

C. T. Bauer College of Business
University of Houston

INVESTMENT MANAGEMENT

FINA - 4320

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Office hours: Tue 4:00-5:30pm

Course Description

This course is designed to provide a sound foundation for the fundamental concepts and techniques in investments. Students who master the course material will acquire the analytical tools and financial theories necessary for making rational investment decisions and understanding the paradigms by which financial securities are valued. The course will prepare students for more advanced courses in Finance. The course is highly quantitative and relies heavily on analytical tools and economic theories. Students should be comfortable with probability, statistics, and regression analysis.

Prerequisite

Students are expected to be familiar with basic concepts in mathematics, statistics, and Excel spreadsheets. The prerequisites for this course are the following:

- 1) Junior standing
- 2) ECON 2304: Microeconomic Principles
- 3) FINA 3332: Principles of Financial Management
- 4) STAT 3331: Statistical Analysis for Business Applications I

The instructor is not authorized to waive prerequisites.

Course Requirements

This course is based on applications using R. See the Wikipedia page if you never heard about R. [https://en.wikipedia.org/wiki/R_\(programming_language\)](https://en.wikipedia.org/wiki/R_(programming_language)). Learning R is critical to take this course successfully. Prior knowledge on R is not strictly required for this course, but at least you need to be willing to learn R in the course. You need to bring your own laptop to the class. All the detailed instructions you need for using R will be given throughout the course. **If you do not want to learn R, please seriously consider FINA4320 courses offered by other instructors.**

Other important information will be presented on the first day of the class.

Course Material

- 1) Main text: Lecture notes will be provided at Blackboard.
- 2) Supplementary reading material:
 - a) Essentials of Investments, Tenth Edition, by Zvi Bodie, Alex Kane, and Alan J. Marcus (You can use a previous edition instead.)
 - b) Other supplemental articles will be provided at Blackboard.

Class Policies

- 1) Students are expected to come to class on time and must behave in a professional manner during class. Switching between sections is not allowed without permission.
- 2) Phones are to be turned off or switched to manner mode. Texting is not allowed.
- 3) Using a smart phone in class is NOT allowed throughout the course:
- 4) Students are responsible for checking the course website at Blackboard and emails regularly for the update.
- 5) Students are required to adhere to the standards of conduct of the *Bauer Code of Ethics and Professional Conduct* and the *UH Student Handbook*.
- 6) Students with disabilities: Please contact the instructor and the Center for Students with Disabilities (<http://www.uh.edu/csd>) for assistance: (713)743-5400.
- 7) Refer to the file **Course_Introduction.pdf** at Blackboard for other detailed policies.

Course Schedule

Week 1 Course introduction / Present value / R-project and R-studio setup (PS#1)

Week 2 Assets / Returns / R (PS#2)

Week 3 Probability / Capital allocation (PS#3)

Week 4 Portfolio theory / Portfolio optimization using R (PS#4)

Week 5 CAPM

Week 6 Review of midterm1 practice questions / Midterm1

Week 7 Statistical analysis of financial data part 1 (PS#5)

Week 8 Statistical analysis of financial data part 2 (PS#6)

Week 9 Spring break

Week 10 Derivatives and simulation methods part 1 (PS#7)

Week 11 Derivatives and simulation methods part 2

Week 12 Review of midterm2 practice questions / Midterm2

Week 13-14 Fun and advanced topics in investments (PS#8)

Week 15 Review of final practice questions

Emails from former students

1) An email from Aamir Ibrahim, a former student

Professor Yae,

I hope this email finds you well! Just last year in my final semester of school I was able to take your Investment Management course. I recall when you mentioned how “R” Programming could prove useful when working with financial modeling or various calculation projections. Today I write you to say thank you! As I have now been one year removed from your course and my undergraduate degrees, I have seen its usefulness. Many financial analyst positions require such tools. As the work force moves towards more analytic data entry positions, its need becomes more vital. Due to your help, and your course I have been able to put the knowledge to use! I only wish that current and future students find it useful and take your notion seriously!

From a very thankful - Wolff Center & Bauer Finance Graduate '16

2) An email from Adil Rajabali, a former president of “Finance Association”

Dear Dr. Yae,

I was very excited to learn Monte Carlo simulations for many reasons. I never knew the importance of such an analysis until I did my internship at KPMG's business valuation group. In my internship, I was tasked to value our clients' assets and do goodwill impairment testing. However, there were certain projects that revolved around options pricing which I nor the rest of the office, including the managing partner, know anything about. However, there was one person who had a math background that knew how to conduct a Monte Carlo simulation and how to explain it to the senior managers. With such a skill, he was one of the key players on the team and became a huge value to the firm. There have been multiple cases where I have even ran in to investment bankers that have become a huge asset in their firms just because they know how to value options and other derivatives. In some cases, they have told me that they are the only person in the office that knows how to run through such a simple model. In addition, they have told me that it takes employees with no math background or any prior experience with the simulation months just to understand the meaning and importance of the simulation.

