ECON 424/CFRM 462
Introduction to Computational Finance and Financial Econometrics

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About Me

- Robert Richards Chaired Professor of Economics
- Adjunct Professor of Finance (Foster Business School), Adjunct Professor of Statistics, Adjunct Professor of Applied Mathematics
- Co-Director of UW MS Degree Program in Computational Finance and Risk Management
- UC Berkeley undergrad: Econ and Stat double major
- Yale Ph.D. with emphasis in Econometrics and Finance
- Co-author of *Modeling Financial Time Series with S-PLUS*, Springer-Verlag and writing *Modeling Financial Time Series with R*, to be published by Springer-Verlag, October 2014
- Consultant to BlackRock Alternative Advisors (7 years)

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Course Material on the Web

- ECON 424 Class Webpage:
  faculty.washington.edu/ezivot/econ424/econ424.htm
  - » Official course page
  - » Lecture notes, class slides and R programs
- ECON 424/CFRM 462 Canvas site

  canvas.uw.edu
  - » Homework uploads
  - » Discussion boards
  - » Videos
- Course material will be mirrored on Canvas site.
- Coursera course (online videos)
  - » www.coursera.org

Add Codes

- If you are not registered for econ 424/CFRM 462 but wish to get into the course, you must sign up on an add code request sheet

- Advisors will check prerequisites, major, graduation year etc and tell me which students can be let into the course

- I will cap enrollment at room capacity

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COURSE MECHANICS
(see syllabus on webpage)

- Course content
- Prerequisites: math, stat, microeconomic theory
- Text:
  - » *introduction to Computational Finance and Financial Econometrics*, by Eric Zivot (manuscript in preparation)
  - » *Statistics and Data Analysis for Financial Engineering*, by David Ruppert, Springer-Verlag, 2010. Free e-book from UW library.
- Additional Readings online.
- Exam Review: Several sets of past exams have been posted on the class web site
- Software: Excel, R
  - » Excel is available on computers throughout campus
  - » Download R from www.r-project.org
  - » Highly recommended to use RStudio from www.rstudio.com
- Exams, homework, class project
  - » HW due every Tuesday at 8pm (online via Canvas)

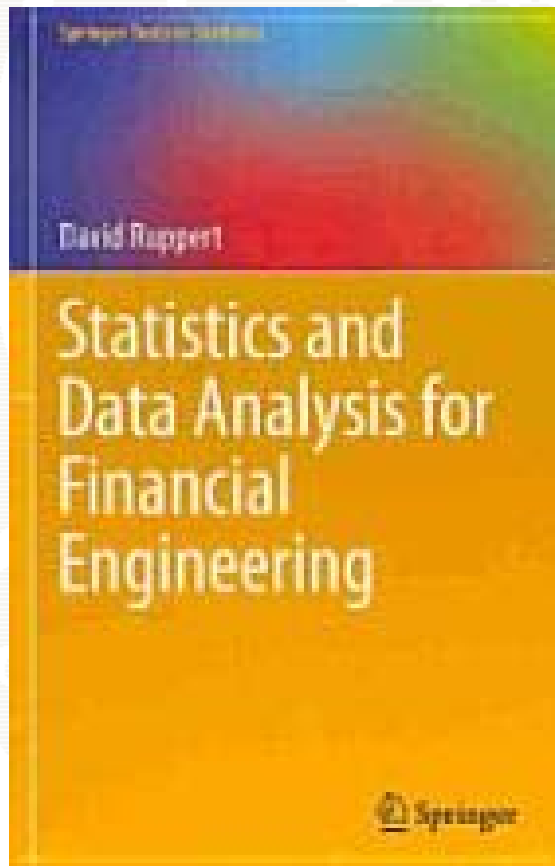# Introduction to Computational Finance and Financial Econometrics

