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Educational Note

Determination of Best Estimate Indexation Assumptions for PPICP Liability Calculations

Committee on Workers' Compensation

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Members should be familiar with educational notes. Educational notes describe but do not recommend practice in illustrative situations. They do not constitute standards of practice and are, therefore, not binding. They are, however, intended to illustrate the application (but not necessarily the only application) of the Standards of Practice, so there should be no conflict between them. They are intended to assist actuaries in applying standards of practice in respect of specific matters. Responsibility for the manner of application of standards of practice in specific circumstances remains that of the members.

MEMORANDUM

To: All Fellows, Affiliates, Associates, and Correspondents of the Canadian Institute of Actuaries

From: Bruce Langstroth, Chair
Practice Council

Stan Warawa, Chair
Committee on Workers' Compensation

Date: March 24, 2015

Subject: **Educational Note – Determination of Best Estimate Indexation Assumptions for PPICP Liability Calculations**

This educational note is intended to assist actuaries in determining inflation and indexation assumptions in order to project the benefit payments as required under the Standards of Practice in valuing the benefits liabilities of a public personal injury compensation plan (PPICP).

This educational note reflects relevant changes in the PPICP Standards of Practice effective March 15, 2011, and comments received on the draft educational note.

As outlined in subsection 1220 of the Standards of Practice, "*The actuary should be familiar with relevant Educational Notes and other designated educational material*." That subsection explains further that a "practice that the Educational Notes describe for a situation is not necessarily the only accepted practice for that situation and is not necessarily accepted actuarial practice for a different situation." As well, "Educational Notes are intended to illustrate the application (but not necessarily the only application) of the standards, so there should be no conflict between them."

In accordance with the Institute's Policy on Due Process for the Approval of Guidance Material other than Standards of Practice, this educational note has been prepared by the Committee on Workers' Compensation and has received final approval for distribution by the Practice Council on February 26, 2015.

Questions regarding this educational note may be addressed to Stan Warawa at his CIA Online Directory address, stan.warawa@worksafebc.com.

BL, SW

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1. Introduction

This educational note is intended to assist actuaries in determining inflation and indexation assumptions in order to project the benefit payments as required under the Standards of Practice in valuing the benefits liabilities of a public personal injury compensation plan (PPICP).

The terms 'inflation' and 'indexation' are used somewhat interchangeably in this document, as they generally are both used in describing growth rates in workers' compensation work. Sometimes, but not always, 'indexation' is used in a more restrictive sense to describe a growth rate that is formally tied by policy or legislation to an external index (such as the Consumer Price Index (CPI)), whereas 'inflation' is related more to the growth in the cost of goods, and/or services (labour).

As outlined in paragraph 5430.01 of the Standards of Practice, economic assumptions include:

> " . . . depending on the benefit being valued, one or more of
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> expected rate of general inflation,
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> expected rate of health care cost of inflation,
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> expected rate of wage inflation,
>
> if different, expected earnings increase specific to wage loss benefits, and
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> expected rate of change of any other economic factor that may be applicable."

Paragraph 5430.02 states that "the economic assumptions that are needed [for the valuation] would depend on the nature of the benefits that are being valued, and may vary by year." Most of the benefits provided by PPICPs are subject to periodic increase, either formally through the legislation and/or policy or informally through increases in the prices of goods and services and the introduction of new goods and services, usually at a higher price than previous goods and services. Some jurisdictions have legacy benefits that are not subject to periodic increase and/or benefits that are subject to periodic ad hoc increases at the discretion of the board of directors.

The specific inflation and indexation assumptions would reflect the circumstances of the entity for which benefits are being valued. As a result, not all of the considerations mentioned in this note may be appropriate for a specific situation.

2. Required Inflation and Indexation Assumptions

Inflation and indexation assumptions may be determined for benefits under the following circumstances:

- Legislated indexation;
- Indexation by policy;
- Ad hoc indexation; and
- Informal indexation or inflation.

2.1 Legislated Indexation

Legislated indexation is most often applicable to wage loss benefits – short-term and long-term benefits to injured workers and ongoing benefits payable to the survivors of deceased injured workers.

Indexation of wage loss benefits is generally based on publicly available statistics (e.g., average weekly earnings (AWE), average industrial wages (AIW), Consumer Price Index (CPI)). In some cases, the rate of indexation will reflect a national index, while in other cases it will be a provincial index. In either case, a substantial volume of historical data is likely to be available to assist the actuary in developing an appropriate assumption.

