in capital structure

What are some of the advantages of EVA?

- Eva is closely related to net present value. It is closest in spirit to corporate financial Theory which argues that the value of the Firm will increase if you take positive net present value projects.
- It avoids the problems associated with approaches that focus on percentage spreads - between ROE and cost of equity and ROC and cost of capital.
- it makes top managers responsible for a measure Rim they have more control over.
- it is influenced by all the decisions managers have to make within a firm.

- Discuss cash value added (CVA) and the concept of strategic investments

What is Cash value added?
CVA is a net present value that uses the net present value approach to calculate company value. This method classifies investments into 2 categories:

- Strategic investments
    - Those of which the objective is to create new value for shareholders such as expansion
    - New product or investment in new market
- Non-strategic investments
    - The ones made to maintain the value the strategic investments create.

- Contrast the CVA and EVA models

Contrast CVA and EVA models
Companies implement EVA because it is easy to understand, they understand what they have always been working with, namely the accounting process.

CVA us at the border between the business reality and the financial reality.

- Discuss market value added (MVA)

Discuss market value added MVA…
MVA is a measure to measure the goal of a company's value-based management (and shareholder value) process which is to make the shareholders as wealthy as possible.
MVA = Total value - Total Capital
The total value is the market values of debt and equity.
Total capital is the adjusted total assets form the statement of financial position.

What are the keys to a perfectly competitive market?

- Costless entry and exit
- Increasing marginal costs of production
- Undifferentiated products

- Explain the earnings multiplier model

Example:
If an ordinary share of a mature company has a payout ratio of 45%, a growth rate of 10% and should provide a total return if 15% its investors, an appropriate P/E ratio for th share is:
P/E = 0.45 / (0.15 - 0.10) = 9X
If the company is expected to earn R5.25 per share next year, the current value of the share is 9 * R5.25 = R47.25

- Calculate the future earnings per share for a company using the earnings multiplier model
- Estimate earnings per share for an industry
- Discuss the use of dividend discount models (DDM) to value growth share s
- Determine the value of a company using the constant growth dividend discount model
- Explain and apply four alternative growth models (e.g. two-stage, H-model, three-stage and growth duration) in the valuation of companies
- Discuss the advantages and limitations of dividend discount models
- Explain the various relative valuation ratios which analysts use to evaluate equity investments (i.e. price/earnings, dividend yields, price/sales, price/asset value, price/cash flow)

Self-assessment questions

1. Dunlop tyre company ltd is expected to earn R2.00, R2.20, and R2.40 per share in each of the 3 years respectively. At the end of the third year, the stock is expected to sell at a current yield of 3%. It is Dunlop’s policy to employ a dividend payout ratio of 25%. If an

investor demands a 15% return for investing in Dunlop stock, how much should he be willing to pay for the shares today?

a. R14.38
b. R13.25
c. R18.25
d. R12.63

$$\frac{0.25(2.00)}{1.15} + \frac{0.25(2.20)}{(1.15)**2} + \frac{0.25(2.40)}{(1.15)**3} + \frac{[0.25(2.40)] / 0.03}{(1.15)**3} = 14.40$$

2. Waterkloof (Ptu) Ltd is expected to pay a dividend of R4.00 per share next year. If Waterkloof's long-term dividend growth rate is 5% per year and its cost of equity capital is 12%, its ordinary shares have a value of approximately

a. R33.38
b. R57.25
c. R23.50
d. R31.75

$$\frac{4.00}{(0.12 - 0.05)} = 57.14$$

3. Inxa pty ltd's current dividend is R2.00 per share. Its cost of equity capital is 15% and its long-term secular dividend growth rate is 4% per year. The value of Inxa's ordinary shares is approximately:

a. R18.18
b. R13.33
c. R18.91
d. R13.87

$$\frac{2.00(1.04)}{(0.15 - 0.04)} = 18.91$$

4. The Atom Company employs a policy of maintaining a dividend payout ratio of 40%. If the company's earnings are expected to be R6.00 per share next year, its cost of common equity capital is 11% and its earnings growth rate is 5%, Atom Company ordinary shares should sell at how many times next year's estimated earnings?

a. 16.7
b. 9.1
c. 10.0
d. 6.7

$$\frac{40}{(0.11 - 0.05)} = 6.7$$

5. The dividend discount model is a special form of a general class of security valuation models called:

a. Monte Carlo models
b. Discounted cash flows models
c. Gordon models

d. Graham and Dodd models

Dividends are the cash flows paid to ordinary shareholders

6. Newly issued treasury bills are yielding 6%. For the past several months, the rate of inflation has been averaging 4%. During the next several months, the rate of inflation is expected to average 5%. The real risk-free rate should be approximately:
    a. 1.5%
    b. 2.0%
    c. 1.0%
    d. 6.0%

rf = rrf + E(INFL)
6% = rrf + 5%
rrf = 1.0%

7. Newly issued treasury bills are yielding 5%, the expected rate of inflation is 3%, and the cost of common equity capital is Inxa (Pty) Ltd is estimated to be 12%. Under these circumstances, the real risk-free rate and the equity risk premium of Inxa ordinary shares are approximately:

a.	Real risk-free rate 8%	Equity risk premium 12 %
b.	7%	9%
c.	5%	7%
d.	2%	7%

rf = rrf + E(INFL)
5% = rrf + 3%
rrf = 2%

rf = rrf + E(INFL)
12% = 5% + rERP
rERP = 7%

8. The equity risk premium is primarily related to:
    a. The level of interest rates
    b. The outlook for inflation
    c. The volatility of a company's sales
    d. All of the above

The equity risk premium is related to the unique risk of a business, such as its business risk (which is related to its volatility of sales), financial risk, liquidity risk, currency risk and country risk. Interest and inflation risks primarily impact on the nominal risk-free rate

9. The financial risk of a firm is primarily determined by:
    a. The firm's debt-to-equity ratio
    b. The trading volume in the firm's shares
    c. The probability that the company's assets might be expropriated by a government
    d. All of the above

Financial risk is related to the way a firm is financed. Option (b) refers to liquidity risk and (c) refers to country risk.

10. In an investor solely in stocks of companies domiciled in the investor's own country, the investor does not have to be concerned with:
    a. Business risk
    b. Financial risk
    c. Liquidity risk
    d. Currency risk
11. Which of the following statements is the least accurate?
    a. Country risk is similar to political risk
    b. Financial risk is the same as liquidity risk
    c. Business risk is independent of management quality
    d. South African investors who invest in foreign securities have to worry about both country risk and currency risk

Financial risk is related to how a firm is financed; liquidity risk refers to the ability to buy and sell the shares quickly without having to give up a large price concession.

12. Business risk depends upon all of the following factors except the:
    a. Volatility of a company's sales
    b. Amount of debt in a company's capital structure
    c. Amount of fixed costs in a company's cost structure
    d. Volatility of the prices of a company's raw materials

The way a company is financed affects its financial risk

13. Companies with high fixed costs and low variable costs:
    a. Typically have a high breakeven point and a low degree of operating leverage
    b. Typically will experience high profit volatility if sales are only slightly volatile
    c. Typically will experience slow profit growth when sales rise above the breakeven point because of the impact of high fixed costs
    d. Typically are poor investments because they are too risky

Option (a) is incorrect because operating leverage will be high in this case; (c) is incorrect because profit growth will be high under these conditions; (d) is incorrect because whether or not the investment is good depends upon its price and not only its risk

14. Which of the following statements is false?
    a. Economic profit margins (EBDIT/Sales) are negatively related to the degree of competition in an industry, i.e. the greater the competition, the lower economic profit margins are likely to be.
    b. Depreciation expenses and interest expenses mostly represent embedded costs.
    c. Barries to entry are important factors that affect the degree of competition in an industry, while exit barriers have little impact on the competitive structure of an industry.

d. The extent to which a firm can choose between adopting a high profit margin/low volume versus a low profit margin/high volume strategy largely depends upon its pricing flexibility.

Industry competitive structures depend on both entry and exit barriers.

15. ACM Gadget Pty Ltd produces gadgets, which it sells for R5.00. The company's fixed costs are R10 million, consisting of R2 million of depreciation and amortisation expense and R8 million of cash fixed costs. The variable costs associated with gadget production are R3.00 per unit. ACM's accounting and cash breakdown points are:

	Accounting Break Even point	Cash break even point
a.	2 000 000 gadgets	4 000 000 gadgets
b.	2 000 000	1 000 000
c.	5 000 000	4 000 000
d.	1 000 000	5 000 000

0 = (P - V)QABE - CF
0 = (R5 - 3)QABE - R10 000 000
QABE = 5 000 000 gadgets (accounting breakeven)
0 = (P - V)QCBE - CFC
0 = (R5 - 3)QCBE - R8 000 000
QCBE = 4 000 000 gadgets (cash breakeven)

16. Far East Ltd produces widgets, which it sells for R80 each. The company's cost structure consists of depreciation and amortisation of R40 million and R10 million of cash fixed costs. The variable cost per widget is R60. the company is in the 30% tax bracket. If the company is expected to produce and sell 4 million widgets in the upcoming year, its estimated operating profit and operating cash flow after income tax are:

	Operating profit	Operating cash flow
a.	R40 000 000	R30 000 000
b.	R21 000 000	R61 000 000
c.	R40 000 000	R20 000 000
d.	R30 000 000	R70 000 000

NOPAT = EBIT (1-T)
= [(R80 - 60)(4 000 000) - R50 000 000](1 - 0.30)
= R21 000 000
OCF = NOPAT + depreciation
= R21 000 000 + R40 000 000
= R61 000 000

17. State at least two major advantages and three major disadvantages of each of the following three valuation methodologies:
    a. Multistage dividend discount model
        i. Advantages
            1. Excellent for comparing vastly different companies

2. Solid theoretical framework
3. Ease in adjusting for risk levels
4. Dividends relatively easy to project
5. Dividends not subject to accounting
6. Flexibility is use and more realistic than constant growth model

ii. Disadvantages

1. Need to forecast well into the future
2. Problem with non-dividend-paying companies
3. Most investors not looking to collect a stream of dividends
4. Problem with high-growth companies (g > k)
5. Problems projecting “forever after: ROE and payout ratio
6. Small changes in assumptions may have big impact
7. Need technology for more advanced models
8. Quality of payouts may differ

b. Absolute and relative price/earnings ratio

i. Advantages

1. Widely used by investors
2. Easy to compare with market and other companies in specific industries

ii. Disadvantages

1. Difficult with volatile companies
2. Need to determine what is “normal”
3. Difficult to project earnings
4. Effect of accounting differences
5. Many factors influence multiples
6. Can be used only for relative rather than absolute measurement
7. Point-in-time “snapshot”
8. Does not address quality of earnings
9. Problem with companies with no income

c. Absolute and relative price/book ratio

i. Advantages

1. Incorporates some concepts of asset values
2. Easy to compute even for companies with volatile or negative earnings
3. Easy to compare with market and specific industries

ii. Disadvantages

1. Subject to differing accounting rules
2. Affected by non-recurring items and share repurchases
3. Subject to historical costs
4. Book may be poor guide to actual assets values

Key concepts

- Cash value added (CVA)
- Dividend discount models
- Dividend yield
- Earnings momentum
- Earnings multiplier model
- Earnings per share
- Economic profit
- Economic value added (EVA)
- Growth duration model
- Growth share
- H-model
- Investment styles
- Market value added (MVA)
- Measures of value added
- Price/asset value ratio
- Price/cash flow ratio
- Price/earnings ratio
- Price/sales ratio
- Relative valuation ratios
- Strategic investments
- Three-stage DDM
- Two-stage DDM
- Value investing

Study unit 10 - technical analysis

Learning outcomes

- List and explain the underlying assumptions of technical analysis

What are the underlying assumptions of technical analysis?

- Market value is determined solely by the interaction of supply and demand
- Supply and demand are governed by numerous factors both rational and irrational. The market continually and automatically weighs all these factors. A “random walker” would have no qualms about this assumption either.
- Disregarding minor fluctuations in the market, share price tend to move in trends which persist for an appreciable length of time. The “random walker” would disagree with the statement. For any trend to persist there has to be some collective “irrationality”.

- Changes in trends are caused by shifts in demand and supply. These shifts, irrespective of why they occur, can be detected sooner or later in the action of the market itself.

Define the random walk theory
It is an economic theory according to which market price movements move randomly. This assumes an efficient market. The theory also assumes that new information comes to the market randomly. together , the two assumptions imply that market prices move randomly as new information is incorporated into market prices. The theory further implies that the best predictor of future prices is the current price, and the past prices are not reliable indicators of future prices.

- Identify and discuss the basic charts used in technical analysis (i.e. price fields, volume, open interest, support and resistance, linear regression, trend lines, supply and demand)

Name the basic security charts and their strengths

- Line chart
    - A line chart is the simplest type of chart. The single line represents a security's closing price on each day. Its strength comes from its simplicity. It provides an uncluttered easy-to-understand view on a security's price.
- Bar chart
    - Displays a security's opening(if available) high, low and closing prices. They are the most popular type of security chart.
- Volume bar chart
    - Usually displayed as a bar graph at the bottom of the chart. Most analysts monitor only the relative level of volume and, as such, a volume scale is often not displayed.

- Explain the price fields defining a security's price and volume

What is an indicator?
An indicator is a mathematical calculation that can be applied to a security's price and/or volume fields.

What are the fields which define a security's price and volume?

- Open.
    - This is the price of the first trade of the period(first trade of the day). When analysing daily data, the open is especially important as it is the consensus price after all interested parties were able to "sleep on it".
- High.
    - This is the highest price the security traded during the period. It is the point at which there were more sellers than buyers (imem there are always sellers willing to sell at higher prices, but the high represents the highests price buyers were willing to pay.
- Low.

    - This is the lowest price the security traded during the period. Its is the point at which there were more buyers willing to buy at lower prices, but the low represents the lowest price sellers were willing to accept.
- Close.
    - This is the last price the security traded during the period. Due to its availability, the close is the price most often used for analysis. The relationship between the open (the first price) and the close (the last price) is considered significant by most technicians
- Volume.
    - This is the number of shares (or contracts) that were traded during the period. The relationship between prices and volume (increasing prices accompanied by increasing volume) is important. When the volume is heavy the market is said to be liquid. When the volume is light, the market is said to be “thinly traded”.
- Open interest.
    - This is the total number of outstanding contracts (i.e. those that have not been exercised, closed, or expired) of a future or option.
- Bid.
    - This is the price a market maker is willing to pay for a security(i.e. The price you will receive if you sell).
- Ask.
    - This is the price a market maker is willing to accept (i.e. the price you will pay to buy the security).

