

XploRe

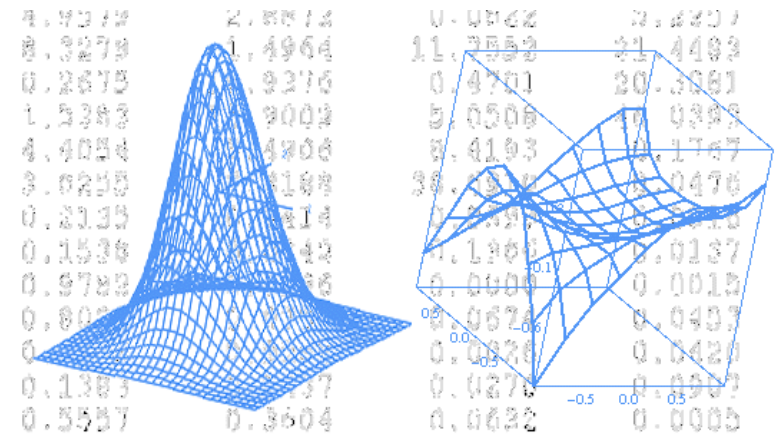
The Interactive Statistical Computing Environment

Wolfgang Härdle



Outline

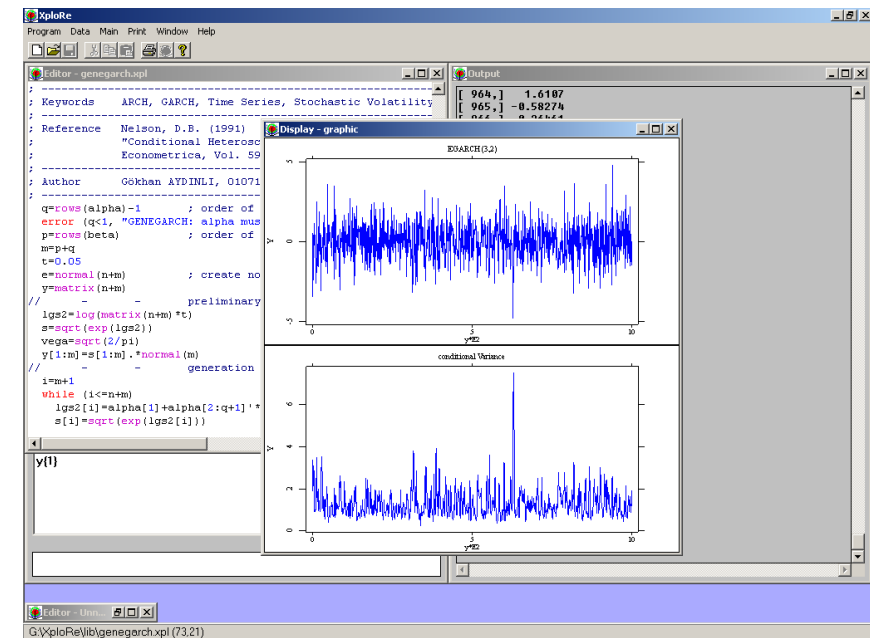
- XploRe
 - statistical tool
 - software environment
 - programming language
 - tool for distant computing
 - XploRe Quantlet Client & MD*ReX
 - teaching aid and ebooks
- Methods, documentation, courses
- MD*Base, MD*Book, MD*Crypt, MD*Immo, MD*ReX, MD*Stat



XploRe – Statistical Tool

Statistical environment:

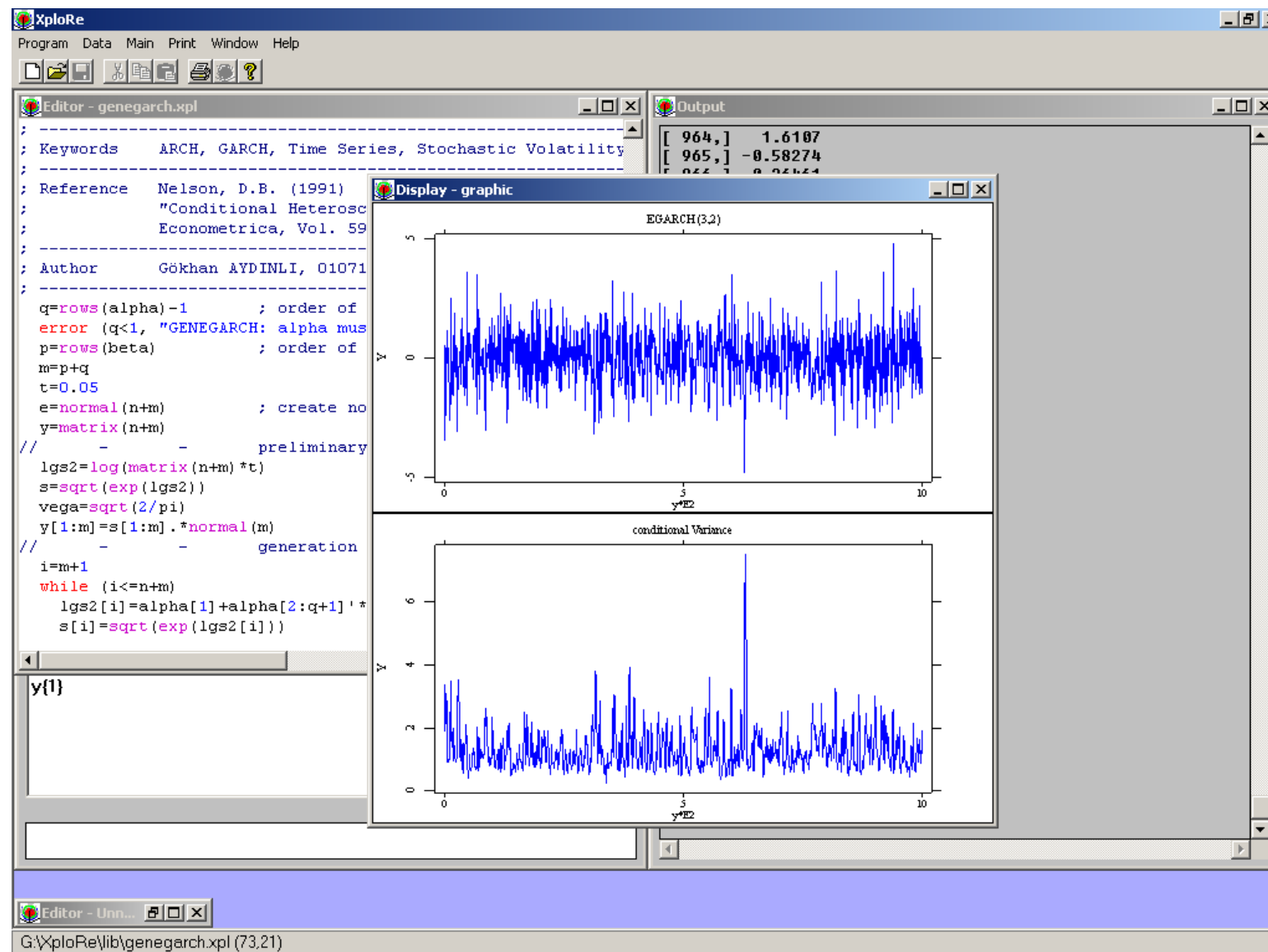
- programming language (PL)
- graphical user interface
-  **uantlets** = statistical methods
- method proliferation architecture
- decision support system (APSS)



XploRe includes standard and brand new statistical methods

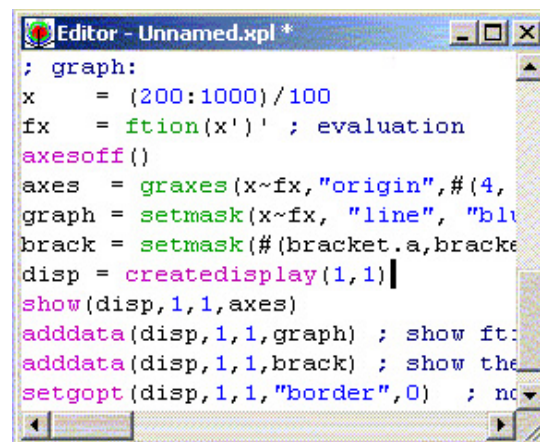


XploRe – Statistical Tool



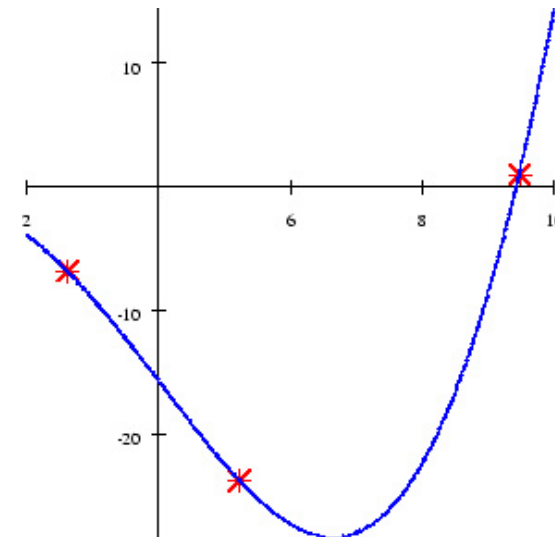
XploRe – Flexible Tool

- **Functions:** basic (`mean`, `show`, `pdfn`) written in C++, Fortran, DLL
- **Quantlets:** statistical methods programmed in XploRe PL
 - stored in ASCII files (no “black box”)
 - html incarnations for browsable help system
 - easily adapted, updated, and extended
 - customizable editor



```

; graph:
x   = (200:1000)/100
fx  = ftion(x)' ; evaluation
axesoff()
axes = graxes(x~fx,"origin",#(4,
graph = setmask(x~fx, "line", "blu
brack = setmask(#(bracket.a,bracke
disp = createdisplay(1,1)
show(disp,1,1,axes)
adddata(disp,1,1,graph) ; show ft
adddata(disp,1,1,brack) ; show the
setgopt(disp,1,1,"border",0) ; no
  
