Canadian Institute of Actuaries | Institut canadien des actuaires

# CIA Study Note

## Experience rating on group health insurance

May 2023

# Table of contents

# Introduction

This document aims to present a method for analyzing group health insurance experience within a prospective pricing framework. It is important to understand the influence of key factors such as the inflation of medical care and the trend in the use of health insurance coverage in a particular group. To this end, consideration will be given to external sources of information that can assist in the analysis of the experience. As this document is written by a consulting actuary, it also presents some factors that promote success in negotiating renewal pricing with the insurer. The role of key stakeholders and the consulting actuary is also discussed.

**Rationale**

Insurers have pricing manuals that allow you to calculate the premium rate that would normally apply to a group for a particular guarantee (life insurance, health insurance, etc.). These rates typically vary according to age and sex, but also to health insurance, according to the following parameters:

- Type of protection (individual or family, but sometimes also couple or single parent)
- Deductible of each sub-warranty
- Co-insurance of each sub-guarantee
- Co-payments on medicines
- Limits or maximums (e.g., semi-private hospital room, maximum in dollars / chiropractic treatment, maximum in dollars / 24 months for corrective lenses) applicable to each sub-warranty
- Coverage level of each sub-guarantee (for example: coverage or not for acupuncturists, coverage or not for drugs outside the Régie de l'assurance maladie du Québec (RAMQ) list in the case of employees in Quebec, etc.)
- Etc.

In theory, the rate manual makes it possible to calculate a very specific pricing corresponding exactly to coverage level or expected cost of the guarantee one wishes to price. We only must add up all the rates of the sub-guarantees for all insured persons benefiting from the same type of protection: individual, family, etc.) within the fee-based group, and average by dividing by the corresponding number of insured. The notional rates thus calculated correspond to the cost of the group's insurance if it behaved like the average of the groups used to construct the pricing manual.

In practice, each group is different from the average and behaves differently. Each employee has different health care needs than their colleagues. In addition, there is no control over the medical needs of dependents. If we know that employees are, at least initially, healthy enough to work, we know nothing about dependents. The employer does not have the right to ask a person they wish to hire if that person has a sick spouse or a sick child. Even in the case of the potential employee, they will not be refused to hire if they have a chronic disease such as diabetes that does not prevent them from working.

In this context, the best guide to estimating the future cost of the guarantee is its recent pricing, weighted by its recent experience (claims + fees vs. premiums), if it is credible.

# Size of groups with experience-based pricing

Pricing is not necessarily 100% based on experience because the group is not always large enough to provide full credibility to its experience.

It should be noted, however, that the experience of health insurance tends to be relatively credible because normally at least 80% of insured certificates claim at least once during a year.

Insurers use all sorts of credibility formulas and sometimes have no indication of the theoretical basis behind their credibility formulas, as it has been developed a long time ago.

Here are four examples of credibility formula in health insurance:

***Formula 1:***
C = 1 - 5 / √N where N > 25 and N represents the number of person-years of exposure. The origin of this formula is lost in the midst of time.

***Formula 2:***
C = √(N/225) where N is the number of person-years of exposure. This formula assumes that a phenomenon for which the result is less than 15% of the true value 17 times out of 20 is fully credible.

***Formula 3:***
C = √(N/680) where N is the number of person-years of exposure. This formula assumes that a phenomenon for which the result is less than 10% of the true value 18 times out of 20 is fully credible.

***Formula 4:***
C = √(N/1000) where N is the number of person-years of exposure. This formula assumes that a phenomenon for which the result is less than 10% of the true value 19 times out of 20 is fully credible.

The table below illustrates these different formulas:

| Number of certificates | Number of years – persons over two years | Credibility | | | |
|---|---|---|---|---|---|
| | | Formula 1 | Formula 2 | Formula 3 | Formula 4 |
| 10 | 20 | 0% | 29,8% | 17,1% | 14,1% |
| 25 | 50 | 29,3% | 47,1% | 27,1% | 22,4% |
| 50 | 100 | 50,0% | 66,7% | 38,3% | 31,6% |
| 100 | 200 | 64,6% | 94,3% | 54,2% | 44,7% |
| 200 | 400 | 75,0% | 100,0% | 76,7% | 63,2% |
| 400 | 800 | 82,3% | 100,0% | 100,0% | 89,4% |

Which of these formulas is deemed best doesn't materially matter. There are as many formulas as there are actuaries.