What are the rules for interpreting volume?

- Rising volume and price are a normal phenomenon.
- Volume normally leads price.
- Rising price and falling volume are abnormal and indicate a weak rally.
- A parabolic risk in prices and a sharp increase in volume are unsustainable, which typically results in an exhaustion move.
- The reverse set of circumstances epitomises a selling climax.
- When prices test an important low and are accompanied by lower volume, this should be interpreted as a bullish cue.
- An expansion of volume following a price peak during a consolidation, or accompanied by a downward price-pattern completion is a bearish sign because it indicates that volume is not going with the trend.
- Choppy market activity characterised by a price that has been rallying for some time accompanied by heavy volume are bearish signs.
- An accumulation phase in a market is identified by stabilization in prices and a marked increase in volume. It is extremely bullish if prices break out to the upside along with increasing volume.

- Record volume coming off a major low is generally a reliable signal that a significant bottom has been put in place and should never be overlooked. Widespread disbelief in the rally by traders is an excellent confirming signal.

- Discuss the rules for interpreting open interest

What are the rules for interpreting open interest?

- If prices are rising and open interest is increasing at a rate faster than its five-year seasonal average, a bullish scenario is represented.
- If the pen interest numbers flatten following a rising trend in both price and open interest, take this as a warning of an impending top.
- High open interest at market tops is a bearish signal. If the price drop is sudden, this forces many “weak” longs to liquidate. If that begins to happen, open interest will decline.
- An unusually high or record open interest in a bull market is a warning signal. When the rising trend of open interest begins to reverse, expect a bear trend to begin.
- A breakout from a trading range will be much stronger if open interest rises during the consolidation.
- Risking prices and a faster-than-normal seasonal decline is open interest is bearish.
- If prices are declining and open interest is rising faster than seasonal average, this is evidence of new short positions being acquired.
- A decline in both price and open interest indicates liquidation by frustrated traders with long positions.

- Discuss price, volume and open interest interpretations related to both rising and declining markets

Discuss price, volume and open interest interpretations in a rising market

- volume and open interest both increasing indicates buyers are bidding prices higher at an accelerating rate, Drawing in new players on the short side. This is the healthiest condition for a bull market with plenty of upside Potential remaining.
- volume increasing but open interest flat is usually the next stage of a bull market as previous shorts are forced to cover their positions amid rising losses, neutralizing the influx of new positions..
- Volume still increasing but open interest declining shows that a combination of previous shorts covering their losses and early longs taking profits Now more than offsets new entrants to the market. the market is beginning to run out of new buyers.
- volume declining but open interest increasing means that liquidation of prior positions has now subsided and balls once again are adding positions faster than old players are liquidating. Buyers and sellers are more nervous and taking smaller positions.
- volume declining but open interest flat again means that not only are both bulls and bears Less interested in adding to positions but that liquidation of prior positions is once again neutralizing the number of new positions.
- Both volume and open twist declining is the weakest possible time for a bull market before a major top. It means there are few willing to trade and profit-taking by prior longs is more than offsetting the addition of fresh long positions. This is typically the last gasp

of a bull market, before bearish psychology takes over and the sellers assume control of the trend, ending the bull market and beginning a down trend through aggressive selling.

Discuss price, volume and open interest interpretations in a declining market

- Volume and open interest both trending higher means sellers (bears) are in control and aggressively driving prices lower at an accelerating pace. This is the healthiest picture possible if you are looking for lower prices.
- Volume increasing with open interest is the next stage of a bear market, as previous longs are forced to cover their positions amid rising losses, neutralising the influx of new short positions.
- Volume is still increasing but open interest declining shows a combination of previous longs covering their losses and early shorts taking profits, which now more than offsets new entrants to the bear market. The market is starting to run out of new sellers.
- Volume now declining, but open interest increasing means that while liquidation of prior positions has now subsided and bears are once again adding new short positions faster than old players are liquidating, buyers and sellers are taking smaller positions.
- Volume declining but open interest flat again means that not only are bulls and bears less interested in adding to positions, but that liquidation of prior positions is once again neutralising the number of new positions. This is a sign the bear market has about run its course.
- Both volume and open interest are declining. This is the weakest possible situation for a bear market before a major bottom. It means there are few willing to trade and profit taking by prior shorts more than offsetting the addition of fresh short positions.

- Discuss the interpretation and merits of moving averages as an analytical tool

Define a moving average…
A moving average is the average price of a security at a given time.

How do you calculate a “simple” moving average?
A “simple” moving average is calculated by adding the security’s prices for the most recent time periods and then dividing by n; for example adding the closing prices of a security for the most recent 25 dasy and then dividing them by 25. Since the moving average in the chart is the average price of the security over the last 25 days, it represents the consensus of investor expectations of the last 25 days.

Long-Term trends are often isolated using a 200-day moving average.

What are the merits of moving average systems?

- You will always be on the right side of the market - prices cannot risk very much without the price risking above its average price.

- The disadvantage is that you will always buy and sell late. If the trend does not last for a significant period of time, typically twice the length of the moving average, you will lose money.

- Contrast leading and lagging indicators

Contrast leading and lagging indicators and what type of indicator should you use.
Lagging indicators are superb when prices move in relatively long trends. They don't warn you of upcoming changes in prices they simply tell you what prices are doing so that you can invest accordingly. Trend-following indicators cause you to buy and sell late and, in exchange for missing the early opportunities, they greatly reduce your risk by keeping you on the right side.

Leading indicators help you profit by predicting what prices will do next. Leading indicators provide greater rewards at the expense of increased risk. They perform best in sideways-trading markets. Leading indicators typically work by measuring how overbought or oversold a security is. This is done with the assumption that a security that is oversold will bounce back.

What type of indicator you use, lagging or leading is a matter of personal preference. Most investors are better at following trends than predicting them. Many successful investors prefer leading indicators.

- Discuss the assumptions underlying Dow Theory

What are the underlying assumptions of the Dow Theory?

- **The averages discount everything**
    - An individual's stock price reflects everything that is known about the security. As new information arrives market participants quickly disseminate the information and the price adjusts accordingly.
- **The market is made up of three trends**
    - At any given time in the stock market three forces are in effect:
        - Primary trend
            - May be either bullish (rising) market or a bearish (falling) market.
            - Usually lasts for more than one year & may last many years
        - Secondary trends
            - Are intermediate and corrective reactions to the primary trend.
            - These reactions last for one to three months.
        - Minor trends
            - Short-term movements lasting one day to three weeks.
            - Secondary trends typically consist of a number of minor trends.
- **Primary trends have three phases**

    - First phase is made up of aggressive buying by informed investors in anticipation of economic recovery and long term growth.
    - Second phase is characterised by increasing corporate earnings and improved economic conditions. Investors will begin to accumulate stock as conditions improve.
    - Third phase is characterised by record corporate earnings and peak economic conditions. The general public now feel comfortable participating in the stock market.
- **The averages must confirm each other**
    - The Industrials and Transports must confirm each other in order for a valid change of trend to occur. Both averages must extend beyond their previous secondary peak (or trough) in order for a change of trend to be confirmed.
- **The volume confirms the trend**
    - Dow Theory focuses primarily on price action. Volume is only used to confirm uncertain situations. Volume should expand in the direction of the primary trend. If the primary trend is down, volume should increase during market declines. If the primary trend is up, volum should increase during market advances.
- **A trend remains intact until it gives a definite reversal signal**
    - An up trend is defined by a series of higher highs and higher lows. In order for an up trend to reverse, prices must have at least one lower high and one lower low ±(the reverse is true of a down trend). When a reversal in the primary trend is signalled by both the Industrials and Transports, the odds of the new trend continuing are at their greatest. However, the longer a trend continues, the progressively smaller become the odds of the trend remaining intact.

- Discuss the application of the overbought/oversold oscillator in technical analysis

What is the overbought/oversold (OB/OS) indicator?
The OB/OS indicator shows when the stock market is overbought (and a correction is due) and when it is oversold (and a rally is due).

Why are oscillators named?
They are named because their value oscillates between a predefined ragange.

What are momentum indicators and what is their sole function?
OB/OS and oscillators. They are the most widely used tools of seasoned traders. Their sole function is to measure the rate at which prices rise and fall, and then present them in a graphical format. The indicators often give advance warning of the latent strength or weakness in a specific price trend.

What is the advantage of the technical interpretation of overbought and oversold areas?
They represent an intelligent point for anticipating a trend reversal. By definition, an overbought condition is a market that has risen too far adn/or too fast to be sustained. A temporary pullback is inevitable,even if the move is eventually destined to go much higher. By definition an oversold condition is a market that has fallen too far and/or too fast to be sustained.

- Discuss the application of the absolute breadth index in technical analysis

Discuss the Absolute Breadth Index…
The Absolute eBreadth Index (ABI) shows how much activity, volatility and change are taking place on the New York Stock Exchange while ignoring the direction prices are headed. You may think of it as an "activity index". High readings indicate market activity and change, while low readings indicate lack of change. Readings above 40% are very bullish and readings below 15% are bearish.

- Discuss the application of the breadth thrust in technical analysis

Discuss the breadth thrust in technical analysis, how it is calculated and when does it occur?
The Breadth Thrust indicator is a market momentum indicator. It is calculated by dividing a ten-day exponential moving average of the number of advancing issues by the number of advancing plus declining issues. A "Breadth Thrust" occurs when, during a ten day period, the Breadth Thrust indicator rises from below 40% to above 61.5%. A "Thrust" indicates that the stock market has rapidly changed from an oversold condition to one of strength, but has not yet become overbought.

- Discuss line studies as an analytical tool (i.e. support, resistance, trend Fibonacci arcs and retracements)

What are line studies?
Line studies are technical analysis tools that consist of lines drawn on top of a security's price and/or indicator. These include the support, resistance and trend line concepts.

Discuss Fibonacci arcs and retracements
Fibonacci arcs and retracements help anticipate support and resistance levels along with price targets. After making long sustained moves in one direction, many markets retrace a part of the move before continuing on further.

- Fibonacci retracements are based on a trend line drawn between a significant trough and peak. If the trend is rising the retracement lines will descend from 100% to 0%. If the trend line is falling the retracement lines will ascend from 0% to 100%. Horizontal lines are drawn at the common Fibonacci levels of 38%, 50% and 62%. As the price retraces, support and resistance often occur at or near the Fibonacci retracement levels.
- Fibonacci arcs can be added to the same chart, or they can be charted alone. The arcs are drawn centered on the last peak or trough, crossing the original trend line at the points where the retracement lines intersect. The price will tend to "react" to both arcs and the retracement levels, as they provide support and resistance.

- Discuss market indicators with reference to the different categories

What are market indicators?
Marke indicators are a group of technical analysis tools designed to help you gauge changes in all securities within a specific market. Market indicators typically analyse the stock market, although they can be used for other markets. They add significant depth to technical analysis, because they contain much more information than price and volume.

Market indicators typically fall into three categories

- Monetary
    - Monetary indicators concentrate on economic data such as interest rates. They help you determine the economic environment in which businesses operate.
- Sentiment
    - Sentiment indicators focus on investor expectations, often before those expectations are discernible in prices.
- Momentum
    - Shows what prices are actually doing, but does so by looking deeper than price.

Given the above three groups of market indicators , we have insight into:

- The external monetary conditions affecting security prices. This tells us what security prices should do.
- The sentiment of various sectors of the investment community. This tells us what investors expect prices to do.
- The current momentum of the market. This tells us what prices are actually doing.

- Explain the use of the relative strength index and positive volume index as market indicators

Discuss the Relative Strength index
The Relative Strength Index (RSI) is a popular oscillator. The name is slightly misleading as the RSI does not compare the relative strength of two securities.

Discuss the Positive Volume Index (PVI)
The PVI focuses on days where the volume increased from the previous day, the premise being that the “crowd” takes positions on days when volume increases. Interpretation of the PVI assumes that on days when volume increases, the crowd-following, “uninformed” investors are in the market.

- List and explain the challenges to technical analysis

What are the conclusions to the discussion on technical analysis?
A fitting conclusion to the discussion on technical analysis is a list of lessons that have been learned, both from others and the hard way:

- Do not compound your losses by averaging down (do not keep buying additional shares at lower prices). It is tempting to think that a loss “does not count” until the position is closed - but it does
- Whenever you own a security, ask yourself if you would buy it today. If you would not buy it, you should consider selling it.
- Do not get distracted by others’ investment prowess. Most investors only discuss their successes, threatening your focus and confidence.
- Wise investments are not made from the heart, they are made using logical approaches that minimise risks and maximise opportunities.
- Master the basics. Most investors spend their time looking for easy money (which is not an easy search) instead of learning the key factors to security prices - supply and demand

Self-assessment questions

1. Which of the following is a contrary opinion rule?
    a. Short sale by spectacles
    b. Confidence Index
    c. OTC-JSE volume
    d. All of the above
2. Which of the following is **not** an assumption of technical analysis?
    a. Prices are a function of supply and demand
    b. Prices adjust rapidly and completely to new information
    c. Prices tend to move in trends
    d. Supply and demand are determined by many factors, both rational and irrational.
3. Technical analysis stands in opposition to which form of the efficient market hypothesis?
    a. Weak
    b. Semi-strong
    c. Strong
    d. Super-strong
4. Which of the following is closest to the underlying assumption of contrary opinion rules?
    a. The market, on average, is right.
    b. Small investors, on average, are wrong.
    c. Large investors, on average, are right.
    d. Small investors, on average, are right.
5. Which of the following is an advantage of technical analysis?
    a. It relies on financial statements
    b. It only has to identify a pattern in prices
    c. It is very subjective
    d. Trading rules do not change with market conditions
6. Which of the following rules is a contrary opinion rule that relies on cash balances?
    a. Debit balances in brokerage accounts

b. Short sales by specialists
c. Advance decline ratio
d. Mutual fund cash balances

7. Which of the following is true about block trades?
    a. A block uptick is probably started by a seller
    b. A block downtick is probably started by a seller.
    c. A value around 1.20 is bearish
    d. A value around 0.70 is bullish
8. If the current price rises through the 200-day moving average form below, this is:
    a. A positive signal
    b. A negative signal
    c. A neutral signal
    d. Possibly a positive signal, but it needs confirmation
9. Two assumptions of technical analysis are that security prices adjust:
    a. gradually to new information and study of the economic environment provides an indication of future market movements
    b. Rapidly to new information and study of the economic environment provides an indication of future market movements
    c. Rapidly to new information and market prices are determined by the interaction between supply and demand
    d. Gradually to new information and prices are determined by the interaction between supply and demand
10. which one of the following would be a bullish signal to a technical analyst using contrary opinion rules?
    a. The level of credit balances in investor accounts declines
    b. the ratio of bearish investment advisers to the number of Advisory Services expressing an opinion increases
    c. A large proportion of speculators expect the price of stock index futures to rise
    d. The ratio of over-the-counter (OTC) volume to the exchange (JSE) volume is relatively high
11. Which one of the following would be a bearish signal to a technical analyst?
    a. The debit balances in brokerage account increase
    b. The market shows poor performance when compared to individual stocks
    c. The yield differential between high-quality and low-quality bonds increases
    d. The ratio of short sales by specialists to total short sales becomes abnormally low

Key concepts

- Demand
- Dow Theory
- Indicators
- Lagging indicators

- Leading indicators
- Line charts
- Open interest
- Overbought/oversold oscillator
- Price fields
- Price volume index
- Primary trend
- Primary trend
- Relative strength index
- Support lines
- Time element
- Trend lines
- Volume
- Volume bar charts

Study unit 11 - Fundamentals of the analysis of fixed interest securities

Learning outcomes

- Describe the basic characteristics, features of a bond (e.g. maturity, par value, coupon rate)

What is a bond?
A bond is a long-term loan with fixed interest payments where an investor agrees to loan money to a company or government in exchange for a predetermined interest rate. Another way to say it is a bond is fixed income security that promises to pay a stream of annual or semi-annual payments for a given number of years and to repay the loan amount at the maturity date.

