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# Non-Proportional Reinsurance Structures for Mortality Risks

In order for life insurance companies to protect their balance sheet against volatile claims experience securing reinsurance coverage has traditionally been used as a means to dampen the impact. For mortality risks, in general, the industry tends to utilize proportional arrangements such Yearly Renewable Term (YRT) structures either on a quota share or surplus per life basis. However, some companies consider coinsurance arrangements, if the specific entity desires to cede other risks beyond just the biometric component.

Non-proportional reinsurance structures tend to be more widely used for group life portfolios and less so for individual life portfolios when companies are establishing their reinsurance programs. However, these arrangements have the flexibility to provide effective risk mitigation on their own or as complementary facilities to a proportional program.

The purpose of this document is to provide a perspective on the general types of non-proportional reinsurance structures that are available to mitigate mortality risks and how they are applied as effective risk management tools.

The types of non-proportional reinsurance arrangements that will be summarized in the subsequent sections of this document are:

1. Per Person Excess of Loss (PPXL)
2. Aggregate Mortality Stop Loss (AMSL)
3. Catastrophe Excess of Loss (CatXL)

## 1. Per Person Excess of Loss (PPXL)

PPXL arrangements are typically annual treaties (i.e., one-year covers) that protect the ceding company against excessive exposure on the net amount at risk (NAR) on a per life basis. These structures tend to be suitable for short-term risks or yearly renewable covers such as:

- Group Life / AD&D business
- Group Personal / Travel Accident business
- Individual Personal / Travel Accident business

Although less common for long-term individual life insurance, PPXL can be applied if the ceding company is open to the potential for annual rate adjustments due to changes in risk exposure or experience.

### *How does a PPXL cover work?*

**a) Coverage**

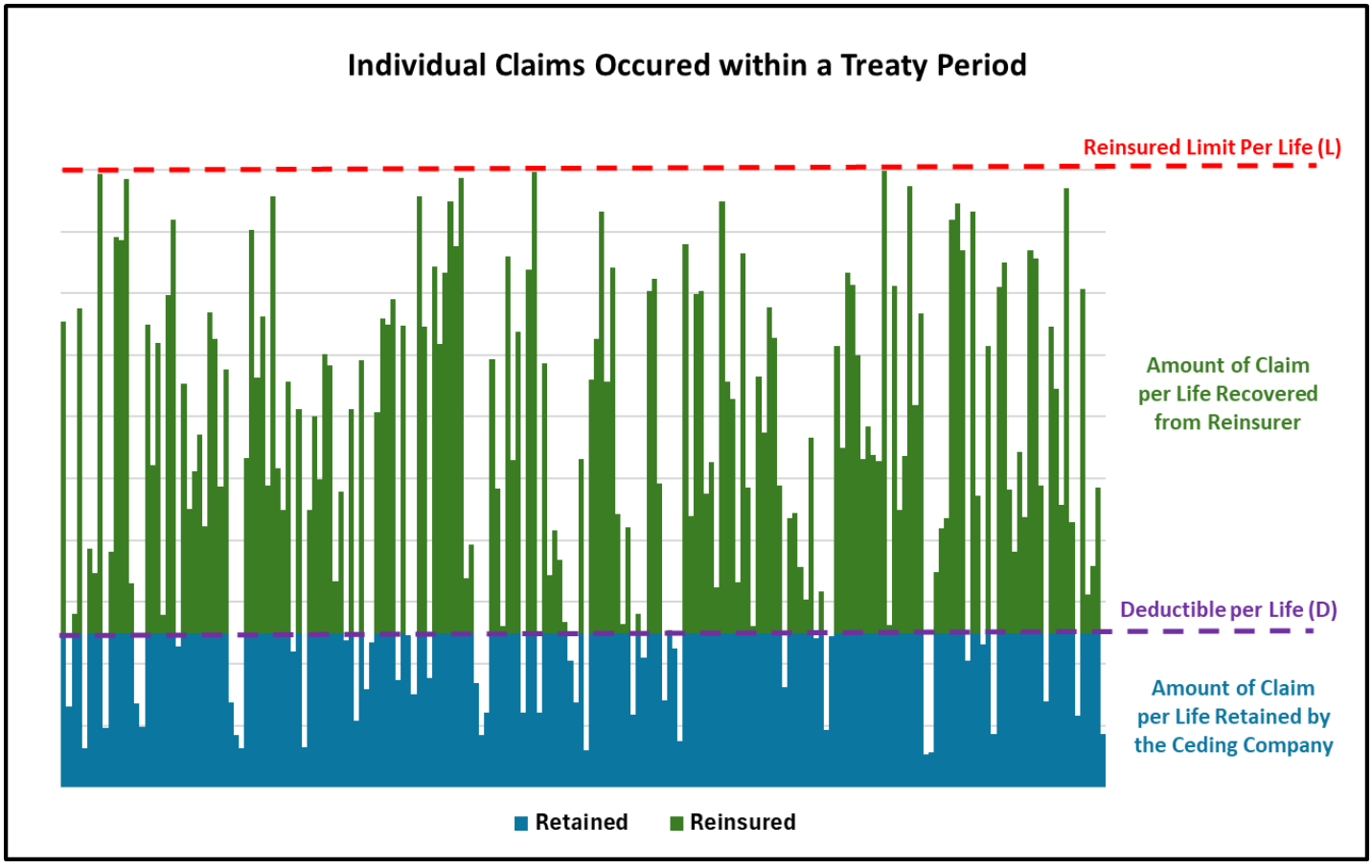
The PPXL cover is usually expressed with a deductible (i.e. the retained portion of the net at amount at risk by the ceding company) “D” and a Limit “L” per life and the common abbreviation is “L xs D” (i.e. the maximum coverage limit in excess of the deductible per life). The deductible is also referred to as the attachment point, priority or retention. The reinsurer will pay each claim minus the deductible up to the limit. For example, assume a portfolio of group life business that has a PPXL cover whereby the ceding