It should be noted, however, that some insurers, typically those specializing in small group insurance, will attribute credibility to the experience of a group of 10 certificates, while other insurers do not give credibility to the experience of groups of less than 50 certificates. This diversity of approaches makes it possible to have a market where not all insurers will come to the same conclusion as to the pricing applicable to a group.

The additional credibility should be applied to the notional pricing, which corresponds to the expected cost, but some insurers sometimes apply it to the pricing charged to the group in the year preceding the calculation. We can therefore observe one or the other of the following formulas:

Formula A:
$\text{Rate}^{\text{Renewal}} = \text{Rate}^{\text{Projected experience}} \times C + \text{Rate}^{\text{theoretical}} \times (1-C)$

Formula B:
$\text{Rate}^{\text{Renewal}} = \text{Rate}^{\text{Projected experience}} \times C + \text{Rate}^{\text{Projected actual}} \times (1-C)$

Formula B contains an interesting logical error: if the current rate is itself based on a credibility applied previously (at the time of its determination) we considerably increase the credibility given to the experience of the group because we find ourselves applying the complement of credibility to credibility. It is a simple trap in which we can fall if we do not always question the logic of what we do!

In the above formulas, rates are projected using an inflation factor (including trend) appropriate to experience and, where appropriate, to past pricing, to reproduce the conditions that will prevail during the period of application of the rates.

In large groups, another approach is to give credibility to the experience of each of the last two or three years. In this case, often the experience of the past year would be considered entirely credible, but the experience of the previous year, although possibly significantly different, is just as credible, which is a contradiction in view of full credibility. This dilemma is solved by spreading credibility over the last two or three years. In this case, the experience of the group is

considered fully credible, but more than one year is considered. In this type of calculation, the last year will typically be given more credibility than in previous years, because any change in the group's grievance patterns will be more closely reflected in the most recent experience.

## Key stakeholders

In the negotiation of group insurance pricing based on experience, there are several stakeholders, all of whom have a decisive role.

Covering the insurer through the client:

The underwriter

- The underwriter analyzes the group's experience and proposes a pricing that represents its best estimate of the cost of the plan for the next year, while allowing the insurer to achieve its profit objective (typically 2% to 3% in health insurance)

The insurer's account executive ("group rep"), sometimes called "insurer's advisor"

- This representative does not sell insurance directly to groups. They represent the insurer vis-à-vis the group and its intermediary (broker or consulting actuary); usually, an account executive only deals with a limited number of intermediaries, which is why insurers use several account executives.
- They are responsible for presenting the conditions for renewing the group insurance policy to the intermediary.
- They are assisted by the service representative, who normally handles the administration of the contract (questions on invoicing, receipt of proof of insurability, etc.). but may also forward questions from the intermediary to the underwriter and account executive.

The insurer's service representative

- This representative is not normally involved in negotiating renewals, except when the account executive representative is not available. Even there, the role of the service representative is limited. Rather, their role is to act as a day-to-day link between the insurer and the group and to ensure that all administrative problems of the group are quickly resolved.

The consulting broker or actuary

- They initially recommended the insurer to the client and negotiate the renewal with the insurer, on behalf of the client. They seek to obtain the best possible conditions for the client. One must be careful, as the best conditions do not necessarily mean the lowest pricing. We can also aim for the most stable or fair pricing.
- If this intermediary is remunerated based on commissions, great prudence and transparency are necessary as there is an appearance of conflict of interest: a greater increase in rates producing a greater increase in the remuneration of the intermediary.

The customer representative

- This is usually the Director of Human Resources, or a member of the client's finance department. They ultimately accept the insurer's pricing, on the recommendation of the intermediary, or mandate the intermediary to call for tenders from several insurers to find insurance conditions.

