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Components of Renewal Premium Change

Purpose

The intent of this paper is to outline a theoretical approach to calculating the components of renewal premium change with a key goal of accurately calculating rate change.

Background

Rate change is a common and important metric used by property and casualty insurance companies to evaluate the change in rate adequacy of individual policies and of their insurance portfolios over time. The rate change metric is used by actuaries to adjust historical loss ratios to current rate levels in the loss forecasting process. Regulators, reinsurers and rating agencies look at rate change metrics to better understand how an insurer's rate adequacy levels are changing. Rate change is a key indicator of how an insurer's loss ratios are likely to change.

In practice, insurance companies use a variety of methods to calculate rate change based on the availability of data, system constraints, resource constraints and individual preferences and opinions. Some methods are highly simplified, while some are very detailed and sophisticated. Often, due to various constraints, compromises must be made and the rate change metric can be distorted by other changes occurring on a given policy.

Example:

Renewal Premium = $1,100
Expiring Premium = $1,000
Ratable exposure units increased by 15%
Distribution of exposure units by class code changed
Deductible increased from $500 to $1,000

What is the rate change on this policy? We do not have enough information in this example to precisely calculate rate change. We need to gather additional information and/or make some simplifying assumptions to make a reasonable estimate of rate change.

When implementing a rate monitoring system, judgment will likely be required in circumstances where the required information is not readily available, or is not practical to obtain. These decisions may result in some simplifying assumptions and modifications to the theoretical framework. However, one should first understand the theoretical framework and implications of making such simplifying assumptions. For example, ignoring deductible change in the rate change calculation may be reasonable for a large book of small deductible policies where the vast majority of insureds all have the same deductible. However, ignoring deductible change for large deductible policies could lead to materially misleading rate change indications. The following pages will discuss this theoretical framework.

Renewal Premium = Expiring Prem * (1+Duration Δ) * (1 + Exposure Δ) * (1 + Coverage Δ) * (1+Rate Δ)

There are various ways to define technical premium, exposure change, coverage change and rate change. This paper will use the following definitions:

Technical Premium = the premium indication before discretionary modifications

This is the premium indicated by the rating plan before any discretionary pricing changes from the underwriter (e.g. excludes schedule rating modifications), but would include pricing changes from experience modification factors and other objective rating factors.

Duration Δ = the technical premium impact from changes in the policy term

This could also be considered part of coverage change. In the event of the renewing and expiring policies having different lengths, this would reflect the pro-rata difference in the duration (e.g. if a 12 month policy is renewed with a 24 month term, that would be a 100% increase in duration).

Exposure Δ = the technical premium impact from changes in the Insured's characteristics

Exposure change can include items such as changes to payroll, revenue, total insured value, market cap, vehicles, class codes, etc. These are all items that reflect the characteristics of the insured and are not directly influenced by the terms of the insurance policy.

Coverage Δ = the technical premium impact from changes in the Policy's characteristics

Coverage change reflects changes to the underlying coverages on the policy (e.g. endorsements that expand or contract coverage). It also includes items such as changes to limits, deductibles, attachment points, quota share percentage.

Rate Δ = the change in price adequacy (as measured by the impact to the expected loss ratio)

The actual/technical ratio is a measure of price adequacy. The change in the actual/technical ratio from expiring to renewing term reflects the change in rate adequacy. The rate change should be calculated in a manner that will allow for accurate on-leveling of loss ratios.

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Frequently Asked Questions:

How are changes in commission reflected in these calculations?

Where commissions are explicitly considered in the pricing of individual policies, changes in commission are reflected in the rate change calculation. Example:

- Expiring premium = $100 with 10% commission, $60 of expected loss, other expense of $20, expected underwriting profit = $10.
- 0% loss trend
- Renewing premium = $90 with 0% commission, $60 of expected loss, other expense of $20, expected underwriting profit = $10.

What is the correct rate change (assuming all else is equal)? Is it:

A. 0% because there is no change in underwriting profit? or
B. -10% because there is 10% less premium per loss exposure?

The answer is B.

- Expiring Expected Loss Ratio = $60/$100 = 60%
- Renewing Expected Loss Ratio = $60/$90 = 66.7%
- On-Level Loss Ratio = 60%/ (1 + -10%) = 60%/90% = 66.7% = correct loss ratio

While there is no impact to the expected underwriting profit, there is an impact to the expected loss ratio, hence 0% rate change would be incorrect in this case.

How are minimum premiums handled in the rate change calculation?

Rate change is calculated before the application of minimum premiums. Illustration:

		Expiring	Renewing	Change
(a)	Exposure Units	100	200	100%
(b)	Technical Rate per Exposure Unit	1.0	1.0	0%
(c) = (a) * (b)	Technical Premium (before minimum)	100	200	100%
(d) = $500	Actual Premium (= minimum premium)	500	500	0%
(e) = (d)/(a)	Actual Rate per Exposure Unit	5.0	2.5	-50%
(f) = (c) * 60%	Expected Loss	60	120	100%
(g) = (f)/(d)	Expected Loss Ratio	12.0%	24.0%	
	Exposure Δ = 200/100 - 1 =			100.0%
	Rate Δ = 2.5 / 5.0 - 1 =			-50%
Premium Δ = (1+Exposure Δ)*(1+Rate Δ) - 1 = (1+100%) * (1 + -50%) - 1 =				0.0%
	On-Level Loss Ratio = 12%/(1 + -50%) = 12%/50% =			24.0%
				Correct

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Definitions & Calculations

- **Renewing Premium (RP)** = actual renewing premium
- **Expiring Premium (EP)** = actual expiring premium
- **Renewing Technical Premium (RT)** = technical premium indication for the renewal term
- **Expiring Re-stated Technical Premium (ET)** = technical premium based on expiring coverages and exposures, using the current rates and current expenses (including commission); hence if there were changes to the rates or commission since the prior year, this may not equal the technical premium indication from one year ago.
- **Renewing Technical Premium at Expiring Coverages (RT@EC)** = what the technical premium indication for the renewal term would be if there were no changes in coverage (e.g. if the insured increases their limit at renewal from 1M to 2M, the renewing technical premium would provide the technical indication at a 2M limit while the RT@EC would provide the technical premium indication at a 1M limit)

Duration Δ = (Renewing Exp Date – Renewing Eff Date)/(Expiring Exp Date – Expiring Eff Date) - 1

Exposure Δ = RT@EC/(ET*(1+Duration Δ)) - 1

Coverage Δ = RT/RT@EC – 1

Rate Δ = (RP/RT)/(EP/ET) – 1

Renewing Premium Δ = RP/EP – 1 = (1+Duration Δ)*(1 + Exposure Δ)*(1 + Coverage Δ)*(1+Rate Δ) – 1

About the Author:

Dave Moore is the president of Moore Actuarial Consulting, LLC which provides actuarial consulting services for commercial and specialty lines of (re)insurance. He has over 25 years of actuarial experience and a diverse background. Dave has extensive pricing and reserving experience for a broad range of (re)insurance products. He also provides Enterprise Risk Management (ERM) services.

Moore Actuarial Consulting, LLC offers a variety of services, including:

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- Management Liability Insurance Specialist (MLIS)
- Construction Risk and Insurance Specialist (CRIS)
- Fellow in the Conference of Consulting Actuaries (FCA)
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