company retains the first $500,000 of claim per life and reinsures the remaining risk up to $2,000,000 per life, then that coverage would be expressed as 1,500,000 xs 500,000 per life.

It is also important to note that in general, all claims are covered on an occurrence basis. That is, any claim must occur within the coverage period of the treaty and is not risk attaching to the effective period of the underlying policies covered in the reinsurance agreement. For example, if the treaty coverage period is from January 1 to December 31, in a given calendar year and a policy is issued on July 1 of that same calendar year, a claim that occurs on December 31 of that year would be a valid claim within the treaty. However, if a claim occurs on January 1 of the following calendar year, then that claim would be inadmissible within the terms of the treaty, despite that the claim was risk attaching to the policy issued on July 1 of the preceding calendar year.

The treaty coverage period is usually for 12 consecutive months, however there are situations whereby the reinsurer would be willing to provide a coverage period up to 24 months.

The chart below is a graphical example of how the risks are ceded.



**b) Premium**

The Premium Rate (PR) is expressed as a percentage of the original Gross Written Premiums (GWP) for the policies ceded into the treaty. GWP is also referred to as the Subject Premium (SP) for the purpose of defining the terms within a PPXL cover. The reinsurance premium is simply the Subject Premium multiplied by the Premium Rate.

**i) Minimum & Deposit Premium (MDP):**

The MDP is the provisional and minimum reinsurance premium that is paid upfront for the PPXL cover and is usually calculated at 80% of the expected reinsurance premium. For example, if the PR is 5% and the expected SP over the coverage period is $20,000,000, the expected reinsurance premium works out to be $1,000,000. Then the MDP would be $800,000.

The reinsurer usually offers the option for the MDP to be paid annually or semi-annually at the start of each payment period. Referring to the example above, and assuming a treaty period from January 1 to December 31 of a given calendar year, if annual mode is selected then $800,000 would be due on January 1 of that calendar year. If the ceding company selects semi-annual mode, then $400,000 would be due on January 1, and the second MDP payment of $400,000 would be due on July 1 of that calendar year.

**ii) Adjustable Premium:**

The Adjustable Premium is settled paid at the end of the treaty coverage period and is simply the actual SP multiplied by the PR, less the MDP that was paid. The total reinsurance premium over the coverage period is floored by the MDP and if the actual SP multiplied by the PR is less than the MDP paid, the adjustable premium would be zero.

**c) Ease of Administration for the Ceding Company**

In terms of reinsurance administration, the PPXL structure requires less reporting to the reinsurer compared to YRT arrangements. With YRT reinsurance structures, the ceding company is required to calculate the reinsurance premium for the risks ceded, based on an agreed upon rate table multiplied by the mortality exposure per life. In addition, for YRT treaties, the ceding company is also required to provide policy data on each life reinsured within the arrangement. The PPXL arrangement just requires the ceding company to provide the aggregate premium revenue results over the treaty coverage treaty period at the end of the year.

With respect to claims that occur throughout the treaty coverage period, the ceding company is only required to report claims that exceed the deductible.