**Items that differentiate the consulting actuary**

All intermediaries have strengths and weaknesses. In the case of the consulting actuary, they differ mainly by the following:

Objectives

- The actuary generally aims to get the client and the insurer to agree on a pricing that is representative of the risk and that will be as stable as possible (for example, an increase of 6% per year instead of a decrease of 5% followed by an increase of 20% and an increase of 3%) to avoid unpleasant surprises on employee premiums.

Technical skills

- The actuary can analyze not only the experience of the group but also inflationary trends that may influence the future cost of the plan.
- Easily explores external sources of information allowing him to validate assumptions and submit a different perspective to the insurer.
- Can detect any unusual situation that may influence the experience or pricing.

Approach: more mathematical than negotiatory

- The actuary aims to establish the rate based on a mathematical analysis understandable by all stakeholders and not based on threats or blackmail against the insurer.

Independence from the insurer

- Since the actuary is not usually paid with commission, they have no personal interest in recommending one level of pricing over another. They show no conflict of interest or appearance of conflict of interest.

# Experience analysis

**Principles and methods**

The purpose of experience analysis is to measure the adequacy of the current rates in relation to the expected experience during the (future) period of application of the new rates. The measure of sufficiency that is obtained indicates whether and how much to increase or decrease the current rate.

This includes:

- Returning premiums to where they would be if current pricing had applied during the observation period.
    - It is usual for the experience period to overlap with two consecutive tariff periods.
    - Therefore, even the latest premiums need to be adjusted to reflect current pricing.
    - By replacing the premiums recorded with premiums adjusted at the current rate level, changes (if any) in insurance coverage between the time the premiums were recognized and the time the analysis is done.
- Projecting incurred benefits (claims paid + change in reserves for claims incurred but not reported) up to the period of application of the new rate by applying inflation and considering changes (if any) in insurance coverage between the time the benefits were recognized and the time the analysis and the period of application of the new pricing.
- Increase projected claims incurred by adding the insurer's costs. These costs are usually estimated as a percentage of premiums, so the cost (benefits + fees) can be projected simply by dividing the projected benefits incurred by (1-costs).

Before performing calculations, one must understand the information provided by the data:

- Per capita costs (per certificate) can be calculated during each of the experience periods analyzed, to validate the insurer's inflation factor.

How does the insurer build the inflation factor:

- Is it "pure" inflation? Otherwise:
    - Is there a franchise erosion component? If so, how much?
    - Is there an aging component of the population?
    - Is there an increase in usage component?
- Does the inflation factor only represent the increase in costs in the insurer's portfolio or does it include a provision for the recovery of deficits incurred on new groups that the insurer has obtained by bidding at a loss?
- How did the insurer derive its inflation factor given the large variations in inflation between drugs, health professionals (especially if their maximum is not indexed) and other health care services?

The actuary must form an opinion on the appropriateness of the inflation factor used by the insurer. It is worth visualizing the phenomena of franchise erosion and prescribing habits of doctors.

**Erosion of the franchise**

The presence of a non-indexed deductible exacerbates inflation, as shown in the example below. Let us assume a plan that reimburses the portion of claims that exceeds $100 for each claimant.

Suppose the claims for year X are as follows:

Insured A: $50

Insured B: $100

Insured C: $200

Insured D: $300

Insured E: $500

The actuarial cost of such insurance, in the absence of fees and taxes, would be [(200 – 100) + (300 – 100) + (500 – 100)] / 5 insured = $700 / 5 = $140

If inflation is 10%, claims for year X+1 will be as follows:

Insured A: $55

Insured B: $110

Insured C: $220

Insured D: $330

Insured E: $550

The actuarial cost of such insurance, in the absence of fees and taxes, would be [(110 – 100) + (220 – 100) + (330 – 100) + (550 – 100)] / 5 insured = $810 /5 = $162

The cost increased from $140 to $162, a 15.7% jump while inflation is 10%. We must therefore add 5.7% to inflation, as an adjustment for erosion of the franchise.

Since many plans have deductibles lower than $100, the erosion factor used by the insurer is typically in the order of only a few percentage points.

The consulting actuary must ensure that the insurer uses this type of adjustment only if the group has a deductible. Some plans are designed without deductible precisely to avoid this phenomenon. In this case, the inflation factor should not include an average erosion of deductibles. An inexperienced underwriter with the insurer could inadvertently apply this type of adjustment, even if not necessary.

