Statistics is cross-disciplinary!

Ladislaus von Bortkiewicz
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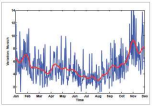
C.A.S.E. – Center for Applied
Statistics and Economics

http://lvb.wiwi.hu-berlin.de
http://www.quantnet.de

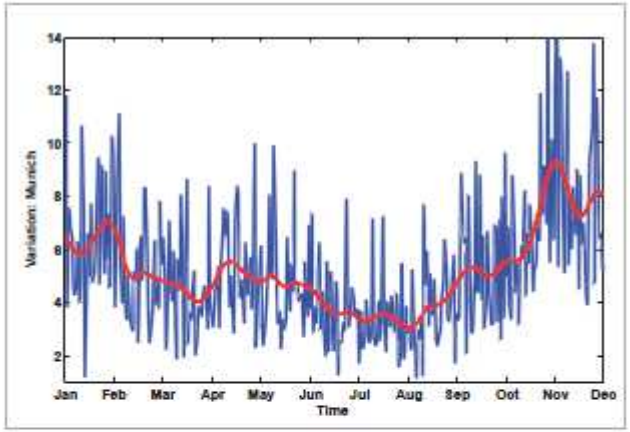
Statistics are everywhere

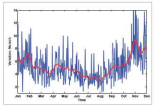
- What will be the Social Security contribution in 2030?
- How likely is it that a portfolio changes by a certain amount?
- How to classify the probability of default for a company?
- At what temperature can a space shuttle get a clearance for take off?



Statistics are everywhere

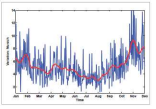
- Insurance against weather volatility
- Reference to a weather index
- Determinants of weather indices
  - Temperature (95% of all WDs)
  - Precipitation (Rain, Snow)
  - Humidity, wind speed
- Transaction form
  - Options
  - Futures



