



ACCG352 — APPLIED PORTFOLIO MANAGEMENT

Unit outline: Semester 2, 2008

Unit Convenor: Dr Ryle Perera
Prerequisites: ACCG329(P) or corequisite ACST305

Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit. If anything in it is unclear, please consult the unit convenor.

1 About this unit

This unit provides students with the analytical skills and techniques required to effectively manage diversified portfolios of securities. The first section of the unit prepares students for asset allocation management and performance assessment of diversified portfolios. Section two reviews theoretical and practical issues relating to the management of portfolios containing options, futures and other derivatives. Material presented has relevance for students interested in careers as security analysts, portfolio managers and corporate treasurers.

It is a 3 credit point unit that complements the material covered in ACCG329 or ACST305. It emphasises the practical implementation of portfolio and option pricing theory within the context of portfolio management.

2 Teaching staff

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Consultation hours will be advised in lectures.

* Lecturer-in-charge and unit administrator; Lecturer for weeks 1–6.

** Lecturer for weeks 7, 9–13.

3 Classes

The weekly three hour class time for this unit consists of a two hour lecture and a one hour tutorial. There are no tutorials in weeks 1 and 8. Weekly tutorials cover material based on the lecture of the previous week.

The timetable for classes can be found on the University web site at: <http://www.timetables.mq.edu.au/>

Students cannot change from one class to the other without the permission of the Convenor. Please note that changes to tutorial classes must be done online and no later than the Friday of the first week of classes.

Tutorial attendance will be recorded and may be taken into account when considering any appeals for special consideration.

4 Required and recommended texts and/or materials

For the first section of the unit, the required textbook is E.J. Elton, M.J. Gruber, S.J. Brown and W.N. Goetzmann, *Modern Portfolio Theory and Investment Analysis*, J. Wiley & Sons, 2007.

For the second section of the unit, the required textbook is J.C. Hull, *Options, futures and other derivatives*, Prentice Hall. Students may also find the accompanying text helpful: J.C. Hull, *Options, futures and other derivatives: solutions manual*, Prentice Hall.

Additional references may be prescribed for individual topics as appropriate.

5 Unit web page

The web page for this unit can be found at: <http://online.mq.edu.au>

Consult the web page frequently. Lecture notes, tutorial solutions, unit announcements and other reference materials will be posted to this site throughout the semester.

6 Learning outcomes

The broad learning outcomes of this unit are an enhanced ability by students to apply concepts in portfolio and option pricing theory to practical settings faced by portfolio managers. Specific learning outcomes for each topic are set out on the first content page of the weekly lecture notes.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students' generic skills in a range of areas. One of the aims of this unit is that students develop their generic skills, such as interpersonal, communication, critical analysis, problem solving, and creative thinking skills, in the effective accomplishment of finance related tasks. Foundation skills of numeracy and information technology are also enhanced by the use of finance-related software.

7 Learning and teaching strategy

Lectures will explain and illustrate major ideas, and disseminate information about the operation and administration of the unit. Tutorials will reinforce the ideas introduced in the lectures, primarily through discussion and numerical exercises.

To help achieve the learning outcomes of the unit, you should

1. read the assigned references for the current week's lecture
2. attend the weekly lecture and review the lecture notes
3. prepare answers to the weekly assignment questions and problems in advance of the tutorial

4. identify any problems in relation to the lectures or tutorial problems and discuss these issues during the tutorial
5. develop reasoning skills and not only rely on the reproduction of textbook or other source material.

8 Relationship between assessment and learning outcomes

Learning outcomes are assessed on three levels:

1. your ability to display an adequate knowledge and understanding of unit concepts
2. your demonstrated competency to provide technical solutions for typical problems faced by portfolio managers
3. the extent to which you show an informed appreciation of the strengths and limitations of applying the unit material in practical situations.

Assessment

Mid-semester test	40%
Major project	20%
Final examination	40%

To achieve a passing grade in this unit, you must obtain a total of at least 40 marks out of the 80 marks available from the Mid-semester test and Final examination components of assessment.

Mid-semester test:

There will be a mid-semester test held during normal lecture hours in week 8 (October 7). Total time available for the mid-semester test is 90 minutes plus 5 minutes reading time. The mid-semester test is based on topics covered during lectures 1 to 6, inclusive.