What is a government bond?
A government bond is a bond issued by the South African government denominated in the country's own currency, namely rand. Government bonds are usually referred to as risk free because the government can raise taxes or create additional currency in order to redeem the bond at maturity.

What are municipal bonds?
Municipal bonds are issued by South African government entities to generate income with which to meet capital expenditure on, for example the construction of highways, bridges and schools.

What are corporate bonds?
Corporate bonds are issued by private companies to obtain debt financing for projects or capital/business expansion. A risk premium(margin or spread) is added to the government yield curve or specific government reference bond in order to price these bonds. Compared to government bonds they have a higher risk to default.

What is the principal value?
The principle value is also known as the face value, future value, redemption value or par value. The principal value is the amount owed by the issuer (borrower) to the bondholder (lender) at the maturity of the bond.

What is a coupon rate of a bond?
A coupon rate of a bond is the amount of interest paid per year expressed as a percentage of the face value of the bond to be paid by the borrower. The majority of bonds are semi-annual paying bonds with half the total coupon payments disbursed every six month. There are also zero-coupon bonds available in the market that do ont pay interest, but are sold at the initial offering to investors at a price less than the par value.

What is the term for maturity?
The term to maturity of a bond is the number of years over which the issuer has contracted to meet the conditions of the obligation set out in the terms of the bond. The maturity of a bond thus refers to the date that the debt will cease to exist, at which time the issuer will redeem the bond by applying the principal value to the holder of the bond.

What is the market value or price of a bond?
The market value or price of a bond is the present value of all cash flows (principle and coupon payments) discounted at the prevailing market rate.

What is the yield to maturity?
The yield to maturity is the composite rate of return of **all** payouts, coupons and capital gain (or loss), and represents the total return of a bond if held until maturity and assuming that all coupons were reinvested at the yield to maturity.

- Calculate the holding period return (HPR) of a bond
- Explain the risks associated with investing in bonds, (e.g. interest rate risk, yield curve risk, call and prepayment risk, reinvestment risk, credit risk, liquidity risk, exchange-rate risk, inflation risk, volatility risk and event risk)

What are the main risk exposures that will affect the value of a bond

- Interest rate risk

    - Interest rate risk can be defined as the risk to which a portfolio or institution is exposed because future interest rates are uncertain. Bond prices are interest rate sensitive. Interest rate risk refers to the effect of changes in the prevailing market rate on the return of a bond, and comprises price risk and reinvestment risk.
- Price risk
    - Price risk is the uncertainty associated with potential changes in the price of a bond caused by changes in interest rate levels and rates of return in the economy. The risk occurs because changes in interest rates affect the present value of future cash flows. Becomes relevant when a bond is sold before maturity at a market rate different from the yield to maturity.
- Reinvestment risk
    - Reinvestment risk stems from the market rate (the current reinvestment rate) being different from the yield to maturity (the assumed reinvestment rate). An increase in the market rate subsequent to buying a bond would result in a lower bond price (capital loss) but higher reinvestment income. A decrease in the market rate will, however, bring about a capital gain along with a loss in reinvestment income.
- Credit risk
    - Credit risk is the risk that the creditworthiness of a bond issuer will deteriorate, increasing the required return (market rate plus risk premium) on that bond and decreasing its value. Credit risk comprises default risk, credit spread risk and downgrade risk.
        - Default risk - is defined as the possibility that the issuer will fail to meet its obligations regarding the payments of coupons and the eventual principal in a timely manner.
        - Credit spread risk - A credit spread is the difference in the yield between different bonds due to their different credit quality. The credit spread reflects the additional net yield an investor can earn from a less credit risk. Reflects the extra compensation investors receive from bearing credit risk. Credit spread risk is measured by the size of the yield differential (risk premium or spread) of a particular bond above a default-free government bond.
        - Downgrade risk - is the risk that a bond's price will decline due to a downgrade in its credit rating. Downgrade risk arises from the deteriorating financial condition of a company, and is a risk every bond faces to a certain extent.
- Yield curve risk
    - Yield curve risk arises from a non-parallel shift in the yield curve - that is, the share of the yield curve change due to the yields of bonds with different maturities changing by different amounts.
- Liquidity risk
    - The liquidity risk in bonds is given by the difficulty of being able to sell securities quickly at an attractive price. Applies only to the investor who is looking to sell its

bonds before the due date. Liquidity risk may be caused by a series of events and/or characteristics of the bond itself, such as small market volumes because of poor ratings, small face value and callable bonds.

- Call risk
    - Call risk is the risk faced by a holder of a callable bond if a bond issuer takes advantage of the callable bond feature and redeems the issue prior to maturity.

- Identify the bond indices available in South Africa and explain their uses

What are Bond rating grades?

Credit risk	**Moody's**	**Standard & Poor's**	**Fitch ratings**
Investment grade			
Highest quality	Aaa	AAA	AAA
High quality	Aa	AA	AA
Upper medium	A	A	A
Medium	Baa	BBB	BBB
Not investment grade			
Lower medium	Ba	BB	BB
Lower grade	B	B	B
Poor grade	Caa	CCC	CCC
Speculative	Ca	CC	CC
No payments/bankruptcy	C	D	C
In default	C	D	D

Name basic bond structures available to both the issuer and holder (investor)...

- Coupon bonds

    - Off the benefit of receiving an interest payment on a semi-annual basis.this is in contrast to other types of bond issue, where the payment of interest may take place on an annual or biannual basis, or even be delayed until the bond reaches full maturity. Advantage: it creates a steady source of income.
- Zero-coupon bonds
    - Are bonds that do not pay interest during their life. Investors buy them at a discount from their face value. Difference between discounted initial market value versus the par value is the return on investment.
- Bonds with embedded options - is a component of a bond and usually provides the bondholder or issuer with the right to take some action against the other party.
    - Callable bonds
        - Is a type of bond that allows the issuer to retain the privilege of redeeming the bond at some point before it reaches the date of maturity.
    - Putable bonds
        - Include an option for the investor to mature the debt at an earlier date than the final stated maturity dates. They are advantageous to the buyer of the bond and offer a lower yield than comparable non-putable securities.
    - Convertible bonds
        - Give the holder the option to exchange them for a predetermined number of shares in the issuing company.
    - Extendable bonds
        - Gives its holder the right to extend its initial maturity at a specific date or dates.
    - Retractable bonds
        - Provides the investor who owns a longer-term bond with the right to withdraw (retract) it at a specific date.
    - Exchangeable bonds
        - Allows the bondholder to exchange it, at a certain price, for common shares in a company other than the one that issued the debt security.
- Floating rate notes
    - Are bonds that pay a fluctuating rate of interest.

- Describe the different types of international bonds (e.g. foreign bonds and Eurobonds)
- Describe bonds with embedded options (e.g. callable bonds and putable bonds)
- Describe zero-coupon bonds
- Describe variable rate bonds
- Define an asset-backed security
- Describe a mortgage-backed security

Self-assessment questions

1. Identify the incorrect statements regarding bond fundamentals:
    a. The bond issuer borrows money from the bondholder in order to acquire money for capital expansion or to finance a specific project
    b. The principal value is the amount owed by the bondholder to the issuer at the maturity of the bond.
    c. The maturity of a bond refers to the date that the debt will cease to exist, at which time the issuer will redeem the bond by paying the principal value to the hold of the bond
    d. The yield to maturity and the market rate used to discount all cash flows in determining the bond's price or market value are one adn the same
2. A non-callable, AA-rated, 15 year zero-coupon is most likely to have:
    a. Default risk
    b. Price risk
    c. Call risk
    d. Reinvestment risk
3. The liquidity risk in bonds can best be described as
    a. The risk that a bond's price will decline due to a downgrade in its credit rating
    b. The difference in the yield between different bonds due to their different credit quality
    c. The risk that the creditworthiness of a bond issuer will deteriorate, increasing the required return on that bond and decreasing its value
    d. The difficulty of being able to sell securities quickly at an attractive price
4. Which of the following statements is true regarding floating rate notes with caps and floors?
    a. A combination of a cap and a floor is called a combo
    b. A cap is an advantage to the holder, while a floor benefits an issuer
    c. A floor is an advantage to the holder, while a cap benefits an issuer
    d. A cap sets the minimum coupon rate to be received by the holder of a floater.
5. If an investor believes that interest rates will rise and the value of bonds will fall, which type of bond provides the investor, who owns a longer-term bond, with the right to withdraw it as a specific date?
    a. Retractable bond
    b. Convertible bond
    c. Extendable bond
    d. Callable bond

Key concepts

- Asset-backed

- Bond indices
- Bonds
- Coupon interest
- Embedded options
- Face value
- Holding period return
- International bonds
- Market price
- Mortgage-backed
- Rating agencies
- Risk exposure
- Structured securities
- Time to maturity
- Variable rate bonds
- Yield to maturity
- Zero-coupon bonds

Study unit 12 - Valuation of fixed interest securities

Learning outcomes

- Explain the sources of return from investing in a bond (i.e coupon interest payments, capital gain/loss, reinvestment income)
- Calculate the traditional yield measures for fixed-rate bonds (i.e. nominal yield, current yield, yield to maturity, yield to call)
- Describe the fundamental principles of bond valuation
- Calculate the value of a bond given the expected annual or semi-annual cash flows and the appropriate single (constant) discount rate
- Explain how the value of a bond changes if the discount rate increases or decreases
- Calculate the change in value that is attributable to the rate change
- Explain how the price of a bond changes as the bond approaches its maturity date
- Calculate the change in value that is attributable to the passage of time
- Identify the relationship among a bond's coupon rate, the yield rate required by the market and the bond's price relative to par value (i.e. discount, premium or equal to par)
- Distinguish between the alternative definitions of duration (Macaulay, modified and effective)
- Explain why effective duration is the most appropriate measure of interest rate risk for bonds with embedded options
- Describe why duration is best interpreted as a measure of a bond's sensitivity to changes in interest rates

- Calculate and interpret the duration (Macaulay, modified dn effective) of a bond, given information about how the bond's price will increase or decrease for given changes
- In interest rates
- Calculate the approximate percentage price change for a bond, given the bond's duration and a specified change in yield.
- Discuss the convexity measure of a bond and estimate a bond's percentage price change given the bond's duration and convexity and a specified change in interest rates
- Describe a yield curve and the different yield curve shares observed
- Explain the basic theories of the term structure of interest rates (i.e. pure expectation theory, liquidity preference theory and market segmentation theory)
- Describe the implications of each theory for the shape of the yield curve
- Calculate spot/zero-coupon interest rates by means of the bootstrap method
- Calculate forward rates from a series of zero rates
- Calculate a bond's value using spot rates
- Discuss forward rate agreements (FRAs) and calculate an FRA payoff

Self-assessment questions

1. Identify the bond with the greatest interest rate risk:
    a. A 5% 5-year bond yielding 4%
    b. A 5% 10-year bond yielding 6%
    c. A zero-coupon 15-year bond yielding 6%
    d. A 10% 20-year bond yielding 8%

The zero-coupon 15-year bond yielding 6% is subject to the most interest rate risk. The combination of a long term maturity, no coupon payments and a low yield results in relatively longer duration and greater price sensitivity.

2. Calculate the realised yield of the following bond: coupon rate 13% (semi-annual); maturity date 15 July 2015; transaction date 15 July 2003; YTM 15.5%; reinvestment rate 9%; market price R86.56
    a. 12.5%
    b. 13.5%
    c. 14.5%
    d. 15.5%

Future value of an annuity (24 coupons invested at 9%)
24 **N** 4.5 **I/YR** 6.5 **PMT** comp **FV** -270.9798
The total return components are the principal value plus interest income (ending value), and the purchase price (beginning value). The total future or ending value in this instance is R370.98 (R100 + R270.98) with the beginning value at R86.56.
24 **N** -86.56 **PV** 370.98 **FV** comp **I/YR** 6.2514
Doubling 6.2514% gives a total return (realised or horizon yield) of 12.50%

3. An investor can decide to invest in (i) a 1-year, zero-coupon bond yielding a spot rate of 10.50% per annum, or (ii) a 6-month, zero-coupon bond yielding s spot rate of 10.30% per annum, and then reinvest this return in a new bond. Calculate the forward rate 6 months from now that would leave an investor indifferent between these two options.
    a. 10.30%
    b. 10.50%
    c. 10.70%
    d. 10.90%

6f6 = $[(\frac{1.0525^2}{1.0515^1})^{1/(2-1)} - 1] * 100 * 2 = 10.70\%$

SR12 = $[(1.103 * 1.107)^{1/2} - 1] * 100 = 10.50\%$

4. Calculate the duration of a 3-year, 7% semi-annual bond yielding 6%.
    a. 1.9857
    b. 2.6814
    c. 2.8107
    d. 2.8888

	V_	V0	V+
FV	100	100	100
PMT	3.6	3.5	3.5
I/YR	2.5	3.0	3.5
N	6	6	6
Comp PV	-105.5081	-102.7086	-100.0000

D = $\frac{105.5081 - 100.0000}{2 * 102.7086 * 0.01} = 2.6814$

5. A 9-year bond has a yield to maturity of 10% and an effective duration of 6.54 years. If the market yield changes by 50 basis points, the bond's expected price change ios:
    a. 3.27%
    b. 3.66%
    c. 5.00%
    d. 6.54%

$\%\Delta P_{D(0.5)}$ = -6.54 (+- $\frac{50}{100}$) = +-3.27%

6. If you expected interest rates to fall, you would prefer to own bonds with:
    a. Long duration and high convexity
    b. Long duration and low convexity

c. Short duration and high convexity
d. Short duration and low convexity

Bonds with longer durations would benefit most from increasing bond prices as interest rates fall, due to higher interest rate sensitivity. Higher convexity bonds are always preferred to lower convexity bonds as they perform better, whether yields fall (greater increase in price) or rise (smaller decrease in price)

7. A 6% coupon bond pays interest semi-annually has a duration of ten, sells for R800, and is priced to yield 8%. If the market rate increases to 9.5% the predicted decrease in price, using the duration concept is:
    a. R72
    b. R80
    c. R96
    d. R120

$\Delta P_{D(1.5)}$ = -10 * ($\frac{150}{100}$%) * 800 = -R120

8. The current price of a bond is R102.50. If the market rate changes by 0.5%, the bond's price changes by R2.50. What is the duration of this bond?
    a. 2.44
    b. 3.87
    c. 4.88
    d. 5.02

Duration = ($\frac{2.50/102.50}{0.005}$) = 4.88

9. Assume a bond with an effective duration of 10.5 and a convexity of 97.3. Using both of these measures, the estimated percentage change in price for this bond in response to a decline in yield 200 basis points is closest to:
    a. 17.11%
    b. 19.05%
    c. 22.95%
    d. 24.89%

$\%\Delta P_{T(-2)}$ = -10.5(-2) + [97.3 $(2/100)^2$ * 100]
= 21% + 3.89%
= 24.89%

10. A straight 5% bond has 2 years remaining to maturity and is priced to yield at 6%. A callable bond that is the same in every respect as the straight bond, except for the call feature, is priced at R917.60. What is the value of the embedded call option?
    a. R45.80
    b. R63.81
    c. R82.40
    d. R99.13

Calculate the price of the straight bond (always assume semi-annual compounding if not stated):
4 **N** 3 **I/YR** 25 **PMT** 100 **FV** comp **PV** -981.4145

The value of the embedded call option is R63.81, representing the difference between the straight bond (R981.41) and the callable bond (R917.60) which trades at a larger discount to par.

