



RPGM

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R

A powerful language, but...

- Cannot create user-friendly interfaces for non-R users
- Difficult to create professional reports

RPGM

Main features

- Creates user-friendly interface for end-users
- Creates PDF reports using LaTeX technology
- Deals with Excel spreadsheets

RPGM

How it works

- RPGM is separated into two softwares:
- An « Editor », to develop RPGM programs (used by actuaries)
- A « Client », to execute RPGM programs (used by end-users)

RPGM Editor

The screenshot displays the RPGM Editor interface with the following components:

- File Explorer:** Shows a project structure with files like `Inputs Example`, `Classeur1.xlsx`, `E-Estimation.R`, `E-ExcelGenerator.R`, `E-Triangles.R`, `F-Triangle.R`, `IBNR.ppro`, `Importation.R`, `Input.pgui`, `Parameters.pgui`, `Report.prep`, `Results.pgui`, and `Results_template.xlsx`.
- Code Editor:** Contains R code for `colSums`, `Delta`, `DevelopTriangle`, `meanw`, and `varw` functions. The `return(colSums(N)/rev(cumsum(E)))` line is highlighted.
- Documentation Panel:** Shows the documentation for `colSums {Matrix}`, including a description: "Form Row and Column Sums and Means" and usage examples for `colSums`, `rowSums`, `colMeans`, and `rowMeans`.
- R Console:** Displays the output of the code execution, showing a table of data for "Mc3 Mississippi chilled" with values ranging from 95 to 1000 and 10.6 to 19.9.

```
1 #The IBNVR coefficient
2 Lambda <- function(N, E)
3   return(colSums(N)/rev(cumsum(E)))
4
5 #The IBNER coefficient
6 Delta <- function(D, X, n = NULL)
7 {
8   if(is.null(n))
9     n <- nrow(X)
10
11  #Locally removing the diagonal for the delta computation
12  X[row(X) + col(X) == n + 1L] <- 0
13
14  return(colSums(D[, -1L])/colSums(X[, -n]))
15 }
16
17 DevelopTriangle <- function(X, lambda, delta, E)
18 {
19   tild.X <- X
20   for(i in 2L:nrow(X))
21     tild.X[(n-i+2L):n, i] <- lambda[i]*E[(n-i+2L):n]+ (1-delta[i-1L]
22     return(tild.X)
23 }
24
25 meanw <- function(tild.X, E)
26   return(sum(tild.X[, ncol(tild.X)])/sum(E))
27
28 varw <- function(tild.X, E, lambda)
29   return(sum((tild.X[, nrow(tild.X)]-lambda*E)^2/(lambda*E))/(nrow(X)
30
31
```

Line	Mc3	Mississippi	chilled	Value 1	Value 2
78	Mc3	Mississippi	chilled	95	10.6
79	Mc3	Mississippi	chilled	175	18.0
80	Mc3	Mississippi	chilled	250	17.9
81	Mc3	Mississippi	chilled	350	17.9
82	Mc3	Mississippi	chilled	500	17.9
83	Mc3	Mississippi	chilled	675	18.9
84	Mc3	Mississippi	chilled	1000	19.9

> Enter a command...
R started

RPGM Client

Easy IBNR [RPGM]

Easy IBNR 1

Sequence

- Input
- Import
- Loading functions
- Computing coefficients
- Input parameters
- Estimation
- Report
- Model
- Excel Generation
- End

Input GUI

Input N
The IBNYR

Input D
The INBER

Input E
The exposure

Model for estimating the IBNR Schnieper
 ChainLadder

RPGM Editor

- Complete IDE (*Integrated Development Environment*) solution
- Easy to use and user-friendly
- Powerful R script editor with intuitive R help
- Wizards for creating interfaces, sequences and reports with no knowledge

RPGM Client

- Loads and executes a program from the RPGM Editor
- Displays interfaces, executes R scripts and generates reports
- No need to know about R to use it
- Simple and clean, user-friendly and very fast

Lot of controls (text inputs, numbers, files, dropdown lists, radioboxes...)
Can be created/modified dynamically from R