## 2. Aggregate Mortality Stop Loss (AMSL)

AMSL arrangements are typically annual treaties (i.e., one-year covers) that protect the ceding company against adverse mortality experience across an entire block of business for the risks it retains. In addition to safeguarding a company's balance sheet against volatility due to unfavorable claims experience, these structures can serve as effective tools for stabilizing earnings.

This reinsurance cover can be applied to individual life or group life portfolios and may include both life and accidental death policies.

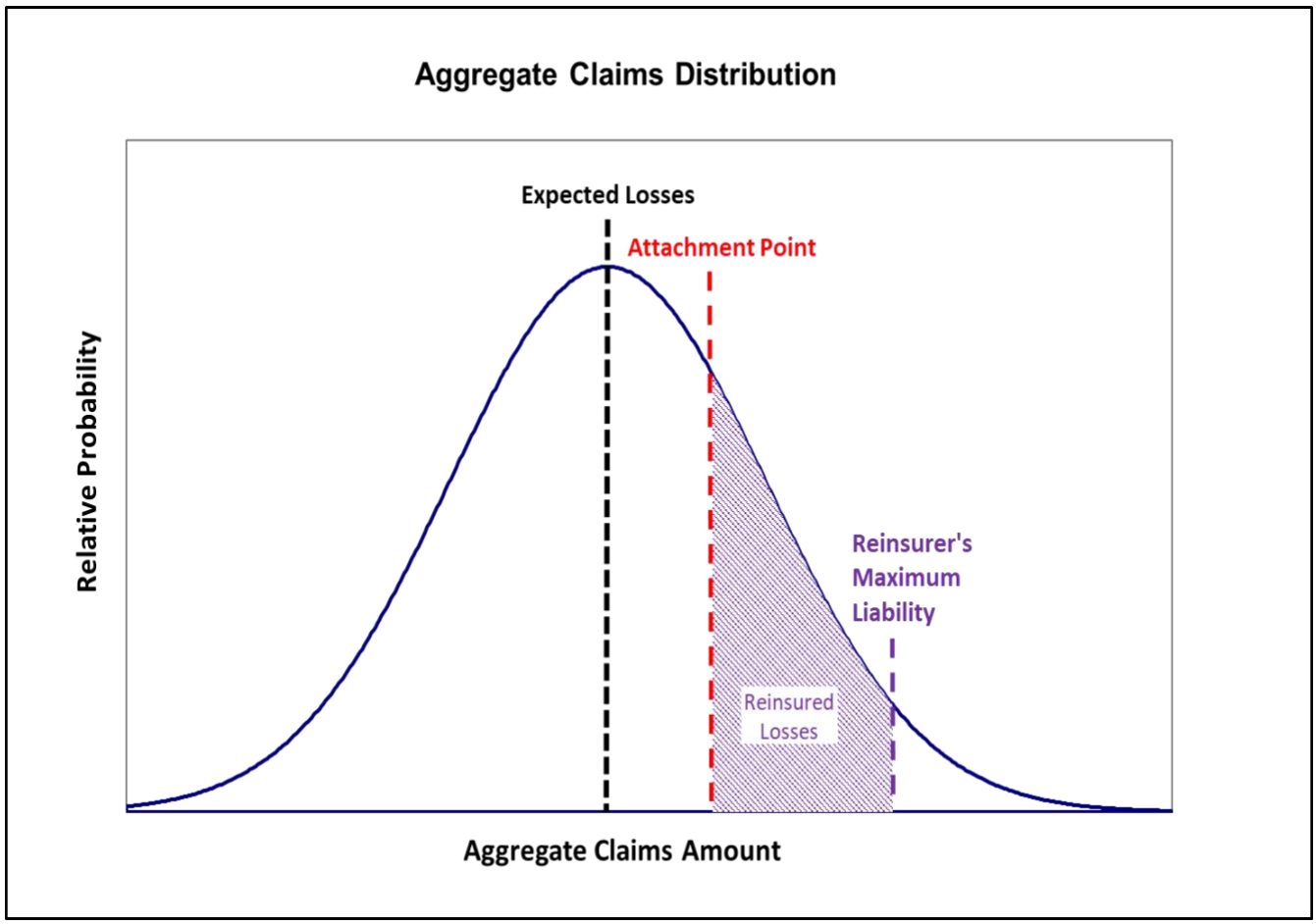
***How does an AMSL cover work?***

### a) Coverage

The AMSL cover is usually expressed with an attachment point as a percentage of expected aggregate claims over a one-year period for a portfolio or block of life insurance business. In terms of reinsurance capacity, the limit to the coverage is also expressed as a percentage to the expected aggregate claims, sometimes called a detachment point, and is further limited by an absolute dollar amount. For example, if the attachment point was 120% of expected claims up to a maximum coverage of 150% of expected claims, and the expected claims over a one-year period is $100,000,000, then the ceding company would be responsible for the first $120,000,000 of claims, and the reinsurer would cover the next $30,000,000 of claims, subject to a maximum of liability to the reinsurer of $30,000,000 over the one-year period. Although the likelihood would be remote, if the aggregate claims exceed the reinsurer's liability, the ceding company would be responsible for those claims above the threshold.

Another key element to establishing an AMSL arrangement is that the ceding company and the reinsurer need to agree upon the basis for the aggregate expected claims over the one-year period. The reinsurer would typically receive the mortality experience of the block(s) or portfolio for the most recent five years and then work with the ceding company to come to an agreement on the expected claims over the coverage period. The expected mortality basis would usually be expressed as a percentage of an industry mortality table (usually gender distinct with smoker class). The expected mortality rates would then be applied to the net amount at risk of each risk retained in the block(s) or portfolio.

The chart below is a graphical example of how the risks are ceded.




**b) Premium**

The "Premium Rate" (PR) is expressed as a per thousand (‰) or per million of average retained aggregate Net Amount at Risk (NAR) over the coverage period. The average NAR is defined as the average between the retained NAR at the beginning of the coverage period and at the end of the coverage period. For example, applying a PR of 0.20‰ with an aggregate retained NAR at the beginning of the coverage period of $45 billion and $55 billion at the end of the coverage period, the final premium would amount to 0.20 x [($45 billion + $55 billion) ÷ 2] ÷ 1,000 = $10 million.