with examples in R
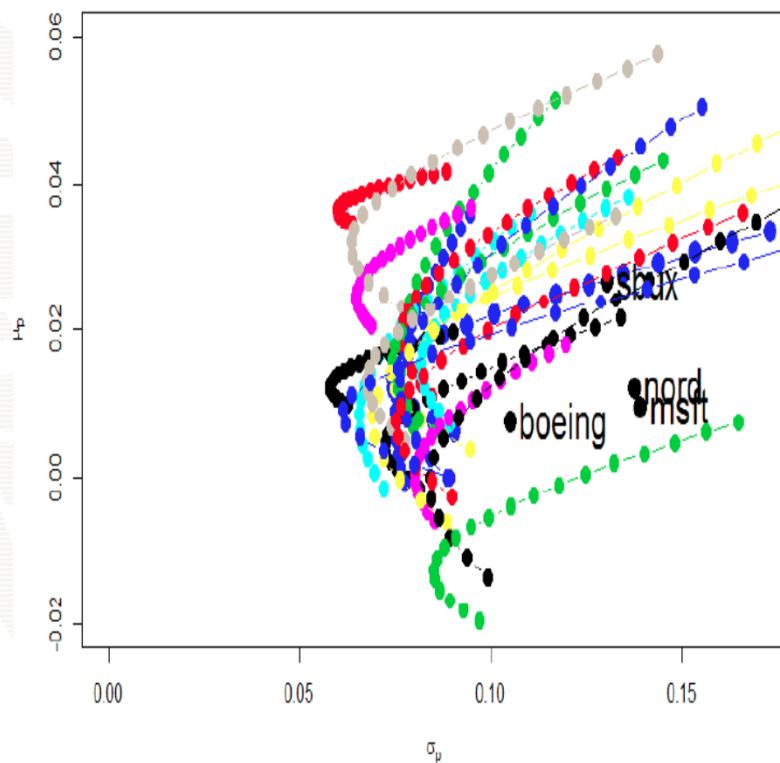
- Textbook in preparation based on course lecture notes

- Chapters are posted on the class webpage

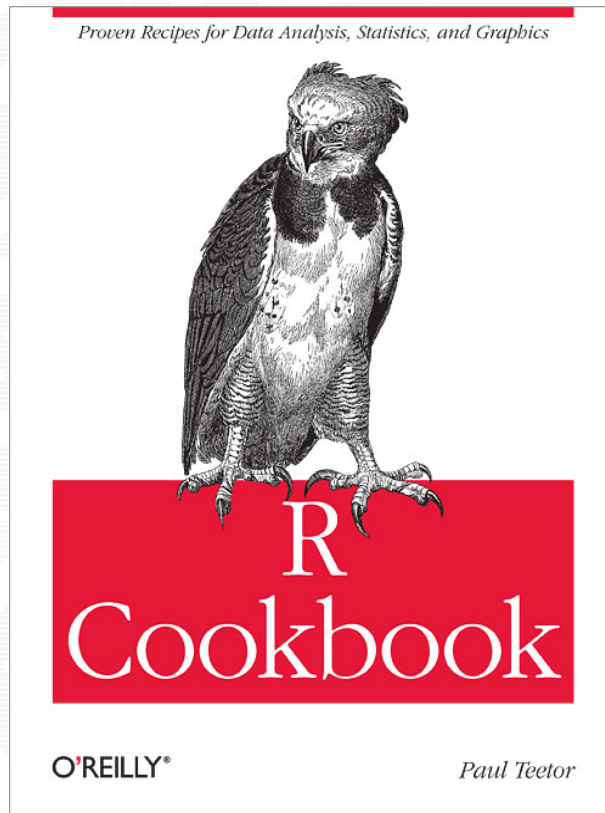- Feedback is welcomed and encouraged!

Statistics and Data Analysis for Financial Engineering

- Excellent statistical treatment of financial data with R integration
- Extensive revision of earlier book *Statistics and Finance: An Introduction*
- Used also in AMATH 542, *Financial Data Modeling and Analysis in R*

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R Cookbook

- No-nonsense guide to R with more than 200 practical recipes helps you perform data analysis with R quickly and efficiently.

