

The Liability for Claims

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Prediction is hard. Especially of the future.
~ Old Danish Proverb

It is in the policyholder's interest that the insurance company stays in business long enough to pay all benefits owed under contract. This is usually a very large number for every insurance company.

Aon Benfield study: carried P&C reserves @ 12/31/2013 = 575.8B¹

The industry's surplus grew 7.4 percent and reached a new all-time-high value of \$752.5 billion as of December 31, 2017. In 2017, earned premiums grew 3.3 percent to \$540.6 billion. Net written premiums climbed \$24.2 billion to \$552.6 billion in 2017 from \$528.3 billion in 2016. Surplus (Consolidated) 2017 \$752,508M, Loss & Loss Adjustment Expense Reserves 2017 \$619,225M²

In 2017, earned premiums grew 3.3 percent to \$540.6 billion

The estimated total future value owed on behalf of policyholders as of any given financial statement date is called the company's *Liability for Claims*³ and is usually the largest liability on an insurer's balance sheet. After estimating those liabilities and other costs, the company takes stock of its assets to determine if it's bankrupt or still a going concern. Estimating the *Liability for Claims* is a very important function of an insurance company. This function falls under the purview of two key company departments: Claims and Actuarial.

Claims Department

When a policyholder files a claim, it is the responsibility of the Claims Department to estimate the total amount likely to be paid out. These claim-level estimates are called "claim reserves." A claim reserve reflects the value of that claim from the insurance company's standpoint. But the total value of claim reserves usually falls short of a company's true *Liability for Claims* for two reasons:

A. Updated claims: as claims stay open and new facts are discovered, values tend to rise. For example, if property values in your area increase significantly, so could the value of your claim.

B. Delayed claims: new, as-yet-unknown claims are often filed after a financial statement date. For example, as of 12/31/2016 Voter Insurance did not know that your claim had yet to be filed. But you paid your premium so Voter must have enough money set aside to respond to your claim, whatever the outcome.

Actuarial Department

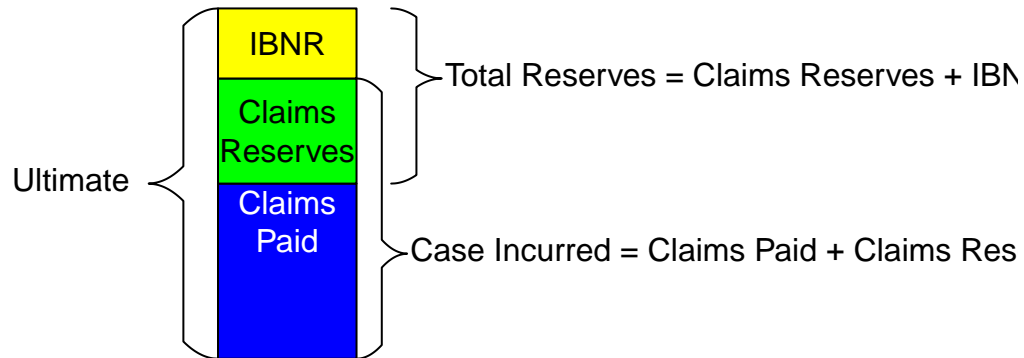
The estimate of the total shortfall (A+B) is called the "Incurred But Not Reported" (IBNR) reserve. It is the responsibility of the Actuarial Department to estimate IBNR.

¹http://thoughtleadership.aonbenfield.com/Documents/20140604_ab_analytics_industry_reserves_study_2013.pdf
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²<https://www.verisk.com/siteassets/media/downloads/insuranceresultsreport2017q4.pdf>. See also http://www.naic.org/prod_serv/STA-PS-17.pdf

³The NAIC (National Association of Insurance Commissioners) breaks *Liability for Claims* into two categories: Losses and Loss Adjustment Expenses (costs to defend and manage the claim). Liability for Claims is my term for the sum of the two. Furthermore, in my opinion the term "loss" connotes something detrimental from the policyholder's standpoint, whereas those amounts are actually policyholder benefits to which they are entitled by virtue of their premium payment every year.

Most actuarial techniques for estimating IBNR actually estimate the ultimate value of claims first, then subtract paid-to-date to get total reserves, and finally subtract claim reserves to get IBNR. Figure 1 below illustrates these concepts.



Why is IBNR important?

Actuaries have many techniques for estimating the ultimate value of claims, and thus IBNR. One of the simplest techniques is called the Loss Development Method. The remainder of this paper will study this method and suggested variants.

