

Appendix 0 – Basic glossary

1. Introduction

There are umpteen insurance glossaries around (see References for some of them), many of which are freely available online, so there's hardly any reason to produce an (umpteen+1)-th glossary... so I've limited myself to a key terms that are specific to general insurance pricing and ubiquitous in this practice area.

However, for those terms that I have managed to include this far, I have tried to expand the explanation of the terms and sometimes include formulae, which is beyond what you normally find in glossaries.

Note that I haven't included names of products (such as employer's liability) in the glossary as the book (Chapter 2) contains an extensive list of insurance and reinsurance products.

This glossary is work in progress – I'll be introducing more terms over time. If anyone desires to contribute with definitions or improve/correct existing definitions, please contact me at pietro_parodi@yahoo.com.

2. The glossary

Base rate

The context is that of exposure rating, by which the premium is derived directly from the insured's exposure rather than from a detailed analysis of loss experience.

The base rate is the rate that the insurer applies to a specified measure of exposure in order to obtain the technical premium, under standard conditions of coverage and for standard risks. The base rate can be modified by various rating factors to account for changes in retention level, risk control mechanisms, territory, etc.

E.g. in property insurance, the base rate is expressed in terms of the total insured value (TIV). A base rate of $x\%$ for, say, a food manufacturing plant means that the technical premium charged for a plant with a given TIV and with average risk exposure and standard coverage (i.e. standard level of retention, coverage of the full value, annual cover, etc.) will be $x \times \text{TIV}/1000$. Rating factors based on retention level, construction material and risk control mechanisms may then be applied to obtain an actual rate.

Another example: in employers' liability, the base rate may be given as $x\%$ of the payroll of clerical workers, and $y\%$ of the payroll of manual workers. Rating factors such as industry sector, loss experience and risk control measures may then be applied to obtain an actual rate.

Claims inflation Claims inflation is defined in (Lloyd's, 2014) as "the change in the expected claims cost level of a like-for-like policy in an economy over time".

Claims inflation vs ordinary inflation

From Parodi (2014): "Obviously, a claim which occurred in 2002 would have, if it occurred again under exactly the same conditions in 2012, a much larger payout, because of a thing called claims inflation. Claims inflation is not the same as the retail price index inflation or the consumer price index inflation we have in the UK, as it depends on other factors that the CPI or the RPI are not concerned about. For example, property claims will depend on a number of factors including cost of repair materials, cost of repair labour, etc. Liability claims will depend on wage inflation and court inflation, i.e. the tendency on the part of the courts to award compensations that are increasingly favourable for claimants."

Ultimately, the difference between claims inflation and ordinary inflation lies in the fact that they concerns different baskets of goods and services: in the case of insurance, the goods and services are the claims and the basket of goods and services is defined by the insurance contract wording (see Lloyd's, 2014, to which the reader is referred for a more in-depth discussion).

Claims made basis Contracts of insurance or reinsurance written on a claims made basis pay the (re)insured for claims reported during the reference period, regardless of when the claim occurs and (in the case of reinsurance) when the original policy inceptioned.

Combined ratio The combined ratio is actually the sum of two ratios:

a.k.a.

$$\text{Combined ratio} = \text{Loss ratio} + \text{Expense ratio}$$

Operating ratio or Underwriting ratio

Where

$$\text{Loss ratio} = \frac{\text{Incurred losses over the reference period}}{\text{Earned premium}}$$

and the expense ratio can be calculated on two bases, the most common of which is the *trade basis*:

$$\text{Expense ratio} = \frac{\text{Underwriting expenses}}{\text{Written premium}}$$

In the definition above, "underwriting expenses" simply means all acquisition costs (e.g. commissions, taxes, fees...) and non-acquisition costs (e.g. servicing the policy and general expenses).

Alternatively, the expense ratio can be calculated on a *statutory basis*:

$$\text{Expense ratio} = \frac{\text{Underwriting expenses}}{\text{Earned premium}}$$

The advantage of the statutory basis definition is of course that it is consistent with the definition of the loss ratio and therefore allows writing the combined ratio as a simple ratio with the earned premium at the denominator. However, as mentioned above, the expense ratio is normally provided on a trade basis.

