

03.25 UNDERSTANDING PML & EML SELECTING THE APPROPRIATE LOSS METRIC FOR UNDERWRITING DECISIONS

Property and Business Interruption losses can vary significantly depending on the assumptions made regarding fire protection systems, emergency response, asset vulnerability and loss propagation. For this reason, insurers, reinsurers and lenders often rely on various loss metrics to evaluate risk exposure and establish appropriate retention and reinsurance strategies.

However, there is no universally accepted definition of these metrics. Terminology and methodologies vary across insurance markets, risk engineering firms and reinsurance organisations. It is therefore essential that risk surveys clearly define the assumptions underpinning each loss estimate.

PROBABLE MAXIMUM LOSS (PML)

The Probable Maximum Loss represents the largest loss that could reasonably be expected from a single event, assuming that one active fire protection (most critical) fails, passive protection systems operate substantially as intended, and that emergency response act with delay.

The PML therefore reflects a severe but realistic loss scenario in which fire protection systems, compartmentation features and firefighting interventions contribute to limiting the extent of damage.

ESTIMATED MAXIMUM LOSS (EML)

The Estimated Maximum Loss represents a more severe loss scenario in which the fire protection measures fail, are impaired, or prove insufficient to control the event.

The EML assumes a credible deterioration in circumstances, resulting in greater property damage and business interruption than would be expected under PML conditions.

MAXIMUM FORSEEABLE LOSS (MFL)

The Maximum Foreseeable Loss represents the largest loss that could reasonably occur when all significant protective safeguards fail completely or are unavailable.

Depending on market practice, some organisations use MFL as a term broadly equivalent to EML, whilst others regard it as a more severe scenario. Consequently, the assumptions behind any reported MFL should always be clearly defined.

TOTAL INSURANCE VALUE (TIV) or MAXIMUM AMOUNT SUBJECT (MAS)

The Total Insurable Value or Maximum Amount Subject represents the total value at risk and corresponds to a near-total loss scenario affecting the entire exposure.

Such scenarios are typically associated with extreme events, including major natural catastrophes or exceptionally severe incidents capable of affecting the whole site.

WHICH METRIC IS “THE BEST”

The choice between PML, EML, MFL or TIV depends largely upon:

- The insurer's risk appetite;
- Available capital and solvency requirements;
- Reinsurance programme structure;
- Treaty capacities and retentions;
- Confidence in the risk engineering assessment.

Some insurers structure their reinsurance protection based upon TIV or MAS values. Others rely primarily on EML or PML assessments when determining retention levels and reinsurance requirements. The greater the confidence placed in the engineering assessment, the more reliance is generally placed upon PML-based underwriting decisions.

A well-prepared risk survey should therefore provide both PML and EML estimates, allowing underwriters and reinsurers to make informed capacity and pricing decisions.

THE IMPORTANCE OF ACCURATE ASSESSMENTS

PML estimates have a direct influence on:

- Net retention levels;
- Treaty utilisation;
- Facultative reinsurance requirements;
- Reinsurance expenditure;
- Underwriting capacity;
- Premium adequacy.

An understated PML may lead to insufficient reinsurance protection, whilst an overstated PML may result in unnecessary reinsurance costs and excessive premium cessions. An inaccurate PML assessment may give rise to what is commonly referred to as a PML Error.

This occurs when the estimated PML differs materially from the actual loss potential of the risk, producing a mismatch between the insurer's exposure and its reinsurance arrangements.

