LONDON SOUTH BANK UNIVERSITY

Investment Analysis

FHD-2-205

Faculty of Business, Computing and Information Management

2006-2007

become what you want to be

Table of Contents

1. UNIT DETAILS

Unit Title:	Investment Analysis
Unit Level:	Level 2
Unit Reference Number:	FHD-2-205
Credit Value:	1
Student Study Hours:	114
Contact Hours:	36 (Lectures and Seminars
Private Study Hours:	150
Pre-requisite Learning (If applicable):	No specific pre-requisite and co-requisite units.
Co-requisite Units (If applicable):	
Course(s):	BABS, BABA, HND
Year and Semester	Year 2, Semester 2
Unit Coordinator:	Carlos Ribeiro
UC Contact Details (Tel, Email, Room)	Room L340a – ext.7814 ribeirc@lsbu.ac.uk
Teaching Team & Contact Details (If applicable):	
Subject Area:	Finance
Summary of Assessment Method:	a) A Coursework assignment with weighting of 50% and comprising 3 assignments worth 16%, 16% and 18% b) A 2 hour written examination with weighting of 50%

2. SHORT DESCRIPTION

The unit is oriented to Level 2 students, in the second semester. It will provide and introduction to the analysis of investment products, and also an introduction to the environment in which they exist. The students will, through the unit, begin to understand the reasons for the existence of financial products, the way in which they are traded, and how to evaluate their value. Additionally, the module will introduce students to the creation of investment portfolios, and the benefits of diversification.

3. AIMS OF THE UNIT

The unit aims to introduce students to stock markets, and the functionality they provide investors with. It will familiarise students with the assets traded in the markets and those individuals and institutions that are involved. It will also introduce students to the principal methods of analysis and valuation of financial assets from the point of view of the investor.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

On completion of the unit, students should be able to:

- Understand the forces behind the demand for and supply of financial assets
- Understand the different financial markets that exist, and which investors operate in them
- Understand the main types of analysis used to evaluate financial assets
- Understand the relationship between risk and return, and the models used to evaluate it
- Understand how to combine assets into portfolios in an efficient manner
- Understand the underlying principles of diversification in portfolios

4.2 Intellectual Skills

The unit emphasises the conditional status of the conclusions drawn from theoretical models that have been developed in an effort to codify the operations of financial management. Successful completion of the unit will mean that students appreciate that theoretical propositions do not normally constitute definitive proofs and that it is important to question the validity of such propositions by reference to rival arguments and empirical evidence.

4.3 Practical Skills

Students will be developing skills in numeracy, problem-solving and understanding of methodologies, specifically related to:

- Interest rates (nominal, real, gross, net, etc)
- Valuation of financial products
- Calculation of risk, returns and the CAPM
- Construction of efficient portfolios

4.4 Transferable Skills

Successful completion of the unit will mean that students will have developed a knowledge of (and be able to utilise) relevant information sources available in paper and electronic form, including web sites dedicated to providing financial data and reports, and academic databases providing more rigorous analyses. In addition, students will be able to use spreadsheets, and other relevant software, to manipulate and analyse financial data.

5. ASSESSMENT OF THE UNIT

Coursework 50%
Examination 50%

COURSEWORK

The coursework will consist of three assignments to be handed in the following dates:

- 23rd of February 2007 (16% of total module marks)
- 16th of March 2007 (16%)
- 4th of May 2007 (18%)

One of the assignments will consist of a number of simple calculations, while the other two assignments will be essays on two topics to be assigned by the lecturer. Students are advised to keep a copy of the assignments for their use. The submitted copy might be retained to be sent to the external examiner jointly with the examination paper.

Each essay should not have more than 1,500 words, and will be marked taking into account effort, clarity and use of relevant academic tools:

1. Analytical and problem-solving skills (50%) – ability to analyse and provide the answer to the assignment given; breadth of knowledge demonstrated; and relevance and practicality of recommendations provided
2. Written communication skills (25%) – ability to write a structured and clear essay; clarity of language and analytical logic; and originality and effectiveness of structure and presentation
3. Information technology skills (10%) – ability to use relevant software both for the preparation of the report and the analysis required.
4. Planning and organisational skills (10%) – the manner in which the task is approached, the extent of background reading done, and ability to meet deadlines
5. Original thinking skills (5%) – evidence of introduction of new ideas, not included in stated brief, which may be relevant to analysis and recommendations.

FINAL EXAM

At the end of the semester students will sit a two hour unseen exam paper. The exam paper will include 2 sections: the first section will have a number of short questions worth 20 marks which are mandatory, and the second section will have 3 questions of 15 marks each, of which students will be asked to answer 2. The questions are related to the unit's learning outcomes, as stated in 4.1 above.

PASSMARK

The passmark for this module is 30% on each component (coursework and unseen exam), with an overall passmark of 40%

6. FEEDBACK

Feedback will normally be given to students 15 working days after the submission of an assignment.

7. INTRODUCTION TO STUDYING THE UNIT

7.1 Overview of the Main Content

The unit will be divided into the following four parts:

- **Part 1 – The financial products and the markets they are traded in**
  General overview of the financial products and markets, and the reasons for their existence, and the different investors' needs they satisfy.
- **Part 2 – Risk and return – Capital Asset Pricing Model**
  Study of risk and return of different investments, and the models used to analyse risk and return.
- **Part 3 – Methods of investment analysis**
  Discussion of the discount, ratio and technical methods of analysing investments including their advantages and disadvantages.
- **Part 4 – Diversification and the creation of portfolios**
  Reasons for diversification and strategies to construct diversified portfolios, in an attempt to maximise return, while minimising risk.

7.2 Overview of Types of Classes

The unit will be run in weekly 3-hour classes. The classes will be divided in two parts, one occupied with the introduction of the new key theoretical concepts, and another dedicated to solving exercises and discussing issues raised by students, normally relative to the concepts discussed in the previous week.

7.3 Importance of Student Self-Managed Learning Time

To realise the learning outcomes identified in part four requires a consistent approach to seminar preparation. The self-managed learning should focus upon a review the lecture notes, completion of the designated reading and work on the set questions.

Students who choose not to work in a reasonably conscientious and systematic manner are likely to encounter difficulties as the successive topics generally assume some appreciation of the earlier material. There is a large amount to cover during the teaching programme, and hence opportunities to review issues from earlier in the course are very limited.

7.4 Employability

Successful completion of this unit will provide students with a knowledge base relevant to the pursuit of professional employment in the arena of investment analysis decision-making. This embraces responsibilities such as investment project appraisal and valuation and the construction of investment portfolios.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Week	Topic
01/02/07	Why people invest, and why are financial products offered *Redhead chapters 1 and 2* *Bodie, Kane, Marcus chapter 1*
08/02/07	Investors and Financial Products – Money, Bonds and Stocks *Readhead chapters 3, 5, 7 and 10* *Howells, Bain chapters 5, 6*
15/02/07	The Markets – Money, Capital, Futures and others *Redhead chapters 8, 12* *Scott chapters 8, 9, 10, 11*
22/02/07	Reading the Financial Pages *Day's Financial Times and Wall Street Journal*
01/03/07	Risk and Return – The Capital Asset Pricing Model (CAPM) *Redhead chapter 16* *Lofthouse chapter 3*
08/03/07	Capital Market Theory – Arbitrage and other alternatives to the CAPM *Redhead chapters 17 and 27* *Lofthouse chapters 4 and 18*
15/03/07	Investment Analysis – Discount Models *Redhead chapter 19* *Lofthouse chapter 10*
22/03/07	Investment Analysis – Ratios and Technical Analysis *Redhead chapter 20, 21* *Lofthouse chapter 15*
29/03/07	Diversification and Portfolio Construction *Redhead chapters 15, 24* *Bodie, Kane, Marcus chapters 5, 6, 7* *Lofthouse chapter 17*
26/04/07	Hedging *Redhead chapters 25, 26*
03/05/07	Course review – revision

9. LEARNING RESOURCES

9.1 Core Materials

KEITH READHEAD, "Introducing Investments" (FT Prentice Hall, 2003)

9.2 Optional Materials

On how the markets function and how to understand the financial pages

Caroline Septon, "Investors Chronicle A-Z of Investment – The essential guide to tools, terms & techniques" (FT Pitman Publishing, 1996)

Robert Haney Scott, "Money Financial Markets and the Economy" (Prentice Hall, 1995) – Financial Products and Markets

Peter Howells & Keith Bain, "Financial Markets and Institutions" (FT Prentice Hall, 2000) – Financial Markets and Products

On investment analysis

Charles Jones, "Investments – Analysis and Management" (Wiley, 2004)

Lawrence J. Gutman, Michael D. Jochuk, "Fundamentals of Investing" (Addison-Wesley, 7th Edition) – Risk and Return

Stephen Lofthouse, "Investment Management" (John Wiley & Sons, 2001) – CAPM and Arbitrage

Frederic Amling, "Investments – An introduction to analysis and management" (Prentice Hall, 1989 – Investment Analysis and Portfolio Theory

Bodie, Kane, Marcus, "Investments" (Irwin, 1993) – Portfolio Theory

Students are also advised to read relevant newspapers, such as the Financial Times and Wall Street Journal

NOTES

EXERCISE ONE

1. What is a zero-coupon bond?

(1 mark)

2. What are the differences between convertible bond and a bond with warrants?

(2 marks)

3. What is the difference between a variable and a fixed interest rates?

(2 marks)

4. Identify the elements included in a personal financial plan.

(2 marks)

5. Identify the differences between capital and money markets.

(2 marks)

6. Identify two key assumptions behind the Capital Asset Pricing Model.

(2 marks)

7. What is the price of a perpetual bond, offering 7% yield when the required market return is 5%?

(2 marks)

8. What yield is being offered by a bond, with maturity in 5 years time at par, if the market price is £105, and market rate is 7%?

(3 marks)

9. If nominal one-year interest rates over the next five years are expected to be 4%, 3%, 3.5%, 5% and 5% p.a., what should a £50 investment grow to over the five years?

(4 marks)

10. It is October 21. Share price on company A is 245p. A's September expiry options at the strike price of 200 are 73p per share for a call and 18p for a put. Calculate the intrinsic and time value for both options.

(5 marks)

(Total 25 Marks)

EXERCISE TWO

You are considering investing in two securities (A and B) with the following forecasted returns:

Security	Probability	Possible Return (%)
A	0.2	25
	0.2	20
	0.6	15
B	0.1	30
	0.5	20
	0.4	10

1. Calculate the expected return for each security and for a portfolio comprising 60% of security A and 40% of security B.

(7 marks)

2. Calculate the expected risk of each security and of the portfolio as above, assuming a correlation coefficient between the two securities of +0.17.