The screenshot displays the R Package Generator (RPGM) Editor window for a package named 'Input.pgui'. The interface is divided into several panels:

- File explorer:** Shows a tree view of the project files, including 'Inputs Example' (a folder) and various R scripts like 'E-Estimation.R', 'E-ExcelGenerator.R', 'E-Triangles.R', 'F-Triangle.R', 'IBNR.ppro', 'Importation.R', 'Input.pgui', 'Parameters.pgui', 'Report.prep', 'Results.pgui', and 'Results_template.xlsx'.
- GUI fields:** A list of GUI fields to be added to the package. The fields are: 'H1 T1 -', 'N_path - Input N' (selected), 'D_path - Input D', 'E_path - Input E', and 'ModelIBNR - Model for estimating the IBNR'. There are 'Add a field' and 'Remove selected' buttons at the bottom.
- Field properties:** A panel for configuring the selected field. It includes a 'Type' dropdown menu (set to 'File'), 'ID', 'Label', 'Help text', 'Value', and 'Required' (checked) options.
- Sequencer:** A panel showing a list of GUI fields in the order they will be generated, including 'Input.pgui - Input', 'Importation.R - Import', 'F-Triangle.R - F-Triangle', 'E-Triangles.R - E-Triangles', 'Parameters.pgui - Parameters', 'E-Estimation.R - E-Estimation', 'Report.prep - Report', 'Results.pgui - Results', and 'E-ExcelGenerator.R - Excel'. An 'Edit' button is present.
- R Console:** Shows the R session output: '> [Starting R]', 'R version 2.15.2 (2012-10-26)', 'starting httpd help server ...done', and '>'. A prompt '> Enter a command...' is visible at the bottom.

Sequence and Error management

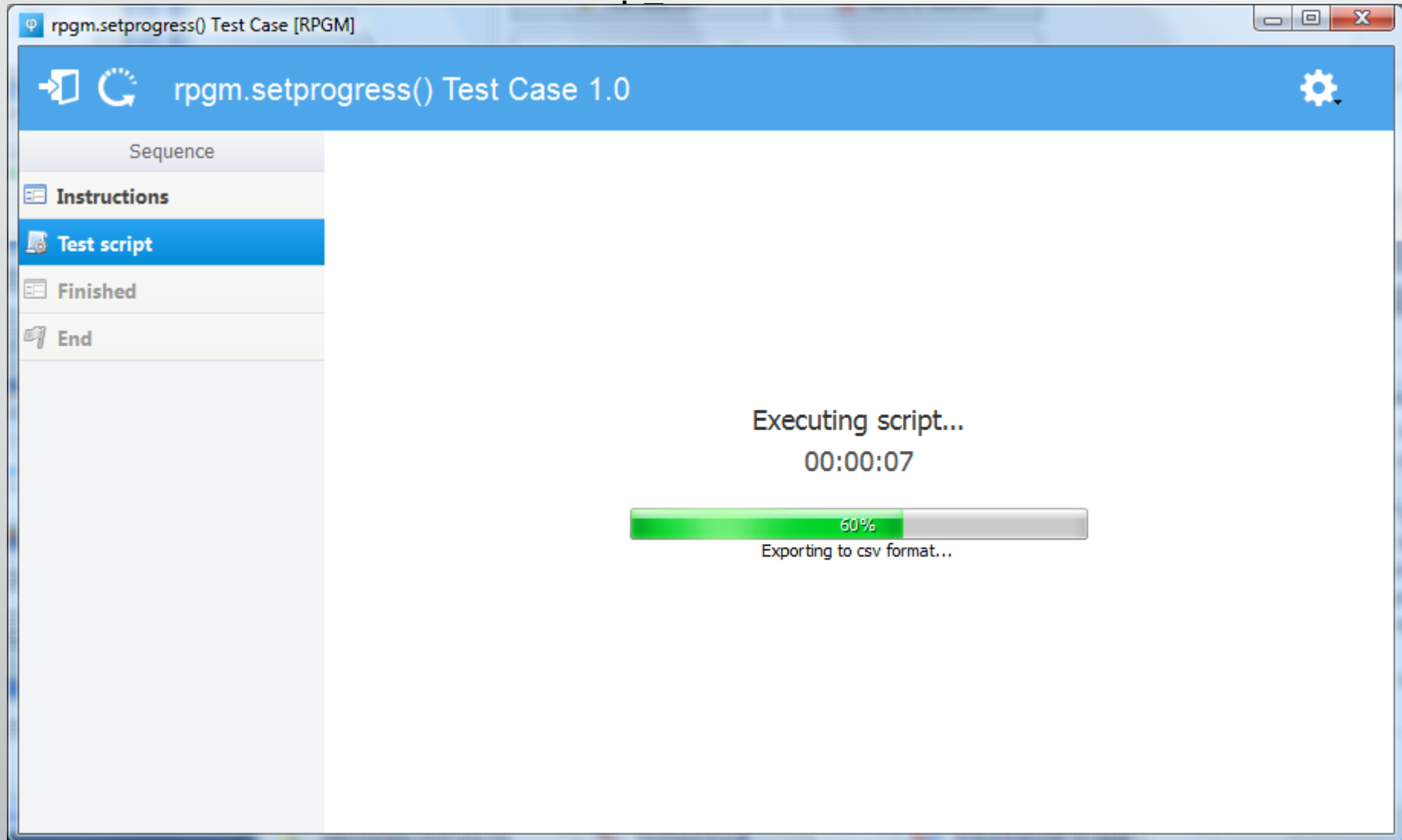
The screenshot shows the 'Easy IBNR 1' application window. The left sidebar contains a sequence of steps: Sequence, Input (selected), Import, Loading functions, Computing coefficients, Input parameters, Estimation, Report, Model, Excel Generation, and End. The main area is titled 'Input GUI' and contains three input fields, each with a 'Choose file...' button:

- Input N:** Inputs Example/N.txt. A red error message is displayed below: 'Unvalide path or data format' and 'The IBNYR'.
- Input D:** object/Inputs Example/D.txt.
- Input E:** utes Example/Exposure.txt.

Below the input fields, there is a label 'Model for estimating the IBNR' with two radio button options: 'Schnieper' (selected) and 'ChainLadder'.

At the bottom right, a yellow warning triangle icon is next to the text 'The form contains some errors.' and a 'Submit' button with a green checkmark icon.

Timerbar with a custom message during execution



RPGM

PDF Report

- No need to know what LaTeX is, even for the developer...
- ... but if you know it, you can type raw LaTeX commands anywhere
- Can insert titles, texts, tables, charts created by R, equations...

PDF Editor

Report.prep - IBNR - RStudio Editor

File Edit Project R Tools View Help

File explorer All projects Report.prep

File explorer

- Inputs Example
 - E-Estimation.R
 - E-ExcelGenerator.R
 - E-Triangles.R
 - F-Triangle.R
 - IBNR.ppro
 - Importation.R
 - Input.pgui
 - Parameters.pgui
 - Report.prep
 - Results.pgui
 - Results_template.xlsx

Report properties Title page

Elements of report:
(Drag and drop to reorder)

- H1 Introduction
- This report contains the sever...
- H1 Tableaux
- paste("The data are given with...
- round(tild.X, 0)
- N
- D

Add element Remove selected

Element properties

Type: Table

- H1 Title
- Simple text / LaTeX expression
- Table
- Image
- Equation
- New page
- Vertical space

First cell text: X

Caption: IBNR with developmer

ID:

Sequencer

Sequencer

Edit

Input.pgui - Input

Importation.R - Import

F-Triangle.R - F-Triangle

E-Triangles.R - E-Triangles

Parameters.pgui - Paramete

E-Estimation.R - E-Estimatio

Report.prep - Report

Results.pgui - Results

E-ExcelGenerator.R - Excel

R Console

```
> [Starting R]
R version 2.15.2 (2012-10-26)
starting httpd help server ...done
>
```

> Enter a command...