No dictionaries of any kind are allowed in the mid-semester test. Non-programmable calculators are allowed, provided that they are not capable of storing text.

Major project:

Students must complete a major project which is due for submission in week 10. Details are provided in section 12 of this document.

Final examination:

The final exam is based on topics covered during lectures 7, 9 to 13, inclusive. Total time available for the final examination is 2 hours plus 10 minutes reading time.

No dictionaries of any kind are allowed in the final examination. Non-programmable calculators are allowed, provided that they are not capable of storing text.

9 Student support services

Besides the general services available (see below in Section 13.4), the Division of Economics and Financial Studies offers the following:

ERIC: EFS Resource and Information Centre
http://www.efs.mq.edu.au/student_support/eric
Location: E4B 106.

10 Class schedule

Week number and topic:

1. Introduction and Asset Allocation
 2. Bond Portfolio Management
 3. Passive Management of Equity Portfolios
 4. Active Management of Equity Portfolios
 5. International Diversification
 6. Portfolio Performance Assessment
 7. Structured products
 8. Mid-semester test
- Mid-semester recess*
9. Modeling portfolio returns: practical issues
 10. Portfolio management with forwards/futures
 11. Portfolio management with options
 12. Managing portfolios of derivatives
 13. Review

11 Weekly lecture topics, readings and assignment questions

Lecture notes, readings and assignment questions can be downloaded from the unit web site.

In completing the assignments, you are encouraged to use appropriate software for numerical calculations, wherever possible.

11.1 Introduction and Asset Allocation

Readings: Lecture for week 1.

- Elton, Gruber, Brown & Goetzmann, Chapter 16.

Assignment Questions: Tutorial in week 2.

1. Elton, Gruber, Brown & Goetzmann, Chapter 16, Questions 1 & 2

11.2 Bond Portfolio Management

Readings: Lecture for week 2.

- Elton, Gruber, Brown & Goetzmann, Chapters 21 & 22.

Assignment Questions: Tutorial in week 3.

1. Elton, Gruber, Brown & Goetzmann, Chapter 21, Questions 1, 2, 3 & 4

11.3 Passive Management of Equity Portfolios

Readings: Lecture for week 3.

- Elton, Gruber, Brown & Goetzmann, Chapters 16 & 27.

Assignment Questions: Tutorial in week 4.

1. Elton, Gruber, Brown & Goetzmann, Chapter 16, Questions 3 & 4

11.4 Active Management of Equity Portfolios

Readings: Lecture for week 4.

- Elton, Gruber, Brown & Goetzmann, Chapters 16 & 27.

Assignment Questions: Tutorial in week 5.

1. Elton, Gruber, Brown & Goetzmann, Chapter 16, Questions 5 & 6

11.5 International Diversification

Readings: Lecture for week 5.

- Elton, Gruber, Brown & Goetzmann, Chapter 12.

Assignment Questions: Tutorial in week 6.

1. Elton, Gruber, Brown & Goetzmann, Chapter 12, Questions 1, 2, 3 & 4

11.6 Portfolio Performance Assessment

Readings: Lecture for week 6.

- Elton, Gruber, Brown & Goetzmann, Chapters 25 & 26.

Assignment Questions: Tutorial in week 7.

1. Elton, Gruber, Brown & Goetzmann, Chapter 25, Questions 1, 2 & 3; Chapter 26, Question 1

11.7 Structured products

Readings: Lecture for week 7.

- Lecture notes
- Equity-Linked Notes, An Introduction, Lehman Brothers, 2001.

- P.A. Stoimenov and S. Wilkens, 2005, Are structured products ‘fairly’ priced? An analysis of the German market for equity-linked instruments, *Journal of Banking & Finance* 29, 2971–2993

Assignment Questions: Tutorial in week 9.

