

GBUS 846 Portfolio Theory

Course Introduction and Syllabus

Yiorgos Allayannis
Faculty Office Building, Room #184
phone: (434) 924-3434
email: allayannis@arden.virginia.edu
Web: <http://faculty.darden.edu/allayannis>

Introduction:

This course covers the classical Portfolio Theory (i.e., Markowitz optimal allocation, CAPM, Index and multifactor models) and discusses Market Efficiency issues in practice. It stresses the international dimensions of portfolio theory (i.e., international diversification, optimal global portfolio selection and emerging markets). Finally, it addresses issues of portfolio strategy, asset allocation and performance evaluation. The course covers both the theoretical and the practical side of investments through cases, articles, homeworks and data exercises.

Specifically, the course consists of the following 4 modules:

- I. Portfolio Theory: Risk, Return, Portfolio Mathematics, and Utility Theory; Optimal Portfolio Selection and Optimal Allocation between the Optimal Portfolio and the Risk-Free Asset*
- II. Models of Risk and Expected Returns; Market Efficiency in Practice*
- III. Global Portfolio Diversification, Risk and Return*
- IV. Applied Portfolio Strategies and Performance Evaluation*

Course Objectives:

The course has the following objectives:

- 1. To develop an understanding of a) how to optimally allocate funds across alternative (risky) asset classes (e.g., stocks, bonds, etc.) to form an optimal portfolio; b) how to optimally allocate wealth between the optimal risky portfolio and a risk-free asset (such as the Treasury-bill).*
This requires critical thinking as well as knowledge of specific techniques on the estimation of expected returns, risk and correlations that are used as inputs into the Markowitz optimal selection model. In addition, it requires some knowledge of basic utility theory (and the development of the concept (and quantification) of risk aversion).
- 2. To expand on the knowledge of the CAPM acquired in the First Year and provide additional insights on how expected returns are determined via the examination of alternative models (such as the multifactor model). Expected returns are a key input into the portfolio asset allocation model, so that large errors in the estimation of expected returns will lead to large errors in the formation of the “optimal” portfolio and hence large underperformance. The same is also true if risk and correlations are estimated with significant error. Again, critical thinking*

is important here: will Yiorgos.com's expected returns for next year be similar to this year's realized returns?

3. *To examine market efficiency issues in practice:* what strategies are successful if markets are efficient? What if markets are not fully efficient?
4. *To develop an understanding of risks outside the US,* such as foreign exchange, political etc. and the ways they may affect expected returns in global markets, or in particular markets, such as the emerging markets, which may not be fully integrated with the world market and therefore traditional models of expected returns may not be appropriate. Should we include emerging markets in the optimal portfolio?
5. *To construct and use alternative methodologies to evaluate portfolio performance.* This ultimately boils down to measuring risk appropriately, so that performance can be attributed to the portfolio manager's skill and not his/her assumption of higher risk. That is, we will examine methodologies that control for the level of risk taken by portfolio managers, or in other words, we will examine risk-adjusted performance measures. This last objective crystallizes the fundamental relationship in Finance, that risk should be linked to expected return. Now, if only we could measure risk and expected return! The course should be of significant aid in this regard.
6. *To examine alternative Portfolio strategies,* such as those pursued by Institutional Investors (e.g., University Endowment); those pursued by Investment companies that have a value (as opposed to growth) orientation; those pursued by Investment companies which appeal to a special clientele (such as high net worth individuals, where tax-minimization is of great importance), and those pursued by Hedge Funds, which employ alternative investment tools, such as derivatives, leverage and short positions. A key variable influencing many of the strategic decisions of portfolio managers (much like any type of manager) is compensation. How can compensation be structured to align the interests of a portfolio manager to those of the investors in the fund?

Tips for achieving maximum benefits from the course:

This agenda is a rather ambitious one. However, in structuring the course, I made sure that there is enough repetition into the system, so that early concepts reappear in different situations later in the course to ensure learning. The first module is the most technical, and perhaps the most complicated in the course. So, you must engage early, work on the homework problems/data exercises/cases diligently to pin down the framework that will be used later on in several of the cases. Formulating a well-functioning team can be very beneficial, although it is not a necessary condition for the successful completion of the course.

For whom the course is intended:

The course is intended for students who anticipate a career in investment/asset management, equity analysis, private client services, or venture capital. Portfolio, along with Derivatives, Equities, and Fixed Income covers the Investments side of the second year Finance curriculum. Portfolio will not examine equity valuation models, which help answer the question "should I buy/sell stock A or stock B?" but rather the question "how should I put stocks A and B together to form an optimal portfolio?" The first question is examined almost exclusively in Equities.

