Intergenerational equity in occupational pension plans

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1 Introduction

Intergenerational equity has been an important consideration in the management of social security programs and blocks of commercial annuity business for a long time but received relatively little attention in the occupational pension sphere until recently. However, as interest in pension plans with risk-sharing elements (jointly sponsored plans, plans with conditional indexation, and target benefits) continues to grow, intergenerational equity will become more and more important.

As a case in point, in Quebec, legislative changes made it compulsory for municipalities to share pension risk with plan members. As a result, we have seen some passionate discussions on trustee committees about intergenerational equity in relation to how surplus (or the reserve for conditional indexation) should be allocated. In January 2018, further regulations came into effect in Quebec, requiring the creation of a funding policy for all occupational pension plans, not just those with explicit risk-sharing elements. Similar requirements were introduced in other provinces in recent years. The requirement for an explicit funding policy, which lays out the manner in which costs and risks are to be managed over the long term, ought to bring up considerations of fairness between generations in all plans, including traditional defined benefit (DB) plans. Specifically, intergenerational equity should pop up when contemplating the management of risk buffers built up from provisions for adverse deviations, which are prescribed by post-solvency-style legislation. It should also come up when considering stakeholders' responses to sudden, unexpected declines in the plan's risk capital.

In principle, the need to take into account intergenerational equity is recognized by nearly all stakeholders in Canada, especially lawmakers and the actuarial profession, yet meaningful public discussion of intergenerational equity in relation to occupational pensions (as opposed to social security) at the policy and regulatory levels has been scarce. This stands in stark contrast to corresponding discussions and action in, for example, the Netherlands or Denmark.

Traditionally, dialogue around this topic has been hindered by a number of factors: the lack of uniform definitions and language, practitioners' lack of familiarity with existing metrics, and limited opportunities for thought exchange focused explicitly on intergenerational equity.

The objective of this report is to fill these gaps by cataloguing relevant concepts and definitions of intergenerational equity, identifying usable metrics, and providing a snapshot of current practice. Section 2 provides a survey of key concepts from the literature, spanning publications in the areas of actuarial science, economics, and philosophy. Section 3 brings a practical angle, reporting on key findings from a series of small roundtable meetings held with select Canadian stakeholders (sponsors/stewards of large public and private sector pension plans, consulting actuaries, regulators and policy makers), discussing their approach to intergenerational equity in occupational pension plan management. Section 4 expands on some issues raised at the roundtables. Section 5 concludes.

2 Intergenerational equity in the literature

The fundamental question relating to intergenerational equity is "how should we allocate costs and benefits between different groups over time?" When considering finite resources, this involves balancing the competing interests of different groups in a way that does not place an excessive burden on any given group. Differences in approaches arise from varying definitions of what a suitable "balance" is, corresponding to different ideas of what constitutes "excessive burden."

The question of what constitutes a fair allocation of costs and benefits in a society or in a contract has been explored by philosophers, economists and actuarial scientists, among others. Their findings influence the way expert stakeholders (policy makers, pension economists and actuaries) approach the question of intergenerational equity in occupational pension plans. Meanwhile, lay stakeholders (pension committee members, trustees, and members) may rely on the colloquial meaning of words like fairness, equity or justice. In order to avoid confusion, it is important to be aware of the different ways these words can be used, and to agree upon common usage.

For example, the Merriam-Webster online dictionary reports that in everyday speech, the words "fair," "just" and "equitable" are synonyms with the following nuance:

- "Fair" has a sense of being "marked by impartiality and honesty" (Fair, n.d.),
- "Just" means "following a standard of what is right" (Just, n.d.), whereas
- "Equitable" holds up a "less rigorous standard than 'just' and usually suggests equal treatment of all concerned" (Equitable, n.d.).

However, their usage can be radically different and rather technical in specific disciplines.

In this section, we first present various concepts of "just allocations" from a philosophical perspective. We then lay out the general approach to allocation problems in normative economics, before focusing on contracts with risk and the notion of "actuarial equivalence" as a measure of fairness. We explore the tension between actuarial fairness and the egalitarian impulse, and identify it as a source of potential disagreement, confusion or miscommunication between stakeholders. Finally, we present a collection of metrics for intergenerational equity found in the literature.

2.1 Justice and equity in philosophy

In philosophy, the branch of distributive justice deals with the question of allocating various benefits and burdens within a society. Theories of distributive justice attempt to provide consistent frameworks for identifying morally preferable allocations and actions that lead to such allocations. The competing theories described below are commonly represented in our everyday lives. They are also reflected in some of our beliefs and principles around how pension arrangements ought to be structured. The descriptions below are based on Lamont and Favor (2017).

In the *libertarian* tradition, individual rights, including individual property rights, have primacy. All allocations that arise from acquisitions and exchanges that are justified (that is, fulfill the

principles of justice in acquisition and the principles of justice in transfer) are considered morally acceptable, regardless of the outcomes that they produce.

By contrast, the *strict egalitarian* tradition is *only* concerned with outcomes: an equitable allocation is characterized by *equal outcomes* (that is, equal wealth or equal income) for all. Note that an equal allocation of wealth in one period may not remain equal in subsequent periods, because of unequal growth due to differences in talent, effort, or other circumstances. As a result, at a practical level egalitarianism that insists on equal outcomes beyond some initial time point requires frequent redistribution.

Luck egalitarianism is a modified version of egalitarianism that supports redistribution to create *equal opportunity* for all in order to neutralize the impact of circumstances owing purely to luck. However, luck egalitarians accept inequality if it flows from one's own choices or from factors for which one is responsible. In practice, it can be difficult to draw a clean line between outcomes that are purely based on luck and outcomes for which one is fully responsible.

John Rawls' theory of justice starts from a foundation of equality with respect to what he calls basic (mostly political) rights. Redistribution is then justified for two reasons, collectively referred to as Rawls' *difference principle*: to create greater equality of opportunity (as long as it does not infringe on the equality of basic rights), and to improve the absolute position of the least advantaged members of a group (as long as such redistribution does not infringe on equality of opportunity). The Difference Principle captures aspects of our common sense morality—a desire to protect ourselves and others from the vagaries of luck in the natural lottery that decides our talents and the life circumstances we are born into, and a corresponding desire to lift up the least advantaged—while also maintaining the importance of basic rights for all and placing practical limits on the amount of redistribution that is acceptable.