Note that if the loss ratio does *not* include claims handling expenses but only the indemnity, then the combined ratio needs to be modified so as to include a separate entry for loss adjustment expenses:

$$\text{Combined ratio} = (\text{Indemnity-only}) \text{ Loss ratio} \times (1 + \text{CHE ratio}) + \text{Expense ratio}$$

Where CHE ratio=claims-handling expenses/Indemnity loss

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| Costing model | See Pricing model |
| Deductible | <p>The amount retained by the (re)insured on each claim. (Also referred to as <i>excess</i>.) If X is a loss and D is the deductible, the amount reimbursed by the (re)insurer is $\max(0, X - D)$ and the amount retained by the (re)insured is $\min(X, D)$.</p> <p><i>Deductible vs excess.</i> Deductibles and excess are typically used interchangeably, although one term or the other may prevail depending on the context, the territory or the organisation. E.g. in UK personal lines insurance "excess" is normally used, whereas in commercial lines one often speaks of "(each and every loss) deductible".</p> <p>Attempts to differentiate between the two terms are sometimes made but you can't trust this distinction to be consistent across organisations.</p> |
| Earned premium | <p>The premium earned over the reference period $[t_0, t_1]$ is the amount of written premium that should be allocated to the period $[t_0, t_1]$ to reflect the proportion of the total risk that belongs to $[t_0, t_1]$.</p> <p>Earned premium can be defined as net or gross of acquisition costs or reinsurance. The way in which it is calculated depends on how risk is spread over the policy period, and on the purpose of the exercise (i.e. if it is retrospective, such as in profitability analysis, or prospective, as in pricing).</p> <p>More information in Blanchard (2005), Parodi (2014b)</p> |
| Employee-years | <p>A measure of exposure to employers' liability that reflects not only the number of employees employed by a company over a certain period (e.g. a policy year), but the percentage of the year that each employee spent in employment for that company and whether the employee was working full-time or part-time.</p> |

It's actually easier to explain how to calculate it than to define it. Let's assume you want to calculate the employee-years in 2014 for a given organisation.

Consider in turn all employees that were employed by the organisation at some point over 2014:

- (1) if an employee has been employed full time for a company for the whole of 2014, they will count for 1 employee-year
- (2) if an employee has worked full time for the company from 1/4/2014 until the end of year (and possibly later) they will count for 0.75 employee-years
- (3) if an employee has worked part-time (let's say 60%) for the whole of 2014, they will count for 0.6 employee-years
- (4) if an employee has worked part-time (60%) from 1/4/2014 they will count for $0.6 \times 0.75 = 0.45$ employee-years

Then you sum over all employees (at least those that are covered by the employers' liability policy) and you get the number of employee-years.

In formulae: assume that n employees have worked for an organisation at some point in year y . Assume that employee j has worked for the organisation for a proportion $a_j^y \in (0,1]$ of the year, and that during that time they have worked for a proportion $b_j^y \in (0,1]$ of the time. Then the number of employee-years EY^y for year y is

$$EY^y = \sum_{j=1}^n a_j^y b_j^y$$

By construction, $EY^y \leq n$.

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| Estimated maximum loss | See MPL |
| Excess | See Deductible |
| Expected maximum loss | See MPL |
| Expense ratio | The expense ratio is discussed at some length under "Combined ratio". |
| Franchise | In certain policies, the loss amount below which no payment is made by the (re)insurer, and above which the full payment is made. |

If X is the loss and F is the franchise, the amount paid by the (re)insurer is $X \times \theta(X - F)$ where $\theta(x)$ is the step function ($\theta(x) = 1$ if $x \geq 0$, 0 otherwise).

Deductible vs franchise. The difference between the deductible and the franchise is that unlike in the case of the deductible, the franchise is not deducted from the loss amount: the full amount is paid once the franchise threshold is reached.