Key concepts

- Bond prices
- Bootstrapping
- Callable bonds
- Convexity
- Coupon
- Current yield
- Duration
- Effective duration
- Forward rate agreements
- Forward rates
- Interest rates
- Liquidity preference
- Macaulay duration
- Modified duration
- Nominal yield
- Price-yield
- Pure expectations
- Realised return
- Reinvestment
- Segmented market
- Spot rates
- Valuation
- Volatility
- Yield curve theories
- Yield to call
- Yield to maturity
- Yield-maturity

Study unit 13 - An introduction to derivative instruments

Learning outcomes

- Define a derivative and differentiate between exchange-traded and over-the-counter derivatives
- Define a forward commitment, identify the types of forward commitments and describe the basic characteristics of forward contracts, futures contracts and swaps
- Define a contingent claim and identify the types of contingent claims
- Describe the basic characteristics of options and distinguish between an option to buy (call) and an option to sell(put)
- Discuss the purposes and criticisms of derivative markets
- Explain the concepts of arbitrage and the role it plays in determining prices and in promoting market efficiency
- Describe how a futures position may be closed out (i.e. offset) prior to expiration
- Define initial margin, maintenance margin, variation margin and settlement price.
- Describe how a futures contract can be terminated by close-out at expiration, delivery, an equivalent cash settlement or an exchange-for-physicals
- Identify the basic elements and describe the characteristics of option contracts
- Define European option, American option, moneyness, payoff, intrinsic value and time value
- Explain how payoffs are determined
- Identify the minimum and maximum values of European options and American options
- Calculate put-call parity for European options
- Describe the characteristics of swap contacts and explain how swaps are terminated
- Define currency swaps and calculate and interpret the payments on a currency swap
- Define a plain vanilla interest rate swap and calculate and interpret the payments on an interest rate swap
- Determine the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general share of the graph of the strategies of buying and selling calls and puts, explain each strategy's characteristics
- Determine the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration and general share of the graph of the covered call strategy and the protective put strategy, and explain each strategy's characteristics

Self-assessment questions

1. A risk-averse investor owning shares in Blue Corporation decides to add the shares of either Yellow Corporation or Green Corporation to her portfolio. All three shares offer the same expected return and total risk. The covariance of returns between Blue and Yellow is -0.05 and Blue and Green is +0.05. Portfolio risk is expected to:

a. Decline more by buying Yellow Corporation
b. Decline more by buying Green Corporation
c. Increase by buying either Yellow or Green Corporation
d. Decline or increase, depending on other factors

A positive covariance means that asset returns move together and a negative covariance means that returns move inversely. Financial assets that generate returns that have a positive covariance with each other will not provide much diversification. A risk-averse investor wanting to hold a more diversified portfolio would prefer to add financial assets with returns that exhibit a weak linear relationship and therefore have low or negative covariance with each other.

2. The return on an asset added to a portfolio is less than perfectly positively correlated with the returns of the other assets in the portfolio but has the same standard deviation. What effect will adding the new asset have on the standard deviation of the portfolio's return? The standard deviation
   a. Will increase
   b. Will decrease
   c. May increase or decrease, depending on the asset allocation model
   d. May increase or decrease, depending on the individual securities mix in the portfolio

Use the following information to answer questions 3 to 6.

Probability of occurrence	Security A	Security B
50%	12%	10%
25%	10%	11%
25%	8%	9%

3. Calculate the required rate of return for A and B.
   a. A 10% B10.5%
   b. A 11.0% B11.5%
   c. A 10.5% B10.0%
   d. A 12.0% B10.0%

KA = (0.50 * 12) + (0.25 *10) + (0.25 *8) = 10.50%
KA = (0.50 * 10) + (0.25 *11) + (0.25 *9) = 10.00%

4. Calculate the standard deviation of both securities
   a. A 0.71 B 1.66
   b. A 0.85 B 1.66
   c. A 1.71 B 1.66

d. A 1.66 B 0.71

$$\sigma_A = \sqrt{0.50(12 - 10.5)^2 + 0.25(10 - 10.5)^2 + 0.25(8 - 10.5)^2} = 1.6583$$

$$\sigma_B = \sqrt{0.50(10 - 10)^2 + 0.25(11 - 10)^2 + 0.25(9 - 10)^2} = 0.7071$$

5. Calculate the covariance of security A and security B
   a. 0.50
   b. 0.40
   c. 0.15
   d. 0.25

COV_{AB} = 0.50 [(12 - 10.5)(10 - 10)]
+ 0.25 [(10 - 10.5)(11 - 10)]
+ 0.25 [(8 - 10.5)(9 - 10)]
= 0.50

6. Calculate the correlation between the two securities.
   a. 0.21
   b. 0.770
   c. 0.087
   d. 0.910

$$r = \frac{COV_{AB}}{\sigma_A \sigma_B} = \frac{0.50}{(1.66 * 0.71)} = 0.42$$

7. Use the information you obtain in the previous three questions to calculate the portfolio risk if the investment is 50% in A and 50% in B0
   a. 1.030
   b. 0.770
   c. 0.087
   d. 0.910

$$\sigma_P = \sqrt{(0.50^2 * 1.66^2) + (0.50^2 * 0.71^2) + 2(0.50 * 0.50 * 0.50)} = 1.03$$

8. Which one of the following is the most valid justification for including real estate as part of an investment portfolio?
   a. High liquidity
   b. Low project-specific risk
   c. Low management and information costs
   d. Low correlation of real estate with shares and bonds

The most important factor to consider when adding an asset class to a portfolio is its average covariance with all the other asset classes in the portfolio. Returns on real estate and shares have a low correlation, whereas returns on real estate and bonds are generally uncorrelated.

9. In comparing a 65-year-old to a 25-year-old, all the following statements will generally be true, except:
    a. The 65-year old needs more liquidity than the 25 year old does
    b. The 65 year old will seek less risk exposure than the 25 year old
    c. The 65 year old should only invest in short-term cash deposits, while the 25 year old's investments should be mainly in equities
    d. The 25 year old should invest as must as possible in tax deferred plans while the 65 year old may no longer desire this type of investment

A life-cycle investing approach starts with a comparatively high-risk, high-return strategy that gradually moves to low risk, low return over the years. However, an investment portfolio should always be well diversified. Older investors should not invest in short-term cash deposits only.

10. The correlation coefficient of portfolio's X's and the market's returns is 0.95 and the correlation coefficient of portfolio Y's and the market's return is 0.60. Which of the following statements best describes the levels of portfolio diversification?
    a. Both portfolio X and Y are well diversified
    b. Both portfolio X and Y are poorly diversified
    c. Portfolio X is well diversified and portfolio Y is poorly diversified
    d. Portfolio X is poorly diversified and portfolio Y is well diversified.

The market containing all possible investment choices represents the ultimate or optimum in diversification. therefore , a portfolio that exhibits a high(er) correlation with the market is assumed to be relatively more diversified.

Key concepts

- Arbitrage
- Call option
- Clearinghouse
- Covered call
- Currency swap
- Derivatives
- European options
- Forward options
- Futures contracts
- Futures price
- Hedge ratio
- Interest rate swap
- Long
- Margins
- Marking-to-market
- Open interest

- Option bounds
- Option delta
- Option premium
- Option pricing
- Payoff
- Protective put
- Put option
- Put-call parity
- Risk management
- Risk profiles
- Short
- Swaps
- volume

Study unit 14 - Portfolio management

Learning outcomes

- Discuss the different phases in the life cycle of an investor (i.e. accumulation, consolidation and spending)
- Discuss the objectives regarding the risk and return of the portfolio (i.e. capital preservation, capital appreciation and/or current income)
- Discuss the constraints faced by investors (i.e. liquidity, time horizon, tax concerns, legal and regulatory requirements, unique needs and personal preferences)
- Distinguish between individual and institutional objectives and constraints
- Explain asset allocation and its importance to portfolio performance
- Explain the importance of diversification
- Discuss the determination of the asset mix, referring to policy and tactical asset allocation
- Explain portfolio construction referring to the measuring of risk and return
- Calculate the expected return for an individual security and a portfolio of securities
- Calculate the expected standard deviation for an individual security and a portfolio of securities
- Explain and calculate the covariance and the correlation between assets
- Determine the optimal asset allocation for a two-security portfolio
- Distinguish between two equity portfolio management strategies (i.e. active and passive)
- Describe the various active management strategies related to equity portfolios (e.g. intrinsic valuation, relative valuation, technical valuation)
- Describe the various passive management strategies related to equity portfolios (e.g. buy-and-hold, indexing)

- Distinguish between two fixed interest-bearing security portfolio management strategies (i.e. active and passive)
- Describe the various active management strategies related to fixed interest-bearing security portfolio(e.g. Interest rate anticipation, credit analysis, yield spread analysis, bond swaps.
- Illustrate the merits of a proposed bond swap transaction
- Describe the various passive management strategies related to fixed interest-bearing security portfolios (e.g. buy-and-hold, indexing)

ANSWERS ON PAGE300

Self-assessment questions

1. Suppose a 9-month futures contract is entered into on a non-dividend-paying share when the share price is R60 and the risk-free interest rate is 8% per annum. An investor has just taken a long position in this contract. Six months later, the price of the share is R55 and the risk-free interest rate is 8.5% per annum. The delivery price and value of this futures contract are closest to:
    a. R61.17 R7.44
    b. R61.17 R7.37
    c. R63.57 -R7.37
    d. R63.57 -R7.28
2. A 3 month futures on a share trading at R95 is available for R98 per contract. The risk-free interest rate is 10% per annum. The following transactions will generate an arbitrage profit:
    a. Borrow R98, buy the contract and sell the share
    b. Short the contract, borrow R95 and buy the share
    c. Sell the share and the futures contract, invest R95
    d. Sell the contract, invest R98 and buy the share
3. A non-dividend paying share is currently trading at R50. This share price is expected to increase or decrease by R10 over the next three-month period. The risk-free interest rate is 8% per annum. The delta (Δp) and price (p) of a 3 month European put option on this share with a R50 strike should be close to:
    a. -0.5 R4.43
    b. 0.5 R4.43
    c. -0.5 R5.38
    d. 0.5 R5.38
4. A European call option and put option on the shares of ABC Limited both have a strike price of R26 and a time to expiration of 6 months. The call option trades at R3.50 and the put option trades at R3.00. The current risk-free interest rate is 12% per annum and the current share price is R25. the following transactions will generate an arbitrage profit:
    a. Borrow money; buy put; sell call; buy spot
    b. Sell call; buy put; sell spot; invest proceeds
    c. Sell put; borrow money; buy call; buy spot

d. Buy spot; sell call; invest proceeds; buy put

5. A share trading at R15 is expected to increase to R19 or decrease to R13 over the next month. What is the probability of a R17 strike put on this share ending up in-the-money? Is this put currently in, out or at-the-money?
    a. 33% in-the-money
    b. 33% out-the-money
    c. 67% out-the-money
    d. 67% in-the-money
6. An investor owns 20 000 Absa shares. He would like to protect the value of this portfolio by entering into either a single stock futures contract or a put options contract with a 0.6666 delta on this share. How many SSF contracts or options contracts will the investor have to buy or sell to achieve this?
    a. Sell 200 SSF contracts, buy 300 put options
    b. Buy 200 SSF contracts, sell 300 put options
    c. Sell 200 SSF contracts, buy 113 put options
    d. Buy 200 SSF contracts, buy 113 put options
7. A call with a strike price of R25 costs R3. A put with a strike price of R20 costs R2. A trader uses these options to create a strangle. What is the maximum potential loss (per option) of this strategy, and for which two values of the spot price does the trader break even with a profit of zero?
    a. R1 R15 and R30
    b. R5 R15 and R30
    c. R1 R18 and R28
    d. R1 R18 and R28
8. You wish to obtain an exposure to a specific share. Suppose that you buy a call with a R70 strike at R6.75. Calculate the effective price paid to purchase the share if the share price at expiration is R65 and R78 respectively.
    a. R71.25 R71.75
    b. R71.25 R76.75
    c. R71.75 R71.75
    d. R71.75 R76.75
9. A put option with a R60 strike (R8 premium) and a put option with a R70 strike (R14 premium) are available on a certain share. What combination of these options would result in a bull put spread, and what is the maximum potential profit of this strategy?
    a. Long put (R60) plus short put (R70) R4
    b. Long put (R70) plus short put (R60) R4
    c. Long put (R60) plus short put (R70) R6
    d. Long put (R70) plus short put (R60) R6
10. Under the terms of an interest rate swap, a financial institution has agreed to pay 9% per annum (compounded quarterly) and to receive 3 month JIBAR in return on a notional principal of R10 million, with payments being exchanged every 3 months. The swap has a remaining life of 10 months. The interest rate is 8% for all maturities. Determine the value of the interest rate swap to the financial institution.