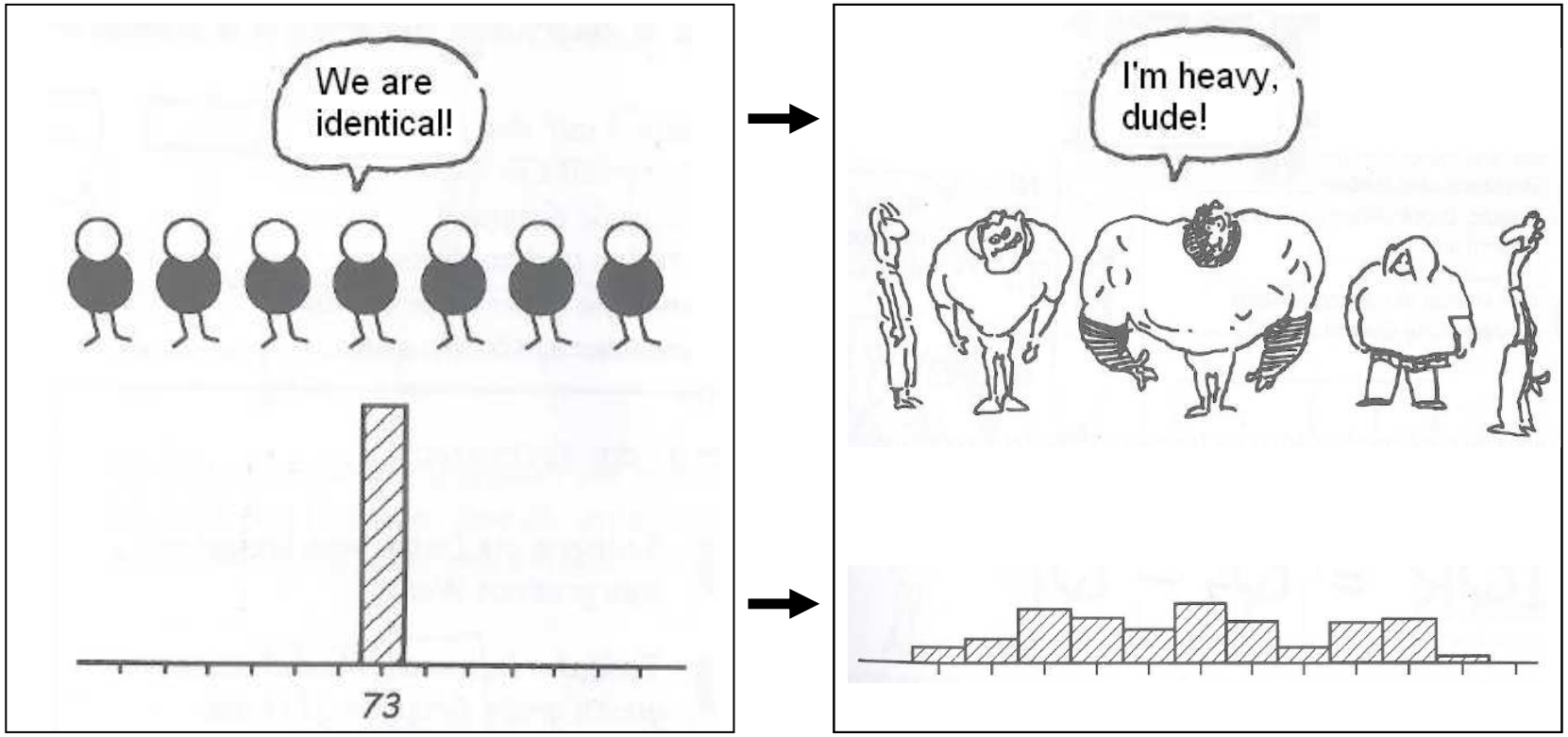


Statistics are everywhere

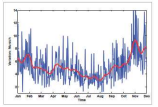
- How many own goals did Hertha BSC score in 2010/2011?
- How likely is an own goal in the last three minutes?



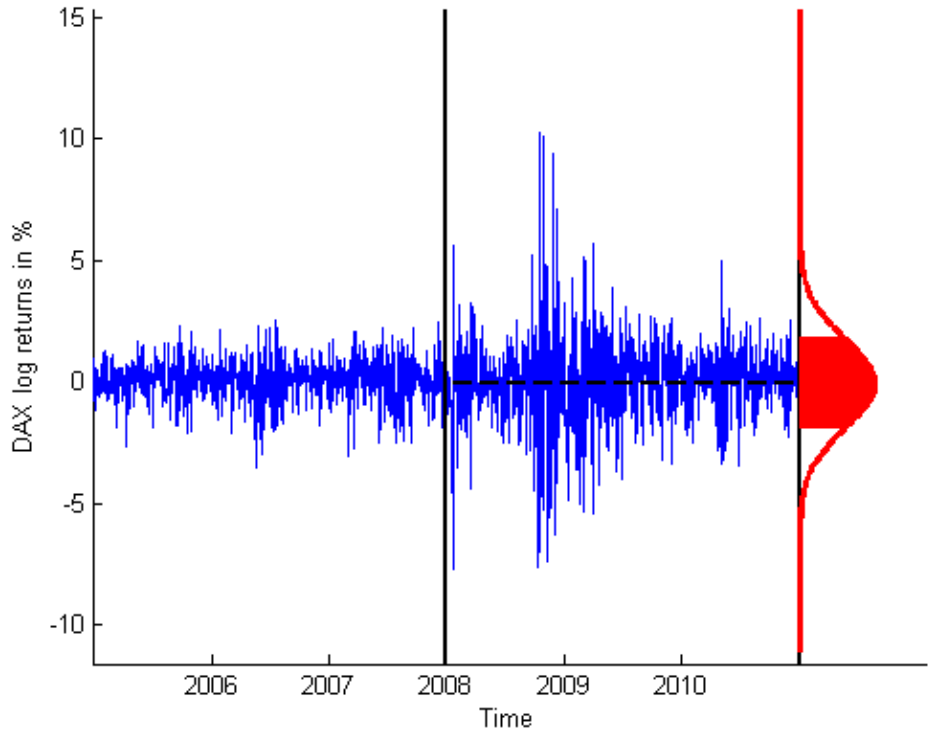
Statistics are everywhere



Adding the football team to the sample broadens the histogram: dispersion of weight increases

