Reserve Variability Calculations
Chain Ladder, R, and Excel

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CANE Meeting

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Overview

Love/Hate Relationship?

Love/Hate Relationship?

Powerful Combination

http://www.r-project.org/

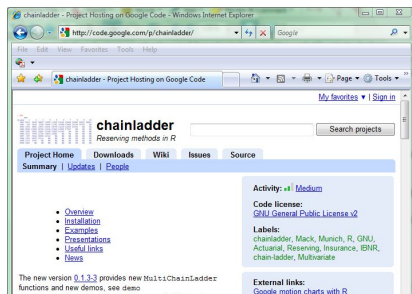http://rcom.univie.ac.at/

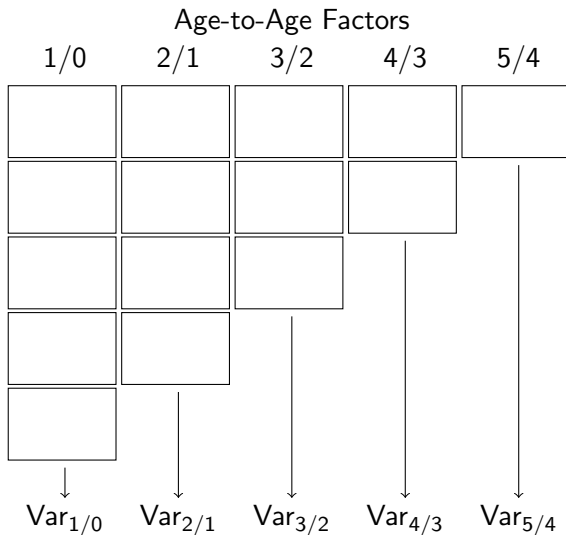## ChainLadder Package hosted on Google Code

- Reserving functions
    - MackChainLadder
    - MunichChainLadder
    - BootChainLadder
    - MultiChainLadder
- Utility functions for triangles
- Visualization
- Demos

Project web page:

```
http://code.google.com/p/chainladder/
```

Mack Chain Ladder Method

Age-to-Age Factors

Mack Chain Ladder in Excel and **R**

Example in Excel and **R**.

The Excel workbook used in the presentation is attached to this PDF file. In Adobe Reader go to `View>Navigation Panels>Attachments` to see the attachments.
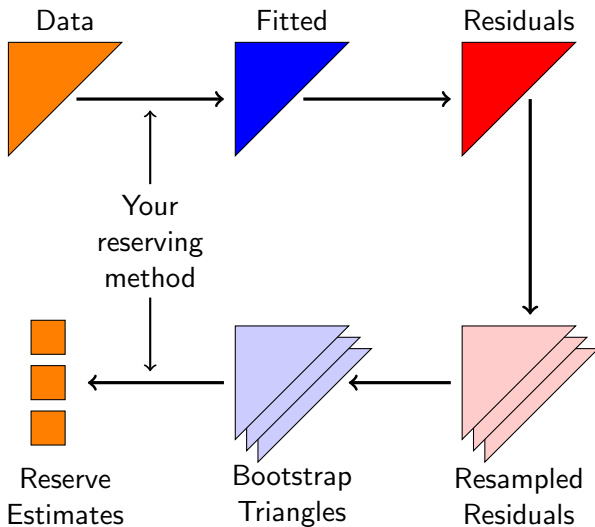
Mack Chain Ladder advantages/disadvantages

Advantages:

1. Easy to explain
2. Reserve variability linked to LDF variability
3. Easy to implement
4. Excel keeps track of the calculation dependencies

Disadvantages:

1. Sparse triangles can give you wild answers
2. Variance of tail factor hard to determine
3. Method provides only mean and variance

Bootstrap Method

Bootstrap Chain Ladder in **R**

Example in **R**.

The R script used in the presentation is attached to this PDF file. In Adobe
Reader go to View>Navigation Panels>Attachments to see the attachments.

Bootstrap advantages/disadvantages

Advantages:

1. Non-parametric
2. Easy to apply and computationally simple
3. Empirical distribution of reserves

Disadvantages:

1. Computationally intensive (minor concern)
2. Not clear how many replications to do
3. Hard to reproduce answers (if you are not careful)
4. Tail factor variability

Integrating MS Office and **R**

1. Easy to use **R** graphics in MS Office
2. Easy to exchange data via the clipboard
3. **xlsReadWrite** package provides functions to natively read and write Excel files
4. Easy to connect with databases (ODBC)
5. **RExcel** and **SWord** embed **R** into Excel and Word
6. With **StatConnector** we can use **R** within MS Office VBA
7. With **rcom** we can manipulate MS Office from **R**