```

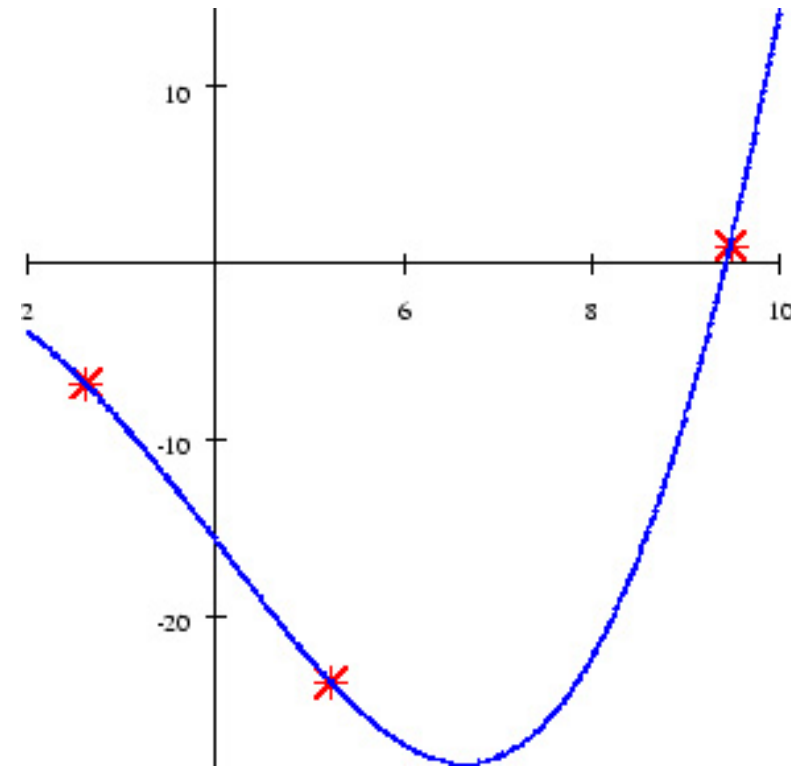


XploRe – Flexible Tool

```

Editor - Unnamed.xpl *
; graph:
x    = (200:1000)/100
fx   = fton(x')' ; evaluation
axesoff()
axes  = graxes(x~fx,"origin",#(4,
graph = setmask(x~fx, "line", "blue")
brack = setmask(#(bracket.a,bracket.b), "bracket", "red")
disp = createdisplay(1,1)
show(disp,1,1,axes)
adddata(disp,1,1,graph) ; show function
adddata(disp,1,1,brack) ; show brackets
setgopt(disp,1,1,"border",0) ; no border

```



Module Structure

- **Basic Module**—basic procedures, data analysis, graphics, mathematics and numerical mathematics, cluster analysis, teachware
- **Dynamic Systems Module**—finance, time series, panel data, errors in variables
- **Flexible Regression Module**—generalized linear models, generalized partial linear models, generalized additive models, single index models, hazard regression
- **Non- & Semiparametric Smoothing**—kernel density and regression, kernel estimation, splines, wavelets, neural networks
- **Advanced Statistical Methods**—Value at Risk, robust techniques, semiparametric hazard regression, statistical process control



XploRe – Software Environment

- Standalone program
 - Windows, Unix, Linux, Apple
 - Limited Edition **LE** (downloadable)
 - Academic Edition **AE**
 - Professional Edition **PE**
 - Xtended Package **XP** = **PE** + **ebooks** + Support
- Client-server application
 - Windows, Unix, Linux, Apple
 - MS Office - Client



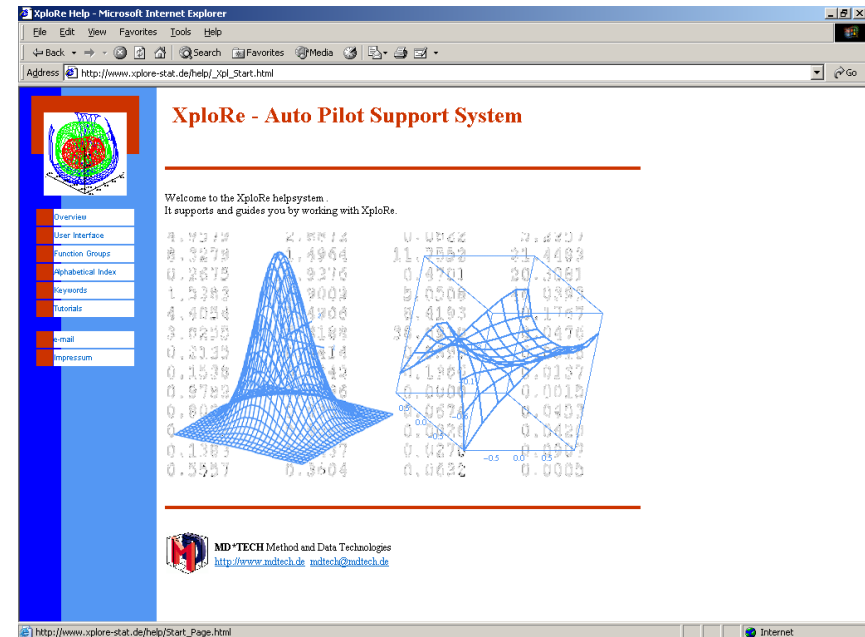
XploRe – PL

- interpreted $\Rightarrow$
 - easy debugging
 - sources directly accessible (example: `aseq`, `mseq`)
- matrix-oriented (example: `gls`)
- offers powerful graphical tools (example: `setmask`)
- offers user interaction (example: `doglm`)
- HTML documentation templates (`APSS`)



Auto Pilot Support System (APSS)

- List of methods and function groups
- Help for functions and quantlets
 - description
 - input/output parameters
 - examples
- Keywords
- Task-oriented **Tutorials**

