

The Actuary and IBNR and IBNYR and IBNER

June 29, 2017

```
##  
## Attaching package: 'dplyr'  
  
## The following objects are masked from 'package:stats':  
##  
##     filter, lag  
  
## The following objects are masked from 'package:base':  
##  
##     intersect, setdiff, setequal, union
```

The problem

The problem

- Split total reserve into IBNYR and IBNER
- The problem is with our *data* not our algorithms
- Stochastic process for individual claims
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What I'll show you

- Detailed walk through of an example first proposed by Guszcz and Lommele.
- Comment on how this fits with aggregate methods
 - Bifurcated data
 - Hierarchical models
 - Bayesian
- Easy stan walk through
- Stan for individual claims

What I won't talk about:

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*Tiny bit of history**Toy Example**The parameters**First cut*

This is painfully easy to develop. So what's the big deal?

Here's the (soon-to-be) big deal

- For starters, we have no idea about the split between IBNYR and IBNER. The 12-24 month development is a combination of the two.
- Our losses were not stochastic. Imagine a scenario where a claim was reported on January 1 rather than January 31. (Hang on, though. This would put that claim as a first report ??? months claim.)
- What's significant is that there are differences between initial report X and initial report Y.
- The number of claims reported to date is *always* IBNYR.
- We can regress on the number of open claims. Our intuition tells us that IBNER and IBNYR have different relationships.
 - IBNER is positively correlated to open claims. As open claims goes down, incremental development also goes down.
 - IBNYR may have an inverse relationship at earlier development stages. Fewer claims means that I'm going to see more reported.
- We may now model independently. For more recent periods, we may posit a model for the number of claims, which utilizes our IBNER factors estimated from a prior period.

IBNYR

IBNER

Not-so toy example

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Final thoughts

Why aren't you fitting individual claims?

- I would love to, but honestly, I rarely see actuaries care about doing that.
- This method is a ready analogue to established techniques and can hopefully serve as an on-ramp for actuaries to:
 1. Complain about how much data they're throwing away and
 2. Move the focus to individual claims

When does this make sense mathematically?

- When the financial amount (payment or reserve) depends meaningfully on initial or later report
- When the initial amount depends meaningfully on *when* it is initial

When does this make sense practically?

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Read everything here:

<http://pirategrunt.com/CLRS2017/IBNYER>

References