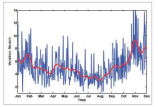


Statistics are everywhere

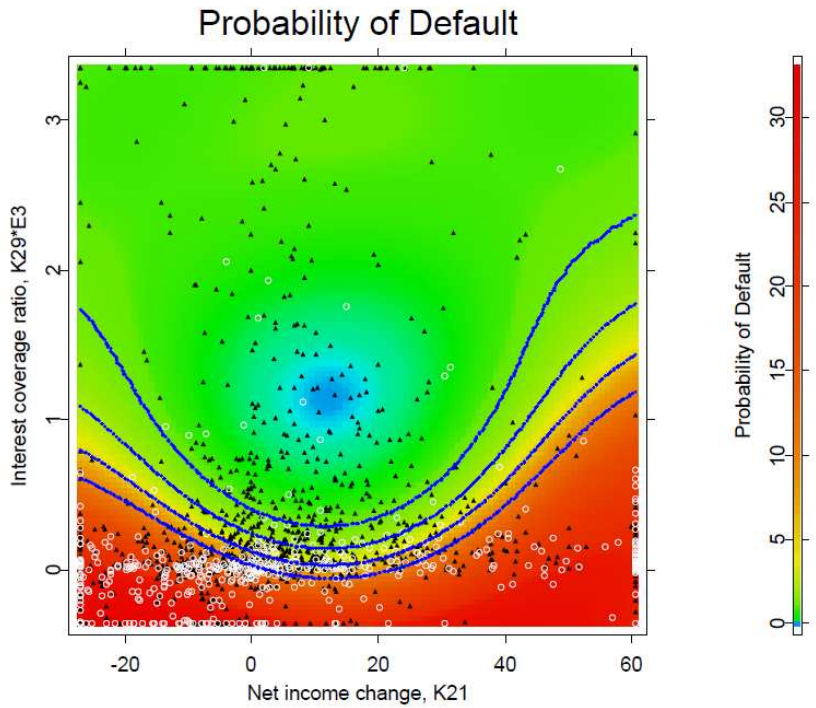


SFE_DAXLogreturns

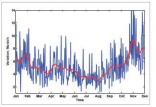
DAX Log-Returns



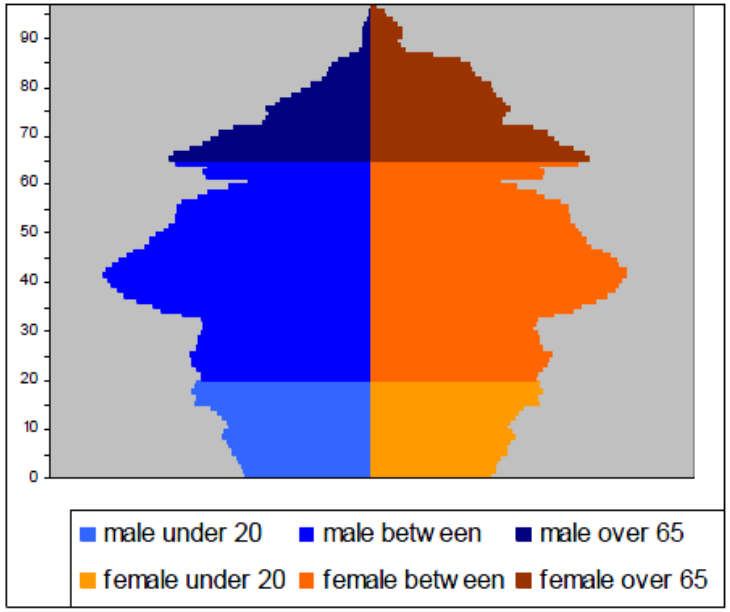
Statistics are everywhere



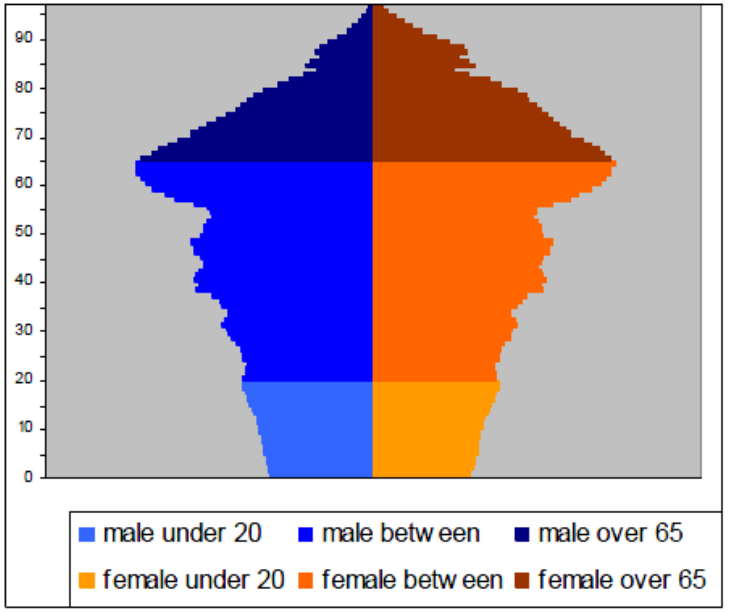
Estimation of PDs: The boundaries of six risk classes are shown, which correspond to the rating classes: BBB and above (investment grade), BB, B+, B, B- and lower.



