



From treaty to triangle: practical reserving for risks attaching reinsurance

Reinsurance treaties sit above a whole book of underlying policies, so they need a clear rule to decide which losses fall within a given treaty period. In practice, treaties are written on one of three bases:

- **Losses-occurring:** the treaty responds to losses that occur during the treaty period. This is the more common default overall, particularly for property catastrophe and most short-tail non-proportional business, because it's administratively simple and produces a self-contained accident year (AY) triangle.
- **Risks-attaching:** the treaty responds to all losses from policies that incept or renew during the treaty period. This basis can be seen in some proportional treaties, since the reinsurer is essentially taking a share of the cedant's book as it is written. Attaching to the underwriting year (UWY) keeps a full year of business together under one set of treaty terms and rates.
- **Claims-made:** the treaty responds to claims made (or reported) during the treaty period. This basis is used mainly to match underlying business that is itself claims-made, such as professional indemnity, medical malpractice or cyber lines.

The choice of basis is a matter of treaty wording and it matters well beyond terminology: how the business is reserved for, how loss ratios should be read, and what kind of triangle (accident year, underwriting year or reporting year) is the right tool for monitoring it. As such, not treating the basis correctly in practice leads to inconsistent reserving, misleading performance metrics and inappropriate monitoring frameworks, creating material operational and financial risks. The rest of this article focuses on the risks-attaching basis specifically, since it introduces a reserving complication (the need to earn out written premium) that the other two bases don't share in the same way.

SEPARATING WRITTEN FROM EARNED

A risks attaching treaty covers losses on any underlying policy that incepts during the treaty period, irrespective of when the loss occurs. Assuming standard one year underlying contracts, consider a risks-attaching reinsurance treaty that incepts on 1 January 2024 and therefore covers UWY 2024. If an underlying policy incepts on 1 December 2024 and runs to 30 November 2025, the treaty will respond to losses for that policy's full term. Measured from the treaty's inception, the treaty is effectively on risk for that policy for a span of 23 months despite the treaty's nominal period of 12 months. Thus a single underwriting year can produce claims for almost two years after it begins.

Therefore, at any evaluation date, a UWY contains a mix of earned and unearned exposures. For reserving, this means that the reserve will have two distinct components: an earned component on losses that have already occurred, and an unearned component for losses that have not occurred yet because the underlying policy that will produce them has not yet incepted, or has incepted but the loss date has not arrived. The standard actuarial device for handling this is the earning pattern, which is an assumed curve describing what fraction of a UWY's ultimate premium has been earned by each evaluation date.

There are two common ways to bring earning into the analysis. One is to convert the UWY triangle into an AY triangle and use it as the exposure base for loss ratios or Bornhuetter-Ferguson. The other method is to reserve directly on the UWY triangle with a standard chain-ladder, and then apply the earning pattern to split the resulting reserve between the portion attributable to exposure that has already earned (true IBNR) and the portion still attributable to exposure that has not earned yet.

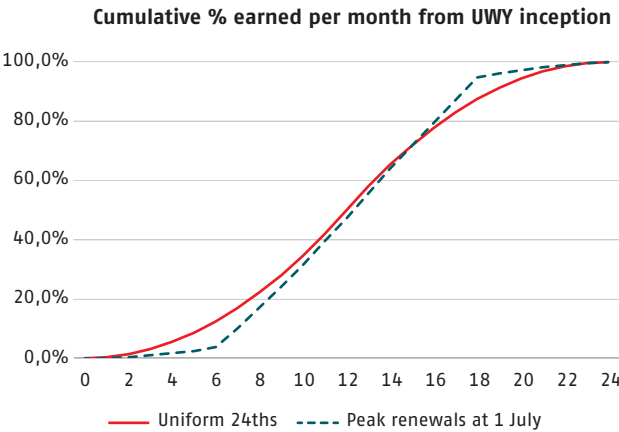
A SIMPLE NUMERICAL EXAMPLE

To demonstrate how this would be calculated, we will look at a simple example where the reinsurer has the following incurred losses per UWY. In this example, we calculate the ultimate losses for this reinsurer using a simple chain-ladder method. Assuming a tail factor of 5 percent, we arrive at the following reserves per UWY:

UWY \ Months	12	24	36	Ultimate	Reserve
2023	180	450	585	614	29
2024	190	475		648	173
2025	200			683	483
Total				1 945	685

This reserve does not only include the IBNR as would have been the case with AY triangles but also a component of unexpired risk reserve. To arrive at the IBNR, the unexpired risk component needs to be stripped out using a suitable earnings pattern.

The simplest and most widely taught earning pattern is the 24ths method, which assumes premium (and correspondingly, exposure) is written uniformly across the 12 months of the underwriting year, and each underlying policy is itself a 12-month policy earning uniformly over its own term. Under these assumptions, the fraction of premium earned per month after the start of the UWY follows a triangular pattern, and the cumulative pattern looks as shown in the graph and presented in the table. When these assumptions are violated, for example with seasonal writing patterns or non-annual policy terms, the pattern should be adjusted accordingly.



Time since UWY inception	percent of exposure earned
12 months	50 percent
24 months	100 percent
36 months	100 percent

The earliest two underwriting years have been fully earned. The reserve calculated for these two underwriting years fully represents the earned component and does not include any unexpired risk reserves. However, as the latest underwriting year has only been 50 percent earned, the calculated total ultimate contains 50 percent unexpired risk reserves, resulting in the following IBNR (after the unearned component has been removed):

UWY	Latest Incurred	Total Ultimate (Earned + Unearned)	Total Reserve (Earned + Unearned)	Earned Ultimate	IBNR
2023	585	614	29	614	29
2024	47	648	173	648	173
2025	200	683	483	683	141
Total	1 260	1 945	685	1 945	344

MARKET PRACTICE

In practice, there are various options adopted when doing risks-attaching reinsurance reserving, depending on the type of business and the market in which it operates:

- **Property catastrophe** business is frequently written on a losses-occurring basis specifically to avoid this complexity as a straightforward AY cohort is far easier to reserve and to model.
- **Marine, aviation, and a meaningful share of liability business** remain more commonly risks-attaching, often for reasons of administrative convenience (matching the reinsurance term to the underlying policy term) rather than any preference for risks-attaching on reserving grounds.
- **Lloyd's market practice** has historically leaned toward reserving on a UWY basis as the primary structure, consistent with the three-year account history Lloyd's syndicates report against, with earning and exposure adjustments applied as an actuarial overlay rather than a full conversion to AY triangles. This is as much a function of data structure and market convention as it is a deliberate methodological choice.
- **Bermuda reinsurer practice** typically observe that reserving is performed on UWY triangles, with the unearned component appropriately being excluded. This method appropriately reflects the reporting lag between the occurrence of losses at the cedant and the subsequent reporting of losses to the reinsurer.

CONCLUSION

In conclusion, applying a standard chain-ladder without first confirming the attachment basis can produce a plausible-looking but misleading reserve and therefore actuaries must establish the treaty basis before interpreting or adjusting chain-ladder results to ensure that measurements are appropriate, adjustments are justified, and results can be communicated reliably to stakeholders. ■

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