The approaches above are primarily focused on the benefits and burdens of individual members of society when making decisions about whether redistribution is justified. By contrast, *utilitarians* are only interested in *total* utility within a society or group. Desirable actions are those that produce the greatest overall utility for the group, without specific concern about the relative utilities of individuals within the group.[1] The original, 18th-century, hedonistic version of utilitarianism conceived utility as quantities of pleasure, and the corresponding ethical objective was to maximize pleasure. In the 1930s, utility was recast as "preference satisfaction" based on individuals' preference orderings. This modern version of utilitarianism is sometimes seen as having no implicit ethical standard, since the actual items or goods that satisfy individuals' preferences are not relevant to the maximization exercise (Riley, 2018).

2.2 Equity and fairness in normative economics

Normative economics focuses on prescribing what "should be"; that is, how the economy ought to be structured or how resources ought to be distributed. Its primary goal is to prescribe

[1] This may lead to distributions that require some members of society to take on significant additional burdens to generate (perhaps only marginally) greater utility for others. A common criticism of utilitarianism is that it takes the utility maximization imperative, which could be justified over an individual's own lifetime, and applies it *across individuals* in a group, where it may produce morally unacceptable results.

solutions to economic problems. Since the late 1700s, normative economics has operated in the utilitarian paradigm. To this day, utilitarianism serves as the dominant framework in which economic policy decisions are made, including those surrounding pensions.[2]

Utility maximization is closely related to the concept of Pareto efficiency. An allocation is considered Pareto efficient if there are no other allocations that would increase the utility of at least one agent without reducing the utility of another. An allocation that maximizes utility is Pareto efficient, although the converse is not necessarily true.

An allocation problem can have many feasible solutions that are all Pareto efficient. To help choose among these solutions, additional criteria are needed. One idea pursued extensively in the literature is combining the efficiency criterion with some formal mathematical concept of equity. Numerous notions of equity have been proposed for this purpose, including equity as no-envy and egalitarian equivalence.

Equity as no-envy (Foley, 1967) considers an allocation equitable when no agent envies the bundle of another; that is, each agent prefers her own bundle to that of anyone else's, based on her own preference ordering. Combining Pareto efficiency with the no-envy condition gives us *fair allocation rules*, as coined by Schmeidler and Yaari (1971). Considerable work has been done by welfare economists over the past 50 years to investigate the existence of fair allocations under various conditions (e.g., Varian, 1973; Suzumura, 1980; Denicolo, 1998; Suzumura and Shunitsuka, 2003). In many cases, Pareto efficiency is, in fact, incompatible with being envy free (Pazner and Schmeidler, 1974; Shinotsuka *et al*., 2007).

Egalitarian equivalence was proposed by Pazner and Schmeidler (1978) as an alternative notion of equity. An egalitarian-equivalent allocation is characterized by the existence of a reference bundle which is equivalent to each agent's actual bundle based on that agent's own preference ordering; that is, every agent likes her own bundle just as much as she likes the reference bundle. Egalitarian equivalence is always compatible with Pareto efficiency; that is, a Pareto-efficient and egalitarian-equivalent allocation always exists.

The two equity conditions described above are *consequentialist* in nature. They are concerned with creating a specific type of outcome for individual agents or generations: an egalitarian one. By contrast, a *procedural equity condition* is focused on how the preferences of different agents are treated when evaluating the total social utility of a stream of costs and benefits over time. One such condition is *anonymity*: treating all generations as interchangeable, regardless of *when* they live. The concept of anonymity finds its origins in the work of 19th-century ethical philosopher Henry Sidgwick, and was formulated mathematically as a condition of intergenerational equity by Diamond (1965). Diamond showed that intergenerational anonymity is incompatible with Pareto efficiency when the social choice function (the function combining the utilities of successive generations) is continuous. Attempts to reconcile various equity conditions with Pareto efficiency in an intergenerational context have been made ever since; some classics and more recent ones are documented in Roemer and Suzumura (2007).

[2] See, e.g., publications by CPB Netherlands Bureau for Economic Policy Analysis, such as ter Rele *et al*. (2021).

A related point of contention in normative economics is the use of discounting when aggregating utilities over an infinite time horizon (e.g., in the context of climate change, or the extraction of non-renewable resources, etc.). Discounting shifts wealth and resources to those alive today, often at the expense of future generations. Since Koopmans (1960) showed that Pareto efficiency cannot be combined with undiscounted utilities in the social choice function, economists prefer to use a positive discount rate. However, moral philosophers object to this practice (Parfit, 1984). In subsequent sections, we will revisit the role that discounting plays in intergenerational equity in the context of pensions.

2.3 Aleatory contracts and actuarial fairness

An aleatory contract is one where the parties' obligations "depend on an uncertain event or contingency" (Aleatory, n.d.). Examples include gambling, insurance, and life annuities. Traditional DB plans can be thought of as a collection of aleatory contracts between the sponsor and the plan members.[3]

In contingent pension plans, where at least some of the uncertainty is borne by plan members, the underlying aleatory contracts between the members and the plan sponsor are more complex. Here, the sponsor can be thought of as the operator of a risk pool, rather than just a guarantor. In contingent pension plans where the sponsor takes no risk—e.g., in member-funded pension plans (RRFS) in Quebec—the sponsor's obligations under its various implicit aleatory contracts with different members cancel each other out. In this case, the sponsor (or the plan) is simply a conduit for risk sharing and risk transfers among members.

An important question is, under what conditions is an aleatory contract fair? There are two cases to consider:

- If the contract is a *risk transfer* (where one party takes risk and the other pays a fixed price), then the price paid for the contract should be fair.
- If the contract involves *risk sharing* or *risk exchange* (where both parties carry risk), then the allocation of the random rewards and burdens between the parties should be fair.

The question of determining a fair price under an aleatory contract has been around for as long as people have engaged in gambling. Aristotle considered the fair price to be the simple average of possible payoffs under the contract (Heras *et al*., 2019). Under this construction, two aleatory contracts with the same risk ought to have the same price.