Statistics are everywhere



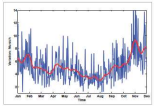
2007



2030

Demographic development in Germany

Interactive example at http://www.destatis.de/bevoelkerungspyramide/

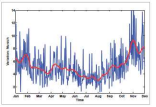


Descriptive Statistics

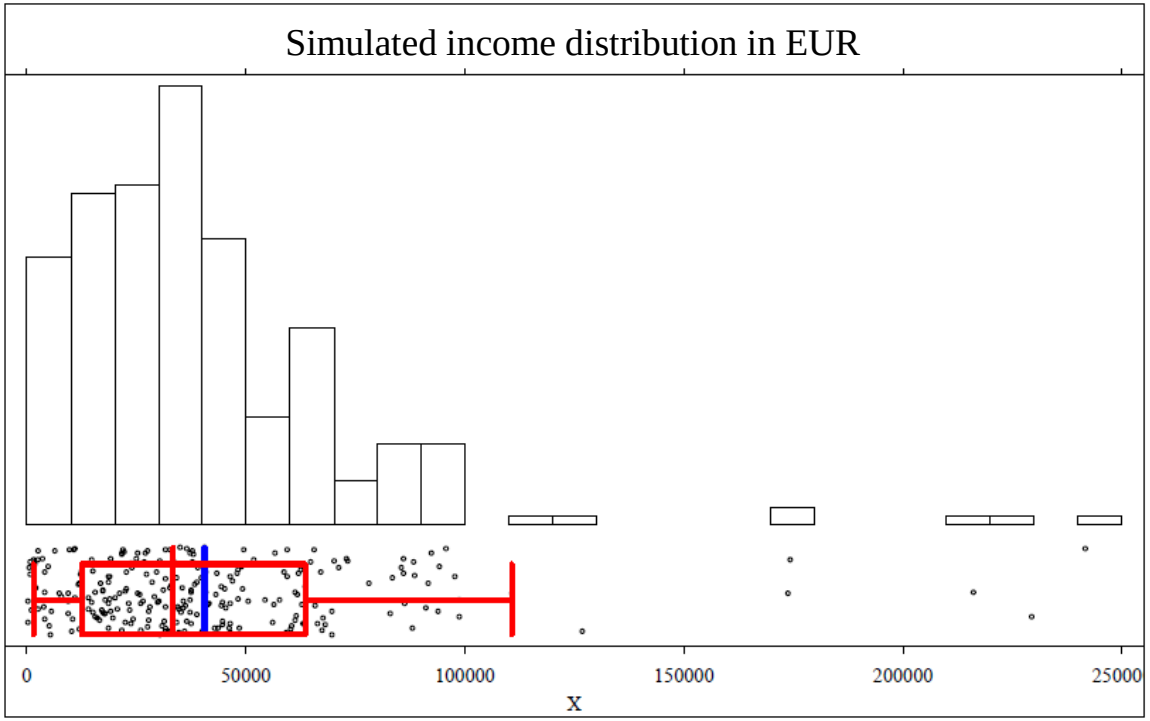
- Description of observed values
- Frequency distribution and graphs
- Mean Values and dispersions

Inferential Statistics

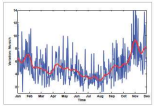
- Conclude from a sample to the population
- Degree of uncertainty is measured with probability theory
- Inference over several models



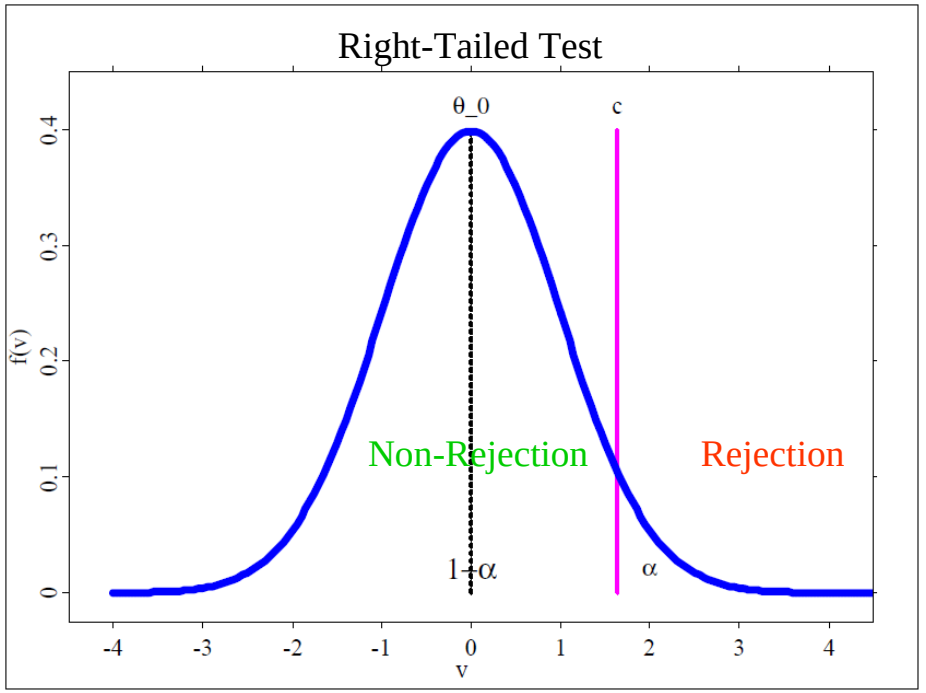
Descriptive Statistics



What is the average income?
Mean (blue) = 40493 EUR , Median (red) = 33690 EUR



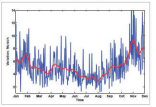
Inferential Statistics



$H_0 : \mu \leq \mu_0$ $H_1 : \mu > \mu_0$

Non-Rejection of H_0 : $\{v \mid v \leq c\}$ $P(V \leq c \mid \mu_0) = 1 - \alpha$

