

## 6.3.0 → Overview

→ overview → Insurers often rely on the expected claims method when expanding into new lines of business or entering new geographic regions. Actuaries commonly apply this method to estimate unpaid claims, particularly for the earliest, most immature periods where historical data may be limited.

→ Expected claims ratio is a fundamental element in various other reserving methods, including the Bornstaedt-Ferguson + Cope Gk techniques, which we will cover in subsequent sections.

→ In this section, we will discuss how the expected claims method works & conclude by evaluating how changes in an insurer's environment impact this reserving approach, similar to the previous section.

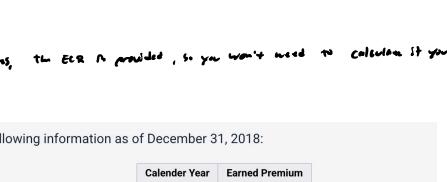
~~~~~

### 6.3.1 → Expected claims method

→ overview → The second loss reserving method we'll discuss is the expected claims method, or EC method for short. Rather than relying on observed experience, the EC method estimates unpaid claims using an a priori (initial) estimate & spans observed claim experience to date, which this method is especially useful for new businesses or for lines that are rapidly changing since historical claims experience may not actually give us accurate information on future claims experience in those instances.

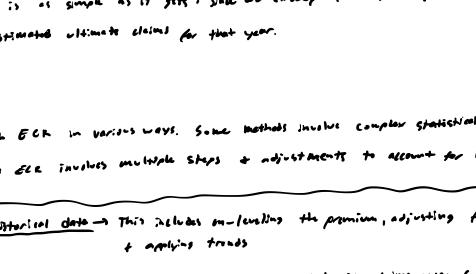
→ In the EC method, ultimate claims are estimated by multiplying an exposure loss by a ratio known as the expected claims ratio (ECR). The exposure loss may vary, but the most common choices are EPs & earned exposures.

→ Is using the EP ECR, the AY ultimate claims can be expressed as:



This approach uses the expected LR, derived from historical data, to project ultimate claims based on the EP.

→ Is using the EP ECR, the AY ultimate claims can be expressed as:



In this approach, the expected pure premium is multiplied by a relevant exposure measure (e.g. number of vehicles, payroll) to determine the ultimate claims.

#### → Assumptions + uses

→ The primary assumption of the expected claims technique is that claims paid (or reported) to date for a given day provide no useful information on future claim payments from that day. In other words, claims from AY 2018 should be ignored when estimating ultimate losses for AY 2019.

→ Another assumption of this method is that an actuary can more accurately estimate total unpaid claims using an a priori (initial) estimate rather than relying solely on to claims experience observed to date. In some cases, the claims data reported to date may offer limited insight into the ultimate claims, particularly when compared to the a priori estimate.

→ Unlike the development method, the EC method does not assume stability in claims data. Therefore, it is particularly effective in the following scenarios:

→ when an insurer enters a new line or territory

→ when operational or environmental changes make historical data unreliable

→ when data is limited or unreliable

→ when development factors for early matures are highly leveraged

→ The EC method provides a stable estimate for ultimate claims b/c it is not influenced by the variability in early claims data. However, its stability also means it may not respond quickly to emerging claims experience, potentially resulting in a lag in recognizing significant changes in actual experience.

→ Also, the expected claims method relies on the actuary's ability to determine a reasonable expected claims ratio. Therefore, if a reasonable claims ratio cannot be identified, this method may not perform effectively.

→ In many exam problems, the ECR is provided, so you won't need to calculate it yourself. Let's work through a simple example to see how it's used in practice.