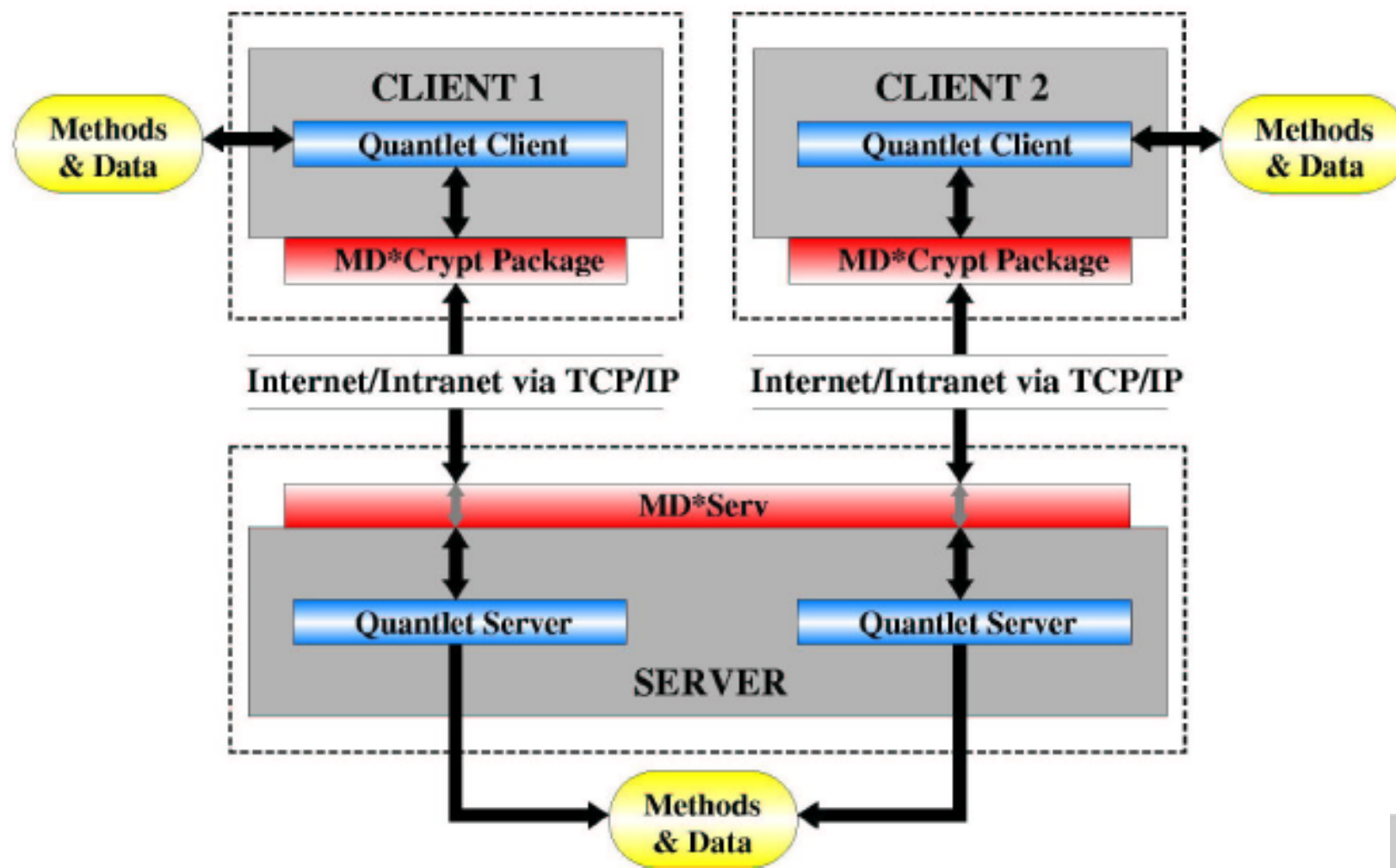


XploRe – Tool for Distant Computing

- XploRe uantlet Server (XQS)
 - complete functionality of XploRe PE
 - available for UNIX, Linux, Windows, Apple
- MD*Crypt
 - communication protocol between XploRe uantlet Client (XQC) and XQS implemented in Java
 - passes any uantlet to the XQS and returns XQSObjects
 - each XQSObject has a "type" property, which may contain various information (text, graphics)
- MD*ReX
 - implements COM enabled custom version of MD*Crypt



XploRe – Tool for Distant Computing



XploRe – Golden Solution

Documentation: flexible system for uantlet documentation

Presentation: custom solution for uantlets

Interaction: edit uantlets in a browser

Examples

Voles Volas Values

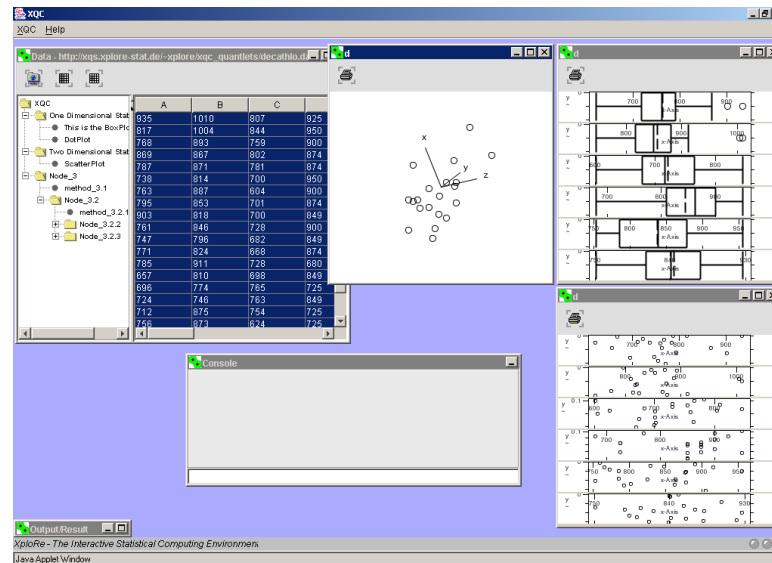
Applied Multivariate Statistical Analysis

Applied Quantitative Finance

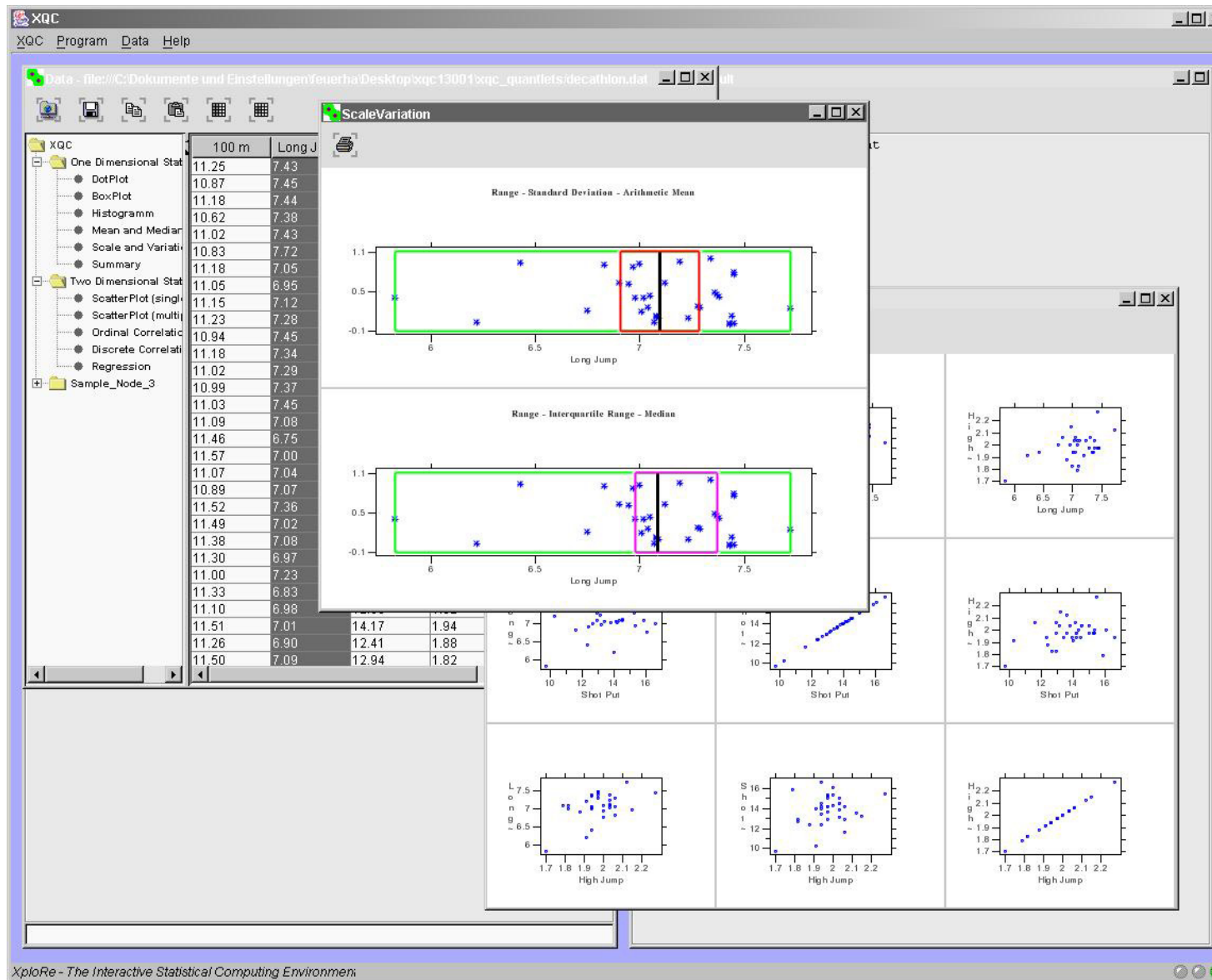


XploRe Quantlet Client

- XploRe Quantlet Client
 - online version (run through a browser)
 - local version (download from <http://www.i-XploRe.de>)
 - connection to any XploRe Quantlet Server
- other clients (MD*ReX, GraphFitI,...)



XploRe Quantlet Client



MD*ReX

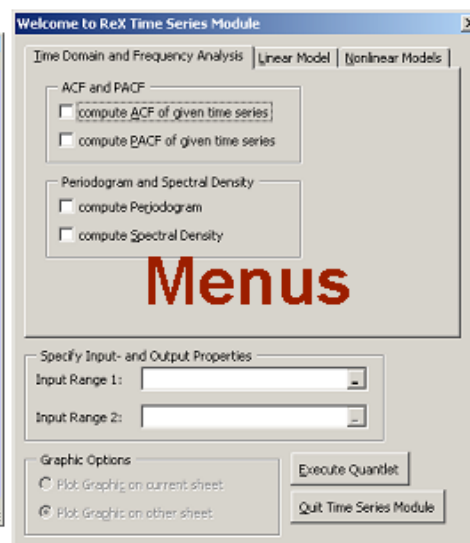
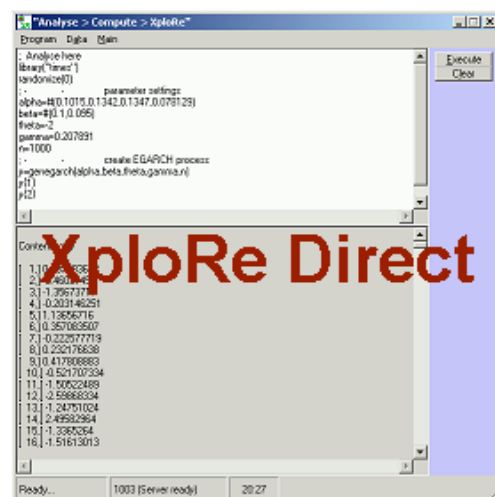
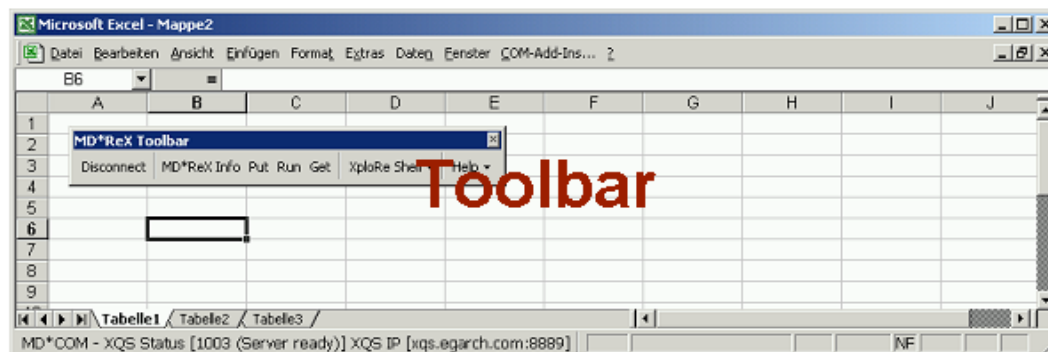
MD*ReX COM (Component Object Model) Add-In