(8 marks)

3. Discuss the effects of foreign investment in the risk and return of an investment portfolio.

(5 marks)

4. Identify and critically appraise the major techniques used in technical analysis of shares.

(5 marks)

(Total 25 Marks)

EXERCISE THREE

A stock market is composed of the following stocks, and the current value of the index is 2,000:

Stock	Share Price	Number of Shares
A	85p	2,000,000
B	150p	3,000,000
C	233p	1,500,000
D	175p	2,500,000
E	200p	4,000,000
F	55p	750,000

1. Calculate the total market capitalization of the market.

(3 marks)

2. The share price of stock C has gone up by 5%, the price of D has gone down 4%, and the price of share F has gone up by 20%. What is the new market capitalization and the new value of the index, assuming a value weighted index?

(4 marks)

3. If stock G, with a price of 250p and 1,800,000 was set to replace one of the stocks currently in the market, which one would have to leave the market in order for the market capitalization not to change? Explain.

(10 marks)

4. Identify the functions of stock indexes.

(3 marks)

5. From the original index, share E is being replaced by share H, with a share price of 140p, and 3,500,000 shares. Calculate the adjustment factor necessary to ensure the index remains at 2,000.

(5 marks)
(Total 25 Marks)

EXERCISE FOUR

1. Explain what is the security market line, and how useful it is as a guide to choosing which shares to buy and sell.

(5 marks)

2. Explain the concept of ß, and indicate, explaining why, which values of ß you would expect for a company in the following sectors:
    1. Leisure and hotels
    2. Utilities
    3. Food retailers
    4. Automobiles and Parts

(6 marks)

3. Using the betas you suggested in the previous question, calculated the required rate of return for the following companies, assuming a risk-free rate of 5% and a return of the market of 14%:
    1. LA Fitness
    2. Severn Trent
    3. Morrison
    4. Toyota

(6 marks)

4. Which of these stocks would you recommend to a risk-averse investor? Why? Would you recommend a different security if the investor needed the money in a year's time?

(8 marks)
(Total 25 Marks)

EXERCISE FIVE

1 - Using the following information contained in Intercontinental Hotels Group plc's 2002 Annual Report, calculate:

a) EPS (there were 863 million Intercontinental shares outstanding in both years)
(2 marks)

b) Current and Acid Test Ratios
(5 marks)

c) Long-term Debt to Equity and Total Debt to Equity Ratios
(5 marks)

d) Interest Cover and Fixed-charge Coverage Ratios
(5 marks)

2 - Based on the results of the ratios you just calculated, would you recommend an investment in Intercontinental? Comment on the results of the ratios, and identify other information you should have to make a better recommendation
(5 marks)

3 - Identify the other two most commonly used methods of investment analysis, and discuss their advantages versus ratio analysis
(3 marks)
(Total 25 Marks)

Intercontinental Hotels Group

PROFIT AND LOSS ACCOUNT		
FOR THE YEAR ENDED 30 SEPTEMBER 2002	2002 £m	2001 (restated) £m
Turnover – continuing operations	3,615	4,033
Costs and overheads, less other income	(3,074)	(3,284)
Operating profit – continuing operations	541	749
Non-operating exceptional items	53	–
analysed as:		
Continuing operations		
Loss on disposal of fixed assets	–	(2)
Loss on disposal of operations	–	(36)
Demerger costs	(4)	–
Discontinued operations		
Profit on disposal of operations	57	38
Profit on ordinary activities before interest	594	749
Interest receivable	116	165
Interest payable and similar charges	(176)	(224)
Profit on ordinary activities before taxation	534	690
Tax on profit on ordinary activities	(52)	(223)
Profit on ordinary activities after taxation	482	467
Minority equity interests	(25)	(24)
Earnings available for shareholders	457	443
Dividends on equity shares	(305)	(293)
Retained for reinvestment in the business	152	150

BALANCE SHEET

30 SEPTEMBER 2002	2002 £m	2001 restated £m
Fixed assets		
Intangible assets	173	174
Tangible assets	7,641	7,558
Investments	249	266
	8,063	7,998
Current assets		
Stocks	91	90
Debtors	623	577
analysed as:		
Amounts falling due within one year	538	527
Amounts falling due after one year	85	50
Investments	218	366
Cash at bank and in hand	84	67
	1,016	1,100
Creditors: amounts falling due within one year	(2,273)	(2,009)
Net current liabilities	(1,257)	(909)
Total assets less current liabilities	6,806	7,089
Creditors: amounts falling due after one year	(764)	(1,180)
Provisions for liabilities and charges	(527)	(591)
analysed as:		
Deferred taxation	(495)	(487)
Other provisions	(32)	(104)
Minority equity interests	(149)	(133)
Net assets	5,366	5,185
Capital and reserves		
Equity share capital	243	242
Share premium account	802	799
Revaluation reserve	1,020	1,025
Capital redemption reserve	853	853
Profit and loss account	2,448	2,266
Equity shareholders' funds	5,366	5,185

EXERCISE SIX

1. What are the differences between convertible bonds and bonds with warrants?
(1 mark)
2. What is a share?
(1 mark)
3. Identify the elements included in a personal financial plan.
(2 marks)
4. Identify and explain the three types of risk that affect an investment.

(2 marks)

5. What is the security market line?

(2 marks)

6. How reliable are dividend discount models as a means to estimating fair prices of shares

(2 marks)

7. What is maturity value of an 8% bond, with maturity in 4 years time, if the
8. market price is £95, and market rate is 11%?

(3 marks)

9. What yield is being offered by a bond, with maturity in 6 years time at par, if the market price is £110, and market rate is 6%?

(3 marks)

10. If nominal one-year interest rates over the next five years are expected to be 3%, 3.5%, 5%, 6% and 7.5% p.a., what should a £200 investment grow to over the five years?

(4 marks)

(Total 20 Marks)

EXERCISE SEVEN

You are considering investing in two securities (X and Y) with the following forecasted returns:

Security	Probability	Possible Return (%)
X	0.1	45
	0.2	5
	0.7	15
Y	0.6	15
	0.3	10
	0.1	-5

a. Calculate the expected return for each security and for a portfolio comprising 60% of security A and 40% of security B.

(5 marks)

b. Calculate the expected risk of each security and of the portfolio as above, assuming a correlation coefficient between the two securities of +0.8

(8 marks)

c. Identify and explain the main strategies of portfolio construction.

(2 marks)

(Total 15 Marks)

EXERCISE EIGHT

a. Elche plc has a ß of 1.1. The risk-free rate of return is 5 per cent, and the market rate of return is 17 per cent. Calculate the company's cost of capital.

(2 marks)

b. Discuss the meaning of "beta" and explain how the "beta" of a company can be determined.

(3 marks)

c. The following table indicates the dividends distributed by SCP plc in the last five years:

Year	2000	2001	2002	2003	2004
Dividend per share	53p	42p	7p	Nil	65p

Indicate and justify the fair market price per share of Elche plc.

(8 marks)

d. Indicate three limitations of the CAPM as a method of determining the required return on equity.

(2 marks)

(Total 15 Marks)

EXERCISE NINE

The current share price for company FCV is 436p. The company has share options currently traded in the stock exchange, and the following data is available for those options:

- Exercise Date = July
- Exercise Price = 420p
- Price of Call Option = 45p
- Price of Put Option = 11p

a. Calculate the intrinsic and time value of both the Call and Put options

(6 marks)

b. Suggest, and explain, two strategies for taking advantage of a reduction in the share price of FCV.

(3 marks)

c. Calculate the profit or loss of a buyer of a put and the seller of a call if the share price on the exercise date is:

i. 400p
ii. 350p
iii. 500p

(6 marks)

(Total 15 Marks)

Welcome to Investment Analysis

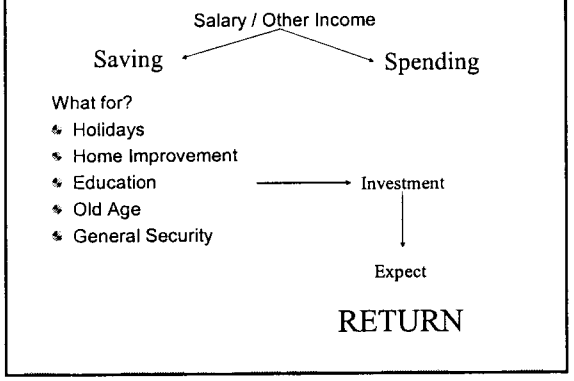
Introduction to Investment

Carlos Ribeiro

01/02/07

Objectives

- After today you should be able to:
  - Identify major reasons for investment
  - Identify major elements in a personal financial plan
  - Distinguish the various classifications of interest rates
  - Understand the difference between interest rate and discount rate



Financial Systems

- Money can be invested in:
  - Real assets or
  - Financial Assets
- Financial systems serve
  - Investors
  - Borrowers
    - Households
    - Business
    - Government

Personal Financial Plan

- Every Personal Financial Plan must include:
  - Budgeting
  - Managing Liquidity
  - Financing Large Purchases
  - Long-term investing
  - Insurance

- Budgeting
  - Concerns the division of income between spending and saving
- Managing Liquidity
  - Concerns the need to have cash, or other means available for making purchases or payments
- Financing Large Purchases
  - May be generated by saving or by borrowing. Savings may not be in highly liquid form until they are needed, but should not be invested in risky assets.

- Long-term Investing
  - The most important long-term investment is to provide for retirement, but there are other objectives, such as children's education, etc
  - Historically real net rates of return have been close to zero, which means 1/3 of salary needs to be saved to keep standard of living
- Insurance
  - Most common types are property and life for partners and dependants

Sources of Investment Risk

- Capital Risk
  - Risk that value of investments might fall
- Inflation Risk
  - Risk that the purchasing power value of assets can be eroded by inflation
- Income Risk
  - Risk that income payments from an investment (interest or dividends) can fall

Interest Rate

- Simple vs. Compound
- Variable vs. Fixed
- Nominal vs. Real

Convention: p.a.

Simple vs. Compound Interest

- Simple
  - Interest is earned only on principal and not on interest
- 10% per year for 2 years on £50 investment
- £50 + 0.1*£50*2 = £60

- Compound
  - Interest in subsequent periods is earned both on principal and accrued interest
- 10% per year for 2 years on £50 investment
- £50 * (1.1)^2 = £60.50

Variable vs. Fixed Rate

- Variable rate
  - Subject to interest variations as rates in money markets change
  - Normally little or no notice is given by banks
- Fixed rate
  - Guarantees the interest rate for a specific period
  - Rate does not change for advised period irrespective of what happens to markets

Nominal vs. Real Rates

- Nominal rate
  - Rate as quoted, without any adjustments
  - Rate used for calculation of interest paid
- Real rate
  - Rate effectively received once inflation rate is taken into account
  - Example: If you deposit £50 (the cost of an average shopping basket today) in an account paying 5% per year, can you buy the same basket in a year's time if inflation is 2%? And if it is 5%? And 10%?