**Prescribing habits of physicians**

Even in the absence of inflation, physicians' prescribing habits can generate artificial inflation when they start prescribing more expensive drugs even if they are not new products, as shown in the example below:

| | Year X | | Year X+1 | |
|---|---|---|---|---|
| Drug | Price of a treatment | % of prescriptions | Price of a treatment | % of prescriptions |
| ABC | $17 | 65% | $17 | 55% |
| DEF | $45 | 25% | $45 | 30% |
| RECORD | $106 | 10% | $106 | 15% |

In this example, the average cost of a treatment is $32.90 for year X and $38.75 for year X+1, an increase of 17.8%, while there is no inflation.

**Example of experience pricing**

On the next page, we have a real situation.

Some elements need to be clarified:

- The plan does not include a deductible.
- The plan does not include a direct drug payment card.
- The travel insurance sub-guarantee is pooled, i.e., experience is not considered (travel insurance premiums and benefits are removed).
- The insurer's inflation factor has no room for deductible erosion.

The renewal submitted by the insurer is shown in this table:

**ACCIDENT AND SICKNESS INSURANCE**
**Renewal as of March 1, 2016**
**INITIAL ANALYSIS FROM THE INSURER**

| | | Period 1 (most recent) | Period 2 (previous) | Period 3 (preceding) | Period 4 (not used) |
|---|---|---|---|---|---|
| | from : | 1 oct. 2014 | 1 oct. 2013 | 1 oct. 2012 | 1 oct. 2011 |
| | to : | 30 sep. 2015 | 30 sep. 2014 | 30 sep. 2013 | 30 sep. 2012 |
| **PREMIUMS** | | | | | |
| Premiums due | | $2,848,474 | $2,768,191 | $2,933,748 | $2,745,920 |
| minus pooled premiums | | $93,552 | $90,900 | $97,389 | $110,699 |
| = Premiums subject to experience | | $2,754,922 | $2,677,291 | $2,836,359 | $2,635,221 |
| Adjusted Premiums | | $2,863,224 | $2,840,704 | $2,947,862 | $2,882,841 |
| **BENEFITS** | | | | | |
| Benefits paid | | $2,488,333 | $2,372,731 | $2,206,739 | $2,202,325 |
| Adjusted benefits | | $2,488,333 | $2,372,731 | $2,208,341 | $2,201,078 |
| less pooled (ou-of-province) | | $39,751 | $104,564 | $18,395 | $22,260 |
| = Net benefits | | $2,448,582 | $2,268,167 | $2,189,946 | $2,178,818 |
| Change in IBNR reserve | | | | | |
| Ending reserve | | $465,231 | $430,952 | $416,090 | $374,856 |
| minus opening reserve | | $430,952 | $416,090 | $374,856 | $378,059 |
| Variation | | $34,279 | $14,862 | $41,234 | -$3,203 |
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 11.0% | 1.159 | 1.287 | 1.428 | 1.586 |
| Projected benefits | | $2,878,458 | | | |
| REQUIRED GROSS PREMIUMS | | $3,300,984 | | | |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | | | |
| Net experience Ratio | | 100.5% | | | |
| Experience Ratio | | 115.29% | | | |
| Weight | | | | | |
| Credibility given to experience | | 100% | 0.00% | 0.00% | 0.00% |
| Max 100% for total over all years | | | Total of this range must be 100% | | |
| **REQUIRED ADJUSTMENT** | | 15.29% | | | |
| **REQUESTED ADJUSTMENT BY INSURER** | | 14.80% | | | |
| **NEGOTIATED ADJUSTMENT BY CONSUL** | | 8.00% | | | |
| Estimated average number of individuals: | | 2136 | 2116 | 2212 | 2201 |
| Estimated average number of families: | | 910 | 907 | 931 | 906 |
| Average premium rates per certificate | | | | | |
| - Individual coverage : | | 61.05 | 59.8 | 61.05 | 58.00 |
| - Family coverage : | | 117.54 | 114.85 | 117.5 | 111.65 |
| Effective rates on March 1 | | | | | |
| - Individual coverage : | | 63.45 | 57.68 | 62.19 | 59.66 |
| - Family coverage : | | 122.17 | 111.06 | 119.27 | 115.04 |

Notes:
The rate period runs from March 1 to February 28
The experience period runs from October 1 to September 30

The insurer is requesting a 14.8% increase, a little less than the increase required according to its calculations.

