

Financial Risk Forecasting Introduction

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To accompany
Financial Risk Forecasting
FinancialRiskForecasting.com
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Financial risk forecasting

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Practical Quantitative Methods in Finance

1. Theoretic concepts of risk
2. Time series models of the stochastic properties of asset prices
3. Methods for evaluating the quality of forecasts (backtesting)
4. Applications with observed financial data, for example, stock prices
5. A statistical programming language
6. Analysis of the outcomes with respect to the original objectives

Material

- Essential reading
 1. Main Textbook: *Financial Risk Forecasting*, Wiley Finance, Jon Danielsson, 2011
 2. Code and R notebook on FinancialRiskForecasting.com
 3. These slides
- Further reading
 5. Peter Christoffersen, 2011, “Elements of Financial Risk Management”, Academic Press; 2nd edition.
 6. Alexander J. McNeil, Rüdiger Frey, Paul Embrechts, 2015, “Quantitative Risk Management: Concepts, Techniques and Tools”, Princeton Series in Finance.
 7. Ruey S. Tsay, 2011, “Analysis of Financial Time Series”, 3rd Edition, Wiley.

Book Overview

Chapter 1 Financial markets, prices and risk

Chapter 2 Univariate volatility modelling

Chapter 3 Multivariate volatility models

Chapter 4 Risk measures; volatility, Value-at-Risk (VaR), Expected Shortfall (ES)

Chapter 5 Implementing risk forecasts

Chapter 6 Analytical VaR for options and bonds

Chapter 7 Simulation methods for VaR for options and bonds

Chapter 8 Backtesting and stress testing

Chapter 9 Extreme Value Theory

Chapter 10 Endogenous risk

Chapter 11 Financial regulations [not in *Financial Risk Forecasting*]

Chapter 12 Machine learning and artificial intelligence [not in *Financial Risk Forecasting*]

LSE course coverage

- We cover all Chapters except 9, Extreme Value Theory
- We cover all Sections in those chapters except Copulas in Chapter 1

The Programming Language In This Course; R

- We *do not* assume you have any knowledge of programming
- But expect you are willing to learn a programming language
- Excel is useless for what we are trying to do here
- Four main software choices
 1. Matlab
 2. Python (Numpy)
 3. Julia
 4. R – what we use in this course
- Daily risk forecasts extremerisk.org
- For learning R, see links on FinancialRiskForecasting.com/notebook

Financial Data Sources

See list on FinancialRiskForecasting.com/notebook/Background/FinancialData

1. [EOD historical data](#)
2. finance.yahoo.com
3. wrds.wharton.upenn.edu (CRSP)
4. Bloomberg
5. db.nomics.world – good economic data but not much financial data

With data you get what you pay for. The cheaper data sources will have errors and gaps in coverage. Bloomberg and WRDS are very reliable, but also very expensive.

LSE lectures are based on WRDS.

Pre-Requisites

- A solid understanding of statistics, including means, variances, skewness, kurtosis, distribution functions, probability densities, quantiles, conditional probability, conditional expectations, Bayes's Rule
- Linear algebra, like in matrix multiplication
- Calculus, especially as applied to distributions
- Basic concepts of financial markets, such as types of assets, like equities, foreign exchange, fixed income assets and derivatives, as well as dividends and interest rates.
- Bonds and options, including the mathematical equations for getting their price