- Written by R finance quant Paul Teetor

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A Beginner's Guide to R
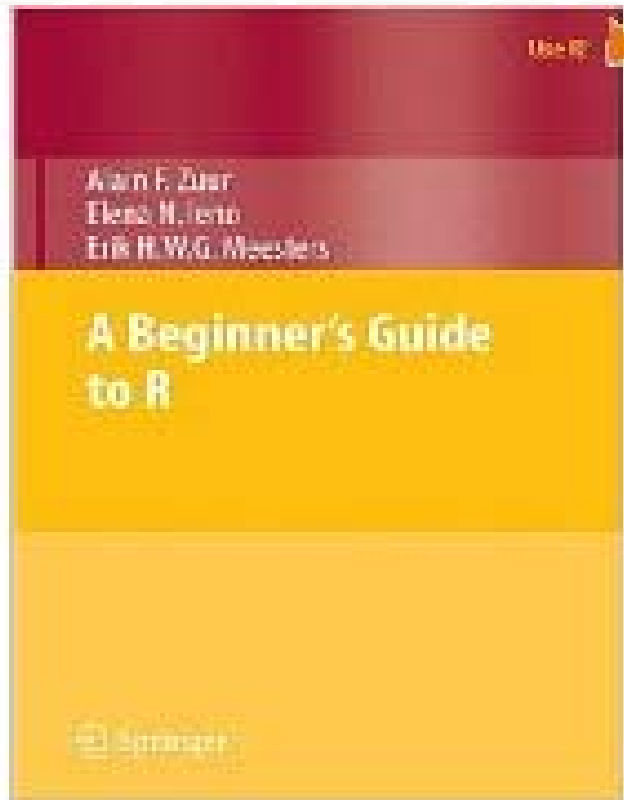
- Gentle introduction to R programming and graphics language

- Not a book about statistical analysis with R

- Short, concise chapters

Brief History of R

- R is a language and environment for statistical computing and graphics

- R is based on the S language originally developed by John Chambers and colleagues at AT&T Bell Labs in the late 1970s and early 1980s

- R (sometimes called "GNU S") is free open source software licensed under the GNU general public license (GPL 2)

- R development was initiated by Robert Gentleman and Ross Ihaka at the University of Auckland, New Zealand

- R is formally known as The *R Project for Statistical Computing*

- www.r-project.org

What is R great at?

- Data analysis

- Data Manipulation

- Data Visualization

- Statistical Modeling and Programming
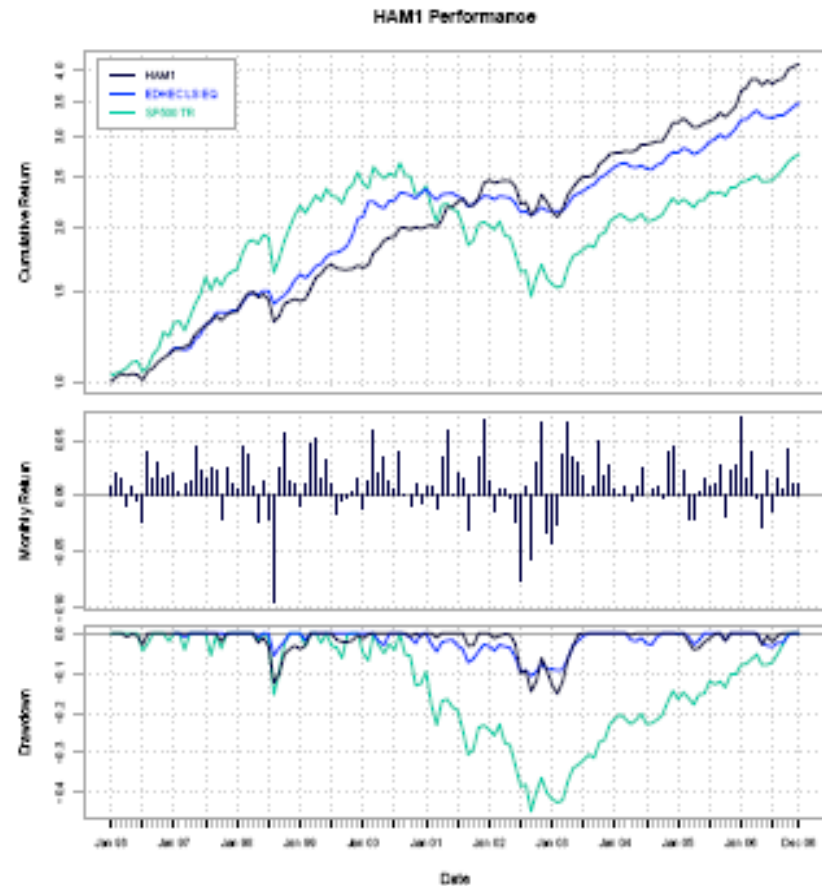
Plot from the PerformanceAnalytics package