a. -R29 351
b. R29 351
c. -R96 459
d. R96 458

Key concepts

- Active management
- Asset allocation
- Asset mix
- Bond swaps
- Buy-and-hold
- Capital appreciation
- Capital preservation
- Consolidation phase
- Constraints
- correlation
- Covariance
- Current income
- Expected return
- Fixed interest-bearing
- Indexing
- Interest rate anticipation
- Intrinsic valuation
- Legal and regulatory
- Life cycle
- Liquidity
- Objectives
- Passive management
- Policy asset allocation
- Portfolio construction
- Portfolio risk
- Relative valuation
- Spending phase
- Standard deviation
- Tactical asset allocation
- Tax concerns
- Technical valuation
- Time horizon
- Unique/personal preferences

- Yield spread analysis

Study unit 15 - Evaluation of portfolio management

Learning outcomes

- Discuss the fundamental issues in performance measurement
- Explain and calculate Treynor's performance index
- Explain and calculate Sharpe's performance index
- Explain and calculate Jensen's performance index
- Compare the traditional methods (Treynor, Sharpe and Jensen) for calculating risk-adjusted portfolio performance
- Explain performance attribution analysis with reference to:
    - Total return calculations
    - Evaluation of performance fees
    - Benchmark portfolios
    - Measurement of allocation effect
    - Measurement of selection effect

Self-assessment questions

1. Which one of the following statements is false?
    a. Benchmark portfolios are passive and unmanaged portfolios that reflect a manager's particular investment style.
    b. Whether the performance of the portfolio comes from general market movements or can be attributed to the skill of the portfolio manager is generally thought to be irrelevant.
    c. The Treynor Performance Index is normally calculated by running a linear regression of the time series of portfolio returns in excess of the risk-free interest rate against the market's returns in excess of the risk-free interest rate.
    d. The performance of the portfolio manager compared to benchmarked market performance entails evaluation of the manager's market timing and security selection.
2. Which of the following is not a guideline included in the CFA-GIPS?
    a. Total return (including realised and unrealised gains) must be included in the calculation of investment performance.
    b. Time-weighted rates of return should not be used.
    c. If composite return performance is presented, the composite must contain all actual fee-paying accounts.

d. Performance presentation must disclose whether performance results are calculated gross or net of management fees and what the firm's fee schedule is

3. _____ contends that unique risk should theoretically be non-existent in a completely diversified portfolio, and performance evaluation should thus focus only on the portfolio's undiversifiable systematic risk.
    a. Treynor
    b. Sharpe
    c. Jensen
    d. Markowitz
    e. Stern
4. Which one of the following statements is true?
    a. The allocation effect measures the impact of individual security selections on the total return of a portfolio
    b. Jensen contends that unsystematic risk should theoretically be non-existent in a completely diversified portfolio
    c. The Sharpe Performance Index also indicates that a higher number shows a higher return for a given risk (thus a higher risk-adjusted average rate of return), or a lower risk for a given return.
    d. The Sharpe Performance Index may be calculated as follows: (Portfolio's average rate of return - Risk-free rate of return) / Beta coefficient of portfolio.
5. Josephine Njuguna, a portfolio manager at Vega Capital, uses the CAPM for making recommendations to her clients. She has gathered the following information (assume a risk-free rate of return of 6%):

	Expected return	**Standard deviation**	**Beta**
Security A	12%	36%	0.7
Security B	17%	25%	1.2
Market Index	14%	15%	1.0

    A. Calculate the expected return for each security
    B. Identify and justify which security would be more appropriate for an investor who wants to (i) add this security to a well-diversified portfolio, or (ii) hold this security as a single-security portfolio.

A. Security A = 6% + 0.7(14% - 6%) = 11.6%
   Security B = 6% + 1.2(14% - 6%) = 15.6%
B. (i) Security A. Its lower beta will be positive for the overall portfolio risk.
   (ii) Security B. When a security is held in isolation, standard deviation is the relevant risk measure. For assets held in isolation, beta as a measure of risk is irrelevant.

6. Godfrey Marozva, and analyst at PSG Investments, would like to evaluate the following three funds (assume a risk-free rate of return of 6%)

Fund	Expected return	Standard deviation	Beta
AAA	16%	5.02%	1.00
BBB	13%	4.04%	1.05
CCC	9%	3.02%	0.89
Market index	12%	3.50%	1.00

Calculate the Sharpe Performance Index, Jensen's alpha and the Treynor Performance Index for the three funds as well as the market index. Comment of the performance of the portfolios.

The portfolios are indicated in ranking sequence (best to worst):

The Sharpe Performance Index = (rp - rf) / <o>p

(1) AAA = (16% - 6%) / 5.02% = 1.99
(2) BBB = (13% - 6%) / 4.04% = 1.73
(3) Market = (12% - 6%) / 3.50% = 1.71
(4) CCC = (9% - 6%) / 3.02% = 0.99

Jensen's alpha = rp - [rf +bp(rm - rf)]

(1) AAA = 16% - [6% + 1.00(12% - 6%)] = 4.00%
(2) BBB = 13% - [6% + 1.05(12% - 6%)] = 0.70%
(3) Market = 12% - [6% + 1.00(12% - 6%)] = 0.00%
(4) CCC = 9% - [6% + 0.89(12% - 6%)] =-2.34%

The Treynor Performance Index (rp - rf) / Bp

(1) AAA = (16% - 6%) / 1.00 = 10.00
(2) BBB = (13% - 6%) / 1.05 = 6.67
(3) Market = (12% - 6%) / 1.00 = 6.00
(4) CCC = (9% - 6%) / 0.89 = 3.37

7. Virgil Fick invested 80% in equity, earning a return of 11%; 10% in bonds, earning a return of 6%; and 10% in money market funds, earning 5%. This has to

be compared to a benchmark portfolio. Taking the JSE ALSI and the ALBI into account, the benchmark portfolio achieved the following return:

Asset class	**Weight (WB)**	**Return of index during period (rB)**	**Weighted return (WB * rB)**
Equity (JSE ALSI)	0.60	9.5	5.7
Bonds (ALBI)	0.30	5.6	1.68
Money market	0.10	4.8	0.48

Virgil invested his portfolio as follows, compared to the benchmark portfolio:

Beginning weights		
Sector	**Portfolio (1)**	**Benchmark (2)**
Oil and gas	10.0	12.0
chemicals	2.4	2.4
Basic resources	8.0	5.0
Construction and materials	2.0	.15
Industrial goods and services	7.6	9.0
Automobiles and parts	0.0	2.5
Food and beverage	10.0	3.8
Personal and household goods	6.0	4.5
Health care	11.0	8.4
Retail	2.0	4.5
Media	1.0	2.9
Travel and leisure	1.0	1.9
telecommunications	6.0	4.6

Utilities	0.0	4.5
Banks	14.0	12.0
Insurances	2.0	5.6
Financial services	6.0	6.0
Technology	11.0	8.9

A. Calculate the return of Virgil's portfolio and the benchmark portfolio
B. Determine the influence of asset allocation and the influence of the selection of assets within markets
C. Perform a sector contribution analysis in order to account for the portfolio manager's ability to outperform the benchmark portfolio

The benchmark portfolio achieved the following return:

Asset class	**Weight (WB)**	**Return of index during period (rB)**	**Weighted return (WB * rB)**
Equity (JSE ALSI)	0.60	9.5	5.7
Bonds (ALBI)	0.30	5.6	1.68
Money market	0.10	4.8	0.48
Return of benchmark portfolio =			7.86

Beginning weights					
Sector	**Portfolio (1)**	**Benchmark (2)**	**Active weights (3)**	**Sector return (4)**	**Sector allocation contribution (5) = (3) * (4)**
Oil and gas	10.0	12.0	-2.0	4.58	-0.0916
chemicals	2.4	2.4	0.0	3.92	0.0000
Basic resources	8.0	5.0	3.0	8.30	0.2490
Construction and materials	2.0	.15	0.5	2.42	0.0121
Industrial goods and	7.6	9.0	-1.4	2.67	-0.0374

services					
Automobiles and parts	0.0	2.5	-2.5	3.42	-0.0855
Food and beverage	10.0	3.8	6.2	7.25	0.4495
Personal and household goods	6.0	4.5	1.5	6.49	0.0974
Health care	11.0	8.4	2.6	9.32	0.2423
Retail	2.0	4.5	-2.5	4.8	-0.1200
Media	1.0	2.9	-1.9	2.33	-0.0443
Travel and leisure	1.0	1.9	-0.9	2.86	-0.0257
telecommunications	6.0	4.6	1.4	10.60	0.1484
Utilities	0.0	4.5	-4.5	1.89	-0.0851
Banks	14.0	12.0	2.0	10.50	0.2100
Insurances	2.0	5.6	-3.6	8.25	-0.2970
Financial services	6.0	6.0	0.0	7.35	0.0000
Technology	11.0	8.9	2.1	3.95	0.0830
	100.0	100.0	0.0		0.7051

Key concepts

- Allocation effect
- Attribution analysis
- benchmark
- Jensen’s measure
- Performance fees
- Performance measurement
- Selection effect
- Sharpe's effect
- Sharpe’s performance index
- Total return

- Treynor's performance index

Study unit 16 - Foreign exchange management

Learning outcomes

- Discuss the restrictions faced by South African residents interested in making foreign investments
- Explain what foreign exchange is and how it trades
- Explain and use the foreign exchange conventions adopted by the Financial Markets Association (ACI)
- Explain and calculate the bid-ask spread and discuss the factors influencing the spread
- Define direct and indirect methods of foreign exchange quotations and convert direct (indirect) foreign exchange quotations into indirect (direct) foreign exchange quotations
- Define currency appreciation and depreciation and calculate the percentage appreciation/depreciation
- Calculate and interpret currency cross rates, given two spot exchange rate quotations involving three currencies
- Define currency arbitrage and perform triangular arbitrage
- Distinguish between the spot and forward markets for foreign exchange
- Calculate and interpret a forward discount or premium and express it as an annualised rate
- Explain interest rate parity and illustrate covered interest arbitrage
- Discuss exchange rate determination and behaviour
- Discuss the economic and political factors affecting exchange (i.e. supply and demand, balance of payments, current/capital account balances, relative inflation rates, relative interest rates, real interest rates and government policies)
- Explain how exchange rates are determined in a flexible or floating exchange rate system
- Describe a fixed exchange rate and pegged exchange rate system
- Discuss absolute purchasing power parity and relative purchasing power parity
- Forecast future exchange rates using relative purchasing power parity (PPP)
- Discuss the Big Mac index as an example of how to use purchasing power parity in comparing living standards across countries
- Discuss the international Fischer effect (IFE)
- Forecast future exchange rates using interest rate differentials (i.e. the relative purchasing power parity and international Fischer effect combination)
- Discuss foreign exchange investments as an alternative investment class

Self-assessment questions

1. If the USDZAR exchange rate is quoted at 15.1500/15.1650,then:
    a. An investor can buy ZAR against the USD at 15.1650
    b. An investor can sell ZAR against the USD at 15.1500
    c. The USDZAR is trading at a midpoint of 15.1575
    d. All of the above
2. The EURUSD mid spot rate is 1.1010. Calculate the exchange rate of the EUR against the USD on an indirect basis.

USDEUR = 1/1.1010 = 0.9083

3. You are given the following midpoint exchange rate. Calculate the EURCHF cross rate:
   EURUSD = 1.1010
   USDCHF = 0.9875

First express USDCHF in a direct quotation basis: CHFUSD = 1/1.09875 = 1.0127
EURCHF = EURUSD/CHFUSD = 1.1010/1.0127 = 1.0872

4. Which of the following exchange rates has a higher bid-ask spread and why: the EURUSD or the USDZAR?

The liquidity in the ZAR is much lower than in the EUR. Dealers in the USDZAR would therefore find it more difficult to match buyers and sellers than they would in the EURUSD. This would result in the USDZAR attracting a higher bid-ask spread.

5. John Mazelike specialises in cross rate arbitrage. He notices the following midpoint quotes:
   EURUSD: 1.3095
   NZDUSD: 0.7280
   NZDEUR: 0.5525

   Ignoring transaction costs, does JOhn have an arbitrage opportunity based on these quotes? If there is an arbitrage opportunity, how will he profit from it if he has USD 1 million available for this purpose?

The implicit NZDEUR cross rate is 0.5559 (0.7280/1.3095). The quoted rate in the market is 0.5525. Triangular arbitrage is therefore possible. The quoted rate is therefore undervalued relative to the implicit cross rate. John's arbitrage profits are calculated as follows:

Step 1: Sell the 1m USD to raise 763 650.25 EUR (1 000 000/1.3095)
Step 2: Use the quoted cross rate to sell 763 650.25 EUR to raise 1 382 172.39 NZD (763 650.25/0.5525).
Step 3: Use the 1 382 172.39 NZD to buy 1 006 221.50 USD at the quoted rate of 0.7280.

John has realised a risk-free profit of 6 221.50 USD

6. The AUDUSD spot exchange rate is 0.7743/47 and the 3-month forward rate is 0.7692/0.7701.
    a. Is the AUD trading at a premium or a discount relative to the USD in the forward market?
    b. Compute the annualised forward premium/discount on the AUD relative to the USD.

The midpoint of the AUDUSD spot rate is 0.7745 and the forward rate 0.7699.

A. 1 AUD will cost 46 USD vents (0.7745 - 0.7699) less 3 months from now. THe AUD therefore trades at a discount to the USD in the forward market.
B. Annualised discount = $\left(\frac{0.7699 - 0.7745}{0.7745}\right) * \left(\frac{12}{3}\right) * 100 = 2.38\%$

7. The current USDCAD exchange rate is 1.2380/85, the annual interest rate for 3 month CAD is 2.54% and for USD 3.10%. The 3 month EURUSD forward foreign exchange rate is 1.2360/60. Calculate whether IRP holds for this example.

The mid-point USDCAD spot rate is 1.2383 and the mid-point forward rate is 1.2365

The calculated USDCAD forward rate is 1.2383 * $\frac{1+(0.0254 * \frac{3}{12})}{1+(0.0310 * \frac{3}{12})}$ = 1.2366

The calculated forward rate is virtually the same as the quoted forward rate. IRP therefore holds with no opportunity to make risk-free profits.

