

# How to integrate R into MS Office\*

\*with MS Windows

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# Integrating R with MS Office

## Agenda

- Using R graphics in MS Office apps
- Exchanging data with Excel
  - Using clipboard for small data sets
  - Reading and writing Excel files with `xlsReadWrite`
- R and MS Office interfaces via `statconnDCOM` server
  - Embed R into VBA
  - Embed R into Excel with `RExcel`
  - Embed R into Word with `SWord`
  - Embed MS Office into R: `rcom`

# Using R graphics in MS Office

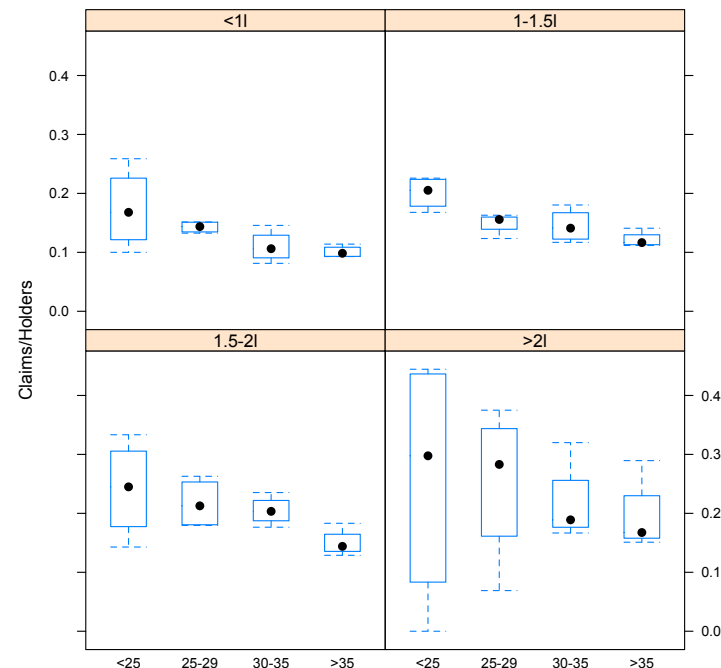
- Windows meta-files (WMF, or EMF (Enhanced meta-file) are the native vector graphic format for MS Windows
- High quality, and editable format for MS Office
- Create WMF-files in R with *win.metafile()*

```
data(Insurance, package="MASS")  
win.metafile(file="C:/Temp/Testplot.wmf")  
plot(Claims/holders ~ Age, data=Insurance)  
dev.off()
```

# Plotting panel plots in separate files

```
library(lattice)
data(Insurance, package="MASS")
P <- bwplot(Claims/holders ~ Age | Group,
data=Insurance, as.table=T, layout=c(1,1))
win.metafile(file="C:/Temp/Test%d.wmf")
print(P)
dev.off()
```

- Note the print statement for lattice plots
- Use “%d” in the file name
- Files are created for each screen



# Data exchange: Clipboard

Use clipboard for small data sets

- **Write R data into clipboard and paste into Excel**

```
data(Insurance, package="MASS")  
write.table(Insurance, file="clipboard",  
            sep="\t", na="", rownames=FALSE)
```

- **Copy in Excel and read into R**

```
read.table(file = "clipboard", sep="\t")
```

## Data exchange: Excel

The **xlsReadWrite** package provides functions to read and write Excel files natively

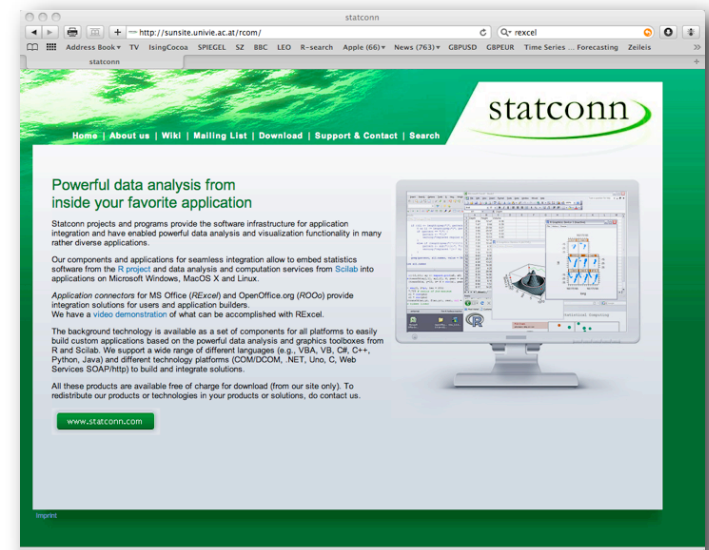
- **read.xls**( file, colNames = TRUE, sheet = 1, type = "data.frame", from = 1, rowNames = NA, colClasses = NA, checkNames = TRUE, dateTimeAs = "numeric", stringsAsFactors = default.stringsAsFactors() )
- **write.xls**(x, file, colNames = TRUE, sheet = 1, from = 1, rowNames = NA )

# R and MS Office Interfaces

We need:

- **statconnDCOM Server:** server which allows to integrate R into other applications.
- **rscproxy:** R package which is required for rcom and for the statconn (D)COM Server.
- **rcom:** R package allowing R and other apps to communicate
- **RExcel:** embeds R into MS Excel.
- **SWord:** embeds R into MS Word

statcom home page



<http://rcom.univie.ac.at/>

# Embed R into your VBA code

## StatConnector allows to use R within MS Office VBA

Add reference to **StatConnectorSrv** 1.1 Type Library

```
Sub FirstR()  
  Dim nrandom As Integer, x As Double  
  nrandom = 100  
  Set StaR = New StatConnector  
  StaR.Init ("R")  
  With StaR  
    .SetSymbol "n", nrandom  
    .EvaluateNoReturn ("x <- rnorm(n)")  
    .EvaluateNoReturn ("pdf(file='c:/Temp/Testplot.pdf')")  
    .EvaluateNoReturn ("hist(x)")  
    .EvaluateNoReturn ("dev.off()")  
    x = .Evaluate("mean(x)")  
  End With  
  Debug.Print x  
End Sub
```



# RExcel: Embed R into Excel

- RExcel allows to use R functions within Excel
- R function can be embedded and are interactive
- RExcel comes with example spreadsheets
- See example in ChainLadder package

**Example: Using RExcel Add-in to use R functions from Excel**  
 The RExcel Add-in is available from <http://sunsite.univie.ac.at/rcom/>

Input Triangle

5,012	8,269	10,907	11,805	13,539	16,181	18,009	18,608	18,662	18,834
106	4,285	5,396	10,666	13,782	15,599	15,496	16,169	16,704	
3,410	8,992	13,873	16,141	18,735	22,214	22,863	23,466		
5,655	11,555	15,766	21,266	23,425	26,083	27,067			
1,092	9,565	15,836	22,169	25,955	26,180				
1,513	6,445	11,702	12,935	15,852					
557	4,020	10,946	12,314						
1,351	6,947	13,112							
3,133	5,395								
2,063									

Using resteval and rapply

Mack.ByOrigin      Cell D22=RSetEval("Mack.ByOrigin","function(x) summary(MackChainLadder(x, tail=TRUE))\$ByOrigin")

Latest	Dev	Ultimate	IBNR	SE	CoV	
18,834	98%	19,169	335	267	80%	Cell D25:I34=(RApply(D22,D8:M17))
16,704	97%	17,158	454	288	63%	
23,466	96%	24,512	1,046	680	65%	
27,067	93%	29,214	2,147	807	38%	
26,180	89%	29,442	3,262	1,520	47%	
15,852	80%	19,848	3,996	2,049	51%	
12,314	68%	18,065	5,751	2,258	39%	
13,112	54%	24,447	11,335	5,459	48%	
5,395	33%	16,331	10,936	6,449	59%	
2,063	11%	18,730	16,667	25,005	150%	

# SWord: Embed R into Word

- SWord is similar to Sweave
- R code snippets are embed into the Word file
- R graphics work as well
- Not GNU! Read licence!
- See example in ChainLadder package

The screenshot shows the Microsoft Word interface with the SWord menu open. The menu options are: Start R, Stop R, Insert Code Snippet, Insert Figure, Insert Figure with Size, Insert Table, Insert Table with Formatting, Run SWord, Generate Document..., Show Properties..., and About SWord... An arrow points from the 'Run SWord' option to a text box that says 'Test your snippets with "Run SWord"'. Below the menu, the document content includes the title 'Using SWord to embed R into Word', a paragraph 'Here are two code snippets which highlight the concept:', and two R code snippets: `{<<>=library(MASS)}{@}` and `{<<results=hide,fig.width=4>>=plot(Claims/Holders ~ Age, data=Insurance)}`. An arrow points from the second snippet to a text box that says 'R code snippets'. Below the code is a box plot showing 'Claims/Holders' on the y-axis (ranging from 0.0 to 0.4) and 'Age' on the x-axis (with categories <25, 25-29, 30-35, >35). An arrow points from the bottom of the SWord menu to a text box that says 'Generate new Word file with R output'.

## *rcom*: Control MS Office from R

- The *rcom* R-package allows to communicate with MS Office. Here we create a PowerPoint slide with a chart.

```
data(Insurance, package="MASS")
myf <- tempfile()
win.metafile(file=myf)
  plot(Claims/holders ~ Age, data=Insurance)
dev.off()
library(rcom)
ppt <- comCreateObject("Powerpoint.Application")
comSetProperty(ppt, "Visible", TRUE)
myPresColl <- comGetProperty(ppt, "Presentations")
myPres <- comInvoke(myPresColl, "Add")
mySlides <- comGetProperty(myPres, "Slides")
mySlide <- comInvoke(mySlides, "Add", 1, 12)
myShapes <- comGetProperty(mySlide, "Shapes")
myPicture <- comInvoke(myShapes, "AddPicture", myf, 0, 1, 100, 10)
```

# Summary

- R graphics can easily be integrated and edited in MS Office applications
- Data exchange between R and Excel is fairly flexible
- R can be used as a server for MS Office
- Recommended:
  - Heiberger R. and Neuwirth E. R Through Excel, Springer Verlag 2009
  - RODBC to connect to data bases
- R and VBA code of this presentation attached:

R\_and\_MS\_Office.R 