

# **IT Notes**

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# 1 Purpose

This document is a guide for the installation of the R package *sstCalculation*.

# 2 Install R, Rstudio, Rtools and sstCalculation

This chapter explains the steps that are necessary to install the software programs (R, RStudio, Rtools) and the packages required to run *sstCalculation*.

#### 2.1 Required software programs

#### Step 1

Please go to this link to install the software programs R and RStudio

https://posit.co/download/rstudio-desktop/

and follow the instructions or contact your IT department.

#### Step 2

Use this link to install the software program Rtools

https://cran.r-project.org/bin/windows/Rtools/

#### 2.2 Required R packages

#### Step 1

Start RStudio. Select the tab Packages on the right and click on Install. A dialog box opens.



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onsole Terminal × Jobs ×	Environment History	Connections Tutorial		-
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version 4.0.3 (2020-10-10) "Burny-Hunnies Freak Out" pyright (C) 2020 The R Youndation for Statistical Computing attorn: x88_d-Mei-Hingh27X46 (d=3-1t) ist freis Software und kommt Onki J60LICHE GARAVITE. e sind eingeladen, es unter bestimmten Bedrigungen weiter zu verbr h. pen Sie Ticense()'or 'licence()' für Details dazu.	R - 🖣 Global Environm	errot - Environment is empty	Q,	
ist ein Gemeinschaftsprojekt mit vielen Beitragenden. ippen Sie 'contributors()' für mehr Information und 'citation()', zu erfähren, wie R oder R packages in Publikationen zitiert werde	Files Plots Packages	Help Viewer	Q	
inen.	Nettro	Description	Version	
ippen Sie 'demo()' für einige Demos, 'help()' für on-line Hilfe, od help.start()' für eine HTML Browserschnittstelle zur Hilfe. ippen Sie 'q()', um R zu verlassen.	en User Library assertthat base6fenc	Easy Pre and Post Assertions Tools for base61 encoding	0.2.1	00
1	D BH	Boost C++ Header Files	1.75.0 0	0.0
•	🗋 bslib	Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'	0.2.4	0 0
	cachem	Cache R Objects with Automatic Pruning	1.0.4	0 0
	cellranger	Translate Spreadsheet Cell Ranges to Rows and Columns	1.1.0	0
	🗆 cli	Helpers for Developing Command Line Interfaces	2.3.1	0.0
	commonmark	High Performance CommonMark and Github Markdown Rendering in R	1.7	0.0
	crayon	Colored Terminal Output	1.4.1	0.0
	crosstalk	Inter Widget Interactivity for HTML Widgets	1.1.1	0.0
	data.table	Extension of 'data.frame'	1.14.0	0 0
	digest	Create Compact Hash Digests of R Objects	0.6.27	0
	<ul> <li>ellipsis</li> </ul>	Tools for Working with	0.3.1	0

Choose *Repository (CRAN)*, enter one of the required R packages and click on *Install* (the dialog box is shown for *data.table* in *FINMA\_Repository*).

Install Packages						
Install from: Repository (FINMA_Repository)	<ul> <li>Configuring Repositories</li> </ul>					
Packages (separate multiple with sp	bace or comma):					
data.table						
data.table rary:						
C:/Users/F11271/Documents/R/w	in-library/4.0 [Default] ▼					
☑ Install dependencies						
	Install (Install Cancel					

After successful installation, *data.table* appears in the list of packages of the user library.



Files	Plots Packages H	elp Viewer		e	_
0	nstall 💽 Update		Q		
	Name	Description	Version		
User	Library				
	assertthat	Easy Pre and Post Assertions	0.2.1		3
	base64enc	Tools for base64 encoding	0.1-3	•	3
	BH	Boost C++ Header Files	1.75.0-0	•	3
	bslib	Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'	0.2.4	•	3
	cachem	Cache R Objects with Automatic Pruning	1.0.4	•	3
	cellranger	Translate Spreadsheet Cell Ranges to Rows and Columns	1.1.0	•	3
	cli	Helpers for Developing Command Line Interfaces	2.3.1	•	3
	commonmark	High Performance CommonMark and Github Markdown Rendering in R	1.7		3
	crayon	Colored Terminal Output	1.4.1	•	3
	crosstalk	Inter-Widget Interactivity for HTML Widgets	1.1.1	•	3
	data.table	Extension of `data.frame`	1.14.0	•	3
	digest 🖑	Create Compact Hash Digests of R Objects	0.6.27		3
	ellipsis	Tools for Working with	0.3.1	•	3
$\frown$	avaluata	Darsing and Evaluation Tools that Dravida Mara Datails than	0.1.4	AT A	<u>.</u>

Repeat step 2 for the packages readxl, openxlsx, MASS, shinydashboard.