**i) Minimum & Deposit Premium (MDP):**

The MDP is the provisional and minimum reinsurance premium that is paid upfront for the AMSL and is usually calculated at 80% of the expected reinsurance premium. The expected reinsurance premium is the PR multiplied by the expected retained NAR over the coverage period. Taking the above example and using the expected NAR of$45 billion, then the MDP would be 80% x 0.20 x $45 billion ÷ 1,000 = $7.2 million.

The reinsurer usually offers the option for the MDP to be paid annually or semi-annually at the start of each payment period. Referring to the example above, and assuming a treaty period from January 1 to December 31 of a given calendar year, $7.2 million would be due on January 1 of that calendar year if the ceding company selects annual mode. If the ceding company selects a semi-annual mode, then $3.6 million would be due on January 1, and the second MDP payment of $3.6 million, would be due on July 1 of that same calendar year.

**ii) Adjustable Premium:**

The Adjustable Premium is settled at the end of the treaty coverage period and is simply the actual calculated premium as defined above less the MDP that was paid. The total reinsurance premium is floored by the MDP and if the actual premium is less than the MDP paid, the adjustable premium would be zero.

Referring to the above example, if the actual calculated premium is $10 million and the MDP is $7.2 million, then the adjustable premium payable at the end of the treaty period would be $10 million – $7.2 million = $2.8 million.

## 3. Catastrophe Excess of Loss (CatXL)

CatXL arrangements are annual treaties that provide protection against the concentration of death risks due to a single catastrophic event for the ceding company's retained portfolio of life policies. The event could be due to a single accidental event or due to natural peril. For example, the loss could be precipitated by:

- A single accidental event such as a bus/road vehicle accident, plane crash, building explosion, etc.
- A natural peril such as earthquakes, windstorms, floods, etc.

It's important to note that a single event due to natural peril is usually subject to a time limit, such as 72 hours or 168 hours from the time the event occurs. In addition, certain events may be limited to a geographic radius, commonly 250 miles, from the event's epicenter.

Coverage may include or exclude losses from:

- acts of terrorism, which could exclude attacks involving nuclear, chemical, or biological weapons;
- accidents involving nuclear, chemical, or biological disasters that are not related to war or terrorism; and
- passive war risks.

Common exclusions are:

- group business for policies issued to professional sports teams, airline employees, or ship crews;
- war (whether declared or not) or civil war; and.
- pandemics.