Example

Assume a risk with:

- Total Insurable Value (TIV): USD 10,000,000
- PML: USD 7,000,000
- Annual Premium: USD 20,000
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The insurer participates in a quota share treaty with:

- Treaty Capacity: USD 5,000,000
- Quota Share: 50%
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For reinsurance purposes, the cedant uses the PML value of USD 7,000,000 as the reference exposure. In effect, the PML is treated as 100% of the sum insured for treaty calculations. The resulting allocation becomes:

- Retention: $50\% \times \text{USD } 5,000,000 = \text{USD } 2,500,000$
- Quota Share Participation: $50\% \times \text{USD } 5,000,000 = \text{USD } 2,500,000$

Because the treaty capacity is limited to USD 5,000,000, facultative reinsurance is required only for the remaining USD 2,000,000. However, if the reinsurance structure had been based on the full TIV of USD 10,000,000, facultative protection of USD 5,000,000 would have been required.

What Happens When a Loss Occurs?

Scenario A: PML Underestimation

If the PML has been understated and a loss reaches USD 8,000,000, the consequences may be serious. The insurer would not only absorb its planned retention of USD 2,500,000, but could also be exposed to an unexpected loss layer of approximately USD 1,000,000 that was neither adequately priced nor protected by facultative reinsurance.

This additional exposure effectively represents an uninsured portion of the risk from the cedant's perspective. Whilst the insurer remains fully liable to indemnify the original insured, a greater share of the claim must be absorbed net of reinsurance.

Scenario A: PML Overestimation

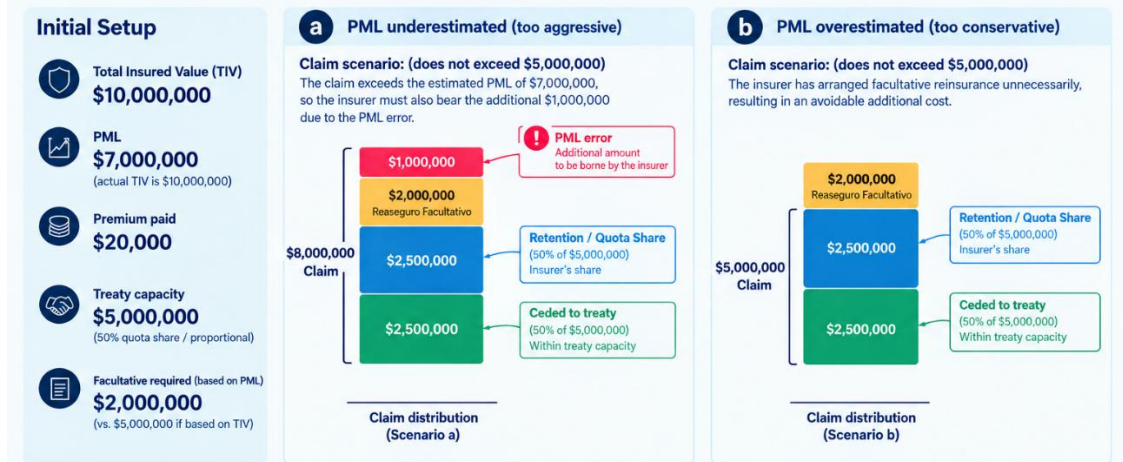
If the PML has been overstated and actual losses never exceed USD 5,000,000, the insurer will have purchased facultative reinsurance that was not required.

In this case:

- Additional reinsurance costs are incurred unnecessarily;
- Premium is ceded that could otherwise have been retained;
- Overall underwriting profitability may be reduced.
- Consequently, the insurer's underwriting result and capital position may be adversely affected.

The Impact of a PML Error

An incorrect PML estimate can lead to additional costs in the event of a claim, or unnecessary reinsurance costs if the PML is overstated. The following example illustrates the impact.



The determination of PML and EML is not a purely mathematical exercise, the assessment requires consideration of:

- Occupancy hazards;
- Fire load and combustibility;
- Site layout and building separation;
- Reliability of fire protection systems;
- Emergency response capabilities;
- Business interruption dependencies;
- Natural catastrophe exposures.

Although engineering methodologies and recognised standards provide guidance, professional judgement remains an essential component of any loss assessment.

As a result, the quality and experience of the risk engineering team can have a direct impact on underwriting and reinsurance outcomes.