8. Consider SA and the US. interest rates in SA are greater than interest rates in the US. Which of the following is true?
    a. ZAR is expected to appreciate relative to USD, and ZAR should trade with a forward discount
    b. ZAR is expected to appreciate relative to USD, and ZAR should trade with a forward premium
    c. ZAR is expected to depreciate relative to USD, adn ZAR should trade with a forward discount.
    d. ZAR is expected to depreciate relative to USD, and ZAR should trade with a forward premium.
9. Assume that the mid spot exchange rate for EURZAR is currency 16.8010, the SA inflation rate is 6.00% and the euro inflation rate is 1.25%. Calculate the expected future exchange rate in 1 year from now under relative PPP.

E1 = 16.8010 * $\frac{(1+0.060)^1}{(1+0.125)^1} = 17.5892$

10. According to the international Fisher effect, if the annual nominal USD interest rate is 3.10% and the annual nominal JPY interest rate is 0%, then the JPY should _____ relative to the USD over the next year.
    a. Appreciate by 3.10%
    b. Be unchanged

c. Depreciate by 3.10%

Key concepts

- Alternative asset class
- Balance of payments
- Bid-ask spread
- Big Mac index
- Capital account
- Cross rates
- Currency arbitrage
- Current account
- Direct/indirect quotation
- Economic/political factors
- Foreign exchange conventions
- Foreign exchange market
- Foreign investment
- Forward discount/premium
- Forward exchange market
- Government policies
- Inflation rate differential
- Interest rate differential
- Interest rate parity
- International Fischer effect
- International parity relationships
- Purchasing power parity (PPP)
- Real inflation rates
- Relative inflation rates
- Relative interest rates
- Supply and demand
- Triangular arbitrage

Self assessment questions

1. The annual holding period return of an investment that was held for four years is 5.74%. The ending value of this investment was R1 000. Calculate the beginning value of the investment.

1. R799.94
2. R945.72
3. R1 057.40

4. R1 250.00

Annual HPR = HPR**1/n
1.0574 = HPR**1/4
HPR = 1.0574**4
HPR = 1.2501
HPR = Ending valu/ Beginning value
1.2501 = 1000 / Beginning value
Beginning value = 1000 / 1.2501
= R799.94

2. Which of the following is not a purpose of market indices?
1. To predict past market movements.
2. To create and monitor an index fund.
3. To measure market rates of return in economic studies.
4. As benchmarks to evaluate the performance of professional portfolio managers.

To predict past market movements

3. If a risk-free asset has a correlation of zero with all other risky assets the expected return will be ..... to/than the actual return.
1. lower
2. equal
3. greater
4. not related
Equal
A risk-free asset is an asset with zero variance which has zero correlation with all other risky assets and produces a risk-free rate of return. It is an asset with a standard deviation of zero because its expected return will equal its actual return.

4. .....(i)..... risk is the only risk that a share contributes to a well diversified portfolio while .....(ii)..... risk is diversified away from this portfolio.
(i) (ii)
1. Financial unsystematic
2. Systematic financial
3. Systematic unsystematic
4. Unsystematic systematic

Use the information in the table below to answer question 5.

	Average rate of return	Standard deviation	Correlation coefficient with market index
Green Limited	26%	14%	0.45
Market Index	10%	6%	

5. Calculate the beta of Green Limited.
1. 0.01
2. 0.06
3. 0.55
4. 1.06

$$\beta = \frac{Corr_{i,m} \times \sigma_i \times \sigma_m}{{\sigma_m}^2}$$

$$= \frac{0.45 \times 0.14 \times 0.06}{0.06^2}$$

$$= \frac{0.0038}{0.0036}$$

$$= 1.06$$

6. Brainchild Limited has a current dividend of R2.00 per share. It has a beta of 1.1 and a constant growth rate of 5%. The risk-free rate is 8% and the return of the market is 12%. Calculate the intrinsic value of Brainchild Limited using the constant growth model.
1. R27.03
2. R28.38
3. R28.57
4. R30.00

The required rate of return of Brainchild Limited using the capital asset pricing model (CAPM):

$$k = r_f + \beta(r_m - r_f)$$

$$= 8 + 1.1(12 - 8)$$

$$= 12.40\%$$

The intrinsic value of Brainchild Limited using the constant growth model:

$$V_0 = \frac{D_1}{k - g}$$

$$= \frac{D_0(1 + g)}{k - g}$$

$$= \frac{2.00(1.05)}{0.124 - 0.05}$$

$$= \frac{2.10}{0.074}$$

$$= R28.38$$

7. Maroon Limited has just paid dividends of R1.00 per share this year. The dividend is expected to grow at 15% over the next two years and at 8% in year three. There after growth is expected to level off to a constant growth of 4%. Maroon Limited has a required rate of return of 18%. Calculate the intrinsic value of Maroon Limited using the three stage dividend discount model.

1. R6.46
2. R9.25
3. R9.37
4. R10.61

$$D_0 = 1.00$$

$$D_1 = 1.00(1.15) = 1.15$$

$$D_2 = 1.15(1.15) = 1.3225$$

$$D_3 = 1.3225(1.08) = 1.4283$$

$$D_4 = 1.4283(1.04) = 1.4854$$

$$P_3 = \frac{D_4}{k - g}$$

$$= \frac{1.4854}{0.18 - 0.04}$$

$$= R10.6102$$

Calculate the intrinsic value:

$$V_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{P_3}{(1+k)^3}$$

$$= \frac{1.15}{(1.18)^1} + \frac{1.3225}{(1.18)^2} + \frac{1.4283}{(1.18)^3} + \frac{10.6102}{(1.18)^3}$$

$$= 0.9746 + 0.9498 + 0.8693 + 6.4577$$

$$= R9.25$$

Use the information in the table below to answer question 8.

Fashion Corporation	
Dividend payout ratio	30%
Net profit margin	15%
Total asset turnover	2.0
Financial leverage	0.9

8. Calculate the growth rate of Fashion Corporation.
1. 8.10%
2. 15.00%
3. 18.90%
4. 27.00%
g = ROE x Retention rate (RR)

ROE = net profit margin * total asset turnover * financial leverage
= 15 * 2.0 * 0.9
= 27%

RR = 1 - dividend payout (D / E)
= 1 - 0.30
= 0.70

g = ROE * RR
= 27% * 0.70
= 18.90%

9. A .....(i)..... shares are shares with low betas, regardless of the nature of the company while .....(ii)..... companies are firms whose business involves great risk.

	(i)	(ii)
1.	cyclical	defensive
2.	cyclical	speculative
3.	defensive	cyclical
4.	defensive	speculative

10. Based on technical analysis, a share should be bought if:
1. the moving average line decreases and crosses the share price line.

2. the moving average line increases and crosses the share price line.
3. the overbought-oversold (OB-OS) line starts to increase from its maximum negative value.
4. alternative 2 and 3 above.

11. Consider a bond selling at par with effective duration of 10.6 years and convexity of 210. A 2% decrease in yield would cause the price to change by 21.2%, according to the duration rule. What would be the percentage price change according to the total effect?
1. 10.60%
2. 17.00%
3. 21.20%
4. 29.60%

$$Total\ effect = -D(\Delta y) + c\left(\frac{\Delta y}{100}\right)^2 \times 100]$$

$$= 21.2 + [210(0.02^2) \times 100]$$

$$= 21.2 + 8.4$$

$$= 29.60\%$$

Use the following information to answer questions 12 and 13.
A bond that pays 8% coupon payment rate annually on its R1000 face value, matures in 4 years and is selling for R967.59.

12. Calculate the expected yield to maturity of the bond.
1. 3.00%
2. 7.00%
3. 8.00%
4. 9.00%

HP 10BII	
Input	**Function**
End mode	BEG/END
1 000	FV
-967.59	PV
80 (=1 000× 0.08)	PMT
4	N
	I/YR
	9.00%

13. Calculate the current yield of the bond.
1. 8.06%
2. 8.27%
3. 9.00%
4. 9.50%
CY = coupon payment / bond price
= 80 / 967.59
= 0.0827 * 100
= 8.27%

14. Calculate the effective duration of an 18%, R1000 par bond maturing in 15 years if the yield to maturity is 7% and interest is paid semi-annually. The yield to maturity changes by 1%
1. 5.23
2. 6.54
3. 7.74
4. 9.23

	V_-	V_0	V_+
FV	1000	1000	1000
PMT	90	90 [(1000 × 0.18)÷2]	90
I/YR	3 [(7-1)÷2]	3.5 [7÷2]	4 [(7+1)÷2]
N	30	30	30
PV	2176.0265	2011.5625	1864.6017

$$Duration = \frac{V_- - V_+}{2V_0(\Delta y/100)}$$

$$= \frac{2\,176.0265 - 1\,864.6017}{2 \times 2011.5625 \times (1/100)}$$

$$= \frac{311.4248}{40.2313}$$

$$= 7.74$$

15. An instrument issued by a company that gives an investor the right but not an obligation to buy shares in that company is a .....
1. warrant.
2. call option.
3. put option.
4. Futures.

16. If two parties enter into an agreement to exchange 10% per annum interest (compounded annually) and a 3-month JIBAR on a notional amount of R35 million. What is the name of this agreement?
1. Interest futures
2. Interest rate swap
3. Interest rate contract
4. Interest rate forward

17. A call option on a share is currently selling for R35. The call option is in the money by R3. What is the strike price of the call?

1. R32
2. R35
3. R38
4. R42

X = 35 - 3 = 32

18. Assume that at the end of four months, the price of a share currently trading at R80 will either move up or down by R5. Calculate the delta of an at-the-money European call option with a strike price of R73.

1. 0.25
2. 0.50
3. 1.00
4. 1.20

$$delta = \frac{f^+ - f^-}{S^+ - S^-}$$

$$= \frac{12 - 2}{85 - 75}$$

$$= 1.0$$

$$f^+ = S^+ - X$$

$$= 85 - 73$$

$$= 12$$

$$f^- = S^- - X; MAX\ 0$$

$$= 75 - 73 = 2$$

$$S^+ = 80 + 5 = 85$$

$$S^- = 80 - 5 = 75$$

19. If there is a one-year spot rate of 6% and a two-year spot rate of 8%, the forward rate from year 1 to 2 is?

1. 8.12%
2. 9.06%
3. 9.72%
4. 10.04%

$$Forward\ rate = \left(\frac{1.08^2}{1.06^1} - 1\right) \times 100$$

$$= \left(\frac{1.1664}{1.06} - 1\right) \times 100$$

$$= 10.04\%$$

Use the information below to answer questions 20 to 22.

Probability of occurrence	Security A	Security B
50%	12%	10%
25%	10%	11%
25%	8%	9%

20. Calculate the standard deviation of Security A.

1. 0.71%
2. 0.97%
3. 1.23%
4. 1.66%

$$Expected\ rate\ of\ return = \bar{k} = \sum_{i=1}^{n} P_i \times k_i$$

$$\bar{k}_A = 0.5(12) + 0.25(10) + 0.25(8)$$

$$= 6 + 2.5 + 2$$

$$= 10.5\%$$

$$Standard\ deviation\ (\sigma) = \sqrt{\sum_{n=1}^{n} P_{ki} \times (k_i - \bar{k}_i)^2}$$

$$\sigma_A = \sqrt{0.5(12 - 10.5)^2 + 0.25(10 - 10.5)^2 + 0.25(8 - 10.5)^2}$$

$$= \sqrt{1.1250 + 0.0625 + 1.5625}$$

$$= \sqrt{2.75}$$

$$= 1.66\%$$

21. Calculate the correlation between security A and B; if the standard deviation of B is 1.23 and the covariance between the two is 1.30.

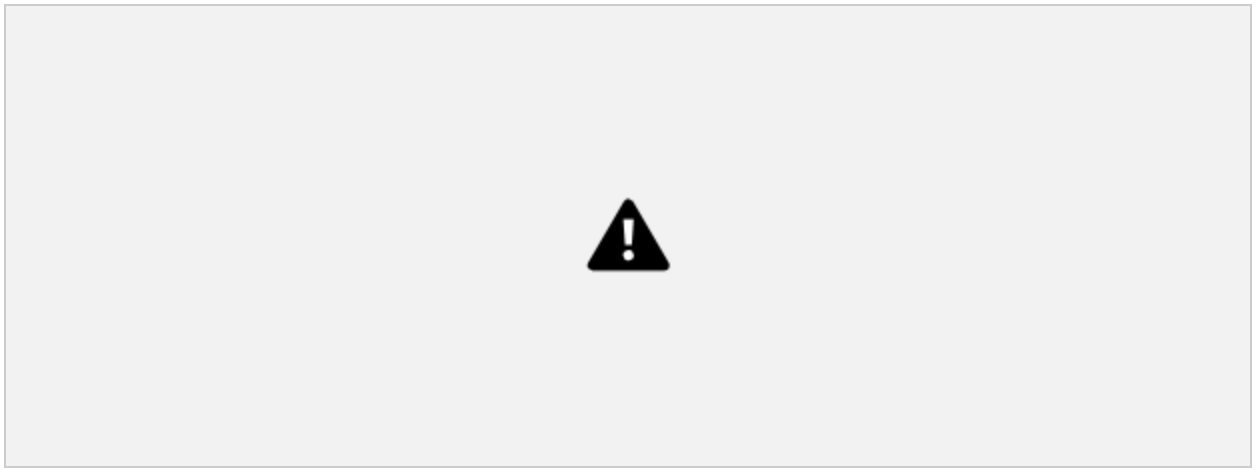
1. 0.21
2. 0.64
3. 0.87
4. 0.81

$$Correlation = \frac{Covariance}{\sigma_A \times \sigma_B}$$

$$= \frac{1.3}{1.66 \times 1.23}$$

$$= 0.64$$

22. Calculate the portfolio risk if the measurement is 50% in A and 50% in B.
1. 0.85%
2. 1.31%
3. 1.66%
4. 2.72%



Use the information below to answer questions 23 to 25.

Portfolio	Average Return	Standard Deviation	Beta
A	8%	3	0.4
B	11%	8	1.0
C	14%	6	1.1
R	3%	0	0
Market index	9%	9	1.0

The risk-free rate of return is 3%.
23. Calculate the Sharpe measure of Portfolio A.
1. 0.50
2. 1.00
3. 1.67
4. 1.83

$$Sharpe = \frac{r_p - r_f}{\sigma_p}$$

$$= \frac{8 - 3}{3}$$

$$= 1.67$$

24. Calculate the Jensen measure of Portfolio B.

1. 2.00
2. 2.60
3. 3.00
4. 4.40

$$Jensen\ (\alpha) = r_p - [r_f + \beta_p(r_m - r_f)]$$

$$= 11 - [3 + 1(9 - 3)]$$

$$= 2.00$$

25. Calculate the Treynor measure of Portfolio C.

1. 8.00
2. 10.00
3. 12.50
4. 14.00

$$Treynor = \frac{r_p - r_f}{\beta_p}$$

$$= \frac{14 - 3}{1.1}$$

$$= 10.00$$

26. Which one of the following statements is false with regards to bond fundamentals?

1. Zero-coupon bonds pay a minimum interest.
2. Callable bond means that the issuer may buy the bond back from the investor

before maturity.
3. Credit ratings do not directly address any risk other than credit risk.
4. The coupon rate of floating rate notes is normally set at a certain percentage below or above the reference rate.
Zero-coupon bonds pay a minimum interest. This statement is incorrect because zero-coupon bonds do not make any interest (coupon) payment.