Prerequisites: Valuation in Financial Markets

Readings/Cases:

Throughout much of the course, we will use the Bodie, Kane and Marcus *Investments*, fifth edition, Irwin 2002 (BKM) as a background, or main reading (BKM is the book officially recommended by AIMR for preparation of the CFA exam). In addition, several articles have been assigned from leading practitioner-oriented journals (e.g., The Journal of Portfolio Management, Financial Analysts Journal). Several of these articles are considered “classics” for Portfolio Managers and complement well the remainder of the readings. Cases for the course are chosen so as to fit the course objectives. Articles and cases will be included in the course-package obtained from DEMS. Note that most Darden cases include a spreadsheet.

Course Requirements and Grading:

There is a series of homework problems and data exercises assigned which can be done in groups of no more than 3 students per group. You should form your team right away as homework problems/data exercises are assigned during the first week of classes. Homework Problems are essential to your learning and you should try them on your own before discussing them with your team. Similarly, data exercises are intended to familiarize you with sources of data such as *Bloomberg* or *Yahoo Finance* and help you apply the theory to building your optimal Portfolio. You are expected to prepare the cases in advance and participate in class. Unexcused absences from more than two classes will materially affect your grade. Please call or email to explain absences. There will be a final exam at the end of the course. More specifically, the percentage allocation is:

Homeworks/Data exercises:	20%
Class Participation:	30%
Final Exam:	50%

I. *Portfolio Theory: Risk, Return, Portfolio Mathematics, and Utility Theory; Optimal Portfolio Selection and Optimal Allocation between the Optimal Portfolio and the Risk-Free Asset*

	<u>TOPICS</u>	<u>READINGS</u>
Oct 18	<i>Introduction to Portfolio Theory: Risk and Return</i>	- BKM, Ch. 5
Oct 19	<i>Risk Aversion, Utility Theory and Portfolio mathematics</i>	- BKM, Ch. 6
Oct 25	<i>Capital Allocation between Risky and Risk-free asset</i>	- BKM, Ch. 7
Oct 26	<i>Markowitz optimal portfolio selection</i>	- <u>Case:</u> Markov's Trilemma UVA-F-1341 (includes spreadsheet) - BKM, Ch. 8

II. *Models of Risk and Expected Returns; Market Efficiency in Practice*

	<u>TOPICS</u>	<u>READINGS</u>
Oct 31	<i>CAPM (1)</i>	- <u>Case</u> : Beta Management HBS 9-292-722 - BKM, Ch. 9
Nov 1	<i>CAPM (2)</i>	- "Reports of Beta's Death Have been Greatly Exaggerated", Grundy and Malkiel, <u>Journal of Portfolio Management</u> , Spring, 1996 - BKM, Ch. 9
Nov 7	<i>Single Index and Multifactor Models</i>	- BKM, Ch. 10
Nov 8	<i>Market Efficiency and Day Trading</i>	- <u>Case</u> : Day Trading at Valhalla Partners UVA-F-1259 - "Another Puzzle: The Growth in Actively Managed Mutual Fund", Gruber, <u>Journal of Finance</u> , July 1996 <i>SKIM THROUGH</i> - BKM, Ch. 12 <i>SKIM THROUGH</i>

III. *Global Portfolio Diversification, Risk and Return*

TOPICS

READINGS

Nov 14 *International Diversification*

- **Case:** The Global Fund HBS-9-391-057
- "Why not Diversify Internationally?", B. Solnik, Financial Analysts Journal,
- BKM, Ch. 25

Nov 15 *Topics in Global/Emerging Markets Investing*

- "Industry and Country Effects in International Stock returns", Heston and Rouwenhorst, Journal of Portfolio Management, Spring 1995
- "Global diversification in a Shrinking World", Speidel and Sappenfield, Journal of Portfolio Management, Fall 1992
- "Emerging Markets: A Quantitative Perspective", Divecha, Drach and Stefak, Journal of Portfolio Management, Fall 1992
- "Country Risk and Global Equity Selection", Erb, Harvey and Viskanda, Journal of Portfolio Management, Winter 1995
- "Is there a Free Lunch in Emerging Markets? ", Bekaert and Urias, Journal of Portfolio Management, Spring 1999