MD*ReX provides access to XQS from any Microsoft Office 2000,XP application via **MD*Crypt**

MD*Crypt.ReXServer is implementable in any COM supported environment

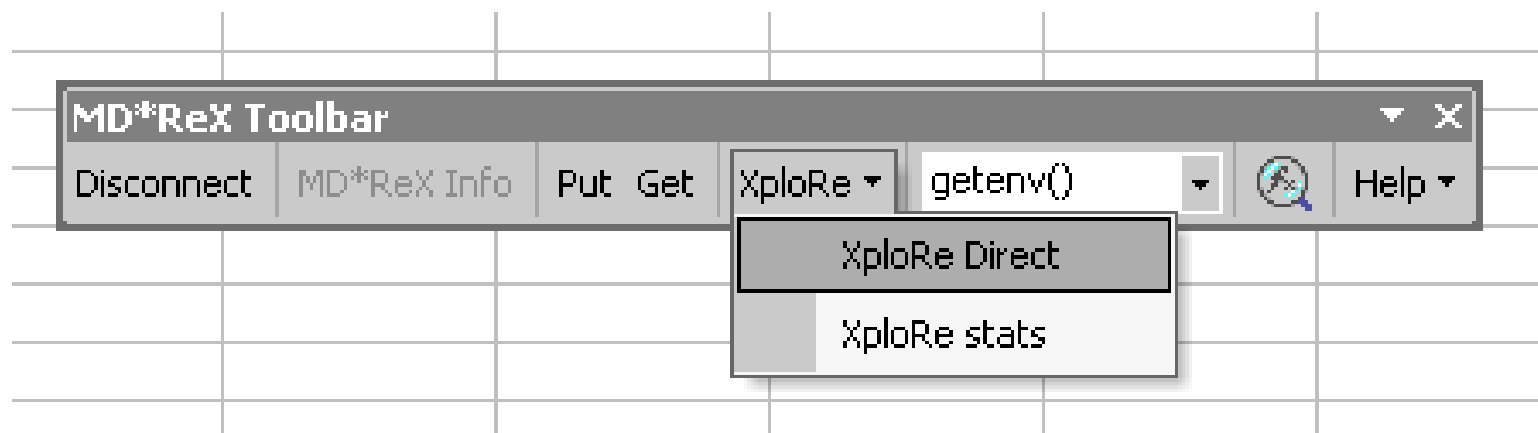


MD*ReX User Interfaces

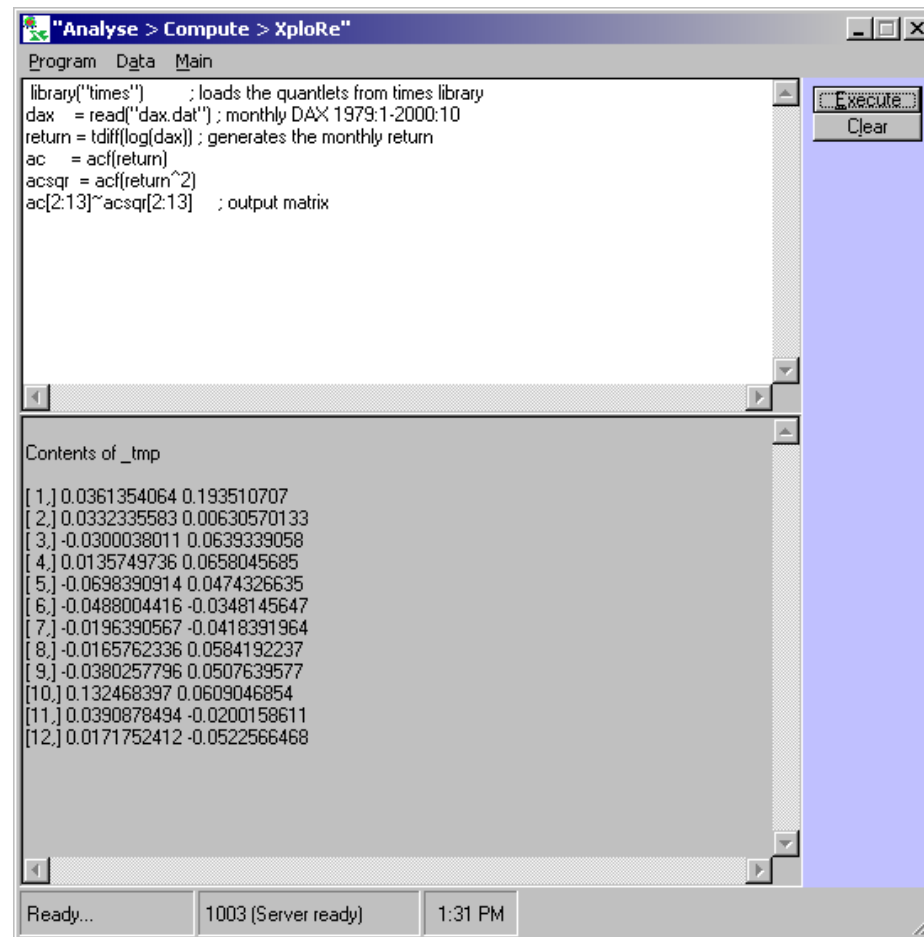


MD*ReX from the User's Perspective

Office Toolbar + Command line

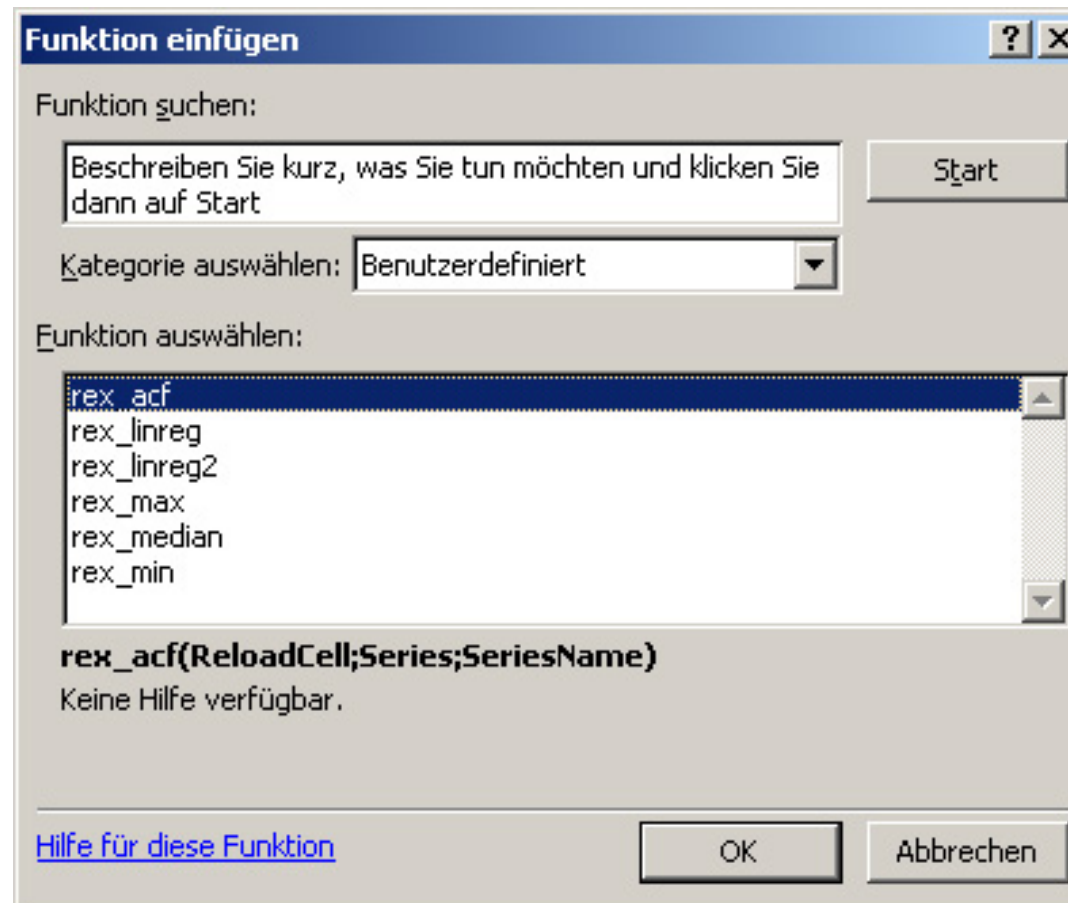


MD*ReX from the User's Perspective Editor



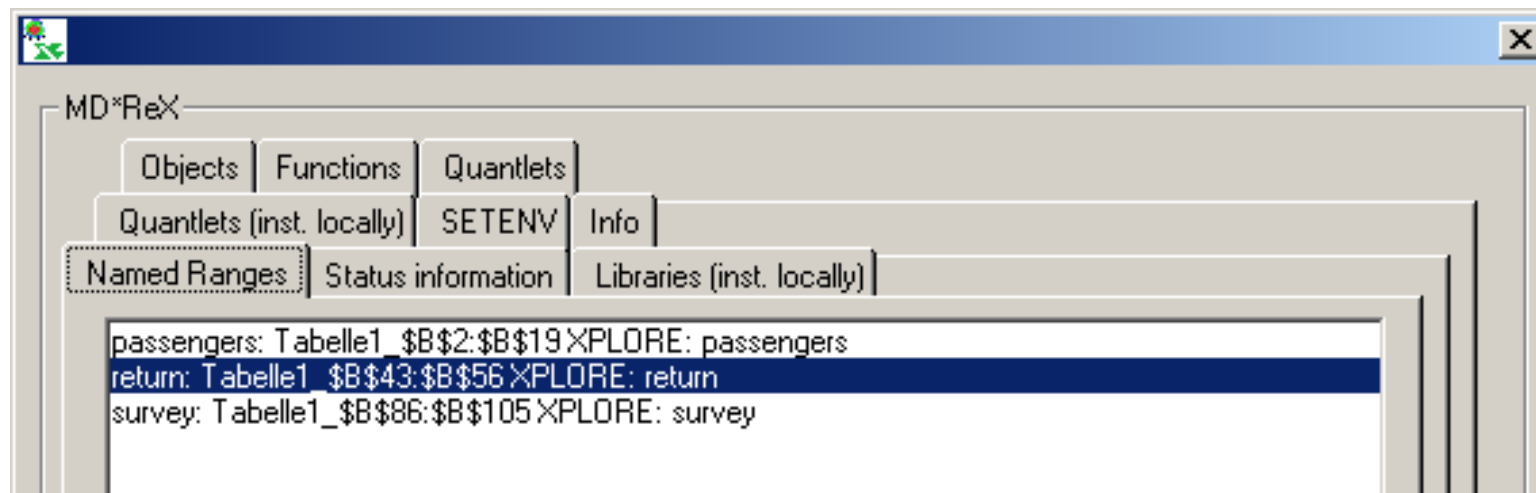
MD*ReX from the User's Perspective

Custom Functions interface to Quantlets



MD*ReX from the User's Perspective