S Language Implementations

- R is the most recent and full-featured implementation of the S language
- Original S - AT & T Bell Labs
- S-PLUS (S plus a GUI)
- Statistical Sciences, Inc.
  - » Mathsoft, Inc., Insightful, Inc., Tibco, Inc.
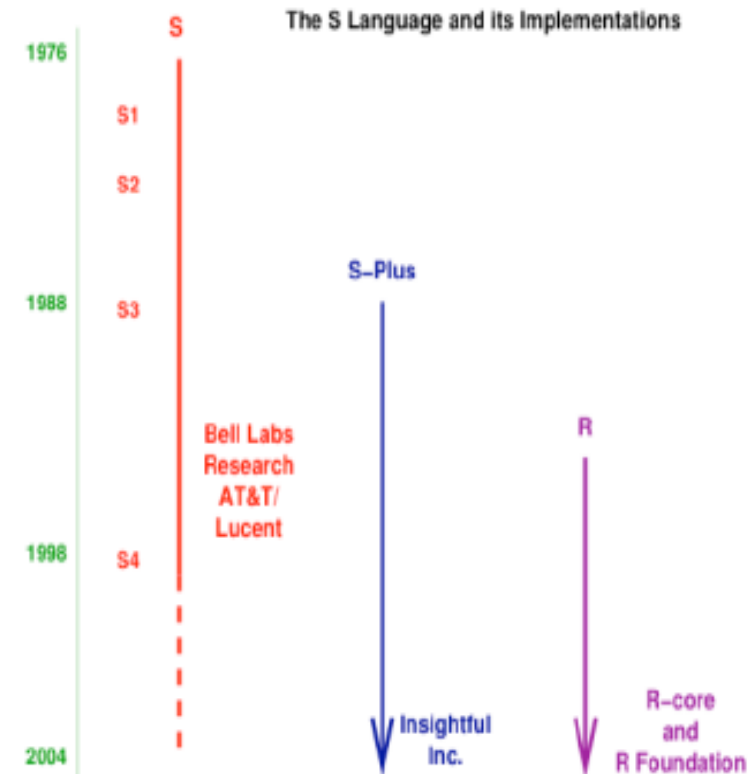- R - The R Project for Statistical Computing

The S Language and its Implementations

Figure from *The History of S and R, John Chambers, 2006*

The R Foundation

- The R Foundation is the non-profit organization located in Vienna, Austria which is responsible for developing and maintaining R

  » Hold and administer the copyright of R software and documentation

  » Support continued development of R

  » Organize meetings and conferences related to statistical computing

R Homepage

- http://www.r-project.org

- List of CRAN mirror sites

- Manuals

- FAQs

- Mailing Lists

- Links

CRAN – Comprehensive R Archive Network

- http://cran.fhcrc.org
- CRAN Mirrors
  - » About 100 sites worldwide
  - » About 25 sites in US
- R Binaries
- R Packages
- R Sources
- Task Views