With the advancement of studies in probability, Aristotle's simple notion of the fair price was eventually replaced by the expected value; that is, the probability-weighted average of possible payoffs. In the 17th century, proto-actuary Johann de Witt used this concept to determine the fair price of insurance and annuity contracts, continuing in the "equal price for equal risk" paradigm. For close to 300 years, the notion of *actuarial fairness* (or actuarial equivalence), which requires that the expected present value of costs equal the expected present value of benefits, has permeated pension and insurance practice.

[3] Similar to an insurer issuing a life annuity contract, the DB plan sponsor promises to pay members a certain level of benefit whose actual cost is uncertain.

Whereas early actuaries were concerned with establishing a fair *single* premium, a pension plan has *periodic* premiums (contributions) paid over time. In addition, a pension plan does not set the contribution level *individually*; instead, a suitable level is set in respect of the entire membership group. Nonetheless, the principle of actuarial equivalence allows us to calculate an *actuarially fair contribution rate* deemed sufficient to support future benefits in a pension plan, at least in expectation, and at the plan level.

Of course, the future will turn out different from expectations, on account of the randomness in key economic and demographic variables. As a result, a contribution rate that was deemed sufficient *ex ante* may turn out to be too high or too low *ex post*. Regulations for funded pension arrangements require that this discrepancy be addressed periodically, either by resetting the contribution level or the benefit level (or both) to re-establish actuarial fairness between benefits and contributions prospectively, at the plan level. However, if contributions made by (or for) current workers are adjusted to finance the benefits of current retirees, the balance of "inputs and outputs" is shifted under the plan. As a result, an outcome or action that is meant to support fairness prospectively at the plan level may well be seen as unfair at the level of individual participants or age-based groupings.

Actuarial fairness has some shortcomings as an indicator of equity even when applied ex ante and at a consistent level (e.g., plan or individual). First, it only takes into account the first moment of the probability distribution of possible outcomes. As such, it does not adequately reflect the risk (i.e., the range of contributions or benefits) faced by stakeholders when setting the appropriate contribution or benefit level (Chen and Vanduffel, 2022). It is thus incapable of taking into account shifts in the riskiness of the outcomes between generations.

An alternative view is provided by an option-based valuation of the pension plan, which decomposes the plan into its various underlying aleatory contracts, then attempts to determine the value of each of those contracts separately using option valuation techniques[4], and aggregates them. Although far from perfect, this approach can be particularly valuable for gaining insight into the complex risk-sharing transactions present in contingent pension plans (see progressively more practical applications in Kocken, 2006; Hoevenaars & Ponds, 2008; Cui *et al*., 2011, and Yi *et al*., 2020).

Second, actuarial fairness does not fully line up with our everyday understanding of an equitable allocation, which often includes a redistributive component stemming from our sense of justice.

2.4 Actuarial fairness and justice

Understanding the distinction between (a) what is actuarially fair and (b) what is considered ideal based on some other notion of distributive justice is critical to meaningful discussions about intergenerational equity, especially in a pension context.

[4] This approach works reasonably well for tradeable risks. However, risks which are routinely exchanged/shared within pension plans, but for which no market currently exists, are less suited for this type of valuation.

If the pension plan is viewed purely as a financial contract whose fairness is defined in terms of the actuarial equivalence of each member's own costs and benefits prospectively (*ex ante*), one does not need to look at outcomes *ex post*. In fact, in any future scenario, one of the parties to the contract will likely benefit more than the other, even though their expected losses are equal. However, if the risk transaction was deemed fair when it was entered into, then it does not retroactively become unfair by virtue of a particular outcome that disadvantages one of the parties. This approach is consistent with a libertarian view of justice, having no concern about the outcome (no matter how extreme) as long as the transaction itself was fair.

Many people, however, do have the impulse to look at the realized outcome *ex post* and declare it unfair if it is "too far" in some sense from expected. This reveals an egalitarian view of justice, preferring equal (or at least similar) outcomes for all parties taking part in the contract. Restoring equity in this sense requires redistribution *ex post,* in addition to any (re)allocation of rights and burdens already taking place under the terms of the actual contract. On the one hand, if this redistribution is made on an ad hoc basis, a measure of unpredictability is added to the contract. On the other hand, if the adjustments are predictable (e.g., based on some agreed upon pattern), they effectively become part of the contract, and the pricing (*ex ante*) ought to be aligned. If the pricing does not reflect these adjustments, persistent subsidies may flow from one group of members to another.

E*x post* adjustments to the original deal are sometimes also justified by appealing to the fact that retired members tend to be more financially vulnerable than those still working, at least in terms of their ability to bear risk or to forego cost-of-living adjustments. In this case, redistributing to them may be justified under Rawls's difference principle.

The actuarial fairness-based view of equity appears to be diametrically opposed to the egalitarian view noted above, and this can be a source of great confusion. We do not endorse either view as "correct". However, we note the importance of agreeing on a common vocabulary before entering conversations or negotiations about equity in pensions in general, and intergenerational equity in particular.

2.5 Assessing differences between generations

Once an appropriate notion of "equity" is chosen, there remains the problem of defining what is meant by generations. In most studies relating to pensions, "generations" relate to age cohorts; that is, groups of people of the same age. How finely graded the age groups are is a matter of choice. At one extreme, economic analyses that employ an overlapping generations model may consider only two groups at any given point: workers and pensioners (Kocken, 2006). At the other extreme, realistic stochastic simulations may distinguish between members down to individual birth years (van Bilsen et al., 2022; Metselaar *et al*., 2022). A compromise would be to consider multiple birth cohorts together in larger groups with (purportedly) similar characteristics or circumstances: baby boomers, generation X, generation Y, millennials, etc.

To assess whether equity between these age cohorts exists, one may take a longitudinal or functional view. Under the former, costs and benefits are assessed over the life course of each cohort. This is most common in the context of occupational pensions, but it requires a very long-

term analysis since the relevant part of the life course (from plan entry to exit) can easily span as much as six decades. Alternatively, one may contrast the burdens and rewards of "workers" (at various points in time) with those of "pensioners" (at the same points in time). This view ignores the fact that today's workers will be tomorrow's pensioners, but it can be useful to understand the evolving nature of the "intergenerational contract".