Ready

The final output generated by the end-user with the Client

Report.pdf - Adobe Reader

Fichier Edition Affichage Fenêtre Aide

2 (3 sur 4) 78,4%

Signets

- Introduction
- Tableaux
- Inputs and Development

Introduction

This report contains the several results computed with Easy IBNR.

1 Tableaux

The data are given with 6 years.

N	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6
Year 1	250	400	410	410	420	415
Year 2	280	370	370	370	370	366
Year 3	240	390	410	400	495	400
Year 4	200	280	330	327	332	328
Year 5	300	460	484	480	486	480
Year 6	310	460	485	481	487	481

Table 1: IBNR with developments

N	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6
Year 1	250	50	0	0	5	0
Year 2	280	10	10	0	0	0
Year 3	240	80	0	0	0	0
Year 4	200	30	20	0	0	0
Year 5	300	40	0	0	0	0
Year 6	310	0	0	0	0	0

Table 2: IBNYR

D	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6
Year 1	0	100	10	0	-5	5
Year 2	0	80	10	0	0	0
Year 3	0	70	20	10	0	0
Year 4	0	50	30	0	0	0
Year 5	0	120	0	0	0	0
Year 6	0	0	0	0	0	0

Table 3: IBNER

Report.pdf - Adobe Reader

Fichier Edition Affichage Fenêtre Aide

3 (4 sur 4) 78,4%

2 Inputs and Development

The Figure 1 is the corresponding representation.