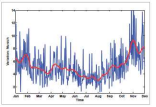
Rejection of H_0 : $\{v \mid v > c\}$ $P(V > c \mid \mu_0) = \alpha$



Ladislaus von Bortkiewicz

- 1901 – 1931: Chair of Statistics at the Institute of Political Economy and Statistics, Friedrich-Wilhelms-Universität zu Berlin
- Prussian army horse kick data
- LvB (Poisson) distribution

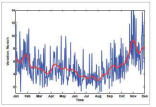
W. Härdle: *"data challenges good theory, theory is created from real data"*



Lecture Statistics I

1. Basics of probability theory
2. Univariate statistical analysis
3. Bivariate statistical analysis
4. Distribution models

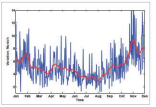
90-min Exam



Lecture Statistics II

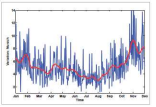
1. Sample theory
2. Estimation techniques
3. Hypothesis testing
4. Regression analysis
5. Time series analysis

90-min Exam

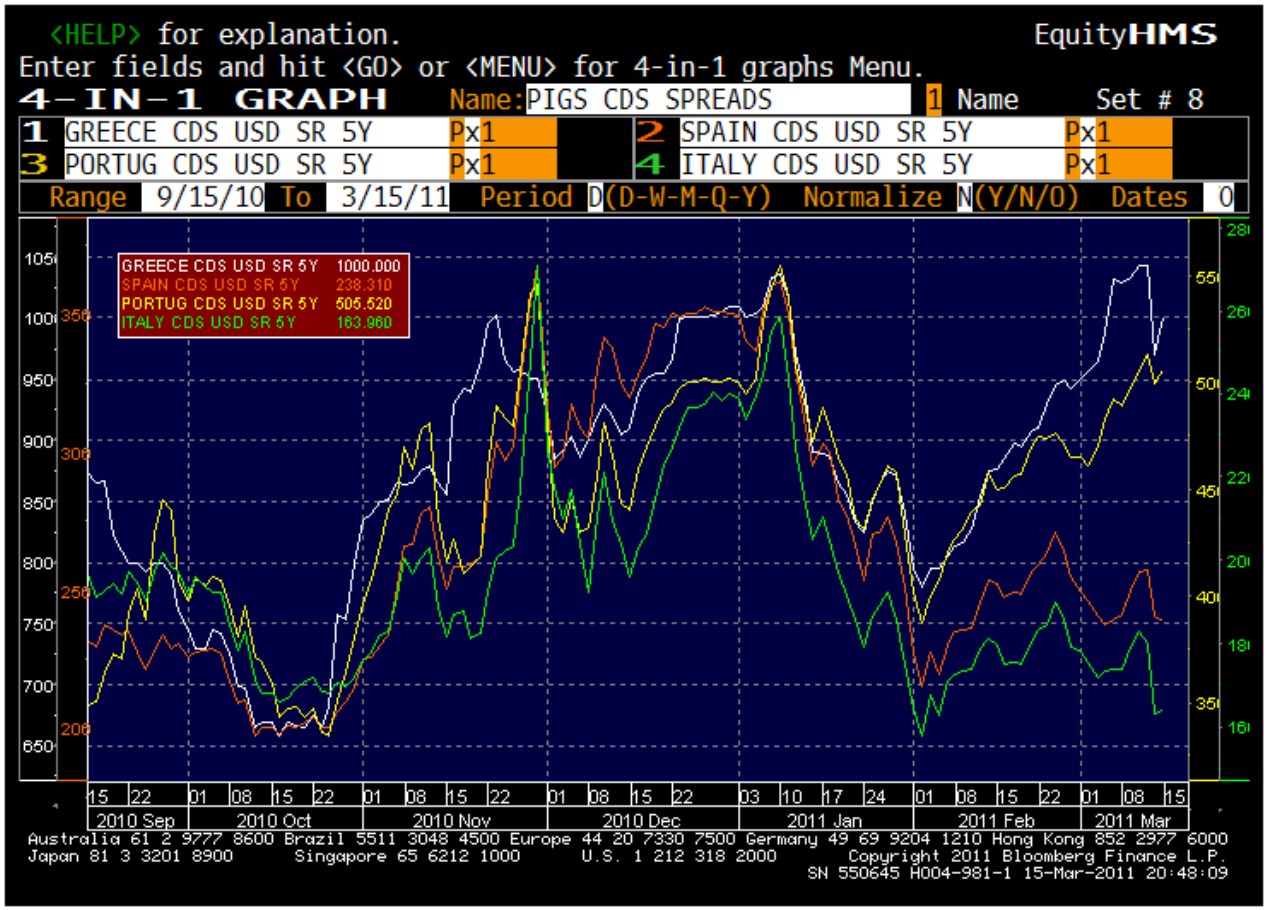


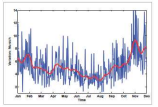
How to teach STAT

Bachelor	Master	Ph.D.
Statistik I	Multivariate Statistical Analysis I	Economic Risk Seminar
Statistik II	Multivariate Statistical Analysis II	Statistical Tools in Finance and Insurance
Staticstical Programming Languages	Non- and semiparametric modelling	Mathematical Statistics Seminar
What is Statistics? - From a historical perspective	Numerical Introductory Course	Selected Topics of Mathematical Statistics
Datenanalyse	Statistics of Financial Markets I	
Privatissimum Statistik	Statistics of Financial Markets II	
Computergestützte Statistik	Applied Quantitative Methods	
	Selected Topics in Banking and Insurance	