In developing an appropriate assumption, the actuary would consider any limitations on the increase (e.g., changes in the CPI up to 5%), whether or not indexation is full (e.g., 100% of changes in the CPI vs. 50% of changes in the CPI), and what happens in the event of a decrease in the index (i.e., are ongoing benefits reduced, or is there a floor of 0%?).

2.2 Indexation by policy

Indexation by policy may occur when the applicable legislation is not specific. Examples include the allowance provided to an injured worker to assist with the activities of daily living (but not generally those requiring the services of a professional health care worker), or the maximum allowance for goods such as hearing aids or prescription eyeglasses.

In some cases, the policy may call for annual indexation based on a measure such as CPI, with the policy subject to periodic review. In other cases, the policy may call for annual indexation but the precise amount is approved annually through an associated fee schedule. In either of these cases, it would usually be appropriate to base the indexation assumption on either the specific formula provided in the policy or on a consistent approach exhibited by the board of directors to increasing the fee schedule.

2.3 Ad Hoc Indexation

In some cases, there may not be a formal annual approach to increases in the level of benefits provided (e.g., the cost of hearing aids is reimbursed up to a maximum of $1,000 per hearing aid, with no specified formal periodic review of this amount). In such cases, the actuary could review the history of changes to the particular benefit as a guide to developing an appropriate assumption.

Another example might be a periodic increase in the fees paid to health care practitioners, which may be negotiated from time to time by the PPICP and the applicable representatives of the practitioner group. This may result in a cycle where the fee schedule remains unchanged for a specific period followed by a relatively large increase following the next negotiation, or there may be a scheduled annual increase included in the agreement.

2.4 Informal Inflation

Informal inflation refers to changes in benefit costs due to changes in the costs of the underlying goods and services provided to injured workers, where the amount of the increase is not under the control of the PPICP. Informal inflation occurs for many health care benefits, where the amount payable by the PPICP is the actual cost of the services provided by hospitals, health care service providers and providers of medical supplies (e.g., prescription drugs).

It can be very challenging to develop appropriate inflation assumptions in these circumstances, as there are many variables that can influence costs. For example:

- Changes in utilization patterns;
- Changes in the perception of the services provided (i.e., client-demanded services); and
- The introduction of new goods and services, generally at a higher price than the goods and services replaced (e.g., prescription drugs and surgical procedures, high–tech prostheses replacing low–tech prostheses).

3. The Starting Point

Valuation of the benefit liabilities of a PPICP generally requires the development of several inflation assumptions applicable to a variety of benefits. The standards of practice require that each of these assumptions be independently reasonable for the benefit being valued. The standards of practice also require that the assumptions be appropriate in the aggregate and internally consistent. This would be accomplished by establishing a single key inflation assumption, then developing the other assumptions relative to the key assumption. The assumption most commonly used as the key assumption is the expected rate of increase in the CPI.

In determining the expected rate of increase in the CPI, and the related inflation assumptions, a relatively long–term view would be taken, reflecting the long-term nature of the liabilities.

A good source of historical data to use in developing this assumption is the *Report on Canadian Economic Statistics* published annually by the CIA, whose primary source in turn is the CANSIM database maintained by Statistics Canada.

Historical long-term averages, while an important reference point, may need to be modified to arrive at an appropriate assumption. It is important to recognize that the best estimate of the future may not be reflected in the past history. So consideration could also be given to 'forward-looking' factors such as the inflation target maintained by the Bank of Canada, the current long-term inflation view of economists, and unfolding trends in the global economies as they may impact Canada.

A 'forward looking' view of CPI could also be obtained by comparing nominal yields on long term bonds with the real yields on real return bonds. However, this approach should be used with caution as the market yields on real return bonds may be distorted due to an imbalance between the supply and demand for these real return bonds. Nonetheless, this can still be a useful reference point.

4. Wage Loss Benefits

4.1 CPI–Indexed Benefits

Benefits may be indexed based on the CPI (either the CPI for Canada or the CPI for the specific jurisdiction). Indexation may be complete or partial (e.g., 100% of changes in the CPI or 50% of changes in the CPI or change in the CPI minus 1%). Indexation may also be capped at a specified maximum (e.g., 100% of changes in the CPI subject to a maximum increase of 5%) or there may be a floor on the level of indexation (e.g., 100% of changes in the CPI, but no benefit reduction if the CPI decreases). For complex indexation scenarios, it may be appropriate to

develop an assumed distribution of expected changes in the CPI in order to properly reflect the expected future indexation.