These bankers range from big banks like Goldman Sachs and they have told me that if I were to learn something that majority of the office doesn't know how to do (such as Monte Carlo simulations) I will be a huge contributor to any firm that I go to.

Thank you!!

A screen capture from R

The screenshot shows the RStudio interface. The console window displays the following R code and its output:

```

> # plot time-varying risk premium
> plot_ovelap(TVM3month, TVM3RP, main="Time-Varying Risk Premium by CAPM (monthly, %)")
> head(data_set) # This command shows the first six rows of the data set
  Month  Nobur  Durbl1  Manuf  Energy  HiTec  Telcm  shops  H1th  Ut1ls
1 199001 -0.0947 -0.0391 -0.0629 -0.0413 -0.0129 -0.1304 -0.0618 -0.0732 -0.0534
2 199002 -0.0054 -0.0504 -0.0255 -0.0305 -0.0411 -0.0026 -0.0184 -0.0207 -0.0022
3 199003 -0.0464 -0.0288 -0.0388 -0.0049 -0.0446 -0.0426 -0.0532 -0.0385 -0.0075
4 199004 -0.0018 -0.0406 -0.0277 -0.0361 -0.0203 -0.0327 -0.0187 -0.0030 -0.0551
5 199005 -0.0907 -0.0773 -0.0809 -0.0594 -0.1257 -0.0923 -0.1162 -0.1279 -0.0542
6 199006 -0.0208 -0.0218 -0.0060 -0.0208 -0.0117 -0.0473 -0.0167 -0.0443 -0.0075
  other  Market  rf
1 -0.0898 -0.0701 0.0057
2 0.0250 -0.0149 0.0057
3 -0.0038 -0.0241 0.0064
4 -0.0343 -0.0283 0.0068
5 0.0815 -0.0889 0.0068
6 -0.0170 -0.0042 0.0063
  
```

The plot window displays a line graph titled "Time-Varying Volatility (monthly, %)". The x-axis is labeled "Year" and ranges from 1994 to 2004. The y-axis ranges from 2 to 12. The legend indicates six data series: Nobur (red), Manuf (green), Energy (blue), HiTec (cyan), Telcm (magenta), and shops (black). The plot shows multiple overlapping lines representing the volatility of different sectors over time.

The source window shows the following R code:

```

#####
##### Dynamic rebalancing (Durbl, HiTec) #####
#####
require(quadprog) # You need to upload the package to use, you have to do this when
# the function "ranging_portfolio_r" uses the function "quadprog". That's why you r
# If you didn't install this package before, you need to install it first. Type "ins
# see LMS_part3_istudio_package_installation.pdf if you have a problem installing a
#####
# upload customized functions
source("ranging_portfolio_r")
source("dynamic_rebalancing.r")
source("plot_ovelap.r")
#####
# select portfolios, rolling-window size, and short-sale constraint option
asset_set = c("Durbl", "HiTec") # or alternately, asset_set = c(3,6)
MW = 30 # (half) size of moving window. For beta estimate at time t, use data from t
shortsale_allowed = TRUE
#####
# optimal weights by dynamic rebalancing (don't change from here)
DK = dynamic_rebalancing_data_set, asset_set, MW, shortsale_allowed)
names(DK) # see the variables in DK
plot_ovelap(DK$month, DK$w, main="Time-varying optimal weights")
DR$SR.all
#####
# In R, you can simply change inputs and dataset if you want to do a similar task.
# BUT it WILL take much longer in EXCEL.
#####
# Now let's try three assets (Durbl, HiTec, shops). This task will be quite complic
# try asset_set = c("Durbl", "HiTec", "shops") # or alternately, asset_set =
  
```

The Environment pane shows the following objects:

- Alpha: num [1:5, 1] 0.00278 -0.0011 0.00202 0.00473 -0.00096
- Beta: num [1:2, 1] 0.601 0.994
- Cov.r: num [1:2, 1:2] 0.00151 0.00103 0.00103 0.00103 0.00341
- data_set: 204 obs. of 13 variables
- data_set_er: 204 obs. of 13 variables
- E.r: num [1:2, 1] 0.00708 -0.0095
- Var_idio: num [1:5, 1] 0.000894 0.001724 0.000454 0.001866 0.001607
- Var_sys: num [1:5, 1] 0.000615 0.001684 0.001397 0.000557 0.004549
- W: num [1, 1:5] 0.538 0.462