Object Mapping MD*ReX view



MD*ReX from the User's Perspective

Object Mapping Excel view I

Microsoft Excel - airline.xls

File Edit View Insert Format Extras Data Window

Disconnect MD*ReX Info Put Get XploRe

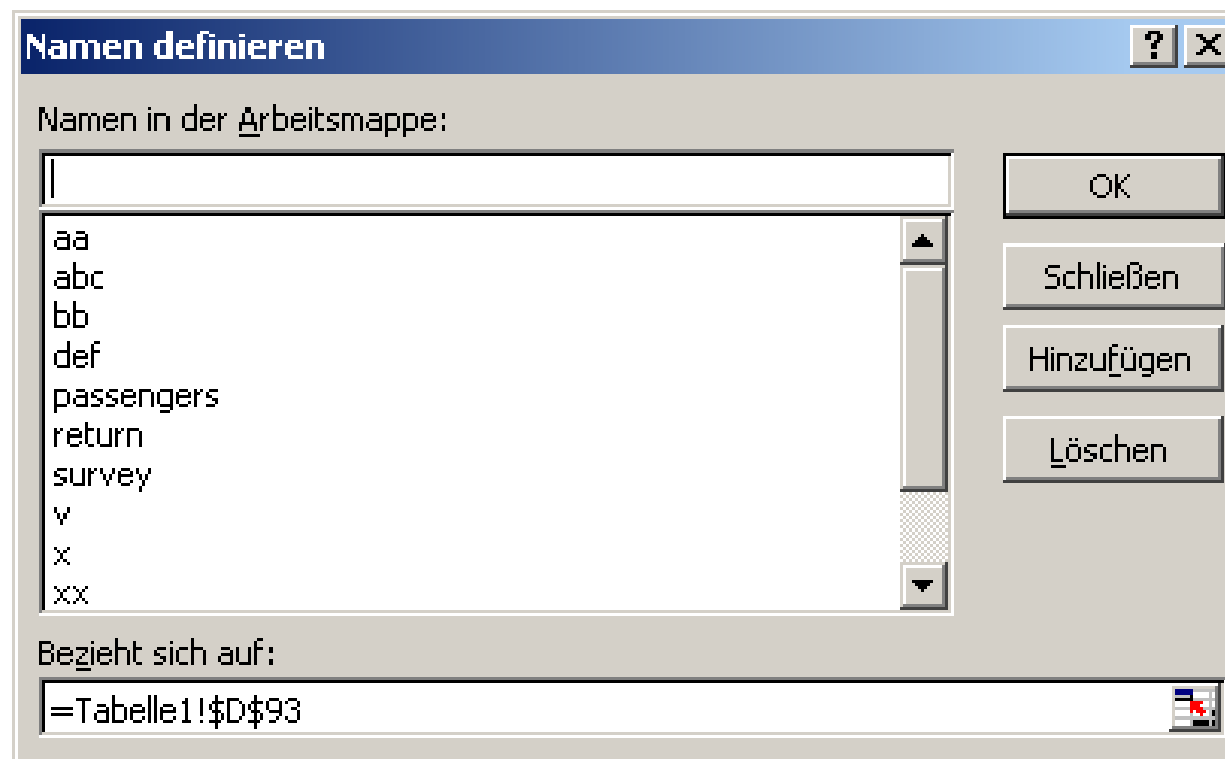
D93 fx -0,0851504430174828

	B	C	D	E	
abc					
def	274	5,61312819	-0,07456359		-(
passengers	237	5,46806002	-0,00680545		(
return	278	5,62762117	0,08860221		(
survey	284	5,64897442	0,34026074		-(
x	277	5,62401772	0,10217623		(
xx	317	5,7589016	-0,09956646		-(
aa	212	5,716700317	0,031600077		r