Discount rate

- Used to calculate the value today of a future streams of cash-flows
- Using the previous example of a £50 investment: receive £5 in one year's time and £55 in two years' time. What is the value today, if discount rate is 10%?
  - £5 / (1.1) + £55 / (1.1)^2 = £50

Formulas

- Average Compound rate (ACR):

  $ACR = [(1+R_1)*(1+R_2)*...(1+R_t)]^{(1/t)} - 1$

  Where: R_t = interest rate in year t

- Real Interest Rate (R_R):

  $R_R = (1+R_n)/(1+i) - 1$

  Where: i = inflation
  R_n = Nominal rate

Revision / Exercises

- Revision:
  - Read chapters 1 and 2 of Redhead
  - Review exercises in chapter 2
- Exercises for next week:

1. A bank deposit pays 4% p.a. one year and 5% p.a. the next. Calculate the average compound rate of return if you collect your interest payments annually.
2. Suppose that the rates above are nominal rates, and that inflation in the two years was 2.5% and 3% respectively. Calculate the average compound real rate of return.

Exercises (cont.)

3. What would be the nominal and real values of an investment of £100 at the rates calculated in 2. at the end of the two years?
4. If nominal one-year interest rates over the next five years are expected to be 2.5%, 3%, 3.5% and 1.5% p.a., what will a £100 investment grow to over the four years? What would be the average compound nominal rate of return?
5. If £1 invested now is expected to be worth £1.45 in seven years, what is the average compound nominal rate of return? If inflation is expected to be 2.5% p.a. what would be the expected average real rate of return?

Exercises (cont.)

6. If £100 invested now is expected to be worth £140 in five years, what is the expected average compound nominal rate of return?
7. An investor who pays income tax at 40%, has a bank deposit that pays 3%, 3.5%, 4%, 4% and 4.5% p.a. before tax in five successive years. Inflation is 2%, 2.5%, 2.5%, 3% and 3% p.a. respectively in the five years.
   a. What is the pre-tax average rate of return?
   b. What is the pre-tax average real rate of return?
   c. What is the post-tax average rate of return?

Investment Analysis

Financial Products –
Money, Bonds and Stocks

08/02/07

Objectives

- After today you should be able to:
  - Identify the main investors and investment vehicles
  - Understand the main financial products and their characteristics
  - Identify the different types of bonds
  - Understand what shares are, their value and the value of stock options
  - Understand how different products satisfy different investor needs

Key Investment Decisions

- Prior to deciding which products to invest in, there are three main questions an investor must answer:
  - What is the timeframe of my investment?
  - What is the purpose of my investment?
  - What level of risk am I willing to accept?

Investors

- Two main groups:
  - Institutional investors
    - Life Assurance
    - Mutual Funds (unit trusts, OEICs, ETFs)
    - Pension Funds
  - Individuals

Investment Timeframe

- Money markets
- Bank accounts (current, savings, etc)
- Bonds
- Shares
- Derivatives (options, futures, etc)
- Institutional investment (life assurance, pension funds, etc)

Money Market Products

- Discount market
  - Treasury bills
  - Commercial bills
- Commercial paper
- Certificates of deposit
- Interbank deposits
- Money market deposits
- Repurchase agreements

Supply and Demand of Money Products is influenced by:

- Supply
  - In the long term:
  1. Economic growth
  2. Inflation
  - In the short term:
  3. Expected fall in interest rates
  4. Rise in interest rates on alternative sources of funds
  5. Residual financing of PSBR (Public Sector Borrowing Requirement)
- Demand
  - In the long term:
  1. Economic growth
  2. Inflation
  - In the short term:
  3. Increase in liquidity preference
  4. Excess liquidity in banking system
  5. Fall in yields on alternative assets

Bonds

- Governments are the main issuers of bonds, but companies can also issue them
- Normally issued with a fixed period to maturity
- Pay a fixed rate of interest
- Redemption value (also known as par) is commonly £100
- Bond prices vary inversely with interest rates (because coupon is fixed)

Bonds (cont.)

- Yield on bonds can be expressed in two forms:
  - Redemption yield (or yield to maturity):
    - The return on a bond taking account of the coupon cash flows and the capital gain or loss at redemption
  - Running yield (or interest yield):
    - The return on a bond taking account only of the coupon payments

Bond Rating

- A bond rating is an assessment of the default risk of a bond
- The rating of the issuer affects the interest rate that the issuer is required to offer, in order to generate demand for the bond
- There are two rating agencies, which use slightly different rating grades:
  - Standard and Poor's – from D to AAA
  - Moody's – from C to Aaa
- Higher grades are called "investment grade", while lower grades are called "speculative grade", because they generate higher returns, but the risk of default is also high

Gilts

- Gilts are bonds issued by the UK Government, as a means of borrowing money. They are issue by the Debt Management Office (DMO), a department of the Treasury
- Types of Gilts available:
  - Conventional – payment of fixed coupons every six months and repayment of nominal value at specified maturity date

Gilts (cont.)

- Types of Gilts available:
  - Double-dated – have two years in their title, and the Treasury can redeem them at any time between those two dates. The Treasury has a call option
  - Undated – have no maturity date, and coupons can be paid to perpetuity
  - Index-linked – coupon payments and principal are linked to Retail Price Index (RPI), so that gilt is inflation protected

Gilts (cont.)

- Types of Gilts available:
  - Rump stocks – a gilt of which little remains in the market, normally as a result of some investors choosing not to take up exchange offers
  - Strips – recent new type of gilt (December 97), which is an acronym for Separately Traded and Registered Interest and Principal Securities. Sometimes known as zero coupon gilts, each cash flow is traded separately. Each strip has the maturity of the date of the interest payment

Other Types of Bonds

- Callable or putable bonds
- Convertibles
- Eurobonds
- Euro bonds
- Floating rate notes (FRNs)
- Foreign bonds
- Index-linked bonds
- Junk bonds
- Strips

Shares

- Also called "equities" or "stocks"
- Ordinary shares give their holder claims to variable future streams of income, paid out of company profits and commonly known as dividends
- Equity owners are part legal legal owners of the firm
- Shareholders are only entitled to a share of the profits left after bondholders and preference share owners have been paid
- Shares are therefore riskier than bonds and preference shares

Preference Shares

- Despite their name, they are more like bonds than shares, because they pay a fixed dividend each year
- Preference shares can be:
  - Irredeemable (majority)
  - Redeemable
  - Cumulative (back pay of missed dividends)
  - Non-cumulative
  - Participating
  - Convertible

Increase in the Stock of Shares and Bonds is influenced by:

- Shares
  - In the long term:
  1. Economic growth
  2. Inflation
  - In the short term:
  3. Rise in the cost of alternative sources of capital
  4. Reimposition of bank lending controls
  5. Reduction in new issue costs
  6. High equity prices
- Bonds
  - In the long term:
  1. Economic growth
  2. Inflation
  3. PSBR
  - In the short term:
  4. Rise in cost of alternative sources of capital
  5. Reimposition of bank lending controls
  6. Reduction in new issue costs
  7. Tighter monetary policy
  8. Expected higher future interest rates

Share Options

- Call option – gives the buyer of the option the right, but not the obligation, to buy shares in a future date at a particular price (the exercise or strike price)
- Put option – gives the buyer of the option the right, but not the obligation, to sell shares in a future date at a particular price
- Writing option – the seller of an option is known as the writer
- At the time of buying the option, the buyer pays the premium, which is the price of the option

Share Options (cont.)

- The reason for the existence of a market for options is the difference in expectation of buyers and sellers
- The buyer of an option is said to have a long option position
- The seller of an option is said to have a short option position
- The profit positions of buyer and seller are the mirror image of each other
- An option is for a number of shares, which differs from country to country (UK – 1,000)

Value of Options

- Intrinsic value
  - Call option – equal to the stock price minus the exercise price of the option. Zero is the minimum
  - Put option – gross profit to be made from exercising the option. Zero if the stock price is equal to or higher than strike price
- Time value
  - Call and put options – difference between it's premium and the intrinsic value. The premium normally exceeds the intrinsic value

Example

- An investor buys a 550p put option on BP Amoco shares at a premium of 7p per share when the share price is 568p. Share price subsequently falls to 400p.
- Cash Outflow - £70 (1,000 share per contract)
- Gross profit - £1,500 (150p per share). 150p is the intrinsic value of the option.
- Net profit – 150p – 7p = 143p (£1,430 per option contract
- Investor has guaranteed that effective selling price cannot fall below 543p

How Private Investors Invest

- The majority of private investors do not go directly to the markets because:
  - Some markets are restricted to institutional investors
  - Cost is too high, especially if amounts invested are small
  - Requires a knowledge that most private investors don't have, and to get it would be expensive and time consuming

SO:

Investment Vehicles

- Investors use indirect investment, by putting money in a fund that uses the money collected from many investors to invest in bonds, shares or other securities
- These funds are known as Institutional Investors, and can be divided into:
  - Life assurance
  - Mutual funds
  - Pension funds

Tax Effects

- In order to reward savings, the Government provides tax incentives to investors:
  - Individual Savings Accounts (ISAs)
  - Different tax levels for dividends and capital gains
  - Venture Capital Trusts (VCTs)
  - Enterprise Investment Schemes (EISs)

Revision / Exercises

- Revision:
  - Read chapters 3, 5, 7 and 10 of Redhead
  - Review exercises in chapter 10
- Exercises for next week:

1. It is 23 February, The Diageo share price is 759p. Diageo May expiry option prices are:
   - Strike price – 750p
   - Calls – 25
   - Puts – 19

   a. Calculate the intrinsic and time value for both of the options

Exercises – cont.

b. Suggest two alternative option strategies for profiting from a price rise. In each case what would be the profit, or loss, in the event of the share price reaching:
   b. 800p
   c. 900p

by the expiry date of the option?

Exercises – cont.

- Exam questions:
  - What is a bond?
  - What is a zero-coupon bond?
  - What is a perpetual bond?
  - What are the differences between convertible bond and a bond with warrants?
  - What is the difference between a variable and a fixed interest rates?
  - Identify the differences between capital and money markets
  - What is a share option?