2

Representation of the average ratio

Index	Z
1	4.2
2	3.5
3	3.7
4	2.9
5	4.0
6	3.8
7	3.4

Figure 1: The évolution of the claim ratio and the mean estimator for next year

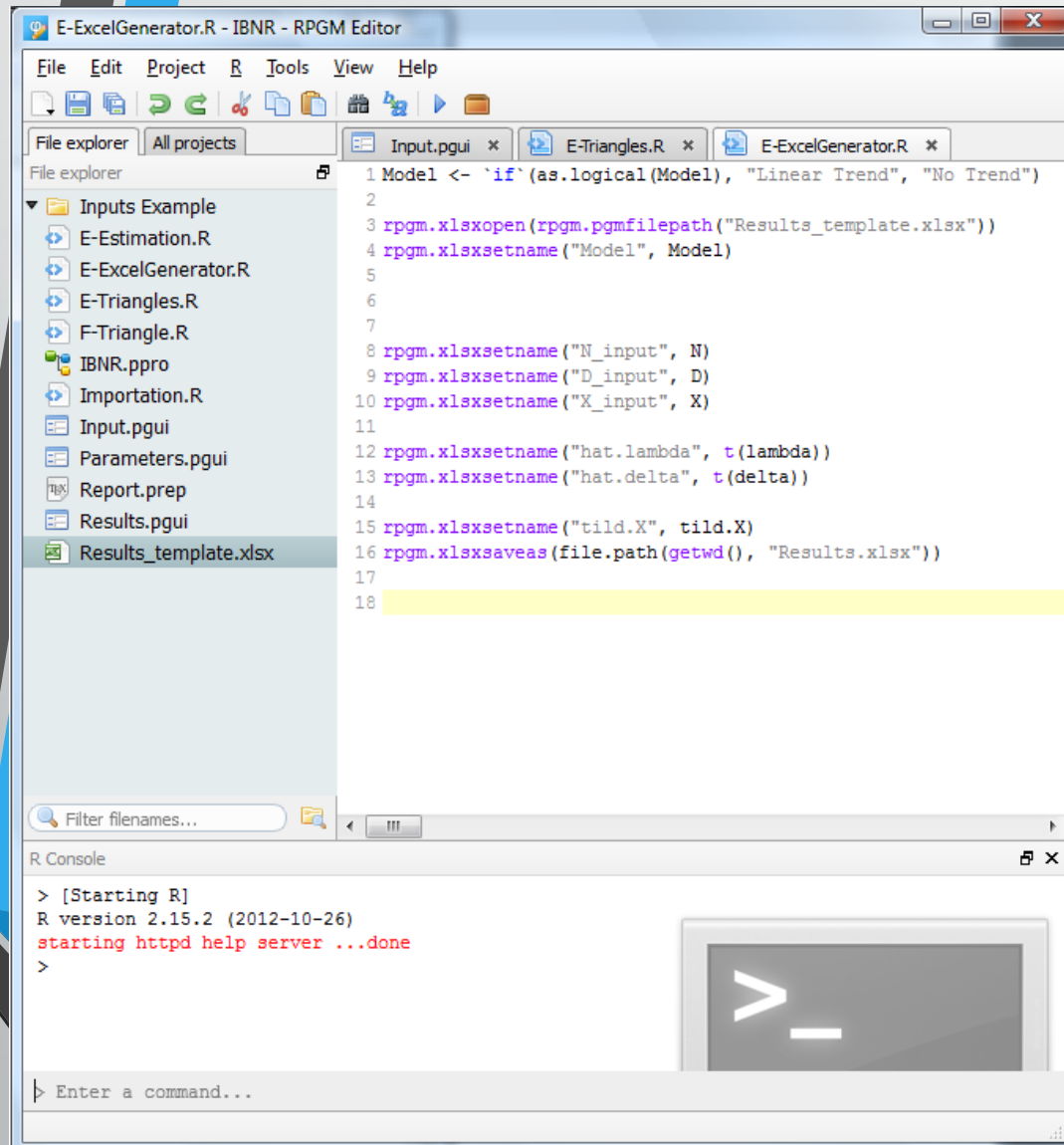
RPGM

Spreadsheets

An easy way to work with spreadsheets

- Create a spreadsheet and name the cells corresponding to your results
- Tell RPGM to write R values to specific cells
- You will automatically get your Spreadsheets with your results

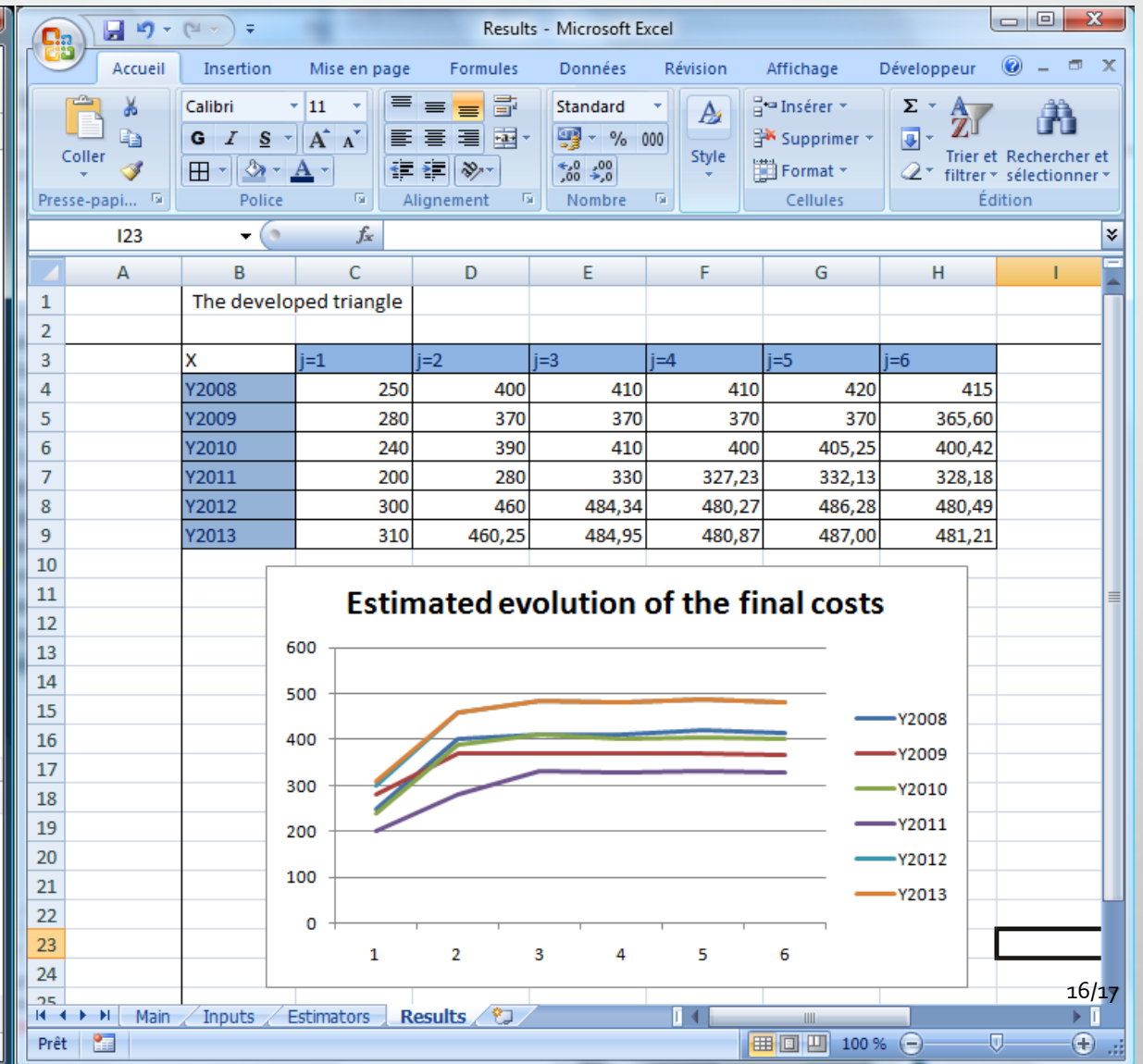
Excel spreadsheet in the Editor and as an output in the Client