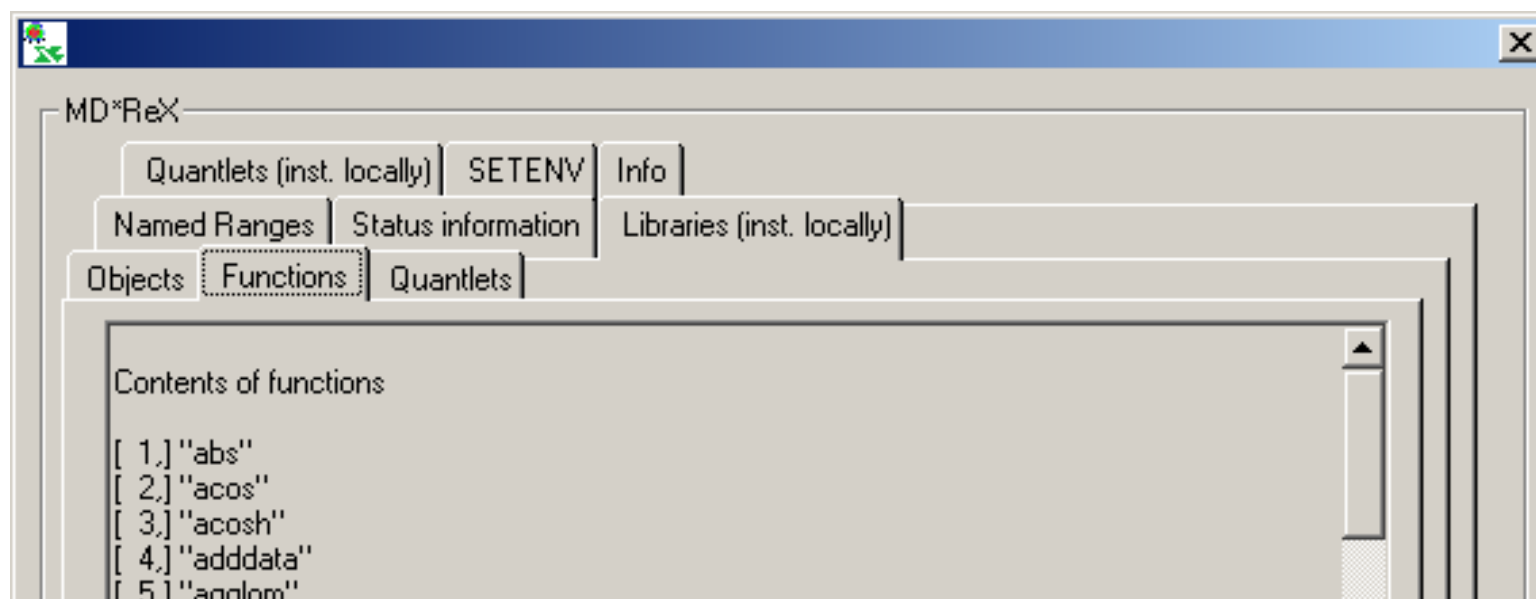
MD*ReX from the User's Perspective II

Object Mapping Excel view II



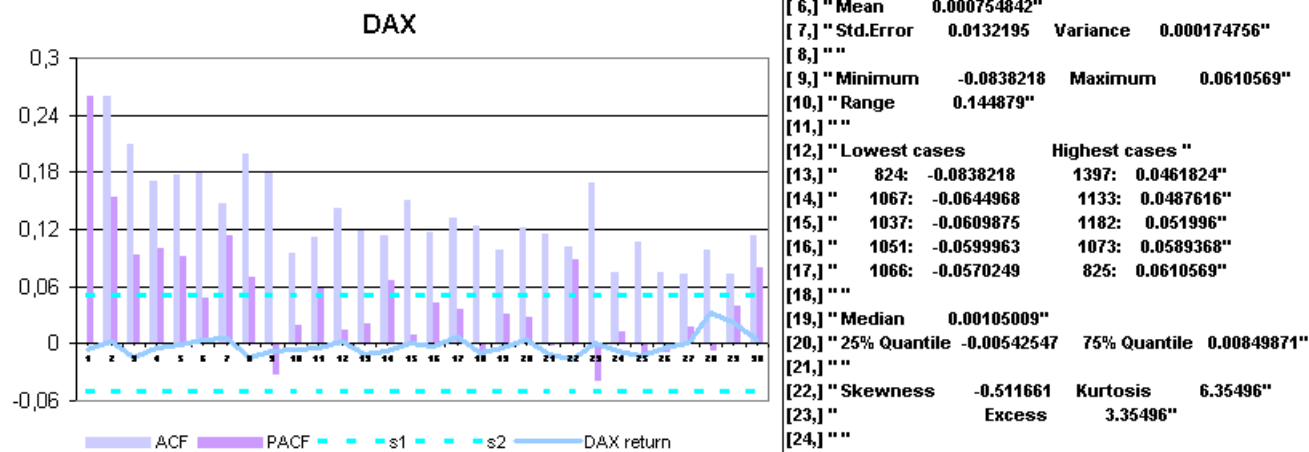
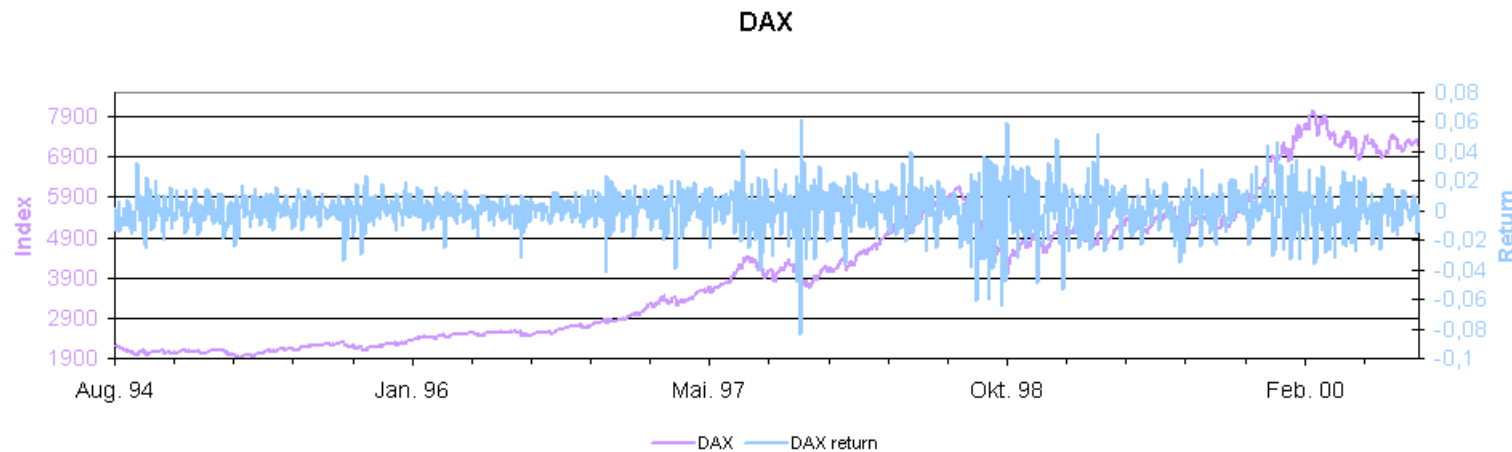
MD*ReX from the User's Perspective II