#### Step 4

Install sstCalculation according to section 3.2 in chapter 3.

# 3 R package sstCalculation

The R package *sstCalculation* for the calculation of the SST Ratio consists of the following programs:

- 1. the standalone R package sstCalculation itself
- 2. a GUI Dashboard started by a web browser.

The R package *sstCalculation* requires the programs R, RTools and RStudio as well as other R packages, as described in chapter 2.

#### 3.1 System requirements

An Intel-compatible machine, with at least 4GB RAM. However, 8GB are recommended.

The *sstCalculation* R package is compatible and has been tested with Windows 7, Windows 8.1 and Windows 10. The *sstCalculation* R-package can also run on other Unix based operating systems supported by R. However, it has been designed only for the listed Windows versions.



# 3.1.1 Required software programs

The following software programs need to be pre-installed on the user's machine.

Software name	Minimum version		
R	3.3.0		
Rtools	3.4		
RStudio	1.0.136		

Remark: RStudio is necessary for launching the GUI.

#### 3.1.2 Required R packages

The *sstCalculation* R package requires the following R packages to be installed in the user's R package library. Package names in italic are pre-installed within R.

Package name	Minimum version
data.table	1.10.4-3
readxl	1.0.0
openxlsx	4.0.17
MASS	None
shiny	1.0.5
shinydashboard	0.6.1
cellranger	None
Rcpp	0.11.6
tibble	1.1
httpuv	1.3.5
mime	0.3
jsonlite	0.9.16
xtable	None
digest	None
htmltools	0.3.5
R6	2.0
sourcetools	None
rematch	None
cli	None
crayon	None
pillar	None
rlang	None
assertthat	None
utf8	1.1.3



stats	-
utils	-
tools	-
methods	-
grDevices	-
graphics	-

#### 3.2 Installation

Above software programs and R packages must be installed before the installation of the R package *sstCalculation*.

#### Step 1

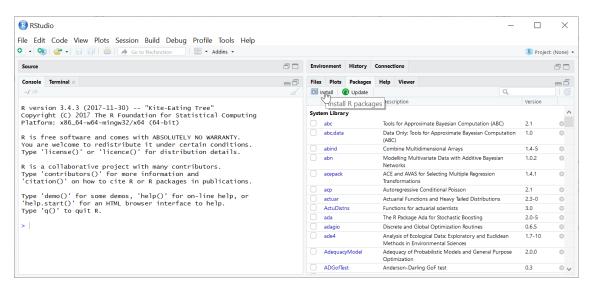
Download the archive *sstCalculation250tar.zip* from the FINMA Website here:

https://www.finma.ch/de/ueberwachung/versicherungen/spartenuebergreifendeinstrumente/schweizer-solvenztest-sst/

Unzip the archive and store the R package *sstCalculation\_2.5.0.tar.gz* on your local drive.

#### Step 2

Start RStudio. Select the tab Packages on the right and click on Install. A dialog box opens.



#### Step 3

Click on *Browse*, search for the R package *sstCalculation\_2.5.0.tar.gz* on your local drive and click *Install* in the dialog box.



Install Packages	
Install from: Package Archive File (.zip; .tar.gz)	~
Package archive:	
/Documents/sstCalculation_2.5.0.tar.gz	Browse
Install to Library:	
C:/Users/f11589/RLibrary/R/win-library/4.3 [Default]	] ~
Install	Cancel

Wait a moment. This feedback is displayed in the console down left.