Indexation may occur at a fixed date for all claims or at the claim anniversary. There would likely be a formal process specified in the legislation (e.g., benefits are indexed as of the claim anniversary, with the level of indexation for the anniversary in *yyyy* based on the average of the monthly increases in the CPI for Canada for the period from July *yyyy*-2 through June *yyyy*-1). Where the exact level of indexation to be applied in the year following the valuation date is known (as it would be in this example), it would be appropriate to couple this known first–year inflation rate with a longer–term assumption for subsequent years.

4.2 Wage–Indexed Benefits

Benefits may be indexed based on a wage and salary index such as the AWE, either for Canada or for the specific jurisdiction. Indexation may be complete or partial (e.g., 100% of changes in the AWE, 50% of changes in the AWE), or may be capped at a specified maximum (e.g., 100% of changes in the AWE subject to a maximum increase of 5%).

Indexation may occur at a fixed date for all claims or at the claim anniversary. There would likely be a formal process specified in the legislation (e.g., benefits are indexed as of the claim anniversary, with the level of indexation for the anniversary in *yyyy* based on the average of the monthly increases in the AWE for Canada for the period from July *yyyy*-2 through June *yyyy*-1). Where the exact level of indexation to be applied in the year following the valuation date is known (as it would be in this example), it would be appropriate to couple this known first–year wage indexation with a longer–term assumption for subsequent years.

Assuming that the core inflation assumption is the rate of increase in the CPI, the critical issue for wage–indexed benefits becomes the relationship between the CPI and the appropriate wage index. The CIA *Report on Canadian Economic Statistics* includes a historical Wage and Salary Index series. These figures come from the CANSIM data.

4.3 Impact of Income Tax

The wage loss benefits provided by PPICPs are usually determined on an ‘after tax (net) basis’ because they are not subject to income tax in the hands of the injured claimant to whom they are paid.

In some cases, indexation may be applied directly to the net benefit currently payable. In this case, the projection of future cash flows simply reflects application of the indexation assumption to the current net benefit.

In other cases, a different approach is used – the after-tax benefit is recalculated each time the indexation is applied (the ‘annual benefit recalculation’ form). This alternate approach usually involves indexation of the pre-injury gross earnings (rather than direct indexation of the existing net benefit used in the first approach). Then a determination of the wage loss benefit is done based on a calculation of the after tax amount of these indexed pre-injury gross earnings, using the updated current tax rates.

In cases where the benefit is recalculated each time indexation is applied, the change in the benefit will be affected by changes in the income tax rates (i.e., if income tax rates are reduced from the previous calculation, the increase in net benefit will be greater than the rate of indexation). In most cases, future changes to the income tax rates are not known in advance,

although a direction may have been indicated. Thus, it is common practice to ignore the impact of future changes in income tax rates.

On occasion, a federal or provincial government may have announced a relatively detailed plan of future tax changes which may be implemented over a period of years. In such circumstances, if the indexation approach is of the 'annual benefit recalculation' form, the actuary may undertake tests to gauge the likely impact of the announced tax changes on net benefits. If the announced changes are likely to have a non-trivial impact on net benefits and the actuary is confident that there is a high probability that the tax change plan will be implemented, the assumed inflation rate may be adjusted to reflect the phase-in of the tax changes.

4.4 Integration with Other Benefits

In many cases, wage loss benefits paid by PPICPs are on a 'first payor' basis. In other cases, PPICP wage loss benefits may be offset by or integrated with CPP/QPP benefits (disability, retirement or survivor benefits), group long–term disability benefits, retirement benefits or other wage loss benefits to which the injured worker may become entitled. Some of these benefits are indexed, but where wage loss benefits are integrated with other benefits that are not indexed, partially indexed or indexed with a different method, if the indexation approach is of the 'annual benefit recalculation' form, the annual increase in the wage loss benefit may exceed the applicable rate of inflation.

In some cases, the benefit calculation may incorporate some form of indirect integration, such as an overall limitation of 85 percent of pre-injury net earnings from all sources.

In the event that offset/integration is applicable and the indexation approach is of the 'annual benefit recalculation' form, the actuary may conduct periodic tests to determine the potential impact of these offsets on the benefit cash flow projections. As the offsets would not apply to all claimants, and the offsets may be quite small in many cases, the actuary may, as a result of these tests, decide that no adjustment to the inflation rate is necessary. In other cases, it may be most appropriate to project the cash flows from the 'pre-integration' benefit and the applicable offsets separately.

4.5 Benefit Calculation Issues

The legislation governing PPICP wage loss benefits tends to be complex and will have evolved over a long period (now approaching 100 years in many jurisdictions). In almost every jurisdiction, this has given rise to a variety of benefits being available to injured workers and survivors of deceased workers. In most cases, the applicable benefit is determined on the basis of the legislation in effect on the date of the injury.