2.6 Potential metrics

A variety of metrics for assessing intergenerational equity have been proposed in the literature, which we summarize below.

Ménard *et al.* (2013) mention five different metrics in the context of social insurance:

- the *benefit/contribution ratio*, being the ratio of the present value of benefits to the present value of contributions over the life cycle,
- the *recuperation rate*, which is the ratio of the present value of total contributions to the annual value of the pension,
- the *internal rate of return*,
- the *stability and affordability of the contribution rate* over a specific horizon, and
- the *full solvency ratio*.

In the literature on individual annuities, the *money's worth ratio* is a popular metric, see Mitchell *et al.* (1999), Cannon & Tonks (2004). It is the expected present value of the stream of payments provided by the annuity divided by its purchase price. This metric is related to the benefit/contribution ratio, but the numerator is a forward-looking expected value instead of a realized value after the fact.

Other metrics arise from the link between intergenerational equity and sustainability. Many pension schemes have automatic balancing mechanisms (ABMs) whose role is to support sustainability by modifying plan provisions in predictable ways in response to emerging experience (Vidal-Meliá *et al*., 2009). It is conceivable that the triggers used for invoking the ABM could also serve as proxies for measuring intergenerational equity. Such proxies could include the *balance ratio* of the Swedish social security system (Settergren, 2001), the *modified balance ratio* proposed by Ma (2016) for funded schemes, and the *open group funded ratio* for Shared Risk Plans in New Brunswick (New Brunswick, 2012).

As noted earlier, intergenerational transfers can also be conceptualized as payouts on *options being written/sold between various generations* of plan members. The fairness of such transactions can be assessed by valuing those options in a market-consistent manner, as in Kocken (2006). Hoevenaars and Ponds (2008) implement such valuations within the generational accounting framework of Auerbach et al. (1994), clearly identifying the net value of each cohort's embedded options. This method is particularly useful in assessing the intergenerational impact of plan design changes, or changes in the actuarial methods or assumptions. See Yi *et al*. (2020) for an application in a Canadian context.

Before adopting a metric, stakeholders should consider whether the context in which the metric was developed matches its intended use. For example, some metrics developed for social security

plans may not be immediately suitable for use in occupational pensions.[5] Stakeholders should also consider the audience for which a particular metric was developed (plan members and annuitants; plan sponsors and decisionmakers; or experts such as actuaries, pension economists and social planners) and use them accordingly.

3 Intergenerational equity in practice

While the literature provides important insights into possible definitions of and metrics for intergenerational equity, it is equally revealing to hear stakeholders' viewpoints on the topic. As part of our research, we held a series of small roundtable meetings with key Canadian stakeholders, discussing their approach to intergenerational equity in occupational pension plan management. Our targeted group included consulting actuaries, sponsors/stewards of large public and private sector pension plans, actuaries involved with unions, as well as regulators and policy makers. Our goal was not just to identify elements of current practice (what is being done, and how often), but also to find out why specific approaches are (or are not) taken. Three separate meetings were held: one in Vancouver[6] for regulators and policy makers, one in Montreal for practitioners in French, and one in Toronto for practitioners in English.

Date	**Location**	**Participant group**	**# of participants**
October 2018	Vancouver	Regulators and policy makers	18
February 2019	Montreal	Quebec practitioners	11
April 2019	Toronto	Practitioners outside of Quebec	10

In this section, we present a summary of these discussions. The objective of this report is not to present the verbatim of the meetings, but rather to highlight the most important elements that emerged.

The main questions discussed were:
1) Are stakeholders concerned about intergenerational equity?
2) What are the current used definitions of intergenerational equity?
3) What are the current and emerging practices in plan design, funding and regulation linked to intergenerational equity?
4) How can intergenerational equity affect the sustainability of pension plans?
5) How is intergenerational equity being measured and monitored?

[5] Occupational pension plans in Canada are pre-funded, but social security schemes generally are not. In addition, social security schemes normally have mandatory participation, but in occupational pension plans new entrants are not always guaranteed. Finally, social security schemes might have redistribution as an explicit objective.
[6] This roundtable immediately followed a meeting of the Canadian Association of Pension Supervisory Authorities and included representatives from most jurisdictions.

3.1 Are stakeholders concerned about intergenerational equity?

All participants involved in consulting or involved with sponsors/unions identified intergenerational equity as an important issue in recent years. Reasons for the increasing concern are focused around three themes. First, the deteriorating financial situation of pension plans since 2000 (low interest rates, market downturns, increased maturity of pension plans, mortality improvements, etc.) have led to pension plan modifications, leaving some cohorts with lower expected benefits while honouring the guaranteed benefits of other cohorts. Second, these modifications, if in some cases were temporary, led to the implementation of conditional pension plans with more flexibility in benefit provisions. Target benefit plans (TBP), member-funded pension plans (RRFS in Quebec), collective defined contribution (CDC) plans are examples of such plans that are allowed (or will soon be allowed) in most Canadian jurisdictions. The higher the risk taken by the members (e.g., variability of contributions, adjustable benefits, deficit funding), the more important the equity issue becomes. Third, the sponsors (mainly employers) mentioned that intergenerational equity was an increasing concern in the context of labor shortages, as the value of a pension plan could be used in a recruitment argument. We note that the roundtables were conducted before the pandemic; this point is even more relevant in the post-COVID era characterized by severe labour shortages in multiple sectors.

The regulators' responses differed significantly from those of other stakeholders. While they expressed some concern theoretically, they said that in practice they were sometimes forced to close their eyes to inequities. Their role is to protect guaranteed benefits, which makes them apply rules (e.g., in the case of wind-ups) that may result in a cohort (e.g., retired members) getting their full benefits while another cohort (e.g., active members) might get a lot less. They also mentioned that they were realistic about the fact that the cost of benefits evolves over time and inequities are to be expected. Also expressed was the lack of power they have when approving or refusing an amendment. More precisely, they cannot refuse an amendment leading to lower benefits (in relation to contribution) if this amendment involves no explicit inequity. As long as the amendment is reasonable in terms of fairness (e.g., in case of benefit reductions), it will not be refused.