First, the following elements are noted:

- The insurer is based only on the experience of the last year, the experience of this year seems entirely credible.
- Pricing increased very little, from $59.66 on March 1, 2012, to $63.45 on March 1, 2015, an increase of 6.4% in three years, or an annual average of 2.1%. Despite these small increases, experience has always shown a surplus. This situation is inconsistent with an increase of 14.8%.
- A discussion with the insurer's representative revealed that the inflation factor of 11% is the standard factor used for all groups of the insurer, before adjusting for deductible erosion. Since there is no deductible, this factor is theoretically accurate.
- The insurer's representative and the underwriter assigned to the group do not know whether or not the inflation factor contains a recovery margin for the losses incurred on the new groups sold at a loss.
    - If this factor is based on the variation in the per capita cost of claims submitted to the insurer for all its groups between two consecutive years, we have a "pure" inflation which includes only the increase in the cost of care but includes an increase in the use of care due to the behaviour of the insured or the aging of the insured population in the insurer's portfolio.
    - If this factor is based on the difference between the per capita cost of claims paid by the insurer for all its groups, then it implicitly includes a deductible erosion effect, then we have inflation plus the erosion of deductibles.
    - If this factor is based on the comparison between the benefits and expenses of a year for all groups, on the one hand, and the corresponding premiums of the previous year, then we have inflation increased by the erosion of deductibles and the recovery of deficits on new business sold at a loss.

    ➔ We can therefore question the quantum of the inflation factor (11%).

We will therefore seek information by completing the insurer's calculations:

**ACCIDENT AND SICKNESS INSURANCE**
**Renewal as of March 1, 2016**
**INITIAL ANALYSIS FROM THE INSURER**

| | | Period 1 (most recent) | Period 2 (previous) | Period 3 (preceding) | Period 4 (not used) |
|---|---|---|---|---|---|
| | from : | 1 oct. 2014 | 1 oct. 2013 | 1 oct. 2012 | 1 oct. 2011 |
| | to : | 30 sep. 2015 | 30 sep. 2014 | 30 sep. 2013 | 30 sep. 2012 |
| **PREMIUMS** | | | | | |
| Premiums due | | $2,848,474 | $2,768,191 | $2,933,748 | $2,745,920 |
| minus pooled premiums | | $93,552 | $90,900 | $97,389 | $110,699 |
| = Premiums subject to experience | | $2,754,922 | $2,677,291 | $2,836,359 | $2,635,221 |
| Adjusted Premiums | | $2,863,224 | $2,840,704 | $2,947,862 | $2,882,841 |
| **BENEFITS** | | | | | |
| Benefits paid | | $2,488,333 | $2,372,731 | $2,206,739 | $2,202,325 |
| Adjusted benefits | | $2,488,333 | $2,372,731 | $2,208,341 | $2,201,078 |
| less pooled (ou-of-province) | | $39,751 | $104,564 | $18,395 | $22,260 |
| = Net benefits | | $2,448,582 | $2,268,167 | $2,189,946 | $2,178,818 |
| Change in IBNR reserve | | | | | |
| Ending reserve | | $465,231 | $430,952 | $416,090 | $374,856 |
| minus opening reserve | | $430,952 | $416,090 | $374,856 | $378,059 |
| Variation | | $34,279 | $14,862 | $41,234 | -$3,203 |
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 11.0% | 1.159 | 1.287 | 1.428 | 1.586 |
| Projected benefits | | $2,878,458 | $2,937,933 | $3,187,044 | $3,449,519 |
| REQUIRED GROSS PREMIUMS | | $3,300,984 | $3,369,190 | $3,654,867 | $3,955,870 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 100.5% | 103.4% | 108.1% | 119.7% |
| Experience Ratio | | 115.29% | 118.60% | 123.98% | 137.22% |
| Weight | | | | | |
| Credibility given to experience | | 100% | 0.00% | 0.00% | 0.00% |
| Max 100% for total over all years | | | Total of this range must be 100% | | |
| **REQUIRED ADJUSTMENT** | | 15.29% | | | |
| **REQUESTED ADJUSTMENT BY INSURER** | | 14.80% | | | |
| **NEGOTIATED ADJUSTMENT BY CONSUL** | | 8.00% | | | |
| Estimated average number of individuals: | | 2136 | 2116 | 2212 | 2201 |
| Estimated average number of families: | | 910 | 907 | 931 | 906 |
| Average premium rates per certificate | | | | | |
| - Individual coverage : | | 61.05 | 59.8 | 61.05 | 58.00 |
| - Family coverage : | | 117.54 | 114.85 | 117.5 | 111.65 |
| Effective rates on March 1 | | | | | |
| - Individual coverage : | | 63.45 | 57.68 | 62.19 | 59.66 |
| - Family coverage : | | 122.17 | 111.06 | 119.27 | 115.04 |