Investment Analysis

The Markets –
Money, Capital, Futures, Others

15/02/07

Objectives

- After today you should be able to:
  - Identify the various financial markets
  - Understand which products are traded in each market
  - Identify the market participants
  - Understand what stock indexes mean
  - Understand how stock indexes are calculated

Money vs. Capital Markets

- In both markets, "debts" or "claims" are offered for sale in exchange for money. Also in both markets money is being borrowed
- The main difference between the two markets is the length of time for which funds are borrowed – money markets funds are borrowed for short periods, while capital markets funds are borrowed for long term use

Money Markets

- Discount (or traditional) market
- Interbank market
- Certificate of deposit market
- Gilt repo market
- Local authority market
- Eurocurrency market
- Of the above, all except the first one are known as parallel markets
- There is very little segmentation between all these types of money markets, with rates highly correlated

Definitions

- In money markets interest rates are quoted as basis points
- **Basis points** is a very fine measure, equal to one hundredth of a percentage point
- The spreads are very small because these markets are very competitive
- **Spread** is the difference between the rate at which you can lend and the rate which you have to pay to borrow

Discount Market

- Funds are raised by issuing "bills" "at a discount" to their eventual redemption or maturity value
- Transactions are normally very large, allowing for profit to be made, even in discount rates of small fractions of 1%
- There is no physical location for this market, with trades normally happening by telephone

Bills

- Anyone can issue them, but they are normally issued by large companies or by the Bank of England on behalf of the Government
- The main buyers (called "market-makers") are discount houses, members of the London Discount Market Association (LDMA)
- Holding of bills is financed by money lent to them "At call" by other deposit-taking institutions
- "At call" means that it is repayable on demand by the banks, resulting in:
  - Banks being provided an interest-earning source of readily available funds
  - Any liquidity shortage on the part of the banks being transferred to the discount markets

Bills (cont.)

- Bills have the following distinctive features compared to other financial instruments:
  - Issued in large denominations (minimum of £5,000, but few Treasury bills are less than £250,000, up to £1,000,000)
  - Bills are a highly liquid asset
  - Reward to the lender for holding bill to redemption comes in a form resembling capital gain, rather than conventional rate of interest
  - Bills are fixed-interest securities, because return for holding it is known at the time of issue
  - With no change in interest rate, market price of bill will approach redemption price as period to redemption shortens

Bills (cont.)

- Rate of discount is calculated:
  - $d = (R - P) / (R * n)$ where:
    - d - discount rate
    - R – redemption value
    - P – initial price of the bill
    - n – the time to redemption in years
- Rate of interest is calculated:
  - $i = (R - P) / (P * n)$ where:
    - i - interest rate
- Some money market instruments' rate of return are expressed as a rate of discount: Treasury bills, commercial bills and commercial paper
- Other instruments' rate of return are "quoted on a yield basis": certificates of deposit, interbank deposits, money market deposits and repurchase agreements

The "Parallel" Markets

- Are also markets for short-term money, sharing many of the characteristics of the traditional discount market
- Most of the participants, banks and discount houses, are also common to discount market
- Deals are done for very large sums of money at very small profit rates

The "Parallel" Markets (cont.)

- Interbank market
  - Develop in the 1960s, initially with foreign banks
  - Market through which banks lend to each other
  - Deals of over £1 million are normal, and for very short - overnight to 14 days – periods
- Certificates of Deposit (CD) market
  - A CD is a receipt for a deposit for a fixed period of time, at the end of which it will be repaid with interest
  - An institution "issues" a CD when it accepts a deposit, and "holds" a CD when it makes a deposit

The "Parallel" Markets (cont.)

- CDs are priced on a yield basis:
  - $P = R / (1 + i * n)$, where
    - R = maturity or redemption value
    - i = market interest rate
    - n = time in years
  - $R = D * (1 + c * n)$, where
    - D = value of the initial deposit
    - c = coupon rate (interest rate paid on CD)
    - n = time in years at issue of CD

Exercise

- Find the price of a 3-month £50,000 CD, paying 10%, if it has 36 days to maturity and short-term interest rates are 10%
- Find the price of this same CD if short term interest rates fall to 8%

The "Parallel" Markets (cont.)

- Commercial Paper market
  - Issued by large corporations as a form of short-term borrowing
  - Return is expressed on a discount basis
  - Maturity usually between 7 and 45 days
- Local Authority market
  - Supplies local authorities with short-term money through bills and deposits
  - Bills issued with maturities of 3 to 6 months
  - Amount of deposits is normally over £50,000 with £1 million being common
  - Sources of deposit can be banks, large firms and other financial institutions

The "Parallel" Markets (cont.)

- Repurchase agreements
  - Agreement to buy any securities from a seller, which will be repurchased at some specified price and time
  - The length of the repurchase agreement (repo) is likely to be short (maximum a few months) they are considered forms of short-term finance
- Euromarkets
  - Markets in which the borrowing and lending takes place in a currency of another country
  - Eurocurrency – currency held outside country of origin

Monetary Policy

- The existence of Parallel markets diminishes impact of BoE's discount market operations
- It also widens the lending and borrowing opportunities
- This reduces the effect of the Monetary policy which is used to control the price and quantity of money and credit available
- Monetary policy instruments – variables which are directly under the control of the monetary authorities
- Policy objectives – ultimate goals of economic policy. There can be some intermediate goals

Stock Exchange

- The main purpose of a stock exchange is the transfer of money from investors to those wishing to obtain capital
- Can be classified into primary and secondary:
  - Investors can buy shares and bonds from issuers and thereby transfer money to them in exchange for potential future cash flows – primary market
  - Investors can also buy shares and bonds from each other in line with their cash flow requirements – secondary market

Reasons for Existence

- It would be difficult for investors and those seeking funds to find each other
- Companies and governments want to raise large amounts, which normally a single investor doesn't have
- Length of time that money is needed is normally long, whereas investors want quick access to their money. Stock exchanges reconciles this two needs.
- Communication of information about companies

Types of Stock Exchanges

- National – normally trade stock of large companies, with demanding listing conditions. Ex: London, New York, Frankfurt
- Regional – local exchange that tend to trade smaller companies. Ex: Munich, Hamburg, Midwest
- Over-the-Counter (OTC) – two different types of OTC markets:
  - Unorganised with trading taking place between individuals on an unregulated basis
  - Highly organised and sophisticated, such as NASDAQ

Trading Systems

- Order-driven – operated by matching buy and sell orders. Price is found as a result of this process.
- Quote-driven – market-makers quote prices at which they are willing to sell (offer or ask price), and prices at which they are willing to buy (bid prices). Stockbrokers or institutional investors decide what they do based on quoted prices.
- Bid-offer spreads (also known as bid-ask prices) – spreads between the buying and selling prices of dealers. Similar to quote-driven, but investors know dealers spread, or profit.

Types of Order

- Giving buy or sell instructions to dealers, can be done in different ways:
  - Market order – stipulates that shares should be traded at most favourable price
  - Specific price – no buy can be done at a price higher than specified, and no sell at a lower than specified
  - Market-if-touched – order implemented when share reaches a certain price
  - Stop order – becomes a market order once trade has reached a certain price, but it involves selling after the price has fallen or risen to a certain price
- Share dealing orders can remain in force for different lengths of time:
  - Fill-or-kill – cancelled if not executed immediately
  - Open order – stays open until executed
  - Specific period of time

Types of Shares

- Ordinary shares – the most common, and also referred to as common stock
- Preference (or preferred) shares – there are many different ones:
  - Cumulative preference shares
  - Non-cumulative preference shares
  - Redeemable preference shares
  - Convertible preference shares
  - Participating preference shares

Market Participants

- Ultimate lenders and borrowers
- Brokers
- Issuing house
- Market-maker
- Arbitrageurs
- Speculators
- Hedgers

Stock Indices

- Stock indices are measures of the price performance of stock portfolios. These portfolios may represent the market (e.g. FTSE all-share) as a whole or a segment of the market (e.g. FTSE 100)
- Indices can be calculated for National Stock Markets, for Regional Stock Markets and for Global Markets
- Indices can also be calculated for bonds

Stock Indices (cont.)

- Indices can be categorised according to:
  - Number of stocks included – it can vary from small (e.g. Dow Jones Industrial Average which includes 30 stocks) to all stocks traded in the market (e.g. FTSE all-share)
  - Method of weighting the stock prices – unweighted, value weighted or price weighted
  - Nature of the averaging –arithmetic or geometric mean

Index Calculation

- A point in time is chosen as the base
- At that point the total value of all the shares in the market is equalled to the base value (normally 100)
- The value of the index at each date after that is calculated as:
  - New value / Old value * 100 (unweighted)
  - Sum of stock prices at new date / sum of stock prices on the base date * Base value (price weighted)
  - Sum of market caps at new date / sum of market caps at base date * Base value (value weighted)

Functions of Stock Indices

- Measure and monitor market movements
- Provide a means of ascertaining changes in aggregate wealth over time
- Barometers of the wider economy
- Means of evaluating the performance of fund managers
- Provide the basis for derivative instruments such as futures and options
- Provide the framework for the creation of tracker funds
- Required by capital models, in particular the CAPM, for a number of purposes such as discount rates and fair rates of return

Revision / Exercises

- Revision:
  - Read chapters 8 and 12 of Redhead
  - Review exercises in chapter 12

Exercises – cont.

1. The current rate of discount on treasury bills is quoted at 11 per cent:
   a. Calculate the price of a newly-issued, ninety-one-day treasury bill for £100,000
   b. Assuming interest rates remain unchanged, what will its price be when there are 36 days left to redemption?
   c. The interest rate currently quoted on 3-month local authority deposits is 11.5%. Is this better or worse than the return on treasury bills?
   d. What would be the price of a newly issued, ninety-one-day treasury bill if interest rates generally rose by 1%?

Exercises – cont.

2. A value weighted index is based on three stocks: A, B and C. The current value of the index is 1000. The share prices and number of shares are:

Stock A – 150p – 1,500,000 shares
Stock B – 100p – 1,000,000 shares
Stock C – 20p – 5,600,000 shares

a) If stock C were to be replaced by stock D, which is priced at 60p with 4,000,000 shares issued, calculate the adjustment factor required to ensure that the replacement does not affect the index.
b) Subsequent to the replacement, the price of stock D falls to 45p. What will the new index be?

Exercises – cont.

3. Exam questions:
   - Identify what a stock market index is, and what functions it serves.
   - Identify the differences between capital and money markets.
   - Exercise 3 Unit Guide

Investment Analysis

Risk and Return –
The Capital Asset Pricing Model

01/03/07

Objectives

- After today you should be able to:
  - Understand the concepts of risk and return
  - Understand the concept of ß and it's meaning
  - Understand the assumptions behind the CAPM
  - Be able to draw a security market line, and understand it's meaning
  - Understand the evidence that exists for and against the CAPM

Definitions

- Return – the cash payments received due to ownership of an investment over a period of time, plus the change in market price divided by the price at the beginning
- Risk – there are many definitions of risk. One defines risk as "the variability of returns from those that are expected"
- The expected return is calculated as the weighted average of the possible returns
- The risk is normally calculated as the standard deviation of a distribution around it's mean

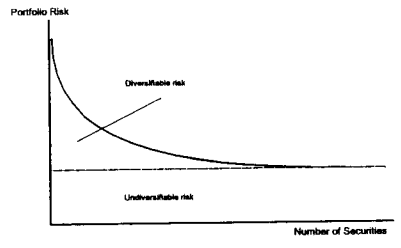
Types of Risk

- The total risk of a security held in isolation is *more* than that of the same security held as part of a portfolio.
- The risk that is removed through portfolio diversification is *specific* or *unsystematic* risk, caused by random events like death of chief executive, market failure, strike in factory, etc. The effects of such random events are eliminated by diversification, so unsystematic risk is also called *diversifiable* risk.