Incurring but not reported (IBNR) losses Losses that have already occurred but haven't been reported to the (re)insurer yet.

In burning cost analysis, an IBNR monetary amount may have to be added to all years that could still develop.

In frequency/severity analysis, a "claim count IBNR" must be added to the number of claims reported in each year/period so as to calibrate the frequency model.

In a reserving context, the IBNR reserve is that amount that is set aside for IBNR losses, i.e. for losses that have occurred before the accounting date but have not been reported by that date.

Incurring but not enough reserved (IBNER) adjustment In a pricing context, an IBNER adjustment is an adjustment to the current estimate of a reported but not yet settled (RBNS) claim (or a group of claims) to make up for any systematic under- or over-reserving that has been identified in the data.

IBNER adjustments to claim severity are addressed in Parodi (2014), Chapter 15.

In a reserving context, an IBNER reserve is an amount set aside for expected deviations from the current estimate of RBNS claims.

Incurring loss ratio Ratio between losses incurred (that is, *paid plus reserved*) over a reference period and the **earned premium** over the same period

$$\text{Loss ratio} = \frac{\text{Incurred losses over the reference period}}{\text{Earned premium}}$$

Note: the incurred losses normally include indemnity *and claims handling expenses* (a.k.a. loss adjustment expenses, LAE, esp. in the US), i.e. all expenses that can be seen as part of the claims themselves (but not acquisition costs and other underwriting expenses).

However, definition may change across territories and across companies, and the loss ratio might be defined purely in terms of the indemnity part, in which case the claims handling expenses need to be taken into account separately in the calculation of the combined ratio (see).

Incurring reinsurance/reinsurance inuring to the benefit of In a reinsurance context, it applies to a situation in which an insurance company (the reinsured) A enters in a reinsurance agreement X (typically a treaty) with a reinsurer (or panel of reinsurers) B, and also has another reinsurance agreement Y with other reinsurers C. If reinsurance agreement Y applies to losses incurred by A before agreement X kicks in, Y is referred to as "incurring reinsurance", and we say that agreement Y inures to the benefit of B. If, on the contrary, contract Y is to be disregarded for the purpose of calculating

the loss to contract X, then we say that Y inures to the benefit of A (the reinsured). This can of course be generalized to the case in which there are multiple inuring arrangements $Y_1, Y_2 \dots Y_k$.

In simple terms,

Inuring reinsurance = all the (other) reinsurance contracts that are applied before the reinsurance contract under discussion

A classic example (see, e.g., RAA (2015)) is that of a quota share and a Cat XL. Assume that an insurance company purchases 70% quota share reinsurance and a £160m xs £40m Cat XL. If the Cat XL applies to the losses of the ceding company after the quota share is taken into account, we call the quota share arrangement "inuring reinsurance". A loss of £180m would then be split like this: £90m are ceded to the reinsurers through the quota share reinsurance contract, while the remaining £90m are split like this: the first £40m are retained by the reinsured, while £50m are ceded to the reinsurers through the Cat XL contract.

In the case above, we would say that the quota share inures to the benefit of the Cat XL contract.

Inward and outward reinsurance

Reinsurance can be either inward or outward depending on whether it is sold or purchased. The terms "inward" and "outward" are a rather unhappy choice because a priori it's not at all clear what comes in and what goes out (is it reinsurance premium? is it the cover?).

For maximum simplification:

Inward = Sold
Outward = Purchased

Unless you are working you're dealing with this on a daily basis it probably helps to develop some sort of mnemonic based on the equalities above...

Loss adjustment expenses

Another term (used mostly in the US) for claims handling expenses

Losses occurring basis

Contracts of *reinsurance* written on a losses occurring (or losses-occurring-during, LOD) basis pay the reinsured for claims occurring during a set contract period, regardless of when the claim is reported and when the original contract of insurance inception.

Although the term "losses occurring" is used in a reinsurance context, the losses occurring basis is the most common contract basis in direct insurance as well, where it is normally referred to as "occurrence basis".