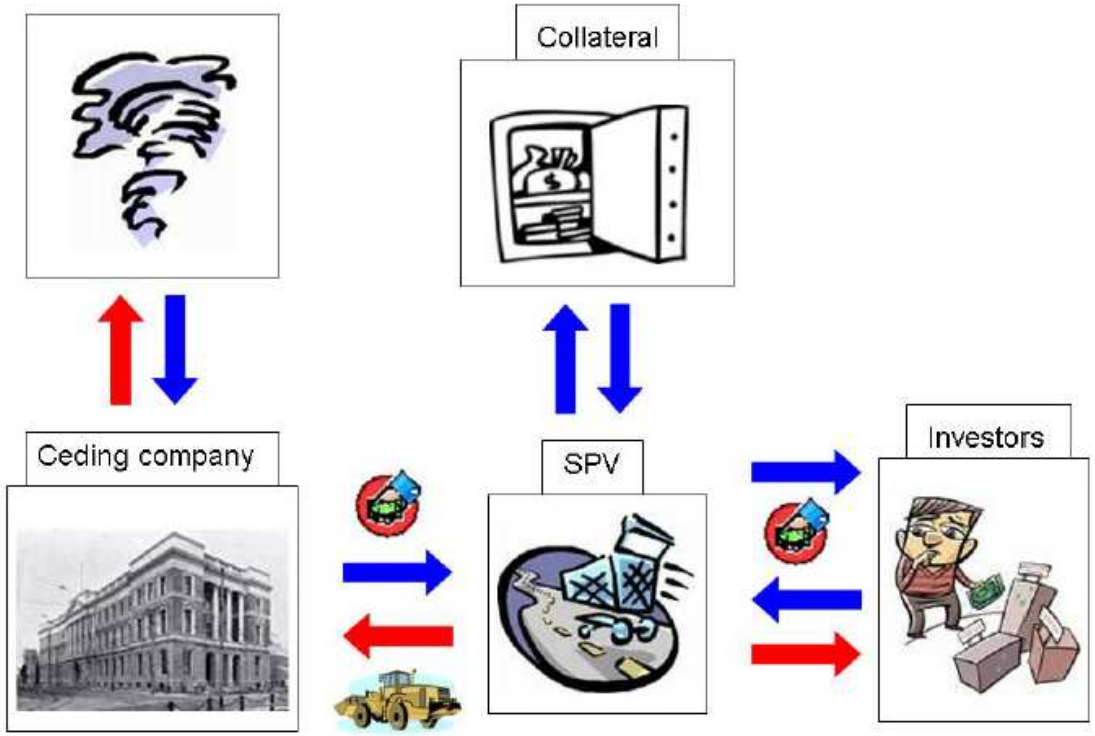


Statistics of Financial Markets

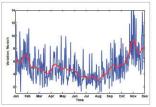




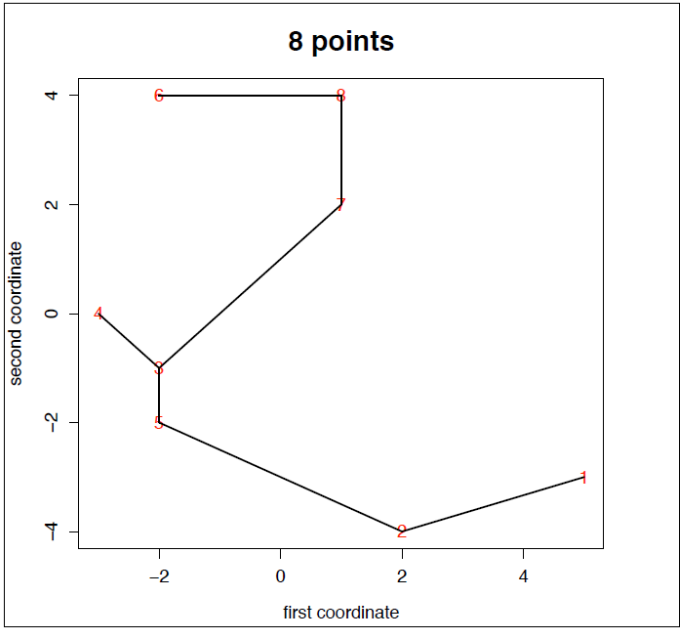
Statistical Tools in Finance

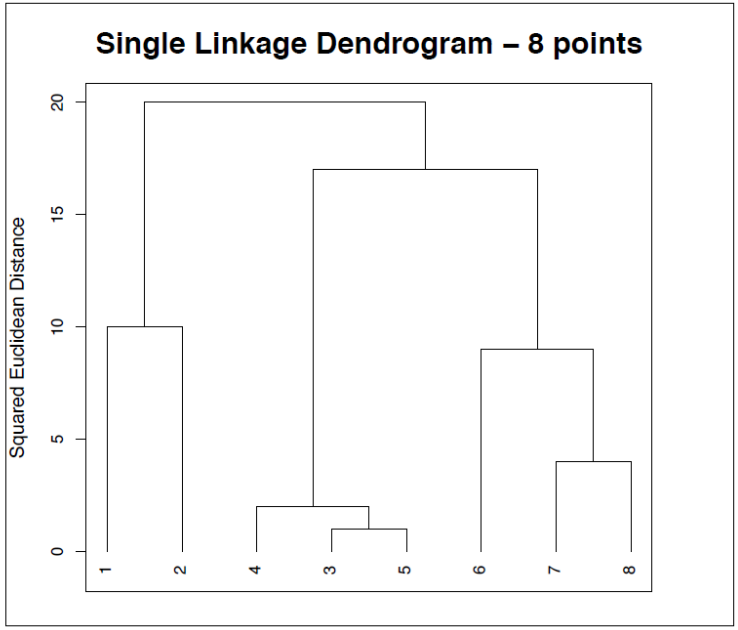


Cat Bonds: Structure of Cash Flows. Event (red), no event (blue)