Policy makers mentioned that intergenerational equity is an important issue when reviewing legislation and allowing new types of plans (e.g., TBP, SRP in New Brunswick, RRFS and Bill 15 for Municipal Pension Plans in Quebec).

3.2 Definitions

3.2.1 How do stakeholders define "equity" and "generations"?

Across all participants, a clear definition of equity did not come out in the discussion. However, participants had very interesting things to say about the concept itself. Many participants referred to the term fairness, and the difference between fairness and equity was discussed. Some participants said that that the two terms were equivalent, while other participants mentioned that fairness sounded more emotional than equity, which sounds more quantitative. In all cases, it was clearly identified that equity was sometimes associated with equality, which would be a wrong understanding of the objective of equity. Equity should refer to the concept of fairness and

reasonability. This raised the question of the level of equity needed to make sure that the plan was sustainable. The issues of sustainability and breaking points were also discussed later in the roundtables.

When asked about the definition of equity, the vast majority of stakeholders linked equity to the level of benefits (expected or paid) and not to contributions. However, when asked about how to measure it, the contributions came into play. We note that similar discussions are observed on pension committees and between pension plan trustees who first think about the level of benefits themselves when thinking about equity, and often nuance this definition afterwards, taking the level of contributions into account.

Participants were also asked to identify how they would define or split generations. As expected, some participants split generations in two parts: pensioners and active members. Others added another group: the "almost retired members". Also discussed was the importance of future entrants because they constitute an important factor in the sustainability of the plan. On this specific question, regulators mentioned that they unfortunately deal only with existing members (respect for accrued benefits, impact of wind-ups) and thus don't take into account future members when thinking about equity across generations.

A participant coming from unions suggested that equity should also be considered between other groups, not just generations. For example, one could compare equity between married vs. single members, members who enroll late in their career vs. members who enroll at a young age, those who are eligible to take early retirement vs. those who are not). The same comment was also made during the regulators/policy makers roundtable. The last split is very much linked to subsidies which will be discussed later in the report.

3.2.2 Is there a need to better define and measure intergenerational equity?

Regulators identified that it was not a priority to define intergenerational equity, mainly because they were more concerned about the trend from DB plans to defined contribution (DC) plans than the specific issue of transfers between generations.

Stakeholders were of a different opinion, saying that a uniform definition is needed to ease discussion between parties involved, especially discussions between the plan sponsor and unions. Without a uniform definition, parties have a hard time to get a common understanding of what intergenerational equity means, which hinders their ability to evaluate the effect of it. Stakeholders also identified the need to use an appropriate measure to quantify intergenerational equity. Unless the concept can be quantified, fairness and equity will just stay a nice aspiration. It is important to note that a single definition across all pension plans has not been identified as desirable. Parties who negotiate with each other should use the same definition, but participants around the table suggested that a framework or guidelines should be used instead of a single uniform definition. Participants identified that a perfect definition should not be the objective, since there are many blurry elements to take into account.

3.2.3 Who should establish a definition and an acceptable level of intergenerational equity?

Participants (excluding regulators) were almost unanimous that a definition should not come from the policy makers or regulators.

They also clearly expressed that a framework (or guidelines) would be beneficial to help establish definitions and thresholds, and that these guidelines could come from the Canadian Institute of Actuaries (CIA) in the form of, for example, an educational note.

3.3 Current and emerging practice

3.3.1 Link between pooling and equity

An interesting discussion was held on the relationship between pooling and intergenerational equity. Risk pooling is obviously an efficient way to fund pensions, reducing risks globally for a group. However, participants identified pooling as a factor that can introduce inequity. In fact, members often perceive individual DC plans as more equitable than DB plans, as there are very little, if any, cross-subsidies between members in the individual plan. A participant, referring to the illustration of the level of pooling according to different types of pension plans published by the CIA (Gagné, 2015) stated that members should realize that risk pooling inevitably involves individual inequity at some point and members should differentiate between individual and collective equity.

According to our roundtable participants, the more important the risk, the more accepted the pooling. For example, mortality risk is generally well accepted to be pooled among members. In contrast, subsidies like early retirement and spousal survivor benefits are less accepted by members. A participant representing unions noted a big trend towards less subsidies such as early retirement, bridge pension before 65 and spousal survivor benefits as members perceive that these subsidies involve a level of pooling that introduces inequities and might not be needed.

3.3.2 Effect of emerging plan types on intergenerational equity

As contingent pension plans emerged from the deteriorating financial situation of pension plans, it was mentioned that these plans, which transfer more risk to members than pure DB plans, involve also less pooling, and probably more intergenerational equity. More specifically, if pensions are immediately adjusted when adverse events occur, then intergenerational transfers are reduced. In pure DB plans, such adjustments would break the promise made to members and usually are not allowed by pension regulations.

Though contingent pension plans were not specifically put in place to address the issue of intergenerational equity, most participants agreed that they could contribute to reducing transfers between generations. However, it was highlighted that different provisions across plans might receive very different reactions from members, even if they targeted the same objective of improving intergenerational equity. The example of conditional indexation vs. pension cuts was given: members are expected to more willingly accept a pension that is not indexed than a pension reduction, even if the two options are actuarially equivalent. The plan design (in terms of

plan type and the provisions for adjusting benefits and/or contributions) should take members' preferences into account, and should be accompanied by an excellent communication plan to increase the chance of success of the implementation of a contingent pension plan.

3.3.3 Effect of financing basis, actuarial assumptions and margins on intergenerational equity

There was a strong consensus among participants that the solvency basis, being too sensitive to interest rates, significantly undermined equity. Participants noted that the solvency basis broke the equity relationship by increasing contributions and decreasing benefits. Participants from the private sector mentioned that, when the deficit problems arose, employers were focused on fixing the financial problem rather than the equity problem.

The recent removal or relaxation of solvency funding rules was not motivated by a concern for intergenerational equity. However, participants agreed that the new funding rules, which are less sensitive to current market interest rates, do a better job of addressing this issue and that they now have the means to stabilize costs (through margins, etc.) to avoid inequities.