Info Objects: Libraries, Objects, Functions, Quantlets



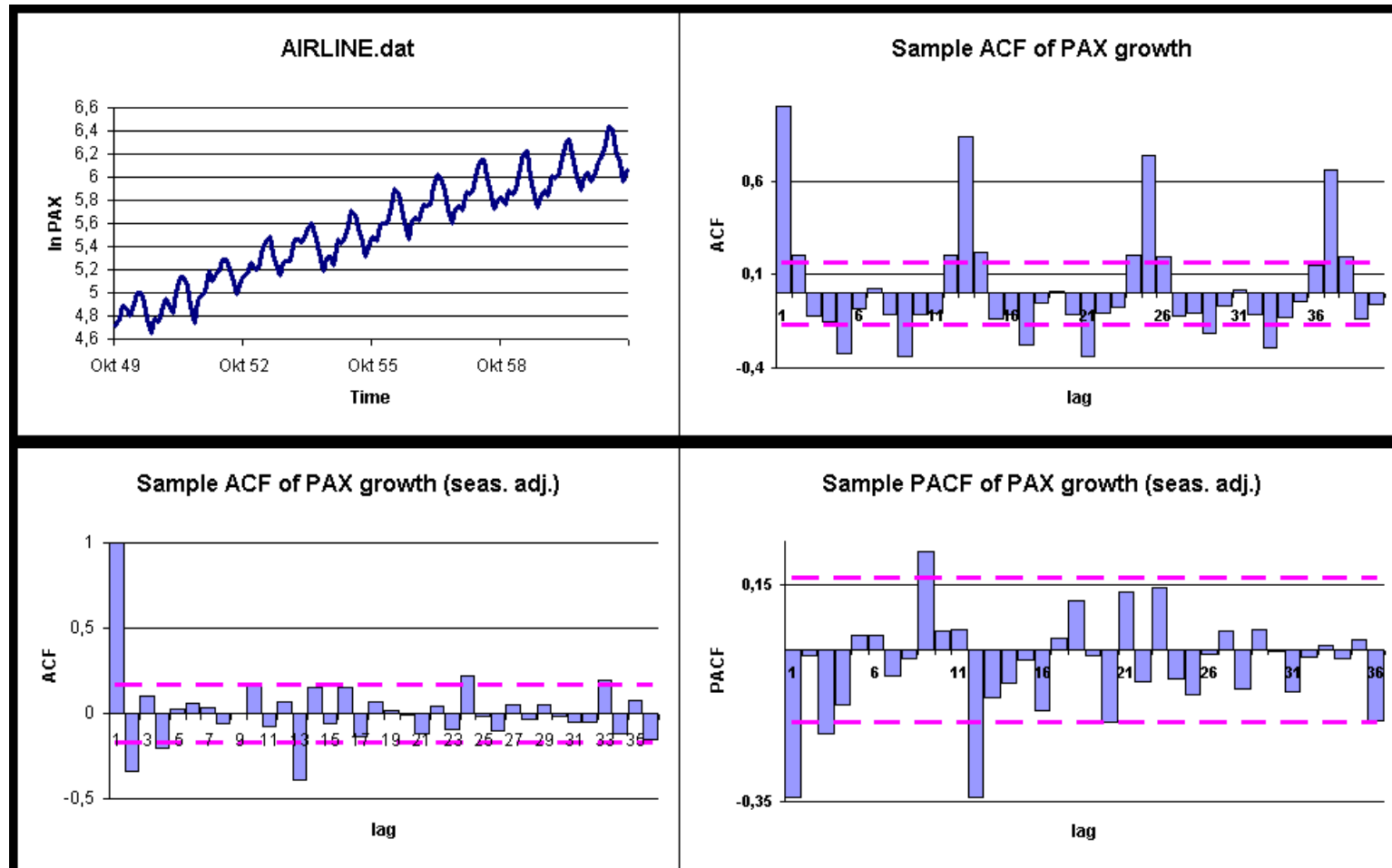
Time series analysis with MD*ReX

DAX 30 return analysis



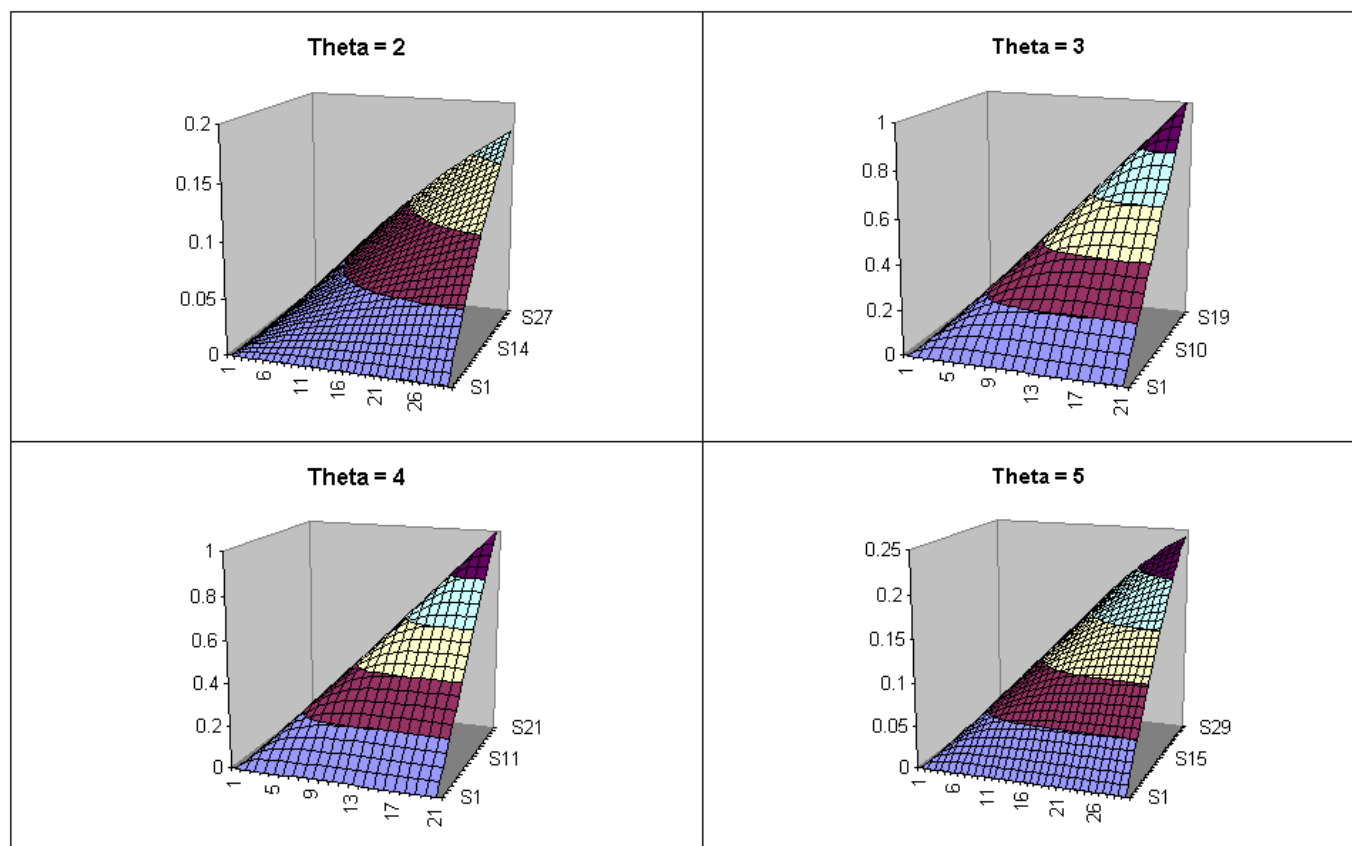
SARIMA analysis with MD*ReX

Seasonality analysis on Airline data



Copulas with MD*ReX

Gumbel-Hougaard, different parameters

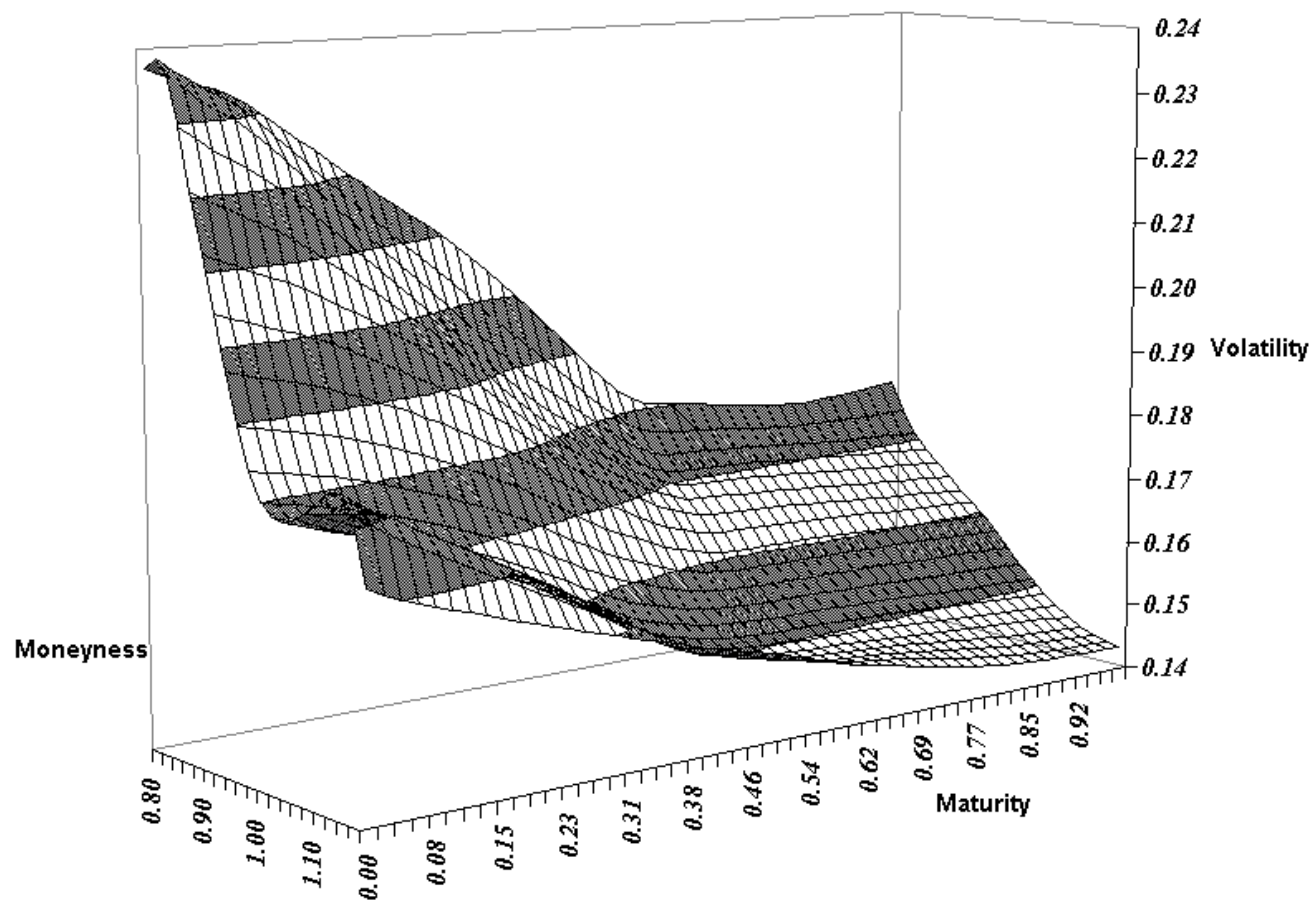


 XFGrexcopula1.xpl
  XFGrexcopula2.xpl
  XFGrexcopula3.xpl
  XFGrexcopula4.xpl



Implied Volatility analysis with MD*ReX

DAX30 IV

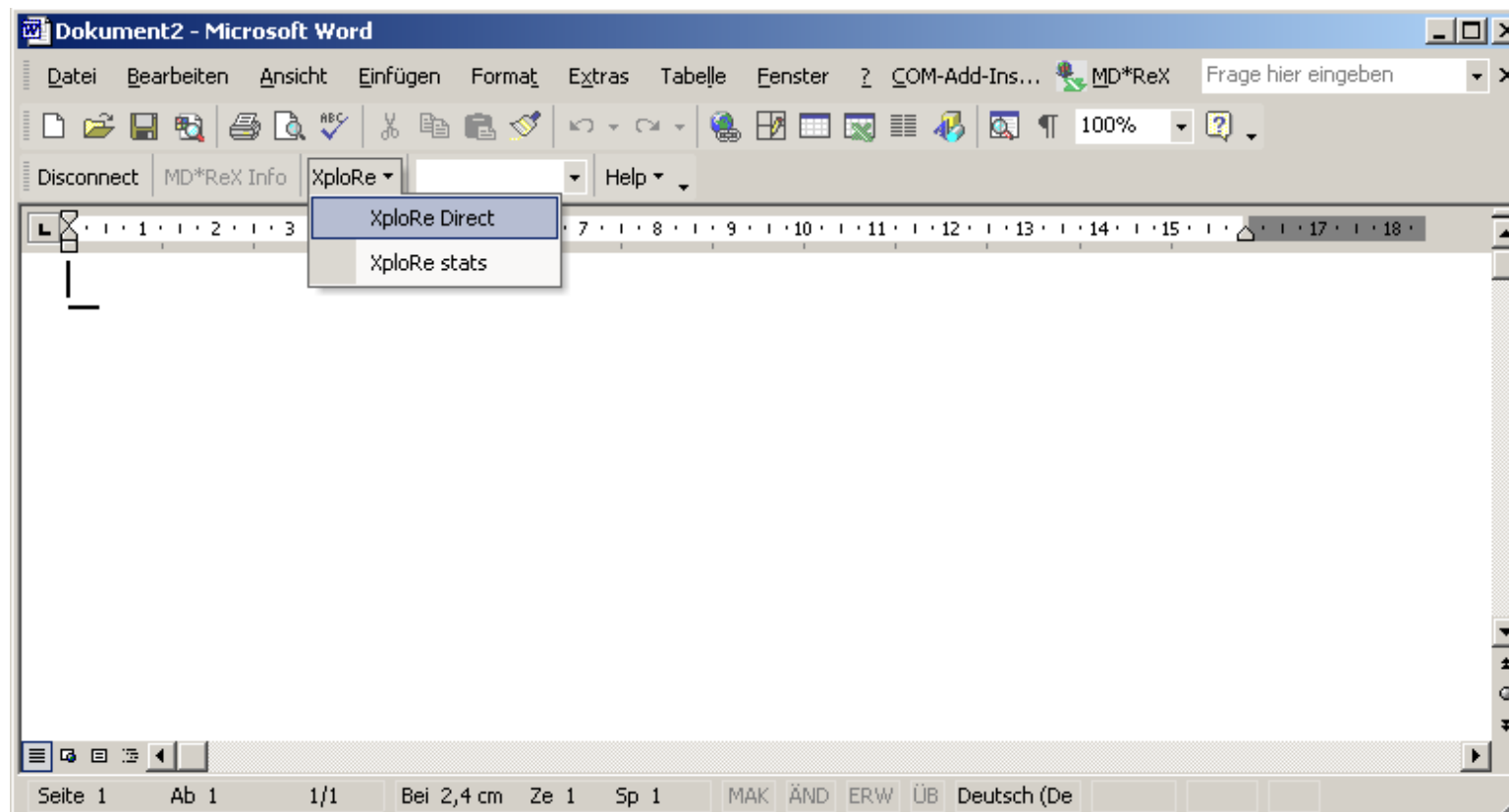


 XFGReXiv.xpl



MD*ReX in Word

COM add-in plugged into Word



XploRe – MD*Book Online

Your own course with MD*Book Online (MDBO)

MDBO - free web service for creation of e-books

MDBO supplies

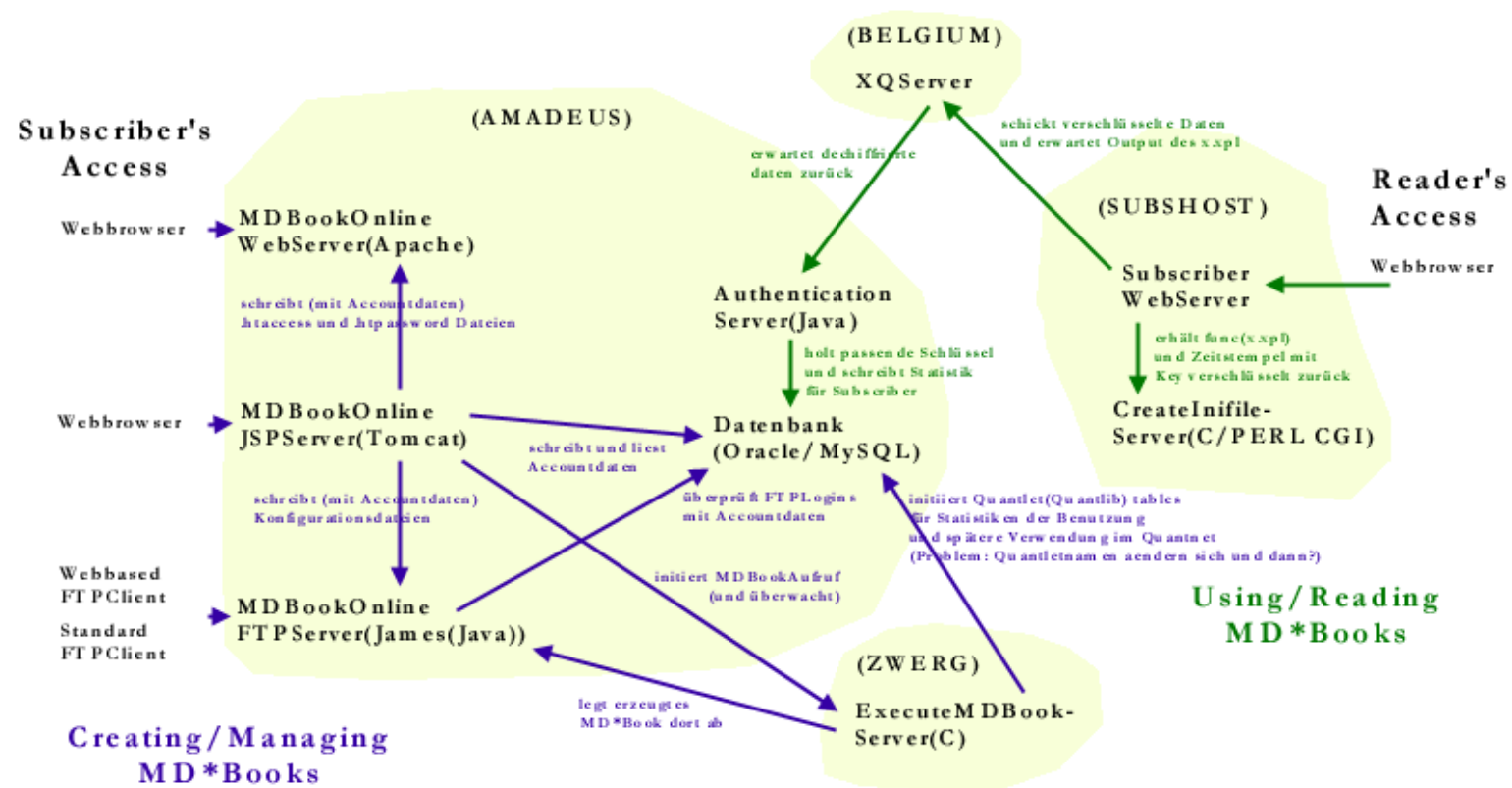
- creation of netbased interactive electronic books from files
- various electronic books formats: MD*Booklet, HTML, PDF, PS
- private working area for sources and e-books

MD*Booklet format:

- contents structured from didactic view (theory vs. examples)
- glossary, bookmarks, multiple choice tests
- embedded golden solution (Quantlet)
- customizable layout ...



XploRe – MD*Book Online



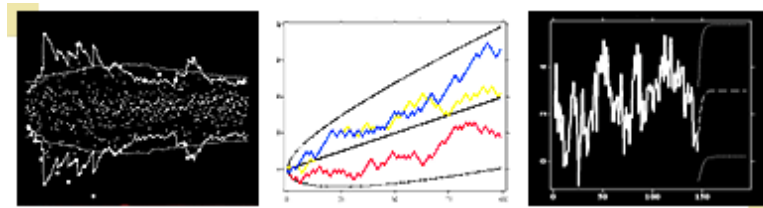
XploRe – Teaching Aids

- Interactive quantlets
- **Teachware** quantlets—interactive methods help understand the basic terms and methods of statistics (example: **tw1d**, **twlinreg**)
- **e-books**—interactive textbooks with examples using XQC in HTML, PDF, PS; published in cooperation with Springer



XploRe – Teaching Aid MD*Booklets

- Courses in MD*Booklet format
- included interactive parts based on XQC
 - MM*Stat (in many languages)