Types of Risk

- *Systematic* risk factors affect *all* the securities in the market - examples of such risk factors are inflation, devaluation, war, etc. Systematic risk is also called *market* risk or *undiversifiable* risk.
- Diversified investors are only concerned with the *systematic* risk of a security - not the unsystematic risk, which can be diversified away.

Risk Diversification



RISK REDUCTION THROUGH PORTFOLIO DIVERSIFICATION

Capital Asset Pricing Model

- The central idea behind the CAPM is that there is only one risk factor that affects the long term average return on investment: the market risk which is measured by the ß
- The CAPM defines the risk/return trade-off for efficient portfolios
- The formula for calculation of the expected rate of return of a security depends on the risk-free rate, the market return and the covariance of the security with the market

Assumptions of the CAPM - 1

- Investors are rational risk-averters & seek to maximise their wealth.
- The market is perfect, i.e.:
  - Not dominated by few investors
  - All investors can borrow or lend at the same risk free rate, without any limit
  - No transaction costs
- Betas calculated on the basis of historical returns remain stable and are therefore relevant for the future

Assumptions of the CAPM - 2

- Investors all have the same one-period investment horizon
- Unrestricted borrowing and lending at the risk-free rate is possible
- All investors have identical expectations with regard to return, standard deviations and covariances
- These assumptions are unrealistic, but they do not make the analysis useless

Risk-free Rate and Market Risk

- The *risk-free rate* is the return expected by investors from risk-free securities, such as Treasury Bills
- Other securities carry a level of risk, and investors will expect to be rewarded with a risk premium: the required rate of return is therefore
  = Risk-free Rate + Risk Premium
- The market portfolio has only systematic or market risk. The risk premium expected on the market portfolio is called the *market risk premium.*
- If r_f is the risk-free rate, and r_m is the rate of return expected on the market portfolio, the difference between the two rates (i.e. $r_m - r_f$) is the market risk premium

The β

- The β of a security can be defined as an index of responsiveness of changes in the value of a security relative to change in the stock exchange or market
- The higher the correlation of this change, the higher the β
- A negative β means that the price of a security tends to go up (down), when the market goes down (up)
- Generally capital goods tend to have the highest βs, and consumables the lowest

Meaning of ß(eta)

- The ß can be interpreted as being:
  - The relationship between expected percentage changes in the stock price and percentage changes in a stock index line
  - The gradient of the characteristic line
- The α of a stock is it's risk adjusted excess return, i.e. the amount by which the excess return is above the level justified by ß. In equilibrium α is zero
- The ß of a portfolio is the weighted average of the ßs of the individual shares in the portfolio

Required Return on Equity

- Expected Return
  - $E(r_i) = r_f + (E(r_m) - r_f) * (Cov(i,M) / \sigma^2_m)$
  - Where:
    - $E(r_i)$ is the expected return of a particular security i
    - r_f is the risk free rate
    - $E(r_m)$ is the expected return on the market portfolio
    - Cov(i,M) is the covariance of returns of security i and the market portfolio
    - σ^2_m is the variance of the market returns
  - The element $(Cov(i,M) / \sigma^2_m)$ is normally known as the ß, and thus the formula is rewritten as:

    $E(r_i) = r_f + (E(r_m) - r_f) * ß_i$

Required Return on Equity

- The formula of the Capital Asset Pricing Model (CAPM) is therefore:

$$R_j = R_f + ß_j * (R_m - R_f)$$

Where:

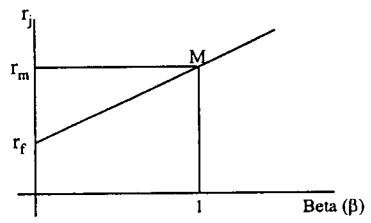
R_j = the rate of return of security j, predicted by the model

R_f = the risk-free rate of return

R_m = the return of the market

$ß_j$ = the 'beta' coefficient of security j

CAPM and the Securities Market Line



SML Equation: $r_j = r_f + \beta_j(r_m - r_f)$

This is called the Capital Asset Pricing Model (CAPM)

Evidence regarding the CAPM

- For some periods, in some countries, the CAPM is supported, but only the zero-beta form
- For many countries, over long periods there is no relationship between beta and returns
- Contrary to CAPM, unsystematic risk appears to be rewarded
- Contrary to the CAPM, variables other than beta are related to return. These variables vary from country to country

Evidence regarding the CAPM

- Even if the CAPM is false, the finding that there is no return for beta risk is a useful finding for investors
- For major market moves, there has been a strong relationship between beta and returns

In summary, evidence seems to tilt towards rejecting the CAPM, but...

Cost of Preference Shares and Bonds

- Calculating the cost of preference shares is easier than calculating the cost of ordinary shares, because the stream of dividends is stable
- To calculate the cost of preference shares (or irredeemable bonds), it is necessary to divide the dividend payable (or interest payable) by the ex-dividend market value of the shares (market value of the bonds)

Cost of Redeemable Bonds

- The cost of redeemable bonds if found by calculating the internal rate of return or using a bond approximation formula:

$$P_0 = \frac{I}{(1+K_d)} + \frac{I}{(1+K_d)^2} + \frac{I}{(1+K_d)^3} + \ldots + \frac{I+RV}{(1+K_d)^n}$$

Where:

I = annual interest payment
RV = redemption value
K_d = cost of debt before tax
P_0 = current market price of bond
n = years to redemption.

Cost Debt - Other

- The cost of bank loans, which have no market value, is approximated by the interest rate paid on them
- If a company is in a tax-paying position, the cost of debt finance must be adjusted to take into account the tax-deductibility of interest payments. Given the company tax rate (C_T):

$$K_d \text{ (after tax)} = K_d(1 - C_T)$$

- The costs of individual sources of debt finance must be weighted according to their relative importance, using preferably market values and, if these are not available, book values

Revision / Exercises

- Revision:
  - Read chapter 16 of Redhead
  - Review exercises in chapter 16
  - Review Exam and Resit Exam Papers 2005, and check which questions can now be solved

Exercises

1. The rate of return on US Treasury bills is 4% p.a. over the next six months. The expected rate of return on the NYSE All Share index portfolio over the same period is 12% p.a. Company A has a beta of 0.6 and an expected rate of dividend yield of 4% p.a. What might be the expected rate of capital growth of an investment in company A?
2. The rate of return on Treasury bills is 3% p.a. The expected rate of return on the FT All Share index portfolio over the same period is 12% p.a. Stocks A and B have anticipated returns of 6% and 20% p.a. respectively. Stock A has a beta of 0.3 and stock B has a beta of 2.0. Are these shares mispriced? If so, should they be bought or sold?

Investment Analysis

Capital Market Theory –
Arbitrage and Other Alternatives to CAPM
And Bond Valuation

08/03/07

Objectives

- After today you should be able to:
  - Identify the five key risk factors that affect all securities
  - Understand the key characteristics of the Arbitrage Pricing Model (APT)
  - Understand how to apply and test the APT
  - Understand and be able to apply the Factor Approach to bond valuation
  - Critically evaluate capital market theory
  - Calculate value of Bonds

Criticisms of the CAPM

- It is a single factor model, where the return on an individual security is a function of the return on the market portfolio
- It is impossible to identify, and measure, the market portfolio
  - APM avoids this criticism, because it does not require the use of the market portfolio
- It is not possible for individual investors to borrow at the risk-free rate
- Not all empirical studies have established a direct link between beta and average annual returns

Five Key Risk Factors

- There are five risk factors that affect the valuation of all securities:
  - Inflation
    - Estimated at the start of the period, based on historical inflation rates, interest rates, etc
    - Most shares have a negative exposure to inflation risk
    - Industries selling "necessities" are less affected by inflation
    - Industries selling "luxuries" are more affected by inflation
    - Asset based industries can benefit from inflation

Five Key Risk Factors

- Business cycle
  - Risk of unanticipated changes in the level of real business activity
  - As with inflation, a start of the period / end of the period comparison is made
- Investor confidence
  - Defined as the unanticipated change in investors' willingness to undertake risky investments
  - It is measured by whether the 20-year maturity risky bonds yield more or less than their average spread over government bonds
  - The spread between the yields on government and corporate bonds is smaller when confidence is higher

Five Key Risk Factors

- Time horizon
  - Risk of unanticipated changes in investors' desired time to payout
  - To measure it, the current spread between the 30-day and the 20-year government bonds is compared with the historical spread
  - If the current spread is narrower, investors are prepared to wait for returns
- Market timing
  - Calculated as the part of securities return which is not explained by the other factors

Arbitrage Pricing Theory (APT)

- It is an alternative to the CAPM
- It's core idea is that the long term average returns of securities is affected by several systematic influences (unlike CAPM's single market risk)
- As in the CAPM, risks other than the systematic are diversifiable
- To encapsulate these various "risks" the APM uses several ßs.
- Each ß represents the sensitivity of the stock to each of those systematic factors

The APT Equation

- The Arbitrage Pricing Theory suggests that the SML should be replaced by the following equation:
  - $E(R_i) = R_f + ß_1 * (RPF1) + ß_2 * (RPF2) + ß_3 * (RPF3)$ where:
    - $E(R_i)$ = expected (or required) rate of return
    - $ß_1, ß_2, ß_3$ = the beta values applicable to the three risk factors
    - RPF1, RPF2, RPF3 = the three risk premiums
- Example above assumes three risk factors, but the model can incorporate different number of risk factors

Role of Arbitrage

- Like in the CAPM, there is an equilibrium point, but it is a multidimensional equilibrium, rather than a two dimensional like the SML
- The equilibrium in the arbitrage pricing theory is the absence of arbitrage opportunities
- If the arbitrage entails short selling (borrowing shares and selling them), the short positions provide negative ßs

Role of Arbitrage

- According to the APM, all investments with identical risk levels, should give the same rate of return
- If this is not the case, it is possible to sell short stocks with low expected returns, and buy shares with high expected returns
- These purchases and sales will render all the net ßs equal to zero.
- Any differences in the amounts invested are matched by borrowing or investing at the risk-free rate

Uses of CAPM and APM

- Both the CAPM and APM are normally used in the valuation of shares
- Whereas the value of debt instruments are mainly dependent on the company to meet its obligations and the interest rate it is offering, value of shares is more dependent on other market factors
- So, how do we value bonds and other debt instruments?