Notes:
The rate period runs from March 1 to February 28
The experience period runs from October 1 to September 30

If the inflation factor of 11% is right, then the experience improves since we go from a projected experience ratio of 137.22% for the period 2011-2012 to 115.29% for the period 2014-2015. In addition, this improvement is consistent from year to year. This is abnormal if previous pricing was adequate.

We can modify the inflation factor to find the one that would produce stable projected experience:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 7.0% | 1.101 | 1.178 | 1.260 | 1.348 |
| Projected benefits | | $2,732,621 | $2,688,575 | $2,811,442 | $2,933,326 |
| REQUIRED GROSS PREMIUMS | | $3,133,740 | $3,083,229 | $3,224,131 | $3,363,906 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 95.4% | 94.6% | 95.4% | 101.8% |
| Experience Ratio | | 109.45% | 108.54% | 109.37% | 116.69% |

With an inflation factor of 7%, we observe a stable ratio of around 109%, which suggests an increase of 9%.

We can check further by comparing the evolution of the cost per capita before fees. If we count a family certificate as equivalent to two individual certificates, we get this:

| Period | Average net cost/equivalent certificate | % change |
|---|---|---|
| 2011-2012 | $542.14 | n/a |
| 2012-2013 | $547.66 | 1.02% |
| 2013-2014 | $580.92 | 6.07% |
| 2014-2015 | $627.62 | 8.04% |

The average annual change would be 5.0%.

If the calculation is performed using 5.0%:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 5.0% | 1.072 | 1.125 | 1.181 | 1.240 |
| Projected benefits | | $2,660,545 | $2,568,733 | $2,635,915 | $2,698,784 |
| REQUIRED GROSS PREMIUMS | | $3,051,084 | $2,945,794 | $3,022,838 | $3,094,936 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 92.9% | 90.4% | 89.4% | 93.6% |
| Experience Ratio | | 106.56% | 103.70% | 102.54% | 107.36% |
| Weight | | | | | |
| Credibility given to experience | | 100% | 0.00% | 0.00% | 0.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 6.56% | | | |

On this basis we can limit the required increase between 6.56% and 9.45%, but let's have a look at what is happening if we use credibility on each of the last three years.

With an equal weighting and an inflation factor of 7%, an increase of 9.12% is obtained:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 7.0% | 1.101 | 1.178 | 1.260 | 1.348 |
| Projected benefits | | $2,732,621 | $2,688,575 | $2,811,442 | $2,933,326 |
| REQUIRED GROSS PREMIUMS | | $3,133,740 | $3,083,229 | $3,224,131 | $3,363,906 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 95.4% | 94.6% | 95.4% | 101.8% |
| Experience Ratio | | 109.45% | 108.54% | 109.37% | 116.69% |
| Weight | | | | | |
| Credibility given to experience | | 33% | 33.33% | 33.33% | 0.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 9.12% | | | |

And an increase of 4.27% with an inflation factor of 5%:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 5.0% | 1.072 | 1.125 | 1.181 | 1.240 |
| Projected benefits | | $2,660,545 | $2,568,733 | $2,635,915 | $2,698,784 |
| REQUIRED GROSS PREMIUMS | | $3,051,084 | $2,945,794 | $3,022,838 | $3,094,936 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 92.9% | 90.4% | 89.4% | 93.6% |
| Experience Ratio | | 106.56% | 103.70% | 102.54% | 107.36% |
| Weight | | | | | |
| Credibility given to experience | | 33% | 33.33% | 33.33% | 0.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 4.27% | | | |