CRAN Task Views

- Organizes 6000+ R packages by application

- Relevant tasks computational finance:
  - » Distributions
  - » Econometrics
  - » Finance
  - » MachineLearning
  - » Multivariate
  - » Time Series
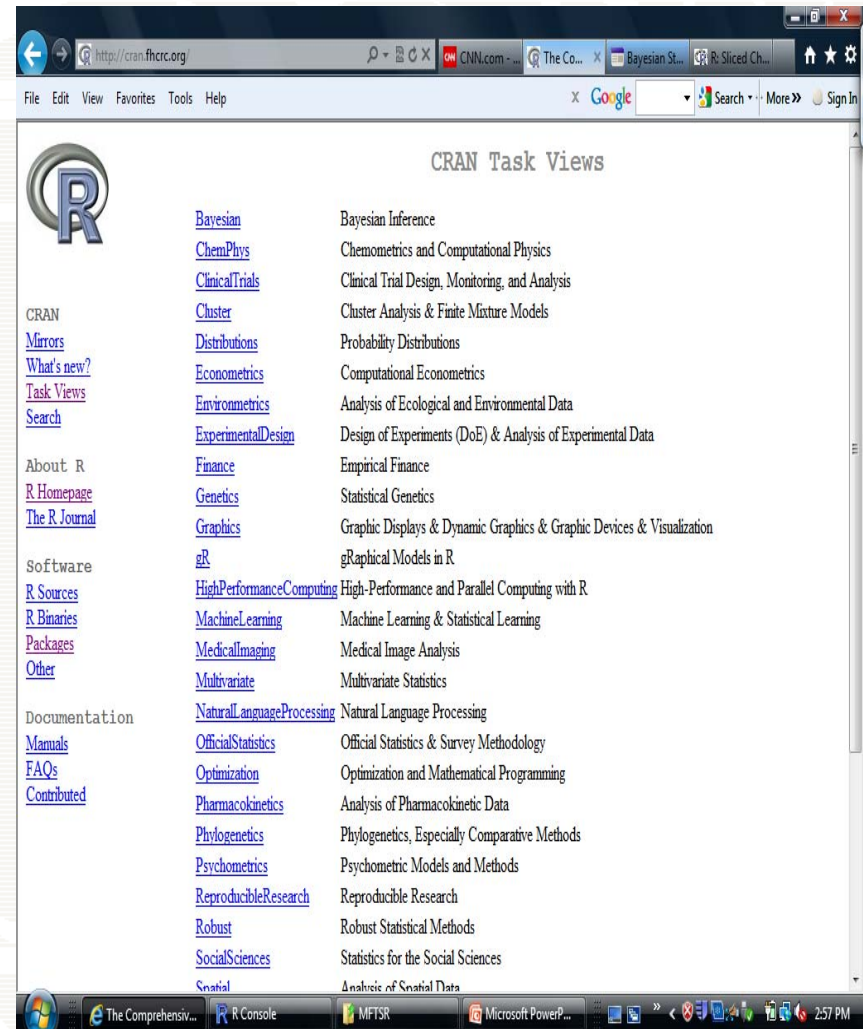
Other Useful R Sites

- R Seek R specific search site:
  - » http://www.rseek.org/

- R Bloggers Aggregation of about 100 R blogs:
  - » http://www.r-bloggers.com

- Stack Overflow Excellent developer Q&A forum
  - » http://stackoverflow.com

- R Graph Gallery Examples of many possible R graphs
  - » http://addictedtor.free.fr/graphiques

- Inside-R R community site by Revolution Analytics
  - » http://www.inside-r.org

- DataCamp – Learn R online interactively
  - » https://www.datacamp.com/

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