The issue of margins was discussed extensively by participants. Some participants thought that setting larger margins could be a powerful tool for reducing intergenerational transfers. Some participants (consultants) have already used the term "intergenerational equity margins" with clients. On the other hand, other participants mentioned that too large margins could in fact reduce equity, by pushing transfers to future generations. An example of this could be the RRFS plan, where indexation is funded but not guaranteed, which creates very large margins (so-called indexation reserves). Specifically, the rules governing the use of those reserves can be so conservative that the reserves become enormous before they can be used to grant indexation, and thus increase intergenerational transfers.

Accounting rules were also discussed. Similarly to the solvency basis, participants agreed that the use of mark-to-market bond yields (focused on current economic conditions) for accounting purposes can have a negative impact on intergenerational equity. The impact is greatest when there is a significant gap between the cost of the plan on a funding basis (using on long term expected returns) and the cost on an accounting basis (using current market interest rates).

3.3.4 Effect of the funding policy on intergenerational equity

The establishment of a funding policy is now mandatory in almost all jurisdictions. This policy describes the funding objectives with respect to the variability and level of contributions and benefits ,as well as the major risks associated with the funding of the plan, and the tolerance level of the employer and active members for these risks.

Participants were asked whether this funding policy had been a catalyst to address the issue of intergenerational equity. The consensus was that, unfortunately, funding policies have been established "plain vanilla;" i.e., stating general objectives such as stability of contributions and/or sustainability of benefits, without seriously addressing the issue of intergenerational equity. However, some participants expressed hope that future versions of the funding policy will give the opportunity to trustees to have deeper discussions about intergenerational equity. A

participant added that since intergenerational equity is mentioned in their funding policy, it is expected that this issue will be central in the discussion when the next funding shortfall arises.

3.4 The link between intergenerational equity and sustainability

Intergenerational equity has been identified as an important contributing factor to sustainability. Members, especially new entrants, must perceive the plan as being fair; i.e., providing benefits at a reasonable cost to stay on board and see value in the plan. Too much inequity (i.e., transfers between generations) could lead to disengagement by members and threaten the sustainability of the plan.

Communication to members has been identified as important when the members feel that they are not treated fairly (e.g., active members perceiving that there is not sufficient equity relative to retired members). Participants mentioned that measuring and monitoring intergenerational equity could be useful in their communication with members.

3.5 Measurement and monitoring

3.5.1 What metrics are currently used (if any)?

Quantitative metrics are not widely used. Most participants use more qualitative measures or some proxy coming from studies produced for other purposes (e.g., the ALM exercise to establish investment policy).

Participants discussed potential metrics that could be used and their drawbacks. The *ratio of the value of future contributions to value of future benefits* is a good starting point and is intuitively the appropriate one for actuaries. However, some issues related to the method were identified that are not easily fixed, such as the use of present value over the career, the appropriate period of comparison, which cohorts to compare, whether to make comparisons between cohorts or comparisons with other plans, etc. It was also mentioned that this ratio could be misleading, since it could show adequate levels but would not necessarily reflect the level of risk taken across the generations.

A second measure identified was the *internal rate of return* (IRR). Large public plans are using it (CPP, QPP). Participants expressed that the IRR would be very useful and easy to communicate to members, but is difficult to calculate correctly as it should capture changes in longevity, the financial economic environment, etc.

Participants agreed that although a backward-looking metric could be of interest, a forward-looking metric would be more useful. Projected variables already used in ALM studies to assess sustainability (e.g., the stability of contributions, or of the funding ratio) could be suitable starting points for developing metrics specific to intergenerational equity.

3.5.2 Is there a need/appetite to better measure intergenerational equity?

Many participants said that they would very much like to include the level of intergenerational equity in every stochastic projection, but this is not done yet. In the private sector, it was identified that boards are curious about such a measure, but they are not necessarily ready to pay to develop it.

Similar to the discussion about the need for a definition, participants clearly expressed the need to have a metric for intergenerational equity.

The participants involved in pension plans with negotiated contributions and/or benefits expressed even more loudly the need to have guidelines to establish appropriate measures. Those guidelines could help parties agree on a measure to use when negotiating.

3.5.3 How would the right balance (breaking point) be established?

The need to establish a breaking point was identified but difficult to discuss in precise terms. As in the case of ALM stochastic studies, the trend would probably be more important to analyze than a specific breaking point.

An interesting idea submitted by participants was to develop a benchmark (via a survey) across different plans, allowing plans to compare with each other.

3.5.4 Who should establish the appropriate metric/breaking point/method?

The vast majority (but not all) stakeholders thought that these should not come from the legislator, but rather from either academia and/or the CIA. A framework or some guidelines would be preferred to a unique measure.

4 Commentary

4.1 Choice of discount rate

The discount rate is a key assumption that controls the timing of costs in a DB plan and the timing of benefits in a contingent pension plan. A higher discount rate makes the actuarial liability appear smaller and therefore accelerates the emergence and use of surplus, all other things being equal.

In Canada, the plan administrator is responsible for selecting the discount rate, usually with significant input from the plan actuary. In many cases, the discount rate is based on the best estimate of long-term future returns on plan assets, less a margin for “adverse deviations”. The CIA provides guidance on the selection of the best estimate rate for going concern funding valuations (CIA, 2015). The size of the margin depends on the level of conservatism chosen by the plan sponsor and is normally documented in the plan’s benefit/funding policy.

The discount rate can change from time to time due to:

- Changes in long-term return expectations,
- Changes in the asset mix which affect the best estimate of the long-term portfolio return, or
- Changes in the level of conservatism reflected in the margin for adverse deviations.

In a DB plan, a higher discount rate generally benefits the plan sponsor by allowing it to make lower contributions to finance the same level of benefits. However, this will also come with increased risk if the change in the discount rate was triggered by a greater allocation to risk assets or by a reduction in the margin.

In a contingent pension plan, changing the discount rate triggers a transfer of wealth and risk between generations of plan members. It is therefore important to clearly articulate when and how the discount rate can be changed in the plan's benefit/funding/investment policy. Who exactly benefits from a higher discount rate in a contingent pension plan depends on the design of the plan. Often, a higher discount rate will provide current pensioners with higher cost-of-living adjustments sooner. It may also benefit current members through lower contributions in the near term, although this may also be accompanied by higher risk in the longer term.