 - XploRe Introductory Course
 - Finance Introductory Course
 - Numerical Methods in Statistics
 - your own course!



XploRe – Teaching Aid MM*Stat

- interactive and flexibly usable Multimedia-Tool
- based on MD*Booklet technology
- 12 Units cover descriptive and inferential statistics
- Each Units has its own lessons
- Enhancements are: further information, interactive examples, MC questionnaire



MD*Tech – Business Models

eBooks ebook publishing platform 

MD*Base Statistical reference data sets

Download-Profiles Profiling of  downloads in cooperation with Springer

Consulting Net Based Data Analysis



XploRe – Documents and Resources

Slides to various courses

- Applied Multivariate Statistical Analysis
- Applied Quantitative Finance
- Microeconometrics
- Non- and Semiparametric Modelling
- Statistical Process Control for Financial Time Series
- Statistics of Financial Markets
- Statistische Methodenlehre I
- Statistische Methodenlehre II



XploRe – Documents and Resources

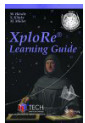
Tutorials on statistical methods and their implementation in [XploRe](#)

- Teaching Statistics
- Regression Models
- Data Exploration
- Finance
- Dynamic Statistical Systems
- Introduction to Econometrics
- Applications
- Programming



XploRe – Documents and Resources

Printed Handbooks published by Springer



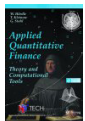
XploRe Learning Guide



XploRe Application Guide



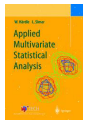
Einführung in die Statistik der Finanzmärkte



Applied Quantitative Finance



Computer-Aided Introduction to Econometrics



Applied Multivariate Statistical Analysis