Return on Bonds

- Different instruments will use different valuation methods, depending on their characteristics
- Return on bonds can be calculated using the factor approach, which is similar to the CAPM and APT
- The factors employed to evaluate the return of bonds tend to be related to the yield curve
- Two most important factors relate to the level and slope of the yield curve

Factor Approach Equation

- The equation for the required rate of return is:
  - **$R_b = R_f + (b_1 * F_1) + (b_2 * F_2)$ where**
    - R_b = required rate of return on bond
    - R_f = risk free rate of return
    - b_1 = exposure to intermediate risk (a base rate, which represents the level of the yield curve)
    - F_1 = risk premium per unit exposure to intermediate risk
    - b_2 = exposure to spread (between short and long term rates, which represent the slope of the yield curve)
    - F_2 = risk premium per unit exposure to intermediate risk

Bond Valuation

- Stream of cash flows to holder of bond
  - periodic coupon interest payments
  - face value of bond on maturity
- The price that investors pay for the bond today is the *present value* of this stream of cash flows, discounted at the appropriate rate of return required by investors

Fixed Rate Bond

- Coupon rate of interest: *fixed* by bond-issuer, taking into account profitability of operations, projected cash flows, etc
- Required rate of return of lenders is the discount rate applied by the market. It *fluctuates*, depending on:
  - Supply and demand for capital
  - Inflation
  - Risk of the bond
  - Years to maturity

Value of a Bond - 1

- The value of a bond is calculated by discounting to the present all the cash flows that the bond will generate
- There are two streams of cash flow:
  - Interest payments (I)
  - Redemption Value (R_n)
- $V = I/(1+r) + I/(1+r)^2 + I/(1+r)^3 + \ldots + (I + R_n)/(1+r)^n$

Value of a Bond - 2

- PV of debt (P_D) = PV of Coupon interest (I)
  +
  PV of Redemption value (R_n)

$$= (I \times AF_{t,\,k_D}) + \frac{R_n}{(1 + k_D)^t}$$

- The value of k_D is called the *"Yield to Maturity"* or *"Redemption Yield"* - it is the average rate of return which investors require from the bond. Its value determines whether a bond sells at par, at a discount or at a premium
  It represents the cost of borrowed capital for the firm

Example

- The yield is nothing more than the IRR of the bond.
- Let I = £8, k_D = 14%, t = 4 years
  ($£8 \times AF_{4,14\%}$) + ($£100/1.14^4$) = £82.52
  Yield = 14%, & PV of bond = £82.52
- What is the *Net* Present Value?
  PV (£82.52) - Investment (£82.52) = 0
- Thus, the yield of 14% is the discount rate which makes the NPV of the bond exactly zero - i.e. it is the IRR of the bond

The Zero-coupon Bond

- This is a bond that pays no coupon at all - the entire return to the lender lies in the difference between the amount paid for the bond and the redemption value of the bond at maturity.
- E.g.: A bond with a redemption value of £100 after 5 years is sold for £78:
  $78 \times (1 + k_D)^5 = 100$
  - the yield k_D = approximately 5%

The Perpetual Bond

- No repayment of principal - only coupon interest paid in perpetuity.
- Value of perpetual bond = present value of the perpetuity I discounted at the required rate of return of debt-holders k_D:

$$P_D = \frac{I}{k_D}$$

The yield of a perpetual bond is easily determined:

$$k_D = \frac{I}{P_D}$$

After Tax Cost of Borrowing

	Ungeared Firm	Geared Firm
Capital employed	100	100
PBIT	60	60
Interest @ 15%	0	15
Profit Before Tax	60	45
Tax @ 33%	20	15
Net Profit	40	30

True cost of borrowing = k_{DAT} = 0.15(1-0.33)
= 0.10 or 10%

Revision / Exercises

- Revision:
  - Read chapters 17 and 27 of Redhead
  - Review formulas and exercises chapter 27
- Exercises:

1. What yield is being offered by a zero-coupon bond, with a redemption value of £100, and maturity in 4 years, which is trading at £80?
2. What is the price of an 8% fixed rate bond, with par value of £100, maturity in 8 years and redeemed at par, if the market interest rate for companies of this risk level is:
   1. 6%
   2. 8%
   3. 12%

Exercises – cont.

3. What is the price of a zero-coupon bond, with a redemption value of £100, offering 6% yield and maturity in 6 years?
4. What yield is being offered by a 9% perpetual bond, which is trading at £90?
5. What is the net present value of an £95 investment in an 8% fixed rate bond, with par value of £100, maturity in 5 years and redeemed at £110, if the market interest rate is 12%?

Exercises – cont.

3. Exam questions:
   - What is the price of a zero-coupon bond redeemable at par, offering 5% yield and maturity in 9 years?
   - What is maturity value of a 6% bond, with maturity in 5 years time, if the market price is £92, and market rate is 9%?
   - What is the price of a perpetual bond, offering 7% yield when the required market return is 5%?
   - What yield is being offered by a bond, with maturity in 5 years time at par, if the market price is £105, and market rate is 7%?
   - Exercise 4 Unit Guide

Investment Analysis

Investment Analysis –
Discount Models

15/03/07

Objectives

- After today you should be able to:
  - Be aware of the three most used method of valuing shares
  - Understand the concept, and limitations of discount models
  - Identify and calculate some of the different types of discount models available
  - Be able to compare the Dividend Growth Model and the Capital Asset Pricing Model

Valuation Models

- There are many types of valuation models, and some investors claim to be successful using different models
- The three most recognised, universally used models are:
  - Discount models
  - Ratios
  - Technical analysis / methods

Discount Models

- One of the main types of investment analysis used is known as Discount Models approach
- This approach involves the calculation of the present value of the future cash flows generated by the investment that is being made
- By discounting the future cash flows, a fair price for the security today is calculated
- The price calculated is therefore dependent on the estimates of the future cash flows

Discounting Cash Flows

- A sum of money received (or paid) in the present is worth more than the same sum received in the future.
- To compare a future cash flow, it has to be discounted:

  $PV = S / (1 + r)$

  where:

  PV – present value of the future cash flow

  S – a cash flow received in one year's time

  r – decimalised rate of interest

Discounting Cash Flows

- If the sum is received after 2 years:

  $PV = S / (1 + r)^2$
- If received after n years:

  $PV = S / (1 + r)^k$
- If we received various payments of the same amount at different points in time:

  $PV = \sum_{k=1}^{n} S / (1 + r)^k$

Discount Future Dividends

- This approach to share valuation,uses the present value of the future dividends distributed by the company
- The simplest case is when dividends are expected to be unchanged over time:
  P = D/(1+r) + D/(1+r)^2 + D/(1+r)^3 + ... + d/(1+r)^n
  where:
  P = Share price
  D = Dividend
- This can be simplified, and shown as:
  P = D / r

Gordon / Dividend Growth Model

- This model assumes that dividend grows at a constant annual rate, which is more realistic than the assumption that dividend is unchanged over time:
  P = D*(1+g)/(1+r) + D*(1+g)^2/(1+r)^2 + ... + D*(1+g)^n/(1+r)^n
  where:
  g = growth rate of dividend
- Assumes this growth rate is "forever", the formula can be simplified to:
  P = D * (1+g) / (r-g)

Gordon / Dividend Growth Model

- This model requires the estimation of the rate of dividend growth, which can be done in two ways:
  - By using the average growth in the past as an approximation of the future
  - By using the formula:
  G = ROE * (1+d)
  where:
  ROE = return on equity
  d = proportion of profits paid out as dividends
- With a constant dividend pay-out ratio, the growth rate of dividends will equal the growth rate of profits

Stochastic Dividend Discount Models

- These models allow for the possibility that dividends do not increase every year
- A stochastic form of the DGM is:

  P = D * (1 + pg) / (r – pg)

  where:

  p = probability that the dividend will increase in a period
- The equation will indicate the average expected return, but you can calculate different values, by using different probabilities

Multi-period Models

- This models are one step closer to reality, as dividends rarely are either constant or grow at a constant rate
- The simpler of these models is the 2-period model: untypical rate for a number of years after which growth proceeds at a normal rate. The formula for this model is:

  p = D * (1 + G) ^ N * (1 + g) / (r – g)

  where:

  p – expected future share price after N years

  G – untypical growth rate

  g – normal growth rate

  N – number of years of untypical growth

Multi-period Models – cont.

- The current fair price is given by discounting the expected future share price and the dividends expected during the period of untypical growth (example of 3 years of untypical growth):

  P = D * (1 + G) / (1 + r) + D * (1 + G)^2 / (1 + r)^2 + D * (1 + G)^3 / (1 + r)^3 + p / (1 + r)^3

  Where:

  P = Share price now
- This model can be expanded to include various different untypical growth rates, and a final normal growth rate

Problems with Dividend Discount Models (DDMs)

- DDMs favour shares with high yields and low price-earnings ratios
- Models are very sensitive to small changes in assumptions
- If the forecasts are poor, the model's results will also be poor
- DDMs provide good results in some years, while producing bad in others. If fund managers use DDMs, they will outperform the market in some years, but underperform significantly in others

DGM vs. CAPM

- CAPM *explicitly* identifies the systematic risk (beta) of a share; DGM *implicitly* takes account of risk as reflected in the existing share price (P_0).
- CAPM is a *normative* model that states what the expected return should be, given the beta; DGM is a *positive* model that states what the required return is, given P_0, D_1 and g.
- CAPM is a *single time period* model, with return calculated over a holding period, e.g. 1 month or 1 year; DGM is a *multi time period* model, which gives the rate for a perpetuity.
- CAPM is criticized for relying on a *single factor* - the return on the market portfolio; a positive model like DGM, which relates return to P_0, D_1 and g, has no such problem.
- Both models face problems in measuring the input data

Revision / Exercises

- Revision:
  - Read chapter 19 of Redhead
  - Review exercises in chapter 19
  - Read article "Markets and Business Cycle" at end of chapter 19 for discussion in class

Exercises

1. SCF has recently paid a dividend of £8p per share. The company's dividends are expected to grow at 6% p.a. Investors in securities of this level of risk require a 9% p.a. rate of return. What is the fair price of the shares?
2. What would be the fair price of the shares if dividend growth were expected to fall to 3.5% p.a. after 4 years?
3. If the rate of dividend growth were to remain at 6% p.a. but with a 25% chance that there would be no dividend growth in a year, what would be the fair price of the shares?

Exercises – cont.