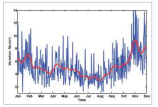
Multivariate Analysis



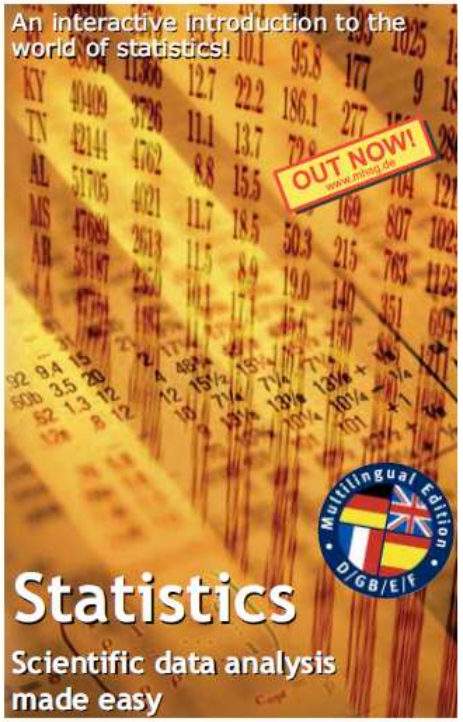


MVAclus8p

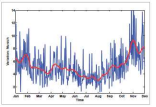
Single Linkage Dendrogram: displays the observations, the sequence of clusters and the distances between the clusters