***How does a CatXL cover work?***

**a) Coverage**

The CatXL cover is usually expressed with the following criteria:

- Attachment Point:

  This is the deductible that the ceding company must retain, from first dollar, for a loss due to a single event. If the loss is less than the attachment point, the CatXL loss would not be triggered. The attachment point is typically set at the Maximum of Any One life (MAOL) multiplied by the Minimum Life Warranty. In some cases, the attachment point can be set as the average retained amount - at risk per life multiplied by the Minimum Life Warranty.

- Reinsurer's maximum liability per event:

  This is the maximum amount of loss that the reinsurer would pay for a single event.

- Reinsurer's maximum liability over the coverage period of the treaty:

  This is the maximum amount of loss that the reinsurer would pay over the coverage period of the treaty should multiple events that trigger losses occur over that period. The coverage period of a treaty is typically for one year. However, there have been cases that were multi-year covers, but those terms tend to be rare. The maximum liability over the coverage period is usually the maximum liability per event multiplied by the number of reinstatements.

- Minimum Life Warranty:

  This is the minimum number of deaths due to a single event in order for a CatXL loss to be valid. Typically, the Minimum Life Warranty would be set to be at least three deaths due to a single event.

- Maximum Any One Life (MAOL):

  Typically, the terms of the reinsurance contract would include the maximum amount of loss for any one life. Usually, MAOL is typically the maximum retention per life of the ceding company. If there is more than one policy on any one life or unknown accumulation of risk on any one life, the maximum loss payable would be capped at the MAOL.

- Number of Reinstatements:

  A reinstatement allows for the ceding company to reinstate the CatXL cover for a subsequent catastrophic event, provided there was a prior catastrophe that triggered a claim event during the same coverage period. Typically, reinsurance contracts allow for one reinstatement, but there are some contracts that have two reinstatements. Normally, there is an additional reinsurance premium charge for the reinstatement.

**b) Premium**

The "Premium Rate" (PR) is expressed as a per million of average retained aggregate Net Amount at Risk (NAR) over the coverage period. The average NAR is defined as the average between the retained NAR at the beginning and at the end of the coverage period. For example, if the PR is 3.00 per million and the retained NAR at the beginning of the coverage period is $45 billion and at the end of the coverage period is $55 billion, the final premium to be charged would be 3.00 x [($45 billion + $55 billion) ÷ 2] ÷ 1,000,000 = $150,000.

Another common definition of the premium is the Rate-on-Line (ROL), which is expressed as a percentage and is simply the expected CatXL premium divided by the maximum liability per event. Taking the above example of the premium calculation and assuming the maximum liability per event is $20 million, the ROL is simply 150,000 ÷ $20 million = 0.75%.

**i) Minimum & Deposit Premium (MDP):**

The MDP is the provisional and minimum reinsurance premium that is paid upfront for the CatXL coverage. It is usually calculated at 80% of the expected reinsurance premium. The expected reinsurance premium is the PR multiplied by the expected retained NAR over the coverage period. Taking the above example with an expected NAR of$45 billion, then the MDP would be 80% x 3.00 x $45 billion ÷ 1,000,000 = $108,000.

**ii) Adjustable Premium:**

The Adjustable Premium is paid at the end of the treaty coverage period and is simply the actual calculated premium less the MDP that was paid. The total reinsurance premium is floored by the MDP and if the actual premium is less than the MDP paid, the adjustable premium would be zero.

Referring to the example above, if the actual calculated premium is $150,000 and the MDP is $108,000, then the adjustable premium payable at the end of the treaty period would be $150,000 – $108,000 = $42,000.

**iii) Reinstatement Premium:**

If a catastrophic event has occurred and a CatXL claim was triggered, the ceding company has the option to reinstate coverage subject to the terms of the treaty. To reinstate the coverage, the ceding company is required to pay a reinstatement premium. The reinstatement premium is calculated as the PR multiplied by the expected retained NAR over the coverage period; then multiplied by the ratio of the amount of the claim that has occurred to the reinsurer's maximum liability per event; and then prorated for the remainder of the treaty coverage period.

Using the above example and assuming a $10 million loss occurred on June 30 during the coverage period of January 1 to December 31, the reinstatement premium would be calculated as:
3.00 x $45 billion ÷ 1,000,000 x ($10 million ÷ $20 million) x (6 months ÷ 12 months) = $33,750.

## Working with RMA

Each of the arrangements described in this document can be an effective risk management tool to safeguard against adverse mortality experience, on its own or as a combination. RMA works with a select group of reinsurers to provide capacity for non-proportional reinsurance arrangements. If there is interest with your organization to explore these solutions, RMA would be happy to meet with you to discuss the optimal reinsurance program that would address your company's risk mitigation needs.