4. FFC is a growing company, and has just paid an annual dividend of £2.20. It expects dividends to grow at an annual rate of 32% over the next 2 years, and 12% after that. What is the fair price of the share if the required rate of return is 13% p.a.
5. A new high growth company is expected to pay no dividends during the first 6 years, at the of which it will pay a 45p dividend. Dividends are expected to grow at 15% p.a. after year 6. The required rate of return for investment of similar risk level is 20% p.a. Estimate the fair price of the shares.
6. Exercises 4 and 8 Unit Guide

Investment Analysis

Investment Analysis –
Ratio and Technical Analysis

22/03/07

Objectives

- After today you should be able to:
  - Understand the types of ratios used by investors
  - Calculate Price-Earning (PE) and EPS ratios
  - Understand how investment analysts overcome the PE ratio's limitations
  - Calculate short-term solvency, financial leverage and coverage ratios
  - Understand the limitations of ratio analysis and how to overcome them
  - Understand the principles of investment technical analysis
  - Recognise the various charts and patterns used by technical analysts

Valuation Models

- There are many types of valuation models, and some investors claim to be successful using different models
- The three most recognised, universally used models are:
  - Discount models
  - Ratios
  - Technical analysis / methods

Types of Ratios

- As part of their financial reporting, companies calculate five types of ratios:
  - Profitability
  - Efficiency
  - Liquidity
  - Gearing
  - Investment
- An investor looks at a different set of ratios:
  - Price-Earnings Ratio and Earnings per Share
  - Short-term Solvency Ratios
  - Financial Leverage Ratios
  - Coverage Ratios

Price-Earnings Ratio

- Price-earnings ratio provides a means to ascertain the appropriate price of a share:
  PE = P / eps
  Where:
  PE – Price-Earnings Ratio
  P – current share price
  eps – earnings per share
- We can calculate an historical or an estimated PE Ratio. To calculate the historical, the most recent eps is used, whereas for the estimated PE ratio, an estimate of the eps for the next period is used
- An estimated PE allows the calculation of a fair price of the share:
  FP = PE * eps

Price-Earnings Ratio (cont.)

- Four different approaches can be used in the calculation of a forward PE:
  1. Average of past price-earnings ratios for the company
  2. Average of price-earnings ratios for similar firms
  3. Using the Gordon growth model:
     $P = D / (r - g)$
     $P / eps = (D / eps) / (r - g)$
  4. Using regression analysis

Price-Earnings Ratio (cont.)

- The PE ratio more commonly used has a limitation, as it is a point-in-time calculation
- As such, most investment analysts tend to use the following process when using PE ratios:
  1. Collect and analyse data for a number of years, not just the most recent year
  2. In preparing reports, present PE data for the previous complete year, the current year, and the following year
  3. Calculate PE Ratios for each of these three years, using each year's current price

Price-Earnings Ratio (cont.)

4. A comparative PE Ratio (industry, all market or comparable companies) is also presented
5. Based on a number of factors, such as past and present growth rate of earnings, past sales growth, profitability, financial strength, quality of management, etc, and on professional experience, an analyst will decide on an appropriate PE Ratio
6. This appropriate ratio is compared to the current ratio. If appropriate PE ratio is higher than current, recommendation is buy

Price-Earnings Ratio (cont.)

7. Instead of calculating an alternative PE Ratio, an analyst may choose to look at a range of historical sector or market PE Ratios. If the company's is in the lower end of the range, it indicates that the company is cheap
8. Sometimes, normalised earnings are used in the PE Ratio calculations. This is particularly the case with very cyclical industries

- In determining an appropriate PE Ratio, investors should not only analyse company accounts, but also review corporate strategy, appraise industry prospects, assess management, etc

Earnings Per Share

- EPS can be broken down into two other ratios:

$$EPS = \frac{\text{Distributable Earnings}}{\text{Number of Shares}}$$

$$= \frac{\text{Distributable Earnings}}{\text{Stockholder's Equity}} * \frac{\text{Stockholder's Equity}}{\text{Number of Shares}}$$

- The first ratio above is known as Return on Equity (ROE), which can be further broken down:

$$ROE = \frac{\text{Distributable Earnings}}{\text{Total Assets}} * \frac{\text{Total Assets}}{\text{Stockholder's Equity}}$$

- These ratios are called Return on Assets (ROA) and Asset/equity ratio, respectively, and the ROA can be further broken down into:

ROA = Profit Margin (Dist.Earnings/Sales) * Asset Turnover (Sales/Total Assets)

Financial Adequacy Ratios

- Three sets of ratios are used to indicate the firm's ability to meet its financial obligations:
  - Short Term Solvency Ratios
    - Evaluate firm's ability to pay short term (less than a year) debts
  - Financial Leverage Ratios
    - Show level of debt financing of the firm
  - Coverage Ratios
    - Show firm's ability to pay interest and repayments originated by the firm's debt

Short-Term Solvency Ratios

- Two ratios are calculated in this category:
  1. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$
  2. Acid-Test Ratio = $\frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$
- Other ratios that can be calculated are the inventory turnover, which indicates how quickly inventory is turned into cash and the accounts receivable (or debtors) turnover, which indicates how quickly the firm's customers pay their bills

Financial Leverage Ratios

- Interest on debt is paid prior to dividends to shareholders => shareholders' risk
- Payment of interest is a legal obligation, but payment of dividends is not => shareholders' risk
- Generated profit insufficient to pay interest may result in administration and bankruptcy => shareholders' risk
- Despite being a cheaper source of finance for the firm, debt represents and increased level of risk for shareholders, therefore it is an important item to be analysed by investors

Financial Leverage Ratios (cont.)

- Ratios analysed in this category are:
  1. Long-Term Debt to Equity = $\frac{\text{Long-Term Debt}}{\text{Shareholder's Equity}}$
  2. Total Debt to Equity = $\frac{\text{Long-Term Debt+Current Liabilities}}{\text{Shareholder's Equity}}$
- Long-term debt is debt which is payable in over 1 year's time
- For the purpose of the ratio calculation, bonds are valued at book value
- As for equity, normally the ratios are calculated twice: once with equity at book value, and once at market value
- High ratios indicate high leverage, therefore higher levels of risk

Coverage Ratios

- Two ratios are calculated in this category:
  1. Interest Cover Ratio = $\frac{\text{(Earnings + Interest Charges Paid)}}{\text{Interest Charges Paid}}$
  2. Fixed-charge Coverage Ratio
     $= \frac{\text{Earnings + Interest Charges Paid + Lease Payments}}{\text{Interest Charges Paid + Lease Payments}}$
- Both these ratios relate the resources available for payments of finance charges, with the level of those charges. The second ratio is more comprehensive, in the sense that it includes firms obligations not included in the interest cover ratio

Problems with Ratio Analysis

- Although ratios are easy to calculate and easy to use, ratio analysis has a number of potential problems which can not be overlooked:
  - Companies use different accounting methods in measuring earnings and other values, thus affecting reported values
  - A particular case of the above is the use of creative accounting, which involves the deliberate abuse of the subjectivity inherent in accounting
  - Some ratios may show that the company is in financial health, while others may show the opposite

Problems with Ratio Analysis (cont.)

- Risk that focusing on ratios, you loose focus from the multitude of other factors that affect the potential success of the firm
- When analysing ratios, the simple ratio has a limited value and we should look at the trend of the ratio over time
- Ratios analyse the past performance, which is not always a good indicator of future performance

Revision / Exercises

- Revision:
  - Read chapter 20 of Redhead
  - Review exercises in chapter 20

Exercises

1. A company has a dividend pay-out rate of 0.6, the required rate of return on its shares is 10% p.a., there is a 4% p.a. expected growth rate of dividends, and earnings per share are forecast to be 43p during the next year. Estimate a fair price for the share
2. Shares in HMV plc are currently 155p. HMV's latest 12-month earnings were 23.5p per share, of which 6.8p were paid out as dividend:
   a. What is the current price-earnings ratio?
   b. If earnings are expected to grow at 6% p.a. and the required rate of return is 10% p.a., what is the justified price-earnings ratio?
   c. Would you buy this share?

Exercises (cont.)

3. Using the accounts distributed in class, calculate:
   a. Current ratio and acid-test ratio
   b. Long-term debt to equity and total debt to equity ratios
   c. Interest coverage and fixed-charge coverage ratios
   d. EPS and all its components
4. Exercise 5 Unit Guide

Technical Methods

- Technical analysts believe that stock markets have a dynamic of their own, independent of outside forces
- As such, all relevant information for evaluating share prices is already contained in the market
- By examining market information, namely past history of share prices (and volumes), it is possible to predict future price movements

Technical Methods (cont.)

- The starting point for analysts is looking at charts with past information
- The most frequently used charts are:
  - Bar charts
  - Line charts
  - Point and figure charts
- These charts are then used to create chart patterns, which will result in the forecasted price of the share

Other indicators

- Apart from charts, technical analysts uses other indicators, such as:
  - Filter rules (buy when it goes up by a certain % from previous minimum or sell when it goes down)
  - Relative strength (ratio of stock to index)
  - Short interest ratios (ratio of short sales to total trading)
- Most of these indicators involve no or only very simple computations

Introduction to Diversification

- Rate of return
  - An investment portfolio provides a return to the investor, which can be calculated as a weighted average of the returns of each individual asset in the portfolio
- Variance
  - The degree of variability of the potential returns of the portfolio, which is a function of the variances of the individual assets in the portfolio

Introduction to Diversification

- Key formulas

$$E(R_p) = (W_e)E(R_e) + (W_b)E(R_b) + (W_d)E(R_d)$$

$$V = \sigma^2 = (W_e)^2\sigma_e^2 + (W_b)^2\sigma_b^2 + (W_d)^2\sigma_d^2 + 2(W_e)(W_b)\sigma_e\sigma_b\rho_{eb} + 2(W_e)(W_d)\sigma_e\sigma_d\rho_{ed} + 2(W_b)(W_d)\sigma_b\sigma_d\rho_{bd}$$

$$\bar{(R)} = \frac{\sum_{i=1}^{n} R_i}{n} \qquad (\sigma) = \sqrt{\frac{\sum_{i=1}^{n} (R_i - \bar{R})^2}{n}}$$

Revision / Exercises

- Revision:
  - Read chapter 21 of Redhead
  - Review Exam and Resit Exam Papers 2005, and check which questions can now be solved
  - Advanced Reading for next session:
    - Chapter 15 Redhead
    - Watson, Head – Corporate Finance – Principles and Practice" – chapter 9

Investment Analysis

Diversification and
Portfolio Construction

29/03/07

Objectives

- After today you should be able to:
  - Understand why portfolio diversification is important for an investor
  - Calculate expected returns and variance of portfolios
  - Identify the different styles of portfolio management and stages in portfolio construction
  - Differentiate between value and growth stocks
  - Identify the different types of investment funds
  - Understand the concept of socially responsible investing

Don't put all your eggs in the same basket

- Spreading one's assets among a large number of investments lessens the risk of losing everything as a result of adverse developments.