The screenshot shows the RStudio Editor window titled "E-ExcelGenerator.R - IBNR - RPGM Editor". The R console at the bottom displays the following output:

```
> [Starting R]
R version 2.15.2 (2012-10-26)
starting httpd help server ...done
>
```

```
1 Model <- `if`(as.logical(Model), "Linear Trend", "No Trend")
2
3 rpgm.xlsxopen(rpgm.pgmfilepath("Results_template.xlsx"))
4 rpgm.xlsxsetname("Model", Model)
5
6
7
8 rpgm.xlsxsetname("N_input", N)
9 rpgm.xlsxsetname("D_input", D)
10 rpgm.xlsxsetname("X_input", X)
11
12 rpgm.xlsxsetname("hat.lambda", t(lambda))
13 rpgm.xlsxsetname("hat.delta", t(delta))
14
15 rpgm.xlsxsetname("tild.X", tild.X)
16 rpgm.xlsxsaveas(file.path(getwd(), "Results.xlsx"))
17
18
```



The screenshot shows the Microsoft Excel window titled "Results - Microsoft Excel". The spreadsheet contains the following data:

	A	B	C	D	E	F	G	H	I
1		The developed triangle							
2									
3		X	j=1	j=2	j=3	j=4	j=5	j=6	
4		Y2008	250	400	410	410	420	415	
5		Y2009	280	370	370	370	370	365,60	
6		Y2010	240	390	410	400	405,25	400,42	
7		Y2011	200	280	330	327,23	332,13	328,18	
8		Y2012	300	460	484,34	480,27	486,28	480,49	
9		Y2013	310	460,25	484,95	480,87	487,00	481,21	

Below the spreadsheet is a line chart titled "Estimated evolution of the final costs". The chart shows the estimated final costs for each year from 2008 to 2013 across six categories (j=1 to j=6). The Y-axis represents the cost (0 to 600), and the X-axis represents the category (1 to 6). The legend indicates the years: Y2008 (blue), Y2009 (red), Y2010 (green), Y2011 (purple), Y2012 (teal), and Y2013 (orange).

The chart shows that the costs generally increase over time for most categories, with Y2013 consistently having the highest costs and Y2011 the lowest. The costs for Y2012 and Y2010 are relatively stable across categories.

Software integration

- One version of R and MiKTeX installed by network
- Can use every version of R and MiKTeX
- Once the installation is done, no maintenance for IT