We can also use a formula of a 1-2-3 type, where we give 1/6 weight to the oldest year, 1/3 to the penultimate year and 1/2 to the last year. This makes it possible to take the whole experience into consideration and to resolve the inconsistency that the experience of each of the years, although slightly different, is 100% credible. In this case, we could even use a 1-2-3-4 formula to give 10% weight to the oldest year.

With a formula 1-2-3 and 7% inflation, we derive:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 7.0% | 1.101 | 1.178 | 1.260 | 1.348 |
| Projected benefits | | $2,732,621 | $2,688,575 | $2,811,442 | $2,933,326 |
| REQUIRED GROSS PREMIUMS | | $3,133,740 | $3,083,229 | $3,224,131 | $3,363,906 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 95.4% | 94.6% | 95.4% | 101.8% |
| Experience Ratio | | 109.45% | 108.54% | 109.37% | 116.69% |
| Weight | | | | | |
| Credibility given to experience | | 50% | 33.33% | 16.67% | 0.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 9.13% | | | |

Therefore, an adjustment of 9.13%, compared to 9.12% with the 1-1-1 formula. Not materially different.

With a formula 1-2-3 and 5% inflation, we get:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 5.0% | 1.072 | 1.125 | 1.181 | 1.240 |
| Projected benefits | | $2,660,545 | $2,568,733 | $2,635,915 | $2,698,784 |
| REQUIRED GROSS PREMIUMS | | $3,051,084 | $2,945,794 | $3,022,838 | $3,094,936 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 92.9% | 90.4% | 89.4% | 93.6% |
| Experience Ratio | | 106.56% | 103.70% | 102.54% | 107.36% |
| Weight | | | | | |
| Credibility given to experience | | 50% | 33.33% | 16.67% | 0.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 4.94% | | | |

Therefore, an adjustment of 4.94%, compared to 4.27% with the 1-1-1 formula. Interesting difference.

Now let's try the 1-2-3-4 formula, first with 7% inflation:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 7.0% | 1.101 | 1.178 | 1.260 | 1.348 |
| Projected benefits | | $2,732,621 | $2,688,575 | $2,811,442 | $2,933,326 |
| REQUIRED GROSS PREMIUMS | | $3,133,740 | $3,083,229 | $3,224,131 | $3,363,906 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 95.4% | 94.6% | 95.4% | 101.8% |
| Experience Ratio | | 109.45% | 108.54% | 109.37% | 116.69% |
| Weight | | | | | |
| Credibility given to experience | | 40% | 30.00% | 20.00% | 10.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 9.88% | | | |

We now observe an increase of 9.88%.

And finally with 5% inflation:

| | | | | | |
|---|---|---|---|---|---|
| Incurred benefits (net benefits + Var. IBNR) | | $2,482,861 | $2,283,029 | $2,231,180 | $2,175,615 |
| Annual projection factor at | 5.0% | 1.072 | 1.125 | 1.181 | 1.240 |
| Projected benefits | | $2,660,545 | $2,568,733 | $2,635,915 | $2,698,784 |
| REQUIRED GROSS PREMIUMS | | $3,051,084 | $2,945,794 | $3,022,838 | $3,094,936 |
| **EXPERIENCE ANALYSIS** | | | | | |
| Target loss ratio (due to fees) | | 87.2% | 87.2% | 87.2% | 87.2% |
| Net experience Ratio | | 92.9% | 90.4% | 89.4% | 93.6% |
| Experience Ratio | | 106.56% | 103.70% | 102.54% | 107.36% |
| Weight | | | | | |
| Credibility given to experience | | 40% | 30.00% | 20.00% | 10.00% |
| Max 100% for total over all years | | Total of this range must be 100% | | | |
| **REQUIRED ADJUSTMENT** | | 4.98% | | | |

We now see 4.98%, compared to 4.94% with the 1-2-3 formula and 4.27% with the 1-1-1 formula.