#### → Example →

Given the following information as of December 31, 2018:

| Calendar Year | Earned Premium |
|---------------|----------------|
| 2016          | \$1,800,000    |
| 2017          | \$2,000,000    |
| 2018          | \$2,300,000    |

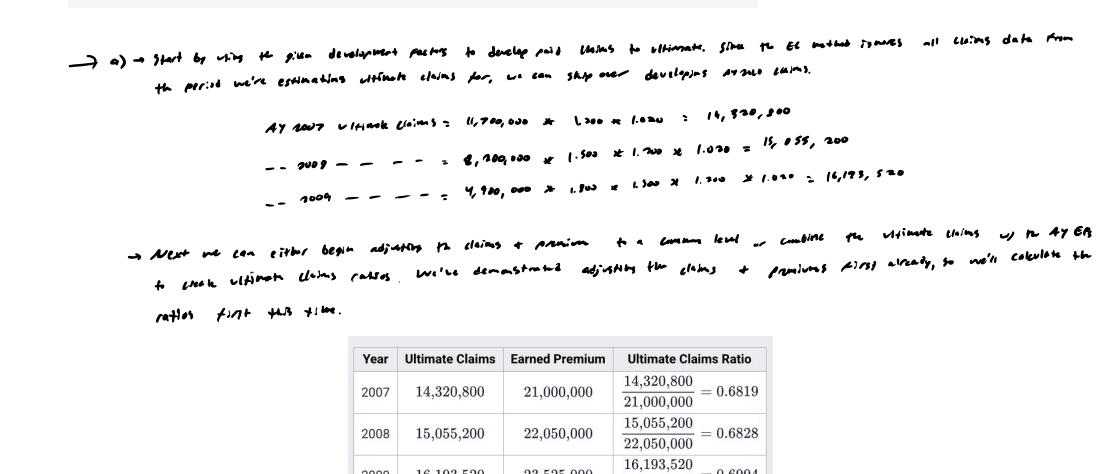
• The expected claims ratio is 47% for all accident years.

Estimate the ultimate claims for all accident years using the expected claims method.

→ This is as simple as it gets! Since we already know the expected claims ratio, multiply it by the EP for each AY to get the estimated ultimate claims for that year.

→ Determining the ECR

→ Actuaries can determine the ECR in various ways. Some methods involve complex statistical modeling, while others are more straightforward. In general, determining an appropriate ECR involves multiple steps & adjustments to account for historical experience, trends, & other external factors:



→ When solving problems, we often skip the third step. The most common choice for an ECR is a straight average of the adjusted claims ratios. However, as w/ selecting a development factor, you should use actuarial judgment to determine the most reasonable ECR. For instance, if any of the historical ratios appear to be outliers, you should consider excluding them from your selection.

→ At times, actuaries use the reasoning behind your selection.

→ We'll explore this scenario in more detail using the following example.

#### → Example →

You are given the following information from an insurance company:

| Accident Year | Cumulative Reported Claims (\$000) as of (months) |
|---------------|---------------------------------------------------|
| 2020          | 12 24 36 48                                       |
| 2021          | 130 423 688 703.38                                |
| 2022          | 146 451 752.08                                    |
| 2023          | 136 424.33                                        |

• The loss trend is 3% per year.

• Tort reform effective January 1, 2022 resulted in a 5% increase to average claim cost for all future claims.

• Assume no development beyond 48 months.

Use the expected claims method to estimate the ultimate claims for accident year 2023.

→ The first step is to adjust the losses & premiums, starting w/ the premiums.

→ Since we want to estimate the ultimate claims for AY 2023, we will convert the historical premiums to the 2023 on-level. And in the EC method, the ECR is determined using only historical data. The data from the year for which we're estimating the ultimate claims, in this case, 2023, is not used.

→ We'll use the on-level EP to project the AY 2023 claims.

AY 2023 ultimate claims = Selected ECR × AY 2023 EP

= 0.866 × \$1,330,000

= \$1,137,000

= \$750,104

→ Alternatively, instead of adjusting premiums & losses separately, we can first calculate the ultimate claims ratios & then adjust them to 2023 levels.

Alternative Approach: (1) (2) (3) (4) (5) (6)  
Year Ultimate Claims Ratio On-Level Factor Loss Trend Adjustment Factor Ultimate Claims Ratio at 2023  
2020 0.6819 1.21 1.04 1.05 806.60  
2021 0.6828 1.15 1.0609 1.05 855.95  
2022 0.6894 1.08 1.03 1.00 734.93

Note that we're dividing by the on-level factor because premiums are in the denominator of the ECR.

(1) = premiums  
(2) = given  
(3) = 1.03<sup>1</sup> (2023 - 2022)  
(4) = 0.6894 × (1.03<sup>1</sup>)  
(5) = 0.6894 × 1.08  
(6) = (1.03<sup>1</sup>) × (1.08) × (1.04)<sup>1</sup>  
AY 2023 EP = 1.08 × 1.03 × 1.04 = 1.330

→ Since we adjusted premiums to 2023 levels, we can now proceed to calculate the claims ratios:

Year Ultimate Claims Ratio

2020 806.60 / 1,120 = 0.5952

2021 855.95 / 1,200 = 0.6203

2022 734.93 / 1,250 = 0.5444

1,330,000 × 0.5952 = 806,600