Main Asset Classes

- Equities (shares)
  - Sectors
- Bonds
  - Corporate / Government
- Deposits
  - Currents / Savings
- Real Estate
  - Residential / Commercial

Two Different Approaches

- "Naïve" Approach
  - Spreading your wealth among asset classes, and within those among different sectors
- Harry Markowitz's Approach
  - More sophisticated, choosing investments based on their correlations

Key Concepts

- Rate of return
  - An investment portfolio provides a return to the investor, which can be calculated as a weighted average of the returns of each individual asset in the portfolio
- Variance
  - The degree of variability of the potential returns of the portfolio, which is a function of the variances of the individual assets in the portfolio

Introduction to Diversification

- Markowitz formulas:
  - Expected rate of return:

$E(R_p) = (W_e)E(R_e) + (W_b)E(R_b) + (W_d)E(R_d)$

  - Expected portfolio variance:

$V = \sigma^2 = (W_e)^2\sigma_e^2 + (W_b)^2\sigma_b^2 + (W_d)^2\sigma_d^2 + 2(W_e)(W_b)\sigma_e\sigma_b\rho_{eb} + 2(W_e)(W_d)\sigma_e\sigma_d\rho_{ed} + 2(W_b)(W_d)\sigma_b\sigma_d\rho_{bd}$

Exercises

- Investment portfolio comprises the following two assets:
  - A – E(R) = 10%, σ = 0.2
  - B – E(R) = 12%, σ = 0.4
- Given that correlation between returns is 1, calculate:
  - Expected return of portfolio
  - Variance of portfolio

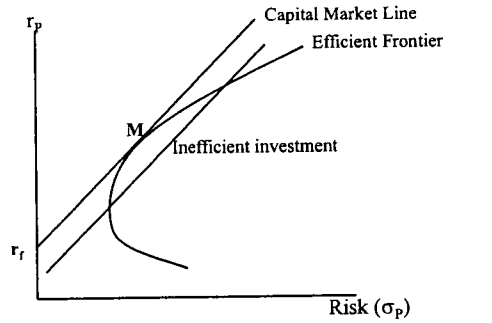
Foreign Investment

- Investing in foreign securities has two effects on the risk of the portfolio:
  - It is reduced by increasing the degree of diversification of the portfolio
  - Additional source of risk: foreign currency or exchange rate risk
- The consensus is that the first effect more than outweighs the second

Risk-Free Asset

- The existence of risk-free assets allows investors to create combinations of portfolios of risky assets and risk-free assets
- This allows investors to move their investments from inefficient positions below the Capital Market Line (which most funds have) to points in the efficient frontier
- This can be achieved by investing in risk-free assets or by borrowing at the risk-free rate

The Capital Market Line



Exercise

- A portfolio consists of stocks A, B and C in equal proportions. Each has an expected return of 10% p.a. and an annual standard deviation of returns of 8%. The coefficient of correlation between the returns of A and B is 0.9, while the correlations between A and C and between B and C are both 0.
  1. Calculate the expected return and risk of the portfolio
  2. Show how the risk can be reduced by changing the proportions of A, B and C. Why has the risk reduction occurred?

Types of Portfolio Management

- Active Portfolio Management
  - The fund manager tries to beat the market, by choosing investments that are likely to provide higher returns
- Passive Portfolio Management
  - Passive fund managers believe that markets are efficient. Therefore all information is reflected in the prices, and no individual can beat the market portfolio

Forms of Passive Management

- Buy and hold strategy
  - Manager buys a representative portfolio of securities and keeps them for the duration of the investment
- Track the performance of a stock index
  - Hold all the shares in the index in the same proportion. Difficult to do in large markets
  - For broad indexes, the fund will be a representative sample of the index

Forms of Passive Management – cont.

- Greater frequency of portfolio changes
  - Composition of the portfolio is adjusted frequently in response to:
    - Risk-free interest rate changes
    - Consensus view on the risk and return characteristics of the market portfolio
    - Degree of risk aversion exhibited by the investors on whose behalf the fund is managed

Stages of Portfolio Construction

- Fund managers can choose how many stages they will take to construct their portfolios
- One-stage process – manager seeks the optimum portfolio from the whole range of securities available
- Two-stage process:
  - Stage one involves the construction of a stock and bond portfolios
  - Stage two optimises the portfolio by mixing the optimum combination of each of the individual portfolios

Stages of Portfolio Construction – cont.

- Three-stage process:
  - Introduces a sector allocation decision between the stock selection and the asset allocation stages
  - For stocks this decision is between sectors, and for bonds it may be by issuer, maturity or credit rating
  - Manager creates an optimum portfolio by sector, and the total portfolio would be constituted by a mix of the sector portfolios
- Four or more stage processes
  - Additional stages in portfolio construction are added by introducing foreign investments

Types of stocks

- When creating portfolios, different types of stocks with similar characteristics need to be identified, as they serve different purposes, and will be included in different type of portfolios
- The most widely used groups of stocks are:
  - Value stocks
  - Growth stocks
- Some analysts divide shares into different groupings and use these groups differently

Types of stocks – cont.

- Value shares are shares that appear to be under-priced, by using indicators like P/E ratio or dividend growth models
- Value shares are expected to achieve rapid earnings growth
- The indicator normally used to distinguish between value and growth shares is the price to book ratio. The book value is given by dividing the companies assets minus liabilities by the number of outstanding shares
- Value shares are shares that have low price to book ration, whereas growth shares are shares with high ratios

Types of Investment Funds

- Index (tracker) funds
  - As the name indicates, these are funds that track the index, and are therefore built using a passive management approach
  - Advantages:
    - Avoid management risk
    - Are always well diversified
    - Much cheaper to run
  - Disadvantages:
    - Don't hold shares in small companies, that may offer good returns
    - May still offer lower return than the market, as it is virtually impossible (and very costly, giving the number of transactions) to perfectly replicate the index in the same proportions, at every moment – known as tracking error

Types of Investment Funds

- Became very popular in the 80s, despite existing since 1949
- Are very flexible in terms of investment style and strategy
- May also use short selling, leverage and derivatives
- Short selling consists in borrowing shares, and selling them, benefiting from a reduction in price in the future
- There are hedge funds (sometimes a misnomer) catering for all types of investors with different timeframes, risk profiles and amounts to invest

Socially Responsible Investing

- It is becoming more popular
- Only invests in assets that meet certain ethical criteria
- Criteria include not investing in tobacco or alcohol companies, companies with poor environmental records, or companies that pay low wages, etc
- SRI funds have recently outperformed market funds. Some analysts argue that this is due to the quality of management of ethically responsible companies

Revision / Exercises

- Revision:
  - Read chapters 15 and 24 of Redhead
  - Review exercises in chapter 15

Exercises

1. An investor has a portfolio of four shares. The expected returns are X – 7%, Y – 7.5%, W – 9% and Z – 10%. The expected standard deviations of returns are X – 12%, Y – 15%, W – 15.5% and Z – 17% p.a., while the correlation coefficients between returns are XY – 0.4, XW – 0.7, XZ – 0.6, YW – 0.5, YZ – 0.2 and WZ – 0
   a. Calculate the portfolio expected return and risk if each share constitutes one quarter of the portfolio
   b. Suggest weightings for the portfolio that would produce a portfolio with lower risk. Explain why risk is reduced.
2. Stocks A, B and C have expected returns of 5% p.a. and variances of 121. The coefficients of correlation between the shares are AB – 09, AC – 0.2 and BC – 0.3
   a. Calculate the risk of the portfolio of 50% A, 25% B and 25% C
   b. Suggest a portfolio with lower risk
   c. What practical difficulties would an investment manager face when calculating the risk of a portfolio of stocks
3. Exercises 2 and 7 Unit Guide

Investment Analysis

Hedging

26/04/07

Objectives

- After today you should be able to:
  - Understand the concept of hedging and the two ways two hedge an investment portfolio
  - Identify the elements that define the value of a future contract
  - Understand the concepts of buying and selling futures, and of short and long positions
  - Calculate market exposure, and the number of contracts necessary to hedge it
  - Understand what call and put options are, and when to use them to hedge portfolio risk

Definition

- Hedging is the reduction of an existing risk
- That is achieved by creating securities or cash movements opposite to the movements that the investor currently holds
- In order to hedge on investments, investors have two options:
  - Hedging with stock index futures
  - Hedging with options
- Speculators can use futures and options as an investment tool, rather than as an hedging tool

Stock Index Futures

- Definition:
  - Contracts for notional purchases or sales of portfolios of shares on future dates
- Exercise of the contract does not involve the actual delivery and receipt of stock
- Stock prices paid or received in the future are guaranteed to approximate predetermined prices because stock price movements are matched by compensatory cash flows
- There are future contracts available on all major stock market indexes (FTSE, S&P, Nikkei, etc)

Example

- Investor believes the price of the securities currently held is likely to come down
- Risk can be reduced by buying stock index futures that will provide a gain if the stock index goes down
- By doing the second operation, the investor will reduce the loss caused by a reduction in the currently held securities, by generating a gain in the index futures

Elements of a Stock Index Future

- The future contract size is calculated based on a cost per index point
- The three key elements in determining the value of the future are:
  - Cost per point
  - Value of index
  - Exercise date
- By buying a future contract at £10 per point at an index value of 5,000, the investor is committing to the buy of £50,000 worth of shares on the exercise date

Decision on Buy/Sell of Future

- An investor will buy a future if he believes that the stock market will go up, and therefore he will be able to sell the shares in the market at a higher price than what he paid for by exercising the future
- An investor will sell a future if she believes that the stock market will go down, and therefore she will be able to buy the shares in the market at a lower price than what she got paid by exercising the future

Long / Short Positions

- By buying a future, you are committing to buy shares at a future date, thus assuming a long position
- By selling a future, you are committing to sell shares at a future date. As you don't have the shares you are committing to sell, you are assuming a short position

Hedge Ratios

- Hedge ratios become necessary when the price behaviour of the futures contract is likely to differ from that of the portfolio being hedged
- This situation occurs because the majority of investment portfolios don't perfectly match the stock index
- Shares with higher volatility (higher betas), will require a higher number of future contracts

Necessary contracts

- In order to calculate the number of future contracts necessary to hedge a portfolio, first it is necessary to calculate the market exposure of the portfolio by multiplying:
  - Amount invested in each stock by
  - Beta of each stock
- This market exposure is then divided by the value of each contract, to calculate the number of contracts to buy or sell
- Value of each contract is calculated by multiplying:
  - Price per index point by
  - Value of index

Hedging with Options

- There are two types of options:
  - Call options – options that give the buyer the right, but not the obligation, to buy the underlying asset
  - Put options - options that give the buyer the right, but not the obligation, to sell the underlying asset
- In an option contract, there is always a buyer and a seller
- The buyer of the option can choose to exercise it or not
- The seller of the option has to abide by the buyer's decision

Call / Put Options

- An investor buys a call options, if he expects the value of the underlying asset to increase
- If the value does go up, he buys the asset at the agreed price, and sells it in the market for the higher price
- If the value goes down, he does nothing
- The buyer of a put option expects the value of the asset to decrease or already owns the asset and is hedging against a fall in price
- The decision to exercise or not exercise the put option is reversed to the decision on a call option

Revision / Exercises

- Revision:
  - Read chapters 25 and 26 of Redhead
  - Review exercises in chapter 25 and 26
  - Review Exam and Resit Exam Papers 2005, and solve questions not covered so far

Exercises

1. All Unit Guide Exercises not previously done
2. Exercises in chapters 25 and 26 of Redhead book