IV. *Applied Portfolio Strategies and Performance Evaluation*

	<u>TOPICS</u>	<u>READINGS</u>
Nov 28	<i>Portfolio Strategy/Equity Analysis</i>	- <u>Case:</u> GMO: The Value versus Growth Dilemma UVA-F-1328 (includes spreadsheet)
Nov 29	<i>Portfolio Strategy/Asset Allocation</i>	- <u>Case:</u> The Harvard Management Company, HBS-9-295-024 - UVA Endowment Mean-Variance Analysis Executive Summary
Dec 5	<i>Investment Company Strategy/ Private Client Services</i>	- <u>Case:</u> Zeus Asset Management UVA-F-1232 (includes spreadsheet)
Dec 6	<i>Portfolio Performance Evaluation (1)</i>	- <u>Case:</u> Zeus Asset Management UVA-F-1232 (includes spreadsheet) - "Asset Allocation: Management Style and Performance Measurement", W. Sharpe, <u>Journal of Portfolio Management</u> , Winter 1992 - BKM, Ch. 24
Dec 7	<i>Hedge Funds/Portfolio Performance Evaluation (2)</i>	- <u>Case:</u> The Dynamis Fund: An Energy Hedge Fund UVA-F-1337 (includes spreadsheet)

ASSIGNMENTS

I. *Portfolio Theory: Risk, Return, Portfolio Mathematics and Utility Theory; Optimal Portfolio Selection and Optimal Allocation between the Optimal Portfolio and the Risk-Free Asset*

Oct 18 - BKM, Homework Problems Ch. 5, (4, 5, 6, 11, 13)
- *Data Exercise 1*

1a. Using the Bloomberg, the Datastream database, or Yahoo finance, download monthly prices on an Excel spreadsheet for the period December 1999 to December 2000 on the S&P500 and the GM and Cisco stocks. Be sure to include dividends if any have been declared (note that some data sources do this for you and report dividend-adjusted prices). Then, estimate the average monthly returns and standard deviations for those assets. Which asset would you invest in and why?

1b. Estimate returns and standard deviations for the above assets using daily prices during December 2000. Evaluate the use of standard deviation as a measure of risk. Evaluate the use of alternative data frequencies (i.e., monthly vs. daily) in the estimation of risk and return. Which asset would you invest in and why?

2. Estimate average monthly returns and standard deviations for the above assets between December 1997-June 1999 and July 1999-December 2000. Which asset would you invest in during the different sub-periods? Does risk change over time?

Note: You may find helpful to read *24.1 Measuring Investment Return*, BKM

Oct 19 - BKM, Homework Problems Ch. 6, (1, 2, 7, 8, 9)
- *Data Exercise 2*

1. Form an equally weighted portfolio of GM and Cisco; b) Form a portfolio where you invest 1/3 in GM stock and 2/3 in Cisco.

- Compare the average returns and standard deviations of the above portfolios to those of GM and Cisco on their own.
- Compare the average returns and standard deviations of the above two portfolios. Which one will you most likely invest in?

2. Calculate the correlations and covariances between (GM and Cisco) and (S&P and GM). Which one of the following *equally-weighted* portfolios would you invest in? a) GM-Cisco b) GM-S&P c) S&P-Cisco d) S&P-GM-Cisco

Initially, use monthly data for the period December 1997-June 1999. Next, examine whether your conclusions change using data for the period July 1999–December 2000. Which of the two periods may be more influential in your decision to form a portfolio of GM and Cisco going forward?

Note: You may find helpful to read *24.1 Measuring Investment Return*, BKM

Oct 25 - BKM, Homework Problems Ch. 7, (1, 2, 3, 4, 5, 8, 13)

Oct 26 - **Case:** Markov's Trilemma, UVA-F-1341
Please reply to the questions posed in the case

ASSIGNMENTS

II. Models of Risk and Expected Returns; Market Efficiency in Practice

Oct 31 - Case: Beta Management, HBS 9-292-722

1. Calculate the variability (standard deviation) of the stock returns of California REIT and Brown Group during the past 2 years. How variable are they compared with Vanguard Index 500 Trust? Which stock appears to be riskiest?
2. Suppose Beta's position had been 99% of equity funds invested in the index fund, and 1% in the individual stock. Calculate the variability of this portfolio using each stock. How does each stock affect the variability of the equity investment, and which stock is riskiest? Explain how this makes sense in view of your answer to Question #1 above.
3. Perform a regression of each stock's monthly returns on the Index returns to compute the "beta" for each stock. How does this relate to the situation described in Question #2 above?
4. How might the expected return for each stock relate to its riskiness?