1. Choose any retail investment product offered by an investment bank that includes embedded options and obtain the Product Disclosure Statement. [You can download these from the web sites of investment banks].
 - (a) Identify the basic securities that are packaged together in the product you chose.
 - (b) Explain the risk and return characteristics of the product from the point of view of the investor. Would you invest in this type of product? Why, or why not?
 - (c) Explain the risks faced by the investment bank issuing this product and suggest how they might manage these risks.
2. Refer to the lecture example of an equity-linked note. Assume the same facts except that the note sells at par.
 - (a) Calculate the participation rate.
 - (b) Would the participation rate be higher or lower if the volatility of the underlying index was higher? Give reasons.
 - (c) Would the participation rate be higher or lower if the term of the investment was longer? Give reasons.
 - (d) Recalculate the participation rate, assuming the zero-rate increased to 8%. What is the intuition for this result?
 - (e) Assume that the zero-rate is 5% and the note sells at par. Create a table that shows how the excess return on the note varies as the return on the underlying ranges from -50% to 50% in increments of 10%.
3. Refer to Stoimenov and Wilkens [2005].
 - (a) Based on the evidence provided in this paper, do you think that equity-linked structural products are beneficial for investors?
 - (b) How can investment banks continue to sell equity-linked structural products that are apparently overpriced?

11.8 Modeling portfolio returns: practical issues

Readings: Lecture for week 9.

- Lecture notes
- Hull, Chapter 12, Sections 12.1–12.4 [All references to Hull in this section refer to the 6th edition.]
- Hull, Chapter 13, Sections 13.1–13.4
- Hull, Chapter 19

Assignment Questions: Tutorial in week 10.

1. *Data analysis:* From the unit website, download accg352-08-tut10.xls which contains simple daily returns for some hedge fund indices and a broad market index.
 - (a) For each return series, calculate continuously compounded returns and compute relevant summary statistics.
 - (b) Plot the time series of returns and squared returns. Comment on these plots.

- (c) Create a histogram of the returns. To what extent do they look normal?
- (d) Compute auto- and cross-correlations. What do these suggest?
- (e) Estimate time-varying volatility using (i) rolling historic volatility; (ii) the EWMA model with $\lambda = 0.94$. Compare the plots of these two estimated volatility series.

2. *Simulation:*

- (a) Suppose the closing price of a stock today is \$100. The expected return is 15% per annum with a volatility of 30% per annum. What is the expected closing price tomorrow? What is the 95% confidence interval?
- (b) Estimate tomorrow's closing price using Monte-Carlo simulation with 100 repetitions. Calculate the standard error of your estimated price.
- (c) Redo (b) using 1,000 repetitions. Calculate the standard error of your re-estimated price. Explain what is likely to happen if you used 10,000 repetitions.
- (d) Estimate tomorrow's closing price using the alternative approach shown in lectures based on the discrete lognormal asset price distribution. Define the range of possible future stock prices as three standard deviations from the expected value and use nine bins.

11.9 Portfolio management with forwards/futures

Readings: Lecture for week 10

- Lecture notes
- Hull, Chapter 3
- T. Brailsford, K. Corrigan and R. Heaney, 2001, A comparison of measures of hedging effectiveness: a case study using the Australian All Ordinaries Share Price Index Futures contract, *Journal of Multinational Financial Management* 11, 465-481
- J. Cotter and J. Hanly, 2006, Reevaluating hedging performance, *The Journal of Futures Markets* 26(7), 677-702.

Assignment Questions: Tutorial in week 11

1. From the unit website, download accg352-08-tut11.xls which contains values for a stock-bond portfolio, the SFE SPI 200 futures valued at A\$25 per index point and 3-year T-Bond futures with a face value of A\$100,000 [prices are quoted in yield per cent per annum where the yield is deducted from an index of 100].
 - (a) Based on the first 300 observations,
 - i. estimate the optimal hedge ratios using OLS regression and compute the 95% confidence intervals;
 - ii. explain the meaning and relevance of the t -statistics;
 - iii. explain the meaning and relevance of the regression R^2 .
 - (b) Use the last 100 observations to evaluate the hedging effectiveness out-of-sample. To do this compute and compare net portfolio returns assuming
 - i. no hedging;
 - ii. hedging based on the estimated optimal hedge ratios estimated in part (a).
 - (c) Why is it necessary to use a multiple regression to estimate the hedge ratios rather than use the respective coefficients from separate simple regressions for each futures-spot relation?
2. Refer to Brailsford, Corrigan and Heaney [2001].
 - (a) Which measure of hedging effectiveness do you think is most useful? Give reasons.