What can we conclude from all this?

- The most important factor is the inflation assumption.
  - The insurer's inflation assumption is not appropriate for this group, even if it is based on a very credible aspect such as the behaviour of the insurer's entire portfolio, because it ignores the past behaviour of the group.
  - The insurer's assumption probably includes a deficit recovery factor for the insurer's new groups.

The insurer's inflation assumption can be validated using RAMQ data on members. "Members" are people not insured by a group plan but exclude social assistance recipients and people aged 65 and over. The source of the data is Table AM.06 of the **RAMQ**:

The change in gross cost per participant must be calculated here is as gross cost is not influenced by deductibles or co-insurance.

| Year | Gross cost | Number of insured persons | Cost / insured | Variation |
|---|---|---|---|---|
| **2012** | $932,556,529 | 1 786 370 | $522 | |
| **2013** | $911,465,043 | 1 785 363 | $511 | - 2.1 % |
| **2014** | $935,793,569 | 1 777 754 | $526 | +2.9 % |
| **2015** | $975,494,591 | 1 775 429 | $549 | + 4.4 % |
| **2016** | $1,019,979,568 | 1 799 103 | $567 | +3.3 % |

*One must note that the RAMQ modified the number of insured persons in 2017 to derive a more realistic figure, but data between 2012 and 2016 remain consistent even if the number of insured is possibly overestimated by 50%.*

Even if the cost / insured is probably underestimated by the RAMQ, the progression is credible. This cost increase should be lower than in private plans because RAMQ has a special agreement with pharmacists, with a considerable limitation of their fees during this period. On this basis, inflation of around 6% can be expected in private schemes.

Since drugs account for about 75% of the cost of group health insurance, inflation can be estimated at 75% x 6% + 25% x 3% = 5.25%. It is assumed that the cost of other care follows general inflation, i.e., 2%, plus 1% to recognize that inflation on care is driven by wage inflation, which exceeds price inflation by about 1%.

What else can be concluded?

- When a group is very large and its experience is credible, it may be beneficial to consider the experience of previous years to:
  - measure the trend of claims (equated with inflation in the group); and
  - smooth out the effect of a possible fluctuation in experience.
- The assessment of the cost of the guarantee and the increase required depends on the person who makes it. In other words, 10 different consultants will probably have 10 different answers!
- Credibility of the consultant with the insurer can have a significant impact on the outcome of the negotiation with the insurer.

How did the negotiation with the insurer come about?

- The insurer accepted the consultant's request (8% increase) for the following reasons:
  - There is a long and strong relationship of trust between the insurer and the consultant, reinforced by the fact that the insurer has never lost money with this client.
  - Insurers are open to negotiation if you can show them that you are right.
  - The inflation factor of 11% included a deficit recovery on the insurer's entire portfolio that does not have to be paid by a client who has been with the insurer for more than five years.
  - The insurer acknowledged that the cost increase trend in this group is unique and significantly lower than the average observed in its portfolio.
  - Financial arrangement with the client includes a patronage dividend formula and a stabilization fund (if premiums are too high and produce a surplus, part goes into a stabilization fund and the rest is paid as a patronage dividend). At the time of this negotiation, the stabilization fund was at the maximum level provided for in the contract.
  - Assuming that the accurate trend or inflation factor is 5%, the required increase would be of the order of 5%. By asking for 8%, the consultant retains a margin of safety that encourages the insurer to accept their position.

Finally, after the fact, the negotiated pricing proved to be fully sufficient, thus justifying the consulting actuary's analytical efforts.



Canadian Institute of Actuaries
360 Albert Street, Suite 1740
Ottawa, ON K1R 7X7
613-236-8196
head.office@cia-ica.ca
cia-ica.ca
seeingbeyondrisk.ca

The Canadian Institute of Actuaries (CIA) is the qualifying and governing body of the actuarial profession in Canada. We develop and uphold rigorous standards, share our risk management expertise and advance actuarial science to improve lives in Canada and around the world. Our more than 6,000 members apply their knowledge of math, statistics, data analytics and business in providing services and advice of the highest quality to help Canadian people and organizations face the future with confidence.