Note that the formula "regardless of when the claim is reported" may in practice have to be qualified because contracts may include a sunset clause, i.e. the prescription that claims must be reported within a certain period of time, e.g. 3 years.

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| Maximum possible loss | See MPL |
| Maximum probable loss | See MPL |
| Maximum foreseeable loss | See MPL |
| MPL | <i>Background: Property losses are always limited by the value of a property, which normally corresponds to the sum insured. For large properties, it is extremely unlikely to have a loss equal to the sum insured, because, e.g., a property may be made of separate buildings and a fire cannot spread from one to the other. This is reason why the concept of the maximum loss that can be expected to occur in practice is introduced.</i> |

The most common definition is perhaps that MPL – spelled out as maximum possible loss – is “the maximum loss that may occur under the most adverse circumstances”. Note that while the TIV (total insured value) is a contractual feature, the MPL is an expert estimate (typically performed by an underwriter).

A more detailed and nuanced explanation follows.

"[MPL] is one of many acronyms with roughly the same meaning: maximum probable (or possible) loss (MPL), maximum foreseeable loss (MFL), expected (or estimated) maximum loss (EML), possible (or probable) maximum loss (PML)... different practitioners will use different names for the same thing, and many will mean slightly different things by these different names, e.g. trying to capture different levels of probability by using different names. This of course maximises confusion, and the analyst is advised to inquire what information exactly is provided with the property schedule (the list of properties along with their properties)." (Parodi (2014), p. 332 (footnote))

Some carriers/organisations use the terms to indicate what may happen under qualitatively different circumstances: e.g., Swiss Re (20xx) takes EML (expected maximum loss) to indicate the maximum loss that may *occur under normal circumstances*, i.e. assuming that all the normal loss prevention mechanisms work as expected, while MPL (maximum possible loss) to indicate the maximum loss that may occur under the most adverse circumstances, i.e. when everything that can go wrong goes wrong (e.g. in the case of fire that might mean that the fire sprinklers don't work, the firemen are unable to come, etc.).

Other organisations may use the terms MPL/PML/EML/MFL to refer to the loss that can occur with a certain level of probability, e.g. they might say that the

PML is " that proportion of the total value of the property which will equal or exceed, in a stated proportion of all cases, the amount of loss from a specified peril or group of perils." (McGuinness, 1969)

Both types of definitions (the ones relying on the failure of controls and the ones relying on a given probability level) are inherently fuzzy, the latter in the most obvious way because such definition needs to be accompanied by a probability level, e.g. PML@99%.

Finally, it should be observed that the value of these different definitions of maximum loss are very much peril-dependent: while fire may not be able to propagate from one area of a building to another, a flood may be less sensitive on physical separation and an earthquake even less. Many of these quantities were introduced in the context of fire losses.

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| Office premium | See Technical premium |
| Outward reinsurance | See Inward and outward reinsurance |
| Possible maximum loss | See MPL |
| Pricing model | <p><i>(Also referred to as costing model or rating model.)</i></p> <p>This is a methodology, and often a tool, used by underwriters to establish the technical premium for a given policy.</p> <p>A pricing model can be based on experience, on exposure or a combination of experience and exposure, and can take into account a number of rating factors.</p> <p>The calibration of the pricing model may be carried out with mathematical methods (e.g. GLM) or by using underwriting judgment or by a combination of the two.</p> <p>Typically, pricing models are developed by underwriters with the help of pricing actuaries.</p> |
| Probable maximum loss | See MPL |
| Rate on line (ROL) | <p>The rate on line (ROL) for a layer is the (re)insurance premium for a layer of (re)insurance divided by the layer limit. In formulae, if the premium for an L x D layer is P, the rate on line is $ROL = P / L$ (regardless of D). Note that the premium P here is the upfront premium and does not include any reinstatement premium. The premium is at 100% interest and not at the participation share of the insurer.</p> <p>The rate on line is a poor benchmark for whether a contract is dear or cheap, since it doesn't take into account the expected losses to the layer (which will</p> |

depend on the exposure and attachment point among other things), but is nonetheless often used by underwriters as a quick sense-check.