Console Terminal 🛪 Background Jobs 🛪
R R4.3.1 · C;/Users/f11589/Documents/sstCalculation/ <sup>⇒</sup>
You are welcome to redistribute it under certain conditions. Type 'license()' or 'licence()' for distribution details.
R is a collaborative project with many contributors. Type 'contributors()' for more information and 'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help. Type 'q()' to quit R.
<pre>&gt; install.packages("C:/Users/f11589/Documents/sstCalculation_2.5.0.tar.gz", repos = NULL, type = "source") Installation du package dans 'C:/Users/f11589/RLibrary/R/win-library/4.3' (car 'lib' n'est pas spécifié) * installing *source* package 'sstCalculation' ** using staged installation ** R ** inst ** inst ** byte-compile and prepare package for lazy loading</pre>
<pre>** help *** installing help indices *** building package indices ** building package indices ** installing vignettes ** testing if installed package can be loaded from temporary location ** testing if installed package can be loaded from final location ** testing if installed package keeps a record of temporary installation path * DONE (sstCalculation) &gt;  </pre>

The installation is completed successfully when everything is displayed in black. Otherwise, for system requirements please refer to above chapter.

### Step 5

Enter the command *library(sstCalculation)* into the console to load the package.

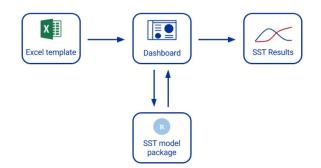


> library(sstcalculation)
sstCalculation 2.5.0
Copyright (c) 2023 Swiss Financial Market Supervisory Authority FINMA
Swiss Financial Market Supervisory Authority FINMA
Laupenstrasse 27
CH-3003 Bern
info@finma.ch
This program comes with ABSOLUTELY NO WARRANTY.
This is free software, and you are welcome to redistribute it
under certain conditions.
Type sstDashboard() and go to the 'Legal Notices' Tab for more details about the license.
Type sstIntroduction() to open an introduction to the sstCalculation package.
Type sstNews() to open an overview of the changes to the sstCalculation package.

The GUI is started via the command *sstDashboard()*. The results are exported to the folder *Documents* by default. A different folder can be defined, see *?sstDashboard*.

# 4 Run the Dashboard

The following picture shows the exchange between the Excel template, the SST dashboard and the R package.



#### Step 1

The SST Dashboard is started and a browser opens with the dashboard. Click on Legal Notices for the legal notices related to the use and transfer of the package.



SST Dashboard		_	٥	×
SST Dashboard				
🚯 Dashboard				_
④ Legal Notices	Input SST Template(s) Browge No portfolio selected			
	Seed Number of simulations			]
	Run tool			
🔳 🔎 📄 🔮 🍣	> 🔈 🙆 🙋 🔟 e 💷 🔽 🛛 🗠 🛸	🎵 🕼 DEU	09: 23.10.	

Upload the filled SST Template.

Öffnen		$\times$
← → • ↑ 🖡 « neues SST Tool > 2020_10_23 v 😈 "2020_10_2	23" durchsuchen	٩
Organisieren • Neuer Ordner		?
■ Bilder 🖈 ^ 🗌 Name	Änderungsdatum	1
2 Technische Bes	23.10.2020 09:29	١
<ul> <li>7 Standardmode</li> <li>9 Standardmode</li> <li>2020_10_14</li> </ul>		
SU279583		>
Dateiname: SST Template.xlsx   Alle Dateien  Öffner  G		~ n

Users of the standard model for participations select all needed SST Templates.

# Step 3

Seed and number of simulations are loaded from the *SST Template*. Number of simulations for solvency calculation purposes should be 1 million. Click on *Run tool* to start the SST calculation.



Input SST	Template(s)			
Browse SS	ST Template.xlsx			
Seed			Numbe	r of simulations
1			1000000	
		Run to	ool	-fm

The *SST Template* is parsed. Specific error messages are displayed in case any inputs are incomplete or incorrect.

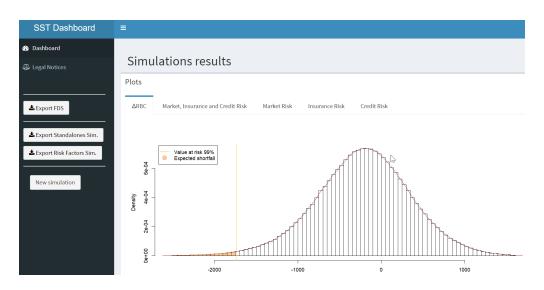
# Step 5

The simulations for the calculation of the SST ratio are generated. This step can take a few minutes.

#### Step 6

Once the simulations are generated and the results for the *Fundamental Data Sheet* are calculated, a graphic is displayed on the screen showing the most important results and marginal distribution functions.







Click on the box Export FDS to download the results for the Fundamental Data Sheet.



# Step 8

An Excel file *Fundamental\_Data.xlsx* containing the results is saved.