27. Assume that you purchase a 2 year R1 000 par value bond; with a 14% coupon and a yield to maturity of 10% (interest is paid annually). The market price of the bond is R1 069.42. After you purchase the bond, one year interest rates are as follows (these are the reinvestment rates):

Year 1	12%
Year 2	10%

Calculate the realised compound or horizon yield, if you hold the bond to maturity. Interest is paid annually.
1. 6.22%
2. 9.38%
3. 10.00%
4. 12.50%

Step 1: Calculate the future value of the coupon payments reinvested.

$$FV\ OF\ COUPONS = \sum COUPON\ PMT\ (1+r)^n$$

$$= [140(1.10)] + 140$$

$$= 154 + 140$$

$$= R294$$

Step 2: Add the face value of the bond to the future value of the coupon payment.

$= 1000 + 294$

$= R1\,294$

Step 3: Calculate the realized yield.

HP 10BII	
Input	**Function**
End mode	BEG/END
1 294	FV
-1 069.42	PV
2	N
	I/YR
	10.00%

28. Which of the following is false with regard to theories on the term structure and the shape of the yield curve?

1. The expectations theory proposes the forward rates are solely a function of current spot rates.
2. The liquidity preference proposes that forward rates reflect investor' expectations of future rates plus a liquidity premium to compensate them for exposure to interest rate risk.
3. The segmented market theory proposes that lenders and borrowers are confined to certain maturity segments due to restrictions on their maturity structure and will therefore not be enticed to shift out of these maturity ranges.
4. The expectations theory proposes that forward rates are solely a function of expected future spot rates.

Use the information below to answer questions 29 to 32.

A 20 year, 10% semi-annual coupon bond (R1 000 par value) is priced at a yield to maturity of 8%. The yield to maturity changes by 1%.

29. Calculate the duration and convexity of the bond.

Effective duration	Effective convexity
1. 9.53	68.78
2. 9.53	137.55
3. 19.06	68.78
4. 19.06	137.55

	V_-	V_0	V_+
FV	1000	1000	1000
PMT	50	50 [(1000×0.10)÷2]	90
I/YR	3.5 [(8-1)÷2]	4 (8÷2)	4.5 [(8+1)÷2]
N	40	40 (20×2)	40
PV	R1 320.3261	R1 197.9277	R1 092.0079

$$Duration = \frac{(V_-) - (V_+)}{2V_0(\Delta y/100)}$$

$$= \frac{1\,320.3261 - 1\,092.0079}{2 \times 1\,197.9277 \times (1/100)}$$

$$= \frac{228.3182}{23.9586}$$

$$= 9.53$$

$$Convexity = \frac{(V_-) + (V_+) - 2V_0}{2V_0(\Delta y/100)^2}$$

$$= \frac{1\,320.3261 + 1\,092.0079 - (2 \times 1\,197.9277)}{2 \times 1\,197.9277 \times (1/100)^2}$$

$$= \frac{16.4786}{0.2396}$$

$$= 68.78$$

30. Calculate the duration effect ….

30. Calculate the duration effect when the yield to maturity decreases [$\%\Delta P_{D(-1)}$] and increases [$\%\Delta P_{D(+1)}$] by 1% respectively. (Base your calculation on your final answer on duration in question 29).

	$\%\Delta P_{D(-1)}$	$\%\Delta P_{D(+1)}$
1.	-9.53%	9.53%
2.	9.53%	-9.53%
3.	-19.06%	19.06%
4.	19.06%	-19.06%

Answer: Option 2

Duration effect

$$\%\Delta \mathbf{P_{D(-1)}} = -\mathrm{D}(\Delta y)$$
$$= -9.53(-1)$$
$$= 9.53\%$$

$$\%\Delta \mathbf{P_{D(+1)}} = -\mathrm{D}(\Delta y)$$
$$= -9.53(+1)$$
$$= -9.53\%$$

31. Calculate the convexity effect when the yield to maturity changes by 1%. (Base your calculation on your final answer on convexity in question 29).

1. 0.69%
2. 1.38%
3. 5.07%
4. 10.14%

$$Convexity\ effect = C\left(\frac{\Delta y}{100}\right)^2 \times 100$$

$$= 68.78\left(\frac{1}{100}\right)^2 \times 100$$

$$= 0.69\%$$

32. Calculate the total effects on price….

32. Calculate the total effects on price $[\%\Delta P_{T(-1)}$ and $\%\Delta P_{T(+1)}]$ when the yield to maturity changes by 1%. (Base your answer on your final answer on duration and convexity in question 29).

	$\%\Delta P_{T(-1)}$	$\%\Delta P_{T(+1)}$
1.	-10.22%	8.84%
2.	10.22%-	-8.84%
3.	-20.44%	18.99%
4.	20.44%	-18.99%

Answer: Option 2

$$Total\ effect = Duration\ effect + Convexity\ effect$$

$$\%\Delta P_T = [-D(\Delta y)] + \left[C\left(\frac{\Delta y}{100}\right)^2 \times 100\right]$$

$$\%\Delta \mathbf{P}_{\mathbf{T(-1)}} = [-9.53(-1)] + \left[68.78\left(\frac{1}{100}\right)^2 \times 100\right]$$

$$= 9.53 + 0.6878$$

$$= 10.22\%$$

$$\%\Delta \mathbf{P}_{\mathbf{T(+1)}} = [-9.53(1)] + \left[68.78\left(\frac{1}{100}\right)^2 \times 100\right]$$

$$= -9.53 + 0.6878$$

$$= -8.84\%$$

33. Tendai Makoni bought shares of Platinum Mine Ltd; it has a market price of R94 and a strike price of R100. He also bought a call option for a premium of R2. Calculate the loss to a put writer and the maximum profit to put holder.

Loss to put writer	Maximum profit to put holder
1. –R4	R98
2. –R4	R100
3. R4	R98
4. R4	R100

$$Loss\ to\ put\ writer = S - (X - p)$$

$$= 94 - (100 - 2)$$

$$= 94 - 98$$

$$= -R4$$

$$Maximum\ profit\ to\ put\ holder = X - p$$

$$= Breakeven\ amount$$

$$= 100 - 2$$

$$= R98$$

34. Which of the following correctly describes the position of a call writer?
1. The call holder has the obligation to sell the optioned securities to the writer of the put option.
2. The call writer will only exercise the option if the share price is greater than the exercise price.
3. The call writer has a profit potential that is unlimited but restricted to the breakeven amount.
4. The call holder has the right to require the writer to sell the optioned securities at a preset price.

35. Which of the following involves the buying, holding and selling of assets to profit from fluctuations in price over the short term as opposed to buying for long term gains?
1. Gearing
2. Hedging
3. Open interest
4. Speculation

36. Eric Vavi bought shares of Invest Wise Limited; it has a market price of R95 and a strike price of R100. He also bought a call for a premium of R5. Calculate the

breakeven and profit for the call holder, if the market price increases to R120.

Breakeven amount	Profit for the call holder
1. R95	R15
2. R95	R25
3. R105	R15
4. R105	R25

$$Breakeven\ for\ a\ call\ holder = X + p$$
$$= 100 + 5$$
$$= R105$$

$$Profit\ for\ call\ holder = S - (X + p)$$
$$= 120 - 105$$
$$= R15$$

37. Calculate the lower and upper bound price of a 3-month European put option on a non-dividend paying share when the share is currently trading at R50, the strike price of R55 and the risk-free rate of interest is 8% per annum.

Lower bound	Upper bound
1. -R3.95	R50.00
2. -R3.95	R53.95
3. R3.95	R50.00
4. R3.95	R53.95

$$\textit{Lower bound:} \quad p \geq X(1+r)^{-t} - S$$
$$\geq 55(1.08)^{-0.25} - 50$$
$$\geq 53.9519 - 50$$
$$\geq R3.95$$

$$\textit{Upper bound:} \quad p \leq X(1+r)^{-t}$$
$$\leq 55(1.08)^{-0.25}$$
$$\leq R53.95$$

38. Which of the following definitions is correct with regards to options?
1. An at-the-money option is when the strike price is equal to the spot price.
2. The European type of option can only be exercised on its maturity date.
3. The option premium is the price paid to the seller by the buyer in order to purchase the option.
4. All of the above.

39. For an option free bond (i.e a bond with no embedded option eg. a call or put), what are the convexity adjustments on the value of the approximate bond price change with regards to a decrease in the yield to maturity (ytm) and an increase in the yield to maturity respectively?
Decrease in ytm Increase in ytm
1. Increase in value Decrease in value
2. Increase in value Increase in value
3. Decrease in value Increase in value
4. Decrease in value Decrease in value
Decrease in the yield to maturity causes an increase in value of the bond while an increase in the yield to maturity causes a decrease in the value of the bond.

Use the information in the table below to answer question 40.
Shares A, P and Y each have the same expected return and standard deviation.

The following table shows the correlation between the returns on these shares.

Correlation of Share Returns			
	Share A	**Share P**	**Share Y**
Share A	+1.0		
Share P	+0.7	+1.0	
Share Y	-0.9	-0.2	+1.0

40. Given these correlations, the portfolio from these shares having the lowest risk is a portfolio:
1. Equally invested in shares A and P
2. Equally invested in shares P and Y
3. Equally invested in shares A and Y
4. Equally invested in shares A, P and Y

The portfolio with the lowest risk is one that is equally invested in shares A and Y. Correlation of share returns is between -1 and +1. The closer to -1 the correlation is the more the returns of the two shares tend to move exactly opposite to each other. Therefore the highly diversified portfolio will be resulting in lower risk.

41. A 5 year R100 par value bond paying semi-annual coupons has a coupon rate of 20% and a yield to maturity 11.94%. Calculate the yield to call, if the bond is callable at R105, at the beginning of year three.
1. 3.17%
2. 5.97%
3. 6.34%
4. 11.94%

Step 1: Calculate the present value of the bond if it not provided in the question. If the present value is provided, move on to step 2.

HP 10BII	
Input	**Function**
End mode	BEG/END
100	FV
10 =[(100×0.20)÷2]	PMT
10 =(5×2)	N
5.97 =(11.94÷2)	I/YR
	PV
	R129.7034

Step 2: Calculate the yield to call of the bond:

HP 10BII	
Input	**Function**
End mode	BEG/END
105	FV
-129.7034	PV
10 =[(100×0.20)÷2]	PMT
4 =(2×2)	N
	I/YR
	4.1408×2 **8.28%**

NB: In calculating the yield to call you replace the par value (R100) with the call price (R105) at the beginning of year three which is the end of year 2. The time to maturity (5 years) is replaced with the call date (2 years).

42. Calculate the yield to put of a 5 year R100 par value bond that sells at a discount at R82.25 and is putable at R93.25 after 3 years. The bond has coupon payments quarterly of R3 and a yield to maturity of 17.4%.
1. 4.35%
2. 4.51%
3. 17.40%

4. 18.05%

The yield to put of the bond:

HP 10BII	
Input	**Function**
End mode	BEG/END
93.25	FV
-82.25	PV
3	PMT
12 =(3×4)	N
	I/YR
	4.5117×4 **18.05%**

Use the information below to answer questions 43 to 46.
A 6 years annual bond with a par value of R100 has an 8.5% yield to maturity and a coupon rate of 6%. If there is a 100 basis points change in the interest rate.

43. Calculate the effective duration.
1. 3.65
2. 4.76
3. 8.48
4. 9.47

	V_-	V_0	V_+
FV	100	100	100
PMT	6	6	6
I/YR	7.5 (8.5-1)	8.5	9.5 (8.5+1)
N	6	6	6
COMP PV	92.9592	88.6160	84.5306

$$Effective\ Duration = \frac{(V_-) - (V_+)}{2V_0(\Delta y/100)}$$

$$= \frac{92.9592 - 84.5306}{2 \times 88.6160 \times (1/100)}$$

$$= \frac{8.4286}{1.7723}$$

$$= 4.76$$

NB: 100 basis points = 1%

44. Calculate the effective convexity.
1. 12.50
2. 14.57
3. 20.00
4. 25.00

$$Convexity = \frac{(V_-) + (V_+) - 2V_0}{2V_0(\Delta y/100)^2}$$

$$= \frac{92.9592 + 84.5306 - (2 \times 88.6160)}{2 \times 88.6160 \times (1/100)^2}$$

$$= \frac{0.2578}{0.0177}$$

$$= 14.57$$

45. Calculate the total effects on price

45. Calculate the total effects on price $[\%\Delta P_{T(-1)}$ and $\%\Delta P_{T(+1)}]$ when the yield to maturity changes by 1%. (Base your answer on your final answer on effective duration and convexity in questions 43 and 44 respectively).

	$\%\Delta P_{T(-1)}$	$\%\Delta P_{T(+1)}$
1.	-4.61%	4.91%
2.	-4.91%-	4.61%
3.	4.61%	-4.91%
4.	4.91%	-4.61%

Answer: option 4

Total effect on price from changes in interest rates:

$$Total\ effect\ =\ duration\ effect\ +\ convexity\ effect$$

$$\%\Delta P_T = -D(\Delta y) + [C\left(\frac{\Delta y}{100}\right)^2 \times 100]$$

% *price increase* $[\%\Delta \mathbf{P_{T(-1)}}]$:

$$\%\Delta P_{T(-1)} = -D(-\Delta y) + [C\left(\frac{\Delta y}{100}\right)^2 \times 100]$$

$$= -4.76(-1) + [14.57\ (0.01)^2 \times 100]$$

$$= 4.76 + 0.1457$$

$$= 4.91\%$$

% *price decrease* $[\%\Delta \mathbf{P_{T(+1)}}]$:

$$\%\Delta P_{T(+1)} = -D(+\Delta y) + [C\left(\frac{\Delta y}{100}\right)^2 \times 100]$$

$$= -4.76(1) + [14.57\,(0.01)^2 \times 100]$$

$$= -4.76 + 0.1457$$

$$= -4.61\%$$

46. Calculate the change in estimated change in price

46. Calculate the change in estimated change in price [$P_{T(-1)}$ and $P_{T(+1)}$ due to duration and convexity?

	$P_{T(-1)}$	$P_{T(+1)}$
1.	R80.34	R97.01
2.	R84.52	R92.95
3.	R92.97	R84.53
4.	R97.01	R80.34

Answer: option 3

Calculate the change in price due to duration and convexity.

$$\mathbf{P_T = V_0 \times (1 \pm \%\Delta P_T)}$$

$$P_{(T-1)} = 88.62 \times (1 + 0.0491)$$

$$\mathbf{P_{(T-1)}} = R92.97$$

$$P_{(T+1)} = 88.62 \times (1 - 0.0461)$$

$$\mathbf{P_{(T+1)}} = R84.53$$

Use the information below to answer questions 47 to 48.