When new legislation is introduced, workers injured prior to the effective date of the legislation may be grandfathered, with benefits continuing to be based on the previous legislation.

In other cases, benefits may be adjusted to reflect the new legislation. When this occurs, there may be a period of transition during which benefits are calculated on both bases, with rules in place to determine which calculated result is applicable.

Depending on the nature of the changes, this may result in a one–time or phased–in increase in benefits beyond the normal inflation expectation or a freezing of benefits until the result of the calculation on the new basis catches up. In some cases, depending on the nature of the changes,

the transition may apply to all claimants, while in other cases it will apply to a small subset of claimants.

In such circumstances, the actuary could conduct tests to determine if a specific adjustment to the inflation assumption applicable to the affected block of claims is required. It would also be appropriate to conduct periodic follow-up tests to ensure that the transition in net benefits is proceeding as anticipated.

4.6 Future Awards

At any time, a PPICP will have a significant number of claims that will qualify for a variety of wage loss benefits in the future.

Short–term wage loss benefits may be valued using some form of loss development approach. These methods generally provide for future inflation implicitly through the factors developed from past benefit payment patterns.

An alternate approach which is also used is to calculate cost factors averaged over recent calendar years which are normalized for inflation. Liabilities are then calculated using these cost factors and future inflation is provided for explicitly.

In addition, there will be a significant number of claimants who will at some point in the future qualify for long–term wage loss benefits. In some jurisdictions, there will be a timeframe imposed for the transfer of claimants from short–term to long–term benefits (e.g., at most five years from the date of the injury), while in other jurisdictions it may be quite open-ended (e.g., the transition occurs when all medical and vocational rehabilitation is complete – a process that can take many years).

At the time of a valuation, the actuary will not know which claimants might in future qualify for long–term wage loss benefits, when those claimants might qualify, and what the amount of their ultimate long–term wage loss entitlement might be. A common practice is to place a value on this block of benefits by referring to recent awards to develop assumptions as to the number, timing, and amount of such awards. Appropriate techniques for developing these assumptions are beyond the scope of this note. It will, however, be necessary to apply the appropriate inflation assumption in projecting the cash flows. In doing so, the actuary would apply the inflation assumption to the period preceding qualification for the award, as well as to the projected payment stream when it materializes.

5. Health Care Benefits

In most jurisdictions, PPICPs have been providing benefits to and on behalf of injured workers for the better part of 100 years. In addition to wage loss benefits, PPICPs are responsible for the costs of health care incurred by injured workers. As PPICPs predated universal medicare in Canada by many years, it had long been the responsibility of the PPICPs to provide these benefits at the time medicare was introduced. Rather than moving the financial responsibility for services provided under medicare to the provincial health system, that responsibility was left with the PPICPs. As a result, the health care benefits provided by PPICPs are quite different from those provided by life insurers under individual and group policies.

A unique feature of the health care benefits provided by PPICPs is that the PPICP retains responsibility for health care costs related to the injury for the lifetime of the injured worker, whether or not the worker is in receipt of wage loss benefits.

5.1 Benefits Provided

The health care benefits provided by PPICPs to and on behalf of injured workers include the following main categories:

- Costs of necessary hospitalization;
- Services of medical professionals (doctors, nurses, etc.);
- Other hospital charges (one-day surgery, X-Ray, etc.);
- Rehabilitative services such as physiotherapy;
- Prescription drugs;
- Provision and maintenance of prosthetic devices, wheelchairs, hospital beds for home use, and home and vehicle modifications;
- Hearing aids;
- Dental services;
- Prescription eyeglasses;
- Orthotic supplies; and
- Ambulance services.

In addition, many jurisdictions provide some form of care allowance to assist the injured worker in the activities of daily living (in addition to the services of medical professionals such as registered nurses). These allowances, which are generally provided if the injured worker is able to remain in the family home but requires assistance in some areas, are often directed towards outdoor activities such as lawn maintenance and snow removal and indoor activities such as house cleaning, meal preparation, and personal hygiene.

In situations involving prosthetic devices, there may also be a clothing allowance in recognition of special needs or abnormal wear and tear.

Severely injured workers may require temporary or permanent placement in a specialized facility if home care is not a viable option.

The rate of increase in the costs of these categories of benefits may be significantly different, as may be the mix of benefits provided as the claim matures (and as the cohort of claimants ages with claim duration). The actuary could investigate these differences and may take them into account in determining appropriate inflation assumptions.

5.2 Acute vs. Chronic Care

The nature of the health care that an injured worker requires tends to change over time.