1,330,000 × 0.6203 = 855,950

1,330,000 × 0.5444 = 734,930

→ Since the ultimate claims ratios show no outliers or trends, it is reasonable to select the straight average as the ECR.

→ Since we want to estimate the ultimate claims for AY 2023, we will convert the historical premiums to the 2023 on-level. And in the EC method, the ECR is determined using only historical data. The data from the year for which we're estimating the ultimate claims, in this case, 2023, is not used.

→ We'll use the on-level EP to project the AY 2023 claims.

AY 2023 ultimate claims = Selected ECR × AY 2023 EP

= 0.866 × \$1,330,000

= \$1,137,000

= \$750,104

→ Alternatively, instead of adjusting premiums & losses separately, we can first calculate the ultimate claims ratios & then adjust them to 2023 levels.

Alternative Approach: (1) (2) (3) (4) (5) (6)  
Year Ultimate Claims Ratio On-Level Factor Loss Trend Adjustment Factor Ultimate Claims Ratio at 2023  
2020 0.6819 1.21 1.04 1.05 806.60  
2021 0.6828 1.15 1.0609 1.05 855.95  
2022 0.6894 1.08 1.03 1.00 734.93

Note that we're dividing by the on-level factor because premiums are in the denominator of the ECR.

(1) = premiums  
(2) = given  
(3) = 1.03<sup>1</sup> (2023 - 2022)  
(4) = 0.6894 × (1.03<sup>1</sup>)  
(5) = 0.6894 × 1.08  
(6) = (1.03<sup>1</sup>) × (1.08) × (1.04)<sup>1</sup>  
AY 2023 EP = 1.08 × 1.03 × 1.04 = 1.330

→ Since we adjusted premiums to 2023 levels, we can now proceed to calculate the claims ratios:

Year Ultimate Claims Ratio

2020 806.60 / 1,120 = 0.5952

2021 855.95 / 1,200 = 0.6203

2022 734.93 / 1,250 = 0.5444

1,330,000 × 0.5952 = 806,600

1,330,000 × 0.6203 = 855,950

1,330,000 × 0.5444 = 734,930

→ Since the ultimate claims ratios show no outliers or trends, it is reasonable to select the straight average as the ECR.

→ Since we want to estimate the ultimate claims for AY 2023, we will convert the historical premiums to the 2023 on-level. And in the EC method, the ECR is determined using only historical data. The data from the year for which we're estimating the ultimate claims, in this case, 2023, is not used.

→ We'll use the on-level EP to project the AY 2023 claims.

AY 2023 ultimate claims = Selected ECR × AY 2023 EP

= 0.866 × \$1,330,000

= \$1,137,000

= \$750,104

→ Alternatively, instead of adjusting premiums & losses separately, we can first calculate the ultimate claims ratios & then adjust them to 2023 levels.

Alternative Approach: (1) (2) (3) (4) (5) (6)  
Year Ultimate Claims Ratio On-Level Factor Loss Trend Adjustment Factor Ultimate Claims Ratio at 2023  
2020 0.6819 1.21 1.04 1.05 806.60  
2021 0.6828 1.15 1.0609 1.05 855.95  
2022 0.6894 1.08 1.03 1.00 734.93

Note that we're dividing by the on-level factor because premiums are in the denominator of the ECR.

(1) = premiums  
(2) = given  
(3) = 1.03<sup>1</sup> (2023 - 2022)  
(4) = 0.6894 × (1.03<sup>1</sup>)  
(5) = 0.6894 × 1.08  
(6) = (1.03<sup>1</sup>) × (1.08) × (1.04)<sup>1</sup>  
AY 2023 EP = 1.08 × 1.03 × 1.04 = 1.330

→ Since we adjusted premiums to 2023 levels, we can now proceed to calculate the claims ratios:

Year Ultimate Claims Ratio

2020 806.60 / 1,120 = 0.5952

2021 855.95 / 1,200 = 0.6203

2022 734.93 / 1,250 = 0.5444

1,330,000 × 0.5952 = 806,600

1,330,000 × 0.6203 = 855,950

1,330,000 × 0.5444 = 734,930

→ Since the ultimate claims ratios show no outliers or trends, it is reasonable to select the straight average as the ECR.

→ Since we want to estimate the ultimate claims for AY 2023, we will convert the historical premiums to the 2023 on-level. And in the EC method, the ECR is determined using only historical data. The data from the year for which we're estimating the ultimate claims, in this case, 2023, is not used.