# Bayesian Modelling of Loss Curves in Insurance

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# Structure of Talk

- Loss Curves
- Chain Ladder modelling (package `ChainLadder`)
- Creating a Model
- Expanding the Model
- Posterior Predictive Checks
- Summary

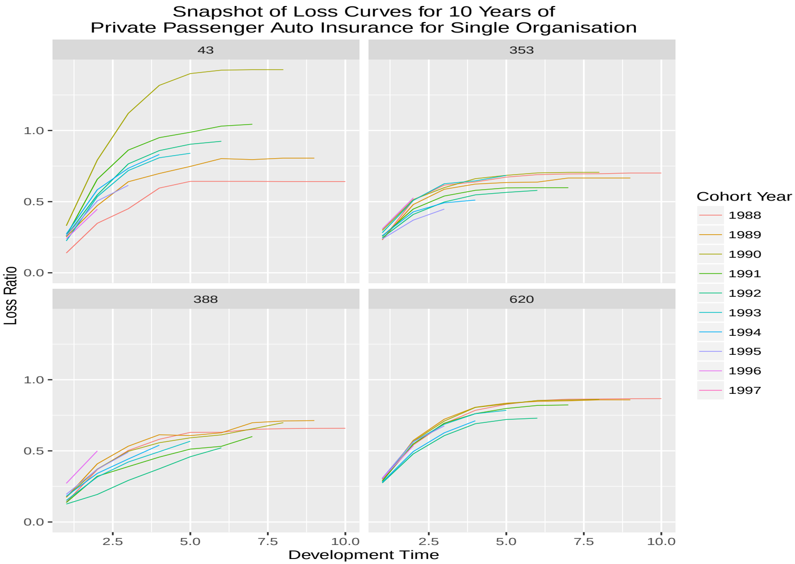
# Loss Curves

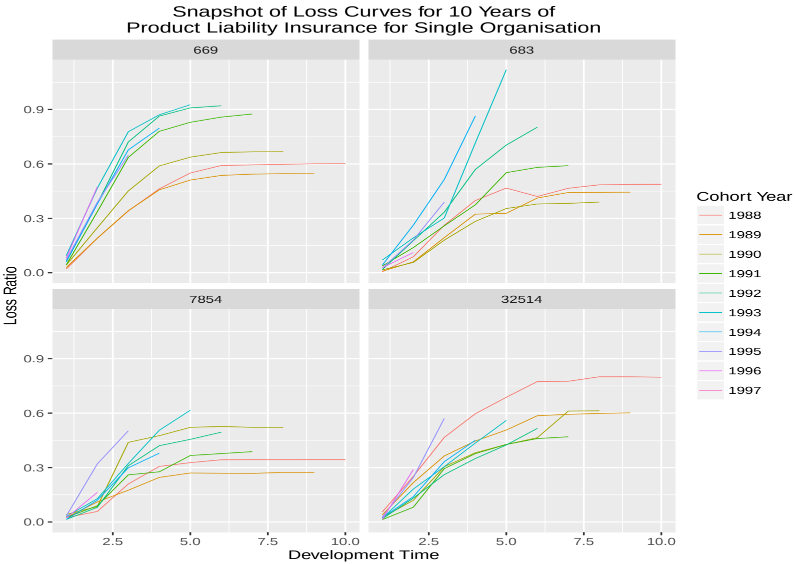
```
use_grcode <- c(43,353,388,620)

ppauto_ss_dt <- ppauto_dt[GRCODE %in% use_grcode
                        ][DevelopmentYear < 1998
                        ][, .(grcode      = GRCODE
                             ,accyear     = AccidentYear
                             ,devlag      = DevelopmentLag
                             ,premium     = EarnedPremDIR_B
                             ,cumloss     = CumPaidLoss_B
                             ,loss_ratio = CumPaidLoss_B / EarnedPremDIR_B)]


print(dcast(ppauto_ss_dt[grcode == 43]
           ,grcode + accyear + premium ˜ devlag
           ,value.var = 'cumloss'),digits=3)

##      grcode accyear premium     1     2     3     4     5     6     7    8    9   10
##  1:     43    1988     957   133   333   431   570   615   615   615  614  614  614
##  2:     43    1989    3695   934  1746  2365  2579  2763  2966  2940 2978 2978   NA
##  3:     43    1990    6138  2030  4864  6880  8087  8595  8743  8763 8762   NA   NA
##  4:     43    1991   17533  4537 11527 15123 16656 17321 18076 18308   NA   NA   NA
##  5:     43    1992   29341  7564 16061 22465 25204 26517 27124    NA   NA   NA   NA
##  6:     43    1993   37194  8343 19900 26732 30079 31249    NA    NA   NA   NA   NA
##  7:     43    1994   46095 12565 26922 33867 38338    NA    NA    NA   NA   NA   NA
##  8:     43    1995   51512 13437 26012 31677    NA    NA    NA    NA   NA   NA   NA
##  9:     43    1996   52481 12604 23446    NA    NA    NA    NA    NA   NA   NA   NA
## 10:     43    1997   56978 12292    NA    NA    NA    NA    NA    NA   NA   NA   NA
```


Snapshot of Loss Curves for 10 Years of
Private Passenger Auto Insurance for Single Organisation
43
353
388
620
Loss Ratio
0.0
0.5
1.0
Development Time
2.5
5.0
7.5
10.0
Cohort Year
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997


Snapshot of Loss Curves for 10 Years of
Product Liability Insurance for Single Organisation
669
683
7854
32514
Loss Ratio
0.0
0.3
0.6
0.9
Development Time
2.5
5.0
7.5
10.0
Cohort Year
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

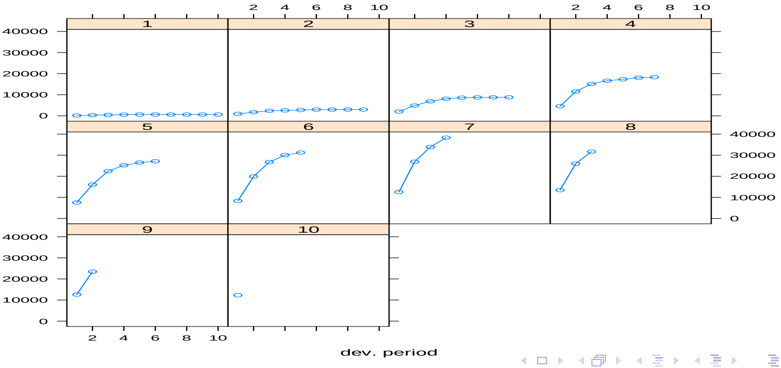
# Chain Ladder

## Standard R approach is `ChainLadder`

```
ppauto_mat <- as.matrix(dcast(ppauto_ss_dt[grcode == 43]
                              ,accyear ~ devlag
                              ,value.var = 'cumloss')[,-1,with=FALSE])

ppauto_ss_triangle <- as.triangle(ppauto_mat)

plot(ppauto_ss_triangle, lattice = TRUE)
```



# Model Creation

# Model Iteration

# Posterior Predictive Checks

# Conclusions

# Get In Touch

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Slides and code available on BitBucket:
`https://www.bitbucket.org/kaybenleroll/dublin_r_workshops`