Reserving Auto Insurance

Using Chain-Ladder Algorithm

Presentation Plan

- ➢ Introduction

- ➢ The Data

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Introduction

❑ The insurance industry, unlike other industries, does not sell products as such, but rather promises. An insurance policy is a promise by the insurer to the policyholder to pay for future claims for an upfront received premium.

❑ As a result, insurers do not know the upfront cost for their service, but rely on historical data analysis and judgment to predict a sustainable price for their offering. In General Insurance (or Non-Life Insurance, e.g. motor, property and casualty insurance); most policies run for a period of 12 months. However, the claims payment process can take years or even decades. Therefore, often not even the delivery date of their product is known to insurers.

❑ The classical chain-ladder method is a deterministic algorithm to forecast claims based on historical data. It assumes that the proportional developments of claims from one development period to the next is the same for all origin periods.

The Data

❑ The claims payment triangle is taken from a U.K. Motor Non-Comprehensive account as published by Christodes (1997). For convenience we set the origin period from 2007 to 2013.

```
         dev
origin    1    2     3     4     5     6     7
  2007  3511 3215  2266  1712  1059  587  340
  2008  4001 3702  2278  1180   956  629   NA
  2009  4355 3932  1946  1522  1238   NA   NA
  2010  4295 3455  2023  1320    NA   NA   NA
  2011  4150 3747  2320    NA    NA   NA   NA
  2012  5102 4548    NA    NA    NA   NA   NA
  2013  6283   NA    NA    NA    NA   NA   NA
```

❑ Then a cumulative development of data is created.

```
           dev
origin    1     2      3      4      5      6      7
  2007  3511  6726   8992  10704  11763  12350  12690
  2008  4001  7703   9981  11161  12117  12746     NA
  2009  4355  8287  10233  11755  12993     NA     NA
  2010  4295  7750   9773  11093     NA     NA     NA
  2011  4150  7897  10217     NA     NA     NA     NA
  2012  5102  9650     NA     NA     NA     NA     NA
  2013  6283    NA     NA     NA     NA     NA     NA
```

❑ It is the objective of a reserving exercise to forecast the future claims development in the bottom right corner of the triangle and potential further developments beyond development age 7.
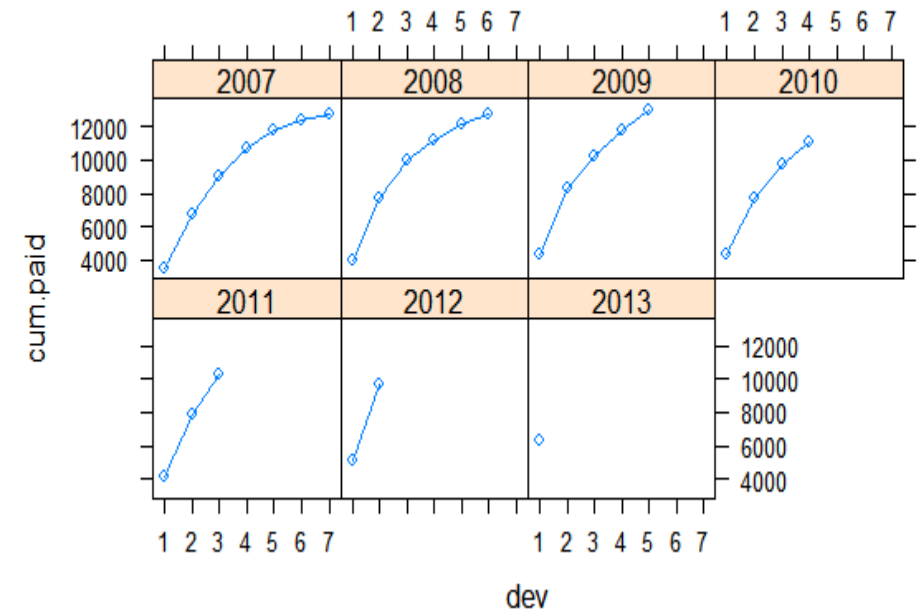
Reserving Model

❏ The triangle appears to be fairly well behaved. The past two years, 2012 and 2013, appear to be slightly higher than years 2008 to 2011, and the values in 2007 are lower in comparison to the later years, for example, the book changed over the years. The last payment of 1,238 for the 2009 origin year stands out a bit as well.

Incremental and cumulative claims development
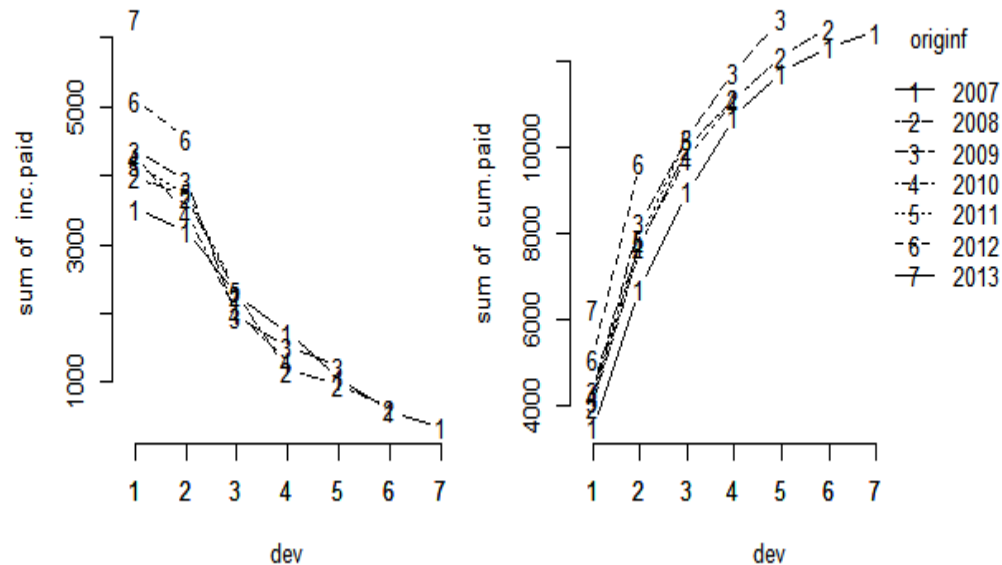
Cumulative claims development

Reserving Model

❑ Using chain-ladder method to develop the reserve model. chain-ladder method is a deterministic algorithm to forecast claims based on historical data. It assumes that the proportional developments of claims from one development period to the next is the same for all origin periods. After applying the model, we get the following table:

```
        dev
origin    1        2          3        4         5         6         7
  2007 3511   6726.00    8992.00 10704.00 11763.00 12350.00 12690.00
  2008 4001   7703.00    9981.00 11161.00 12117.00 12746.00 13096.90
  2009 4355   8287.00   10233.00 11755.00 12993.00 13654.62 14030.54
  2010 4295   7750.00    9773.00 11093.00 12166.34 12785.86 13137.86
  2011 4150   7897.00   10217.00 11719.97 12853.97 13508.51 13880.40
  2012 5102   9650.00   12374.98 14195.40 15568.92 16361.71 16812.15
  2013 6283  11870.06   15221.94 17461.17 19150.67 20125.85 20679.92
```

❑ The total estimated outstanding loss reserve with this method comes as 28,656

Thank You