Assume that you purchase a 4 year R1 000 par value bond, with a 9% coupon, and a yield to maturity of 10% (interest is paid annually). After you purchase the bond, one year interest rates are as follows (these are the reinvestment rates):

Year 1	11%
Year 2	8%
Year 3	6%
Year 4	7%

47. Calculate the present value of the bond.

1. R968.30
2. R996.54
3. R1000.00
4. R1024.85

Calculate the market price of the bond.

HP 10BII	
Input	**Function**
End mode	BEG/END
1 000	FV
90 =(1 000×0.09)	PMT
4	N
10	I/YR
	PV
	=R968.3013

48. Calculate the realised compound or horizon yield, if you hold the bond to maturity.

1. 8.09%
2. 8.74%
3. 9.05%
4. 9.63%

Step 1: Calculate the future value of the coupon payments reinvested

$$FV\ OF\ COUPONS = \sum COUPON\ PMT\ (1+r)^n$$

$$= 90(1.08)\ (1.06)\ (1.07) + 90(1.06)\ (1.07) + 90(1.07) + 90$$

$$= 110.2442 + 102.0780 + 96.3 + 90$$

$$= R398.6222$$

Step 2: Add the face value of the bond to the future value of the coupon pay

$= 1\,000 + 398.6222$

$= R1\,398.3222$

Step 3: Calculate the actual yield received:

HP 10BII	
Input	**Function**
End mode	BEG/END
1 398.6222	FV
-968.30	PV
4	N
	I/YR
	9.63%

Use the information in the table to answer the questions 49 to 50.

All bonds have a face value of R100 and semi-annual coupon payments.

All bonds have a face value of R100 and semi-annual coupon payments.

BONDS	MATURITY	ANNUAL COUPON	PRICE	YTM
A	6 months	7%	R100	7%
B	12 months	11%	R104.29	6.5%
C	18 months	13%	R112.41	4.36%

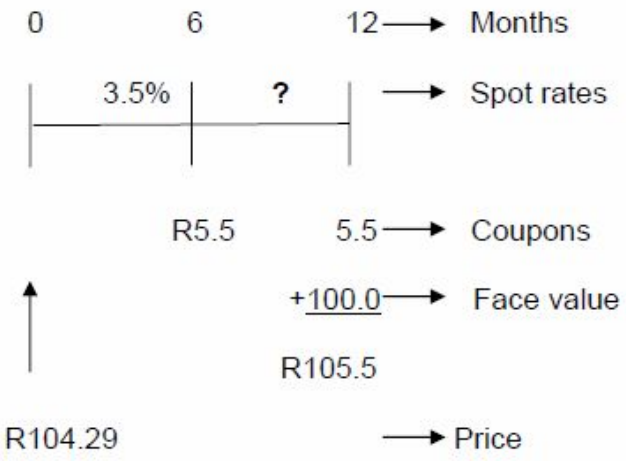
49. Calculate the equivalent 12-month spot rate using the bootstrapping method.

1. 3.25%
2. 3.24%
3. 6.48%
4. 6.50%

6 months spot rate

Since the annual coupon rate (7%) is equal to the yield to maturity (7%) therefore the 6-months spot rate will be equals to the yield to maturity. Therefore the **6-months spot rate = 7%.** However if the annual coupon rate is not equals to the yield to maturity, you should calculate the 6-months spot rate.

12 months spot rate



$$\frac{5.5}{1.035} + \frac{105.5}{(1+r)^2} = 104.29$$

$$5.3140 + \frac{105.5}{(1+r)^2} = 104.29$$

$$\frac{105.5}{(1+r)^2} = 104.29 - 5.3140$$

$$\frac{105.5}{(1+r)^2} = 98.9760$$

$$(1+r)^2 = \frac{105.5}{98.9760}$$

$$(1+r)^2 = 1.0659$$

$$1+r = 1.0324$$

$$r = 1.0324 - 1$$

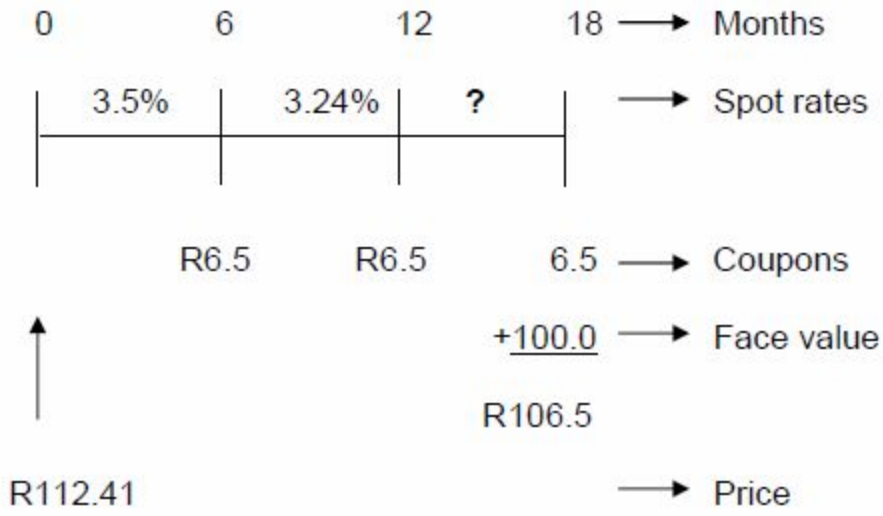
$$r = 0.0324 \times 100 = 3.24$$

12 month spot rate = 3.24 × 2 = 6.48%

50. Calculate the equivalent 18-month spot rate using the bootstrapping method.

1. 2.11%
2. 2.18%
3. 4.22%
4. 4.36%

18 month spot rate



$$\frac{6.5}{1.035}+\frac{6.5}{(1.0324)^2}+\frac{106.5}{(1+r)^3}=112.41$$

$$6.2802 + 6.0984 + \frac{106.5}{(1+r)^3} = 112.41$$

$$\frac{106.5}{(1+r)^3} = 112.41 - 6.2802 - 6.0984$$

$$\frac{106.5}{(1+r)^3} = 100.0314$$

$$(1+r)^3 = \frac{106.5}{100.0314}$$

$$(1+r)^3 = 1.0647$$

$$1 + r = 1.0211$$

$$r = 1.0211 - 1$$

$$r = 0.0211 \times 100 = 2.11$$

18 month spot rate = 2.11 × 2 = 4.22%

51. Which of the following statements is correct with regards to hedging?
1. It is any trading strategy requiring no cash where there is some probability of making a profit without incurring the risk of a loss.
2. It is risky strategy of selling a security not owned in order to capitalise on an expected decline in price and could lead to substantial losses should the opposite occur.
3. It revalues a futures contract on a daily basis and adjusts the open position to reflect profits and losses resulting from the price movements that occurred during the last trading session.
4. It is the practise of offsetting the price risk inherent in any spot market position by taking an equal but opposite position in the futures market.

Option 4 applies to hedging. It is the practise of offsetting the price risk inherent in any spot market position by taking an equal but opposite position in the futures market.
The following statements are incorrect:
Option 1 applies to arbitrage.
Option 2 applies to short selling.
Option 3 applies to marking to market.

52. Put buying has which of the following advantages over short selling?
1. The short seller is not affected by cash dividend payments.
2. The put buyer gets financial leverage.
3. The put buyer is exposed to only limited liability.
4. Both (2) and (3) are advantages.

The short seller must pay the dividends that are due to the lender of the shares.
The risk of the holder of the long put contract is limited to the premium paid however his profit potential is unlimited.

53. Thabo Khumalo purchased a call option with a strike price of R50 for R5. At the same time, he purchased a put option on the same share with an exercise price of R50 for R6. If the share is currently selling for R70 per share, calculate the profit or loss from this option strategy.
1. R0
2. R9
3. R14
4. R15

Profit = (R70 - R50) - R6 - R5
= R20 - R11
= R9

54. A 6-month European call option with a strike price of R40 sells at a premium of R5.00. It has a risk free rate of 8% and a current share price of R42. Using the put call parity, what is the equivalent value of the European put option.
1. R0.00
2. R1.49
3. R5.42
4. R8.51

***Put − call parity*:**

$$S + p = c + X(1 + r)^{-t}$$

$$42 + p = 5 + 40(1.08)^{-0.5}$$

$$p = 5 + 38.49 - 42$$

$$p = R1.49$$

55. Calculate the required rate of return of a portfolio with a 71.1% investment in share A with a 7% required rate of return and 28.9% investment in share B with a 20% required rate of return.

1. 7.00%
2. 8.50%
3. 10.76%
4. 13.50%

$$E(R_P) = w_1 E(R)_1) + (1 - w_1) E(R_2)$$

$$= (0.711 \times 7) + (0.289 \times 20)$$

$$= 4.9770 + 5.78$$

$$= 10.76\%$$

56. A portfolio is made up of share A and share B. Share A has a standard deviation of 24% and has a weight of 40% in the portfolio. Share B on the other hand has a standard deviation of 11% and a weight of 60% in the portfolio. The correlation coefficient of share A and share B is 0.7. Calculate the standard deviation of the portfolio.

1. 4.08%
2. 4.13%
3. 14.97%
4. 16.21%

Portfolio standard deviation (σ_P)

$$\sigma_P = \sqrt{w_1{}^2\sigma_1{}^2 + (1-w_1)^2\sigma_2{}^2 + 2\ w_1\ (1-w_1)\ \rho_{1,2}\ \sigma_1\ \sigma_2}$$

$$= \sqrt{[0.4^2 \times 0.24^2] + [0.6^2 \times 0.11^2] + [2 \times 0.4 \times 0.6 \times 0.7 \times 0.24 \times 0.11]}$$

$$= \sqrt{[0.16 \times 0.0576] + [0.36 \times 0.0121] \times [2 \times 0.0044]}$$

$$= \sqrt{[0.0092 + 0.0044 + 0.0088]}$$

$$= \sqrt{0.0224}$$

$$= 0.1497 \times 100$$

$$= 14.97\%$$

57. The share of Valet Corporation is available at R200. The theoretical futures price is R240 per share. If the futures contract available at that point in time was R225, indicate the appropriate strategy that would earn an arbitrage profit.
1. Long futures, short spot and invest proceeds
2. Long futures, long spot and borrow proceeds
3. Short futures, long spot and borrow money
4. Short futures, long spot and invest proceeds

Long futures, short spot and invest proceeds.
The theoretical or fair value (R240) exceeds the actual market price (R200).

Therefore, it is a reverse cash and carry arbitrage. The appropriate strategy is to long futures, short spot and invest proceeds.

58. Mr and Mrs Mahlangu are both 47 years old. They have repaid their debts and have an income that exceeds their expenses. Their children have left home and they are now emphasizing active retirement planning by accumulation of an investment (retirement) portfolio. Their portfolio is focused on medium risk with portfolios weighting heavier in fixed income generating instruments. In which phase of the individual life cycle would Mr and Mrs Mahlangu be classified.
1. Accumulation phase
2. Capital preservation phase
3. Consolidation phase
4. Spending phase

59. Delta is a sensitivity measure that measures.....
1. an option's sensitivity to changes in the exercise price of the underlying.
2. an option's sensitivity to changes in the volatility of the underlying.
3. an option's sensitivity to gamma's sensitivity to changes in the underlying.
4. an option's sensitivity to changes in the spot price of the underlying.

Delta measures an option's sensitivity to changes in the spot price of the underlying.

60. Which option trading strategy is a combination of a long call and a long put that have the same underlying and the same expiration however with different strikes prices; it also requires a large move in the underlying spot price in order to profit?
1. Strangle
2. Straddle
3. Protective put
4. Bull call spread

BETA CALCULATION QUESTIONS

USE FOUR DECIMAL PLACES IN YOUR CALCULATIONS AND ROUND OFF YOUR FINAL ANSWER TO TWO DECIMAL PLACES WHERE APPLICABLE.

Calculate beta in the following scenarios:

a) The required rate of return of Seiko Corporation is 16%. The risk-free rate of return is 8% per annum and the rate of return of the market is 12%. Calculate the beta of Seiko Corporation using the Capital Asset Pricing Model (CAPM).

Use the information in the table below to answer question b.

	Average rate of return	**Standard deviation**	**Correlation coefficient with market index**
Rio Limited	15%	12%	0.45
Market Index	10%	5%	

b) Calculate the beta of Rio Limited.

Use the information in the table below to answer question c.

	PORTFOLIO X	
Asset	**Proportion**	**Beta**
1	0.20	0.80
2	0.25	1.00
3	0.15	0.90
4	0.30	1.28
5	0.10	1.52

c) Portfolio X consists of the following assets. Calculate the beta of Portfolio X.

ANSWER

a) Calculate the beta of Seiko Corporation using the Capital Asset Pricing Model (CAPM).

$$Required\ rate\ of\ return\ (k) = r_f + \beta(r_m - r_f)$$

$$16 = 8 + \beta(12 - 8)$$

$$\beta = \frac{16 - 8}{12 - 8}$$

$$= 2.00$$

b) Calculate the beta of Rio Limited.

$$\beta = \frac{Corr_{i,m} \times \sigma_i \times \sigma_m}{{\sigma_m}^2}$$

$$= \frac{0.45 \times 0.12 \times 0.05}{0.05^2}$$

$$= \frac{0.0027}{0.0025}$$

$$= 1.08$$

c) Calculate the beta of Portfolio X.

$$\beta_P = (w_1\beta_1) + (w_1\beta_2) + (w_3\beta_3) + (w_4\beta_4) + (w_5\beta_5)$$

$$= (0.20 \times 0.80) + (0.25 \times 1.00) + (0.15 \times 0.90) + (0.30 \times 1.28) + (0.10 \times 1.52)$$

$$= 0.1600 + 0.2500 + 0.1350 + 0.3840 + 0.1520$$

$$= 1.08$$