In the short term, the focus would be on acute medical treatment of the symptoms arising from the injury. In the first year or two following the injury, the health care costs tend to be dominated by hospitalization charges and medical fees, then rehabilitation services such as physiotherapy. For many injured workers, little health care support would be required following this recovery phase.

Later, as the injured worker's medical condition stabilizes, the focus shifts to the needs of those injured workers who suffer a permanent functional loss as a result of the injury or requires an ongoing program of prescription medication. At this stage, the number of injured workers

requiring regular ongoing care would have significantly diminished, but the average cost per recipient is likely to continue to grow.

It is also quite common that an injured worker may be able to function with relatively minimal assistance for a long period but then require active intervention. This could, for example, arise from a need for surgery due to deterioration in the condition of an injured limb, in which case the intervention might cover only a short period. Or, the injured worker's condition might have permanently deteriorated, requiring much more extensive ongoing assistance.

It is important that the actuary understand the changes in the nature of the required care over time, and the impact that this may have on the inflation assumption with duration from the date of the injury.

5.3 Data Issues

External data available for the development of appropriate assumptions are likely to be less immediately applicable to a PPICP than are the data related to wage indexation.

The Canadian Institute for Health Information (CIHI) is probably the premier source of data on Canadian health care expenditures. While very useful information is available through CIHI, the CIHI data have some limitations from a PPICP perspective. Some examples of these limitations follow:

- CIHI data are generally based on the total population. The injured worker population would likely present quite different health issues, particularly as the PPICP's responsibility is limited to those issues specifically related to the workplace injury;
- CIHI data are generally calendar year focused, with trends being tracked on a calendar year to calendar year basis. For valuation purposes, PPICPs generally look at data on an injury year basis with particular attention to treatment and payment patterns by duration following the injury date; and
- CIHI would not have data related to some of the 'health care' benefits provided by PPICPs.

Much of the data useful in the valuation of the health care benefits of a PPICP would come from the data generated by the specific PPICP's claims. These data also are subject to a number of limitations:

- For some benefits, the data may be quite sparse, particularly at the longer durations and for the smaller PPICPs;
- The quality and degree of granularity of the coding may be less than ideal, and may be inconsistent over time;
- Particularly at the longer durations, and especially for the smaller PPICPs, a small number of extraordinary claims may distort the data. Special steps may be required to isolate the impact of such claims;
- The provision of health care and the services available to patients can evolve rapidly, and may not be immediately apparent in the data, especially if several years of data are used in the analysis; and
- The specific policies and administrative practices of the PPICP may be subject to change that can significantly impact the level and types of services provided.

Despite the shortcomings, the specific PPICP's claim data would generally be the primary source, particularly for larger PPICPs.

5.4 Development of the Assumptions

When developing specific inflation assumptions for health care benefits the actuary could take into account the significant differences in the mix of benefits provided as the claim matures, reflecting the overall shift from acute care to chronic care. For example, the mix of benefit payments might vary by duration.

The change in the distribution of expenses over time is important in the development of the inflation assumption, as the rate of increase in cost may be quite different for the different services.

In developing a health care inflation assumption, the actuary could take into account both the mix of services and the rate of cost increase of the services.

As indicated earlier, to the extent that loss development factors are used to project cash flows, an implicit inflation factor is included in the projection factors. As a result, an explicit inflation assumption may not be necessary for the durations covered by this approach. However, an explicit inflation assumption would be necessary if the 'normalized cost factor method' calculation approach is adopted.

The preceding comments assume that all health care benefits are valued as a block, and that a single real rate of health care inflation needs to be developed. This may be the only practical approach for the smaller PPICPs where data at a benefit-specific level may quickly become sparse. Larger PPICPs might consider disaggregating the health care claims into groupings that exhibit similar runoff patterns (e.g., those mostly associated with acute care vs. those mostly associated with chronic care). These groupings may be valued separately, and have differing associated inflation assumptions. For example, hospitalization, physician services, and physiotherapy may be treated as acute care services and the other benefits as chronic care services.

The final step would be to express the health care inflation assumption relative to the CPI inflation assumption to produce an assumed 'real rate of health care inflation' (e.g., change in CPI + 3%). As the CPI inflation assumption is likely to reflect a long term perspective, the actuary would ensure that the assumed real rate of health care inflation also reflects that long–term perspective (i.e., in a period of low CPI increases relative to the long–term trends, it may be more appropriate to compare the observed rates of increase in health care costs to the CPI increases in a comparable timeframe).

Change is a constant in health care. Accordingly, it would be appropriate to undertake regular reviews of emerging experience to ensure that the data on which the health care inflation assumption has been based continue to be appropriate.