Regulatory oversight of the discount rate and its impact on intergenerational equity varies across jurisdictions and by plan type.

- In the past, some Canadian pension regulators internally specified an acceptable range of discount rates to be used by DB plan sponsors, although this practice was not explicitly guided by considerations of intergenerational equity.
- In the context of target benefit plans in BC and Alberta, the current pension standards specify a benchmark discount rate. Deviations from this benchmark affect the size of the required PfAD and, consequently, the timing of benefit improvements.

While basing the discount rate on long-term expected portfolio returns is widely accepted in North America, it is not without opposition. From the perspective of financial economics, using a best estimate discount rate together with a static unit credit valuation does not adequately take risk into account in the pricing of plan benefits. In the case of plans with contingent benefits, this could result in significant mispricing of, for example, increases in pensions in pay, and lead to sizeable unintended transfers between workers and retired members (Kocken, 2012).

In modern risk-sharing plans, decisions about benefit adjustments are often not made on the basis of static valuations; instead, many of these plans use stochastic projections which can, in fact, reflect the associated risk. Nonetheless, the issue of selecting a discount rate for purposes of the statutory valuation remains.

4.2 PfADs, buffers and side funds

In recent years, several jurisdictions moved away from solvency testing and adopted a "going-concern-plus" funding model for DB plans instead, combining the use of best estimate discount rates with an explicit "provision for adverse deviations" (PfAD). The PfAD acts as risk capital

that enhances *benefit security*, that is, the probability that the plan can pay accrued benefits as they fall due.

However, the origins of the going-concern-plus model can be found in the work of the BC/Alberta Joint Expert Panel on Pension Standards, which addressed the funding of "specified contribution target benefit plans" among other things (JEPPS, 2008). The JEPPS report formed the basis of the pension standards applicable to target benefit plans in BC and Alberta. These standards require the inclusion of a PfAD in the contributions (on top of the normal cost of benefits) which then accumulates in the pension fund. There is also a PfAD associated with the accrued liability. When a target benefit plan in BC or Alberta does not have enough funds to cover the PfAD on the liability it does not have to take immediate remedial action; however, the PfAD must be funded before benefit improvements can be made. This ensures that funds that are supposed to be held as risk capital (i.e., the PfAD on the liability) are not diverted towards benefit improvements.

Some jointly sponsored pension plans, such as the BC College Pension Plan, maintain a subaccount that acts as a counter-cyclical buffer where excess assets are placed in "good times" and are drawn down in "bad times". Such accounts are not mandated by pension standards. They do, however, fit with the funding philosophy of their sponsors, aiming to enhance the *stability of contributions* by minimizing fluctuations year to year.

Finally, some pension plans have funds set aside specifically for contingent benefits, separate from the funds intended to finance base benefits. These side funds may be built up from dedicated contributions (either a fixed percentage of pay, or a load on the normal cost) and/or from emerging surplus. The goal of these funds is to enhance the *sustainability of the contingent benefit*; that is, the ability of maintaining them at the same level for the foreseeable future. The BC College Pension Plan's Inflation Adjustment Account serves this purpose, with the plan's funding policy clearly identifying how funds flow into and out of this account.

The term "side fund" suggests that the assets supporting contingent benefits are segregated from the assets supporting guaranteed benefits, and are perhaps even invested differently; however, in many plans the funds available for this purpose may only be tracked on a notional basis. For example, in Quebec, RRFS are allowed to build up an indexation reserve to support cost-of-living adjustments, but this reserve is not separated from the other assets.[7]

Lack of transparency in how much of the plan assets are available to finance guaranteed vs. contingent benefits and how much is set aside as either risk capital or a contingency buffer makes it difficult to track each group's or cohort's rights to (or prospects for) various types of benefits or subsidies under the plan. This was a key consideration in the recent redesign of the Dutch pension system, with the new system consisting of individual accounts and an explicit "solidarity reserve" maintained to facilitate intergenerational transfers (Bilsen *et al*., 2022).

[7] The indexation reserve of an RRFS is built up by funding a fully indexed (but not guaranteed) pension. The criteria for drawing on the reserve are harmonized across all RRFS: current Quebec legislation allows indexation to be granted only when the RRFS remains fully funded and solvent after indexation.

Provisions like the PfADs, buffers and side funds mentioned above are often put in place with the goal of smoothing out consumption over time: they exist to reduce the possibility of substantial fluctuations in contributions and/or benefits from year to year. Theoretically, some smoothing can be achieved without any intergenerational transfers, by simply spreading costs and benefits over an individual's (or cohort's) lifespan, first accumulating then releasing the associated PfAD, buffer or side fund. More frequently, however, smoothing involves intergenerational risk sharing: in the better case by choice, alternatively by default due to lack of transparency and inadequate accounting of who contributed how much and to whom excesses ought to be released. In either case, the philosophy around smoothing (i.e., whether it should be over the lifecycle or across generations) ought to be clearly articulated in the plan's funding/benefits policy. Likewise, the methodology for accumulating and releasing PfADs, buffers and side funds should be consistent with that stated philosophy.

Sometimes, PfADs, buffers and side funds fulfill an additional role that may be at odds with the concept of equal risk for all: they may exist to provide additional benefit protection (in terms of security and stability) during a transition from an unsustainable DB provision to a contingent benefit provision (such as a target benefit plan or an RRFS). Attention needs to be focused on how assets held under such special provisions are to be released as the plan moves through the transition period.

From the perspective of intergenerational equity, all PfADs, buffers and side funds must be treated with care. Critical questions are how much of the provision is still needed, how much can be released, and to whom it should be released.