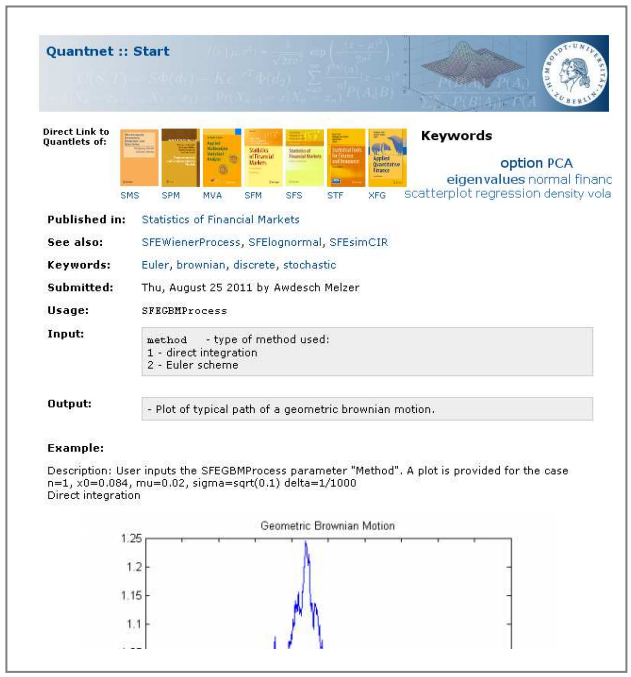
Statistics – Scientific Data analysis made clear



- german, english, spanish, french, . . .
- HTML-based
- Access via www.mhsg.de

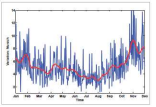


Databases – Quantnet, MM*Stat

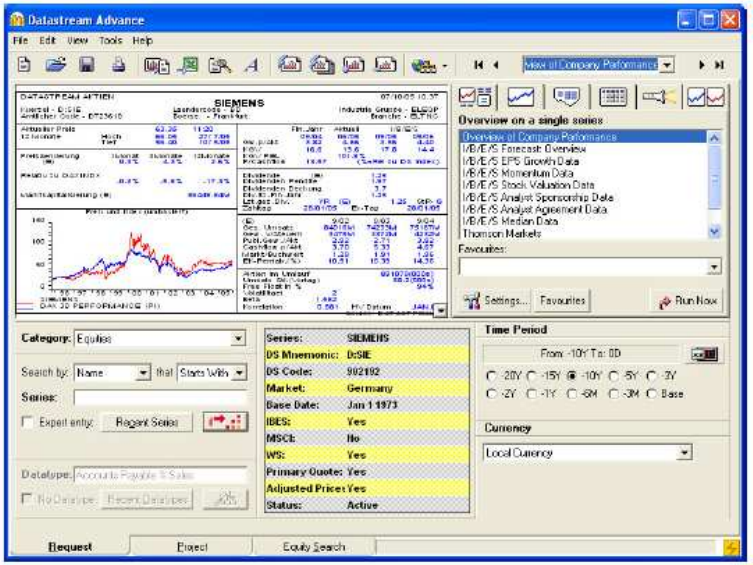


- Quantnet: Matlab, R
- MM*Stat: Wiki,

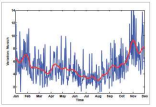
  Multi-Media-Statistics



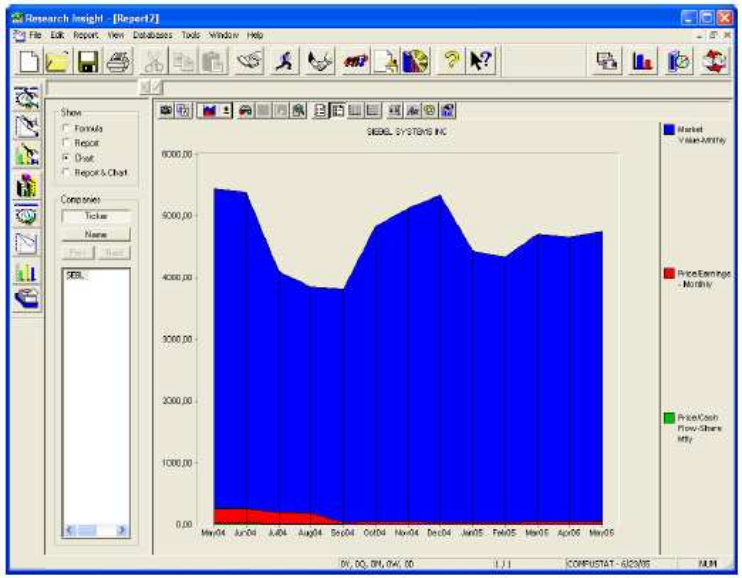
Bloomberg, Datastream and Ecowin



- Bloomberg
  - News and Information Services
  - Extensive financial data (i.e. on weather, energy and climate risk)
- Datastream/Ecowin:
  - Historical economic Data
  - Bonds and stocks
  - Interest and exchange rates



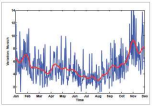
Compustat and CreditReform



- Time Series for Company Data

  (20 years)

- Balance sheet data for solvency of companies in the US, Germany and Austria



Enjoy statistics – the data science!