Nov 1 - BKM, Homework Problems, CH. 9 (2, 5, 6, 17)

Nov 7 - BKM, Homework Problems, CH. 10 (4, 5, 6, 7, 8, 9, 12, 13)

Nov 8 - Case: Day Trading at Valhalla Partners, UVA-F-1259

1. Does day-trading make sense? Explain why or why not, using a specific example.
2. What are the differences between day-trading and risk-arbitrage?
3. Are day-trading and risk-arbitrage consistent with some form of market efficiency?
4. Be prepared to talk about alternative investment strategies and describe their merits (you may choose to talk about a strategy that you've actually implemented or one that you would like to implement [including a strategy that you would not implement]).

ASSIGNMENTS

III. Global Portfolio Diversification, Risk and Return

Nov 14 - **Case**: The Global Fund, HBS 9-391-057

1. Does Global real estate investment make sense for major institutional investors? For Prudential?
2. Where should the fund be invested? What types of properties should the fund invest in? What guidelines should be established?
3. How should the fund be structured? What are the issues? Who should make the decisions? What role should Prudential itself play?
4. Who are the logical investors in this fund?

Nov 15 For each paper, write a paragraph summarizing the main issues. In addition, write a short memo to your portfolio manager making suggestions on what s/he should take into account to construct your optimal portfolio.

ASSIGNMENTS

IV. *Applied Portfolio Strategies and Performance Evaluation*

Nov 28 - Case: GMO: The Value versus Dilemma, UVA-F-1328

1. What is value investing? What is its rationale? What are GMO's main arguments in favor of value investing?
2. What are the differences between value and growth investing? What are their relative merits?
3. Should GMO change its strategy, now that the world has seemingly turned against it?
4. Why wouldn't GMO include Cisco Systems –an otherwise excellent company- in its portfolio at this time? Why are they willing to consider CVS or R.R Donnelley? What is the long-run expected return for those stocks? Support your answers by examining P/E ratios, PEGs (price-earnings-growth) and other metrics that may be relevant for the decision.
5. Would you invest with GMO? Why or why not?

Nov 29 - Case: Harvard Management Company (1994), HBS 925-024

1. What is the right risk profile for the endowment? What are the outside constraints of the endowment?
2. How different is the Harvard Endowment Fund from the UVA Endowment Fund with respect to their asset allocation and overall portfolio strategy?
3. In what ways does compensation affect portfolio strategy? Design a contract that should be offered to the portfolio managers of the Harvard Endowment Fund
4. Should there be a very long-term allocation performance target like 60/40 stocks and bonds? What is the difference between a “strategic” policy mix and a “tactical target”? How often should either one be altered?
5. How does an optimizer work? What are the advantages and disadvantages about using one? What do you do if the optimizer gives you the “wrong”

answer? What type of constraints can or should be used, either to include or exclude an asset class or to limit the allocation to the asset class?

6. What is the nature of the risk/return profile of some of the long/short strategies? How large can they be?

Dec 5 - **Case**: Zeus Asset Management, UVA-F-1232

1. What is Zeus's investment philosophy? Who are its primary investors? What are the issues surrounding individually managed accounts (IMAs)? What are the differences between IMAs and mutual funds regarding their management and target investors?

2. Comment on the current investment process of Zeus's equity growth and bond funds.

3. Evaluate Zeus's strategy as an investment company. How do you see its future?

Dec 6 - **Case**: Zeus Asset Management, UVA-F-1232

1. Evaluate the performance of Zeus's equity, bond and balanced funds. In particular, consider:

a) Total returns relative to appropriate benchmark

b) Sharpe ratios

c) Treynor measure

d) A risk-adjusted measure based on one-factor model (Jensen's alpha)

e) A risk-adjusted measure based on Gruber's four-factor model

f) A risk-adjusted measure based on Graham-Harvey

What are the relative merits of the above performance metrics? How should one decide on which index is the relevant one to evaluate each fund? What kind of information do we obtain using each measure?

Dec 7 - Case: The Dynamis Fund; An Energy Hedge Fund, UVAF-1337

1. Why would a regional brokerage be offering such instruments?
2. Why did S&S start a hedge fund in addition to its Energy Portfolio?
3. Does the fee structure for the Dynamis hedge fund make sense? Comment on the differences in compensation between the Energy portfolio and the Dynamis Fund.
4. Which index would you recommend as a benchmark for the performance of the Energy Portfolio? What, if any, shortcomings does the index you recommended have?
5. How have Dynamis and the Energy Portfolio performed?