The Claims Development Method

In a nutshell, the Claims Development Method multiplies the current aggregated value of a cohort of claims by a factor to get the ultimate value for that cohort. The factor is called the Claims Development Factor (CDF).

$$ClaimsUltimate_{asof} = ClaimsValue_{asof} * CDF$$

IBNR is the difference between that estimated ultimate value and the claims incurred value as of the financial statement date:

$$IBNR_{asof} = ClaimsUltimate_{asof} - ClaimsIncurred_{asof}$$

The substrip “asof” is important. It is the date on which all claims values, paid and reserves, are pulled for entry into the company’s financial statements and into their actuarial models.⁴

Since all reserves, claims reserves and IBNR, are estimates, any changes in these estimates from one asof date to the next will reflect positively or negatively on the company’s income statement over the calendar period between those dates.

Let’s look at an example.

Votre Insurance Company

Your carrier, Votre Insurance Company, has been around since 2011. This is what the company had on its financial statements as of 12/31/2016:

##	paid.diag	case.diag	ibnr	Liability for Claims	ulti
## 2011	2102	80	80	80	2182
## 2012	2348	106	134	134	2482
## 2013	4494	150	150	150	4644
## 2014	5850	292	292	292	6142
## 2015	4648	204	204	204	4852
## 2016	4010	396	396	396	4406
## total	23452	1228	1256	1256	24708

We start this investigation with summarized claim data as displayed in triangular format in Schedule P of the U.S. *Annual Statement*.

Annual Statement: Schedule P

For the benefit of US regulators, as of every December 31st every insurance company must file a set of reports called the *Annual Statement*. This report, a.k.a the “Yellow Book,” is a thick compendium of statistics describing all aspects of an insurance company’s business: from premium to claims to investments and well beyond deep into the bowels of an insurance company. One of the key aspects monitored in the yellow book is the company’s Liability for Claims. Not only is the size of that liability important, but changes in that liability are important too because changes can directly impact the company’s bottom line. We will see how that works with two tables in **Schedule P** of the yellow book, **Part2** and **Part3**.

Changes in that liability are closely scrutinized because they directly flow through to the bottom line.

year over year directly impact the company’s net income that year. over time is illuminated from various perspectives. The data that we will poke and prod in this paper is called GenIns.

GenIns

The ChainLadder package describes GenIns as a “run off triangle of accumulated general insurance claims data.” GenIns is a real, not simulated, cumulative paid loss was created by the Australian actuary Greg Taylor.

egins with its representation in Schedule P - Part 3, meticulously named “Cumulative Paid Net Loss and Defense and Cost Containment Expenses Reported at Year End (\$000 omitted)”:

Then plain ol’ GenIns by kable:

⁴This is the most succinct situation. As you might imagine, accountants have come up with a number of different dates that can have bearing on a company’s financial statements filed with regulatory authorities. We can ignore those complications here.

Table 1: GenIns in Sch P part 3 format

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
2008	358	1,125	1,735	2,218	2,746	3,320	3,466	3,606	3,834	3,901
2009		352	1,236	2,170	3,353	3,799	4,120	4,648	4,914	5,339
2010			291	1,292	2,219	3,235	3,986	4,133	4,629	4,909
2011				311	1,419	2,195	3,757	4,030	4,382	4,588
2012					443	1,136	2,128	2,898	3,403	3,873
2013						396	1,333	2,181	2,986	3,692
2014							441	1,288	2,420	3,483
2015								359	1,421	2,864
2016									377	1,363
2017										344

Table 2: GenIns in triangle format

	1	2	3	4	5	6	7	8	9	10
1	357,848	1,124,788	1,735,330	2,218,270	2,745,596	3,319,994	3,466,336	3,606,286	3,833,515	3,901,463
2	352,118	1,236,139	2,170,033	3,353,322	3,799,067	4,120,063	4,647,867	4,914,039	5,339,085	
3	290,507	1,292,306	2,218,525	3,235,179	3,985,995	4,132,918	4,628,910	4,909,315		
4	310,608	1,418,858	2,195,047	3,757,447	4,029,929	4,381,982	4,588,268			
5	443,160	1,136,350	2,128,333	2,897,821	3,402,672	3,873,311				
6	396,132	1,333,217	2,180,715	2,985,752	3,691,712					
7	440,832	1,288,463	2,419,861	3,483,130						
8	359,480	1,421,128	2,864,498							
9	376,686	1,363,294								
10	344,014									

```

G <- GenIns
class(G) <- "matrix"

kable(G, row.names = TRUE,
      format.args = list(big.mark = ','),
      caption = "GenIns in triangle format")%>%
  kable_styling(font_size = 8, full_width = FALSE)

```