For PfADs that are intended as risk capital, to be held until the benefit promise is fulfilled, stakeholders can draw inspiration from insurance practice, by considering the treatment of risk-based capital, the determination of emerging surplus, and the distribution of dividends to those who provided the capital. In a traditional insurance contract, shareholders put up the risk capital and are rewarded for taking risks by receiving dividends throughout the life of the policy and when it matures. In participating policies, the allocation of surplus and dividends between shareholders and policyholders is critical in establishing the fairness of the contract between these stakeholders. This has been addressed in great detail in, for example, Denmark where participating policies still dominate the market (Andersen and Skjødt, 2007).[8]

4.3 Inter- versus intragenerational equity

Although the focus of this report is on *intergenerational* equity, it is important to recognize that pension plans often have subsidies flowing between many different groups of members, not just different generations. The most common *intragenerational* subsidy in plans that provide lifetime income is the one flowing from men to women, arising because all members pay the same contribution rates and are entitled to the same benefits, even though women tend to live longer. This subsidy is widespread in Canadian plans, as pension law does not allow discrimination based on sex.

[8] A DB plan would in this sense resemble a traditional contract, whereas a target benefit plan would be similar to a participating contract albeit without a guarantor (the equivalent of a shareholder).

Additional intragenerational transfers arise from plan provisions such as subsidized spousal benefits (with the subsidy flowing from single members to those with a spouse) and subsidized early retirement benefits including bridge pensions (from those not making use of the provision, to those who do). As it was pointed out during the roundtable, an examination of intergenerational equity within a pension plan could be a catalyst for a review of these provisions in the broader context of equity among all members.

4.4 Recent economic developments

The past year has seen a significant increase in interest rates and inflation, and significant declines in asset values, not just in Canada but around the world. These changes can have a profound impact on intergenerational equity in Canadian occupation pension plans.

On the one hand, rising interest rates are reducing plans' liabilities in respect of non-indexed benefits. As a result, even with falling asset values, some plans may end up with surplus. To the extent that the increase in nominal interest rates is largely a result of rising inflation, and that rates are expected to return to lower levels in the next few years, plans may not wish to spend (all of) the emerging surplus now and may instead be inclined to increase margins or divert assets to a contingency fund.

On the other hand, rampant inflation has significantly reduced pensioners' purchasing power and the need for cost-of-living adjustments is higher than ever in recent history. In plans with conditional indexation, a decision will need to be made about whether such adjustments can be prudently granted at this time, and this decision will need to be explained to plan members.

Since the generations who benefit from the two possible actions (increase margins or grant indexing) are different, the decision clearly has an intergenerational dimension which ought to be brought to the fore. This may, in fact, motivate stakeholders to agree on relevant definitions and accelerate the development and adoption of metrics for intergenerational equity.

5 Conclusions

Intergenerational equity is key to the sustainability of all pension programs, yet meaningful consideration of this topic in Canada's occupational pension sphere is only just beginning. The purpose of this report is to provide the "fertile soil" from which richer discussions and deliberations can spring forth. In addition to providing an overview of relevant concepts from the literature which can help stakeholders articulate their positions on intergenerational equity with more clarity, we present a snapshot of current approaches, practical obstacles, and opportunities in the Canadian landscape.

Our key messages are as follows:

- There is not a clear, uniform definition of intergenerational equity, either in the literature or in practice. Lay usage of the term may differ significantly from expert, discipline-specific interpretations in actuarial science and economics, so stakeholders should take

time to define terms before engaging in discussion or negotiation around this topic. Practitioners would like guidance on how to approach alternative definitions, and they identified the CIA as a potential source of such guidance.

- There is a tension between actuarial equivalence on the one hand and the egalitarian impulse on the other hand in deciding whether redistribution *ex post* is justified. The former may be sufficient if the pension plan is seen purely as a financial contract; however, principles of distributive justice can be applied if the pension plan is seen as a social contract instead.

- Prospective metrics are always desirable; retrospective metrics are not relevant when the plan is seen only as a financial contract (in this case, pricing and expected outcomes matter, actual outcomes do not).

- The discount rate is a key lever for redistribution between different generations of members. Stakeholders should always consider any change to the discount rate (especially one motivated by a change in the margin) in light of the transfers of wealth and risk that it will trigger between generations.

- Provisions for adverse deviations that act as risk capital may behave fundamentally differently from countercyclical buffers and side funds when it comes to intergenerational equity. PfADs and reserves that do not require full funding unless a benefit improvement is contemplated are even more complex. It is important to know the actual function and operation of such funds to truly understand their impact.

- Conservative discount rates (with margins) and/or dedicated contributions can help build a sizeable buffer fund or reserve, which can provide more stability in contributions and benefits. However, higher reserves could lead to unwanted outcomes if the reserve funded by one cohort is used later for another cohort. When and how buffers are distributed should be carefully considered.

It is clear from the roundtables that many open questions remain regarding intergenerational equity in occupational pension plans. Further research on appropriate metrics is needed, as are opportunities for stakeholders to discuss these issues in an open forum.

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Glossary

Conditional indexation: a provision under which indexation is granted conditional on specified criteria (e.g., a specified level of surplus) being met.

Contingent pension plan: a pension plan in which benefits are contingent on the financial status (e.g., plan with conditional indexation).

Jointly sponsored pension plan ("JSPP"): a pension plan in which the responsibility for decision making and funding are shared by both plan members and their employer(s). The term is formally defined in the pension standards of some, but not all, provinces.

Member-funded pension plan ("Régime de retraite par financement salarial" or **"RRFS"):** under Quebec jurisdiction, a type of pension plan where the employer contribution is set in advance and the remaining required contributions (including payments for deficits) are made by the members. Financial risk for members is limited by the creation of an indexation reserve built up by funding a fully indexed but non-guaranteed pension. Current legislation limits the granting of indexation to when the plan is fully funded and solvent after indexation is granted.

Target benefit plan ("TBP"): a type of pension plan where the level of contribution for both employer(s) and members are fixed and provided for in the plan's provisions. The targeted benefit level is also specified in the plan's provisions and may be adjusted. The adjustment methods and criteria vary across legislations. Under certain circumstances, members' contribution could be increased.

Shared Risk Plan ("SRP"): a type of conditional pension plan that exists under the pension standards of New Brunswick. SRP regulations are more focused on risk management than TBP regulations in other provinces, and place a higher emphasis on the sustainability of the base benefit than that of ancillary benefits (e.g., indexation, bridge, early retirement).