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| Rate on value (ROV) | The rate on value (ROV) for a layer of (re)insurance is the premium divided by the total insured value. It is used for property and property-like business. The premium is at 100% interest and not at the participation share of the insurer. |
| Rating model | See Pricing model |
| Reinstatements | Reinstatements are a mechanism (typically, in an excess-of-loss context) by which cover is restored (reinstated) for the (re)insured after a layer of (re)insurance has been exhausted. It is typically used in property reinsurance. |

How it works

From Parodi (2014), Section 3.3: "For example, if your layer of £3m xs £2m has one reinstatement, that means that once a full £3m have been paid (on one or more claims), another £3m are available. Ultimately, what matters is that the reinsurer makes available £6m for that layer. Once that is also exhausted, no more reinsurance is available. With two reinstatements, the total amount available will be £9m, and with k reinstatements it will be $(k+1) \times £3m$ ". In general, k reinstatements to a layer L xs D limit the compensation to $(k+1) \times L$.

The effect of k reinstatements appears therefore to be the same as having an aggregate limit to the layer of $(k+1) \times L$. The main difference, however, is that the reinsured normally pays a premium in order to have their cover reinstated. When the cover is exhausted, or even partially exhausted, the reinsured pays a premium to have it reinstated, and the premium is normally a proportion of the original upfront premium (some of the reinstatements may be free). A detailed example can be found Parodi (2014), Section 3.3.

Depending on the contract, the reinstatement can be automatic or triggered by the reinsured's request.

What it is for

Reinstatements provide a contractual mechanism for the reinsured to have certainty of cover after a layer of reinsurance has been exhausted. Obtaining such cover might be difficult in the open market given that the reinsured will have likely experienced recent large losses.

At the same time, it provides a mechanism for the reinsurer to avoid unlimited liability (infinite number of reinstatements) and be compensated for providing additional cover.

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| Reported but not yet settled (RBNS) claims | Claims that have been reported but haven't settled yet (i.e. they are still open) and they are hence still liable to changes to their currently reserved value. |
| Retrocession agreement | This is, basically, reinsurance for reinsurers: i.e. a contract by which a reinsurer (the retrocedant) buys insurance cover for some of its (reinsurance) risks from another reinsurer (the retrocessionaire). |

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| Risk attaching basis | Contracts of reinsurance written on a risk attaching (or risk-attaching-during, RAD) basis pay the reinsured for claims originating from policies written during the reference period, regardless of when the claim occurs and of when it is reported. |
| Technical premium | Also called the office premium, this is the premium calculated by the insurer so as to cover the expected losses, the other costs and the desired level of profit. The actual premium charged may then be lower or higher for commercial reasons. |
| Total insurance (or insurable) value (TIV) | The TIV is the total value of a property as specified in the contract, and therefore the maximum possible value of a loss for contractual purposes. This will in general be different, for large properties, from the maximum possible loss (MPL). |
| Vehicle-years | A measure of exposure for commercial motor insurance that reflects not only the number of vehicles owned by an organisation over a certain period (e.g. a policy year), but the percentage of the year that each vehicle was part of the fleet. |

Both the concept and the calculation of vehicle-years is similar to that of employee-years (see entry).

Assume that n vehicles have been part of the fleet at some point in year y . Assume that vehicle j has been part of the fleet for a proportion $a_j^y \in (0,1]$ of the year. Then the number of vehicle-years VY^y for year y is

$$VY^y = \sum_{j=1}^n a_j^y$$

By construction, $VY^y \leq n$.

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| Wageroll, or wage roll | This is another word for "payroll" and indicates the total amount of money paid in wages to the employees of a company. It is often used as a measure of exposure in employers' liability insurance (another measure of exposure is employee-years). |
| Written premium | The written premium for a policy (or a portfolio of policies) during a reference period $[t_0, t_1]$ is the premium charged for that policy (or a portfolio of policies) during $[t_0, t_1]$. Note that for premium to be allocated to $[t_0, t_1]$ the inception date must be within $[t_0, t_1]$. |

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