- (b) What is the ‘joint test’ problem referred to on page 478 and why does it matter?
3. Refer to Cotter and Hanly [2006] who conclude that ‘the measure of hedging effectiveness that is used should also correspond to the outcome that is desired from hedging’. Explain this statement and comment on the evidence supplied in the paper to support their contention.

11.10 Portfolio management with options

Readings: Lecture for week 11

- Lecture notes
- Hull, Chapter 10
- B.H. Do, 2002, Relative performance of dynamic portfolio insurance strategies: Australian evidence, *Accounting and Finance* 42, 279–296
- J. Board, C. Sutcliffe and E. Patrinos, 2000, The performance of covered calls, *The European Journal of Finance* 6, 1–17

Assignment Questions: Tutorial in week 12

1. Consider a stock with the following characteristics: price is \$100; expected return is 17%; beta is 1.2; volatility is 50%. The expected return on the market is 15% and the risk-free rate is 5%. All rates are quoted on a per annum basis. Assume that six month options on the stock are selling at Black-Scholes prices.
 - (a) Compute the expected return, systematic risk and total risk of a portfolio comprising an investment in the stock and a protective put where the put is
 - i. at-the-money;
 - ii. in-the-money;
 - iii. out-of-the-money.
 - (b) Redo the analysis of part (a) above for covered calls.
 - (c) Compute the expected profit for the at-the-money protective put strategy using the approach shown in lectures based on the discrete lognormal asset price distribution. Define the range of possible future stock prices as three standard deviations from the expected value and use nine bins.
 - (d) Redo the analysis of part (c) above for the at-the-money covered call strategy.
 - (e) For the at-the-money covered call strategy, what is the proportion of wealth invested in the stock and in the call?
 - (f) Compute the option elasticity of the at-the-money call and put. Do out-of-the-money options have higher or lower elasticities than in-the-money options? Explain your reasoning.
2. Refer to Do [2002].
 - (a) What are the important differences between protective put strategy and dynamic portfolio insurance methods?
 - (b) Comment on the key distinctions between synthetic put and constant proportion portfolio insurance.
3. Refer to Board, Sutcliffe and Patrinos [2000].
 - (a) The authors note that covered calls should provide lower risk and lower return relative to unhedged positions in the underlying.
 - i. Explain the theoretical basis for both parts of this proposition.
 - ii. While their empirical evidence suggests covered calls have lower risk, the returns do not appear to be lower. What might explain this result?
 - (b) Why is it necessary to model investor preferences to determine whether or not covered call strategies are preferable?

11.11 Managing portfolios of derivatives

Readings: Lecture for week 12

- Lecture notes
- Hull, Chapter 15
- S. Nandi and D.F. Waggoner, 2000, Issues in hedging options positions, Federal Reserve Bank of Atlanta Economic Review, 24–39
- T.C. Green and S. Figlewski, 1999, Market risk and model risk for a financial institution writing options, Journal of Finance 54, 1465–1499.

Assignment Questions: Tutorial in week 13

1. Assume the current underlying price is \$20; the volatility is 25% and the risk-free rate is 6%. A call option with a strike price of \$50 expires in 90 days. Using Black–Scholes values and an underlying price range of \$10 to \$30 in increments of \$0.50,
 - (a) compute the model price of the option after one day;
 - (b) compute the estimated option price after one day using a delta approximation;
 - (c) compute the estimated option price after one day using a delta–gamma approximation;
 - (d) compute the estimated option price after one day using a delta–gamma–theta approximation;
 - (e) redo parts (a)–(d) above for prices after twenty days;
 - (f) comment on the above results.
2. A market maker in options has a portfolio consisting of shares and options for a specific company. The current share price is \$30; the volatility is 40% and the risk-free rate is 5%. The positions are

Quantity	Type	Strike	Expiry
250	Share		
100	Call	40	30 days
-50	Call	25	60 days
80	Put	35	90 days

The market maker can hedge with futures on the stock selling at \$31 and either a 60–day put with strike of \$40 or a 45–day call with strike of \$30.

