CALCULATING IBNR BASED ON CASE RESERVES

Rick Atkinson

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CALCULATING IBNR BASED ON CASE RESERVES

by

Rick Atkinson

I. The Problem

Faced with the task of producing an estimate of incurred by not reported (IBNR) loss reserves, as of a particular evaluation date, given only

- 1. Case reserves as of the evaluation date;
- 2. Industrywide reported and paid loss development factors (LDFs) to ultimate; and
- 3. Sufficient evidence to believe that the industrywide LDFs are applicable

how should one proceed?

II. General Approach

Noting that

IBNR = ultimate loss - paid loss - case reserves

and that case reserves are known, an estimate of IBNR can be made if a reasonable estimate of ultimate loss and paid loss is available.

III. Estimating Ultimate Loss

An estimate of ultimate loss can be made using the known case reserves and the applicable industrywide LDFs. Noting that

we have

 $\frac{\text{case reserves}}{\text{ultimate loss}} = \frac{\frac{\text{reported loss}}{\text{ultimate loss}} - \frac{\text{paid loss}}{\text{ultimate loss}}$ $= \frac{1}{\frac{1}{\text{reported-to-ult LDF}} - \frac{1}{\frac{1}{\text{paid-to-ult LDF}}}$

which implies

ultimate loss = reported-to-ult LDF paid-to-ult LDF

Calculating IBNR (Continued)

IV. Estimating Paid Loss

An estimate of paid loss in now readily obtainable.

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paid loss = <u>ultimate loss</u> paid-to-ult LDF

Finally, IBNR can be estimated using the formula

IBNR = ultimate loss - paid loss - case reserves

V. Conclusion

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Exhibit 1 displays sample calculations of IBNR using this methodology.

In addition to being used to produce an estimate of IBNR, this method may also be used as a reasonableness check of case reserves or IBNR estimates developed using different methods.

Sample Calculation of IBNR Based on Case Reserves

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age of Accident Year	Reported to Ultimate LDF	Paid to Ultimate LDF	Reported Completion Ratio	Paid Completion Ratio	Case Reserves	Case Reserves as a Ratio of Ultimate Loss	Estimate of Ultimate Loss	Estimate of Paid Loss	Estimate of IBNR
12 24 36 48	1.700 1.350 1.250 1.200	3.900 1.950 1.650 1.500	0.588 0.741 0.800 0.833	0.256 0.513 0.606 0.667	100,000 85,000 60,000 45,000	0.332 0.228 0.194 0.167	301,364 372,938 309,375 270,000	77,273 191,250 187,500 180,000	124,091 96,688 61,875 45,000

- Based on industry data. Based on industry data. 1 / (2) 1 / (3) Available from company. (4) (5) (6) / (7) (8) / (3) (8) (9) (6)
- (2) (3) (4) (5) (6) (7) (8) (9) (10)

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Sample Calculation of IBNR Based on Case Reserves

Exhibit 1

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Year 12 24 36 48	1.700 1.350 1.250 1.200	3.900 1.950 1.650 1.500	0.588 0.741 0.800 0.833	0.256 0.513 0.606 0.667	100,000 85,000 60,000 45,000	0,332 0.228 0.194 0.167	301,364 372,938 309,375 270,000	77,273 191,250 187,500 180,000	124,091 96,688 61,875 45,000

(2) Based on industry da	ta.
(1) Based on industry da	ta.
(4) 1/(2)	
ω ₍₅₎ 1/(3)	
(6) Available from compa	ny.
(7) (4) - (5)	
(8) (6) / (7)	
(9) (8) / (3)	
(10) (B) · (9) - (6)	

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