To make the portfolio delta and gamma neutral, what positions in futures and option contracts should the market maker take if transaction costs are \$10 per contract? [Assume Black–Scholes values].

3. Refer to Nandi and Waggoner [2000].
 - (a) How do traders modify the theoretical Black–Scholes analysis to make it useful given the existence of implied volatility smiles, smirks and frowns?
 - (b) Why can simple Black–Scholes hedging analysis still work well even when Black–Scholes prices are wrong?
4. Refer to Green and Figlewski [1999].
 - (a) Define market and model risk. How might they be distinguished empirically? Based on the evidence in the paper, which is likely to be more important?
 - (b) What is a volatility markup, how is it used and is it likely to be successful?
 - (c) Summarise the major practical implications of the evidence in this paper for financial risk managers.

11.12 Review

Readings:

- No new readings. Revise readings from weeks 7, 9–12, inclusive.

12 Major Project

Project Question:

Critically discuss and evaluate “*whether active investing has the possibility of outperforming passive investing*” using the following articles as principal references:

1. Gruber, M.J., 1996, Another Puzzle: The Growth in Actively Managed Mutual Funds, *Journal of Finance*, Vol. LI No. 3, 783–810.
2. Wojciechowski, C.W. and Thompson, J.R., 2006, Market truths: theory versus empirical simulations, *Journal of Statistical Computation and Simulation*, Vol. 76, No. 5, 385–395.

Project Rules:

1. This project MUST be conducted by groups of four or five members. Form your groups as quickly as possible.
2. The written report MUST NOT exceed ten typed, double-spaced pages (i.e. about 3000 words). Submissions that merely reproduce or paraphrase large sections of the article will receive a failing grade. A full bibliography must be included and all source documents properly acknowledged. Plagiarism will result in a zero mark and potential disciplinary action by the University.
3. Your written report MUST include a statement, signed by all members, that sets out the percentage contribution of each member. It is expected that groups will allocate tasks so that each member makes a similar level of contribution. Marks may be adjusted where unequal contributions can be proved from individual log-books or other identifiable evidence.

13 Important general requirement for all units

13.1 Examinations

The University Examination period is from 19 November – 5 December 2008. You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations. <http://www.timetables.mq.edu.au/exam>

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the special consideration process is available at: <http://www.reg.mq.edu.au/Forms/APSCon.pdf>

If a Supplementary Examination is granted as a result of the Special Consideration process, the examination will be scheduled after the conclusion of the official examination period.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period.

No aids, other than a pen and pencil, may be brought into an exam unless specifically permitted by the Convenor. The following are expressly forbidden: mobile phones, calculators, computers, I-pods, PDAs, MP3s and any other electronic aid, and books.

13.2 Plagiarism and cheating

The University defines plagiarism in its rules: “Plagiarism involves using the work of another person and presenting it as one’s own.” Plagiarism is a serious breach of the University’s rules and carries significant penalties. You must read the University’s practices and procedures on plagiarism. These can be found in the Handbook of Undergraduate Studies or on the web at: <http://www.student.mq.edu.au/plagiarism/>

The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Disciplinary Committee.

Plagiarism is simply a type of cheating. Any confirmed cheating may result in serious penalties, including deduction of marks, failure in the unit, and/or referral to the University Disciplinary Committee.

13.3 University policy on grading

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardized numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performance of their students should achieve similar results.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark will also receive a higher final scaled mark.

For an explanation of the policy see:

<http://www.mq.edu.au/senate/MQUonly/Issues/Guidelines2003.doc> or

<http://www.mq.edu.au/senate/MQUonly/Issues/detailedguidelines.doc>

The standard grading scheme is:

0 – 45	Fail
46 – 49	Conceded Pass
50 – 64	Pass
65 – 74	Credit
75 – 84	Distinction
85 – 100	High Distinction

13.4 Student support services

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at <http://www.student.mq.edu.au>

13.5 Classroom etiquette

Students are expected to arrive on time, certainly before five minutes past the hour, and not to leave until the class ends. If you have a recurring problem that makes you late, or forces you to leave early, have the courtesy to discuss this with your lecturer/tutor.

Students are expected to be quiet during lectures unless, of course, class participation is required.

Mobiles should be turned off during classes; not simply set to “silent”.