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How Actuaries Work And How Leaders Ought to Work

The Pension Papers™

People are living longer lives and many are, in fact, working long past the age at which they retired in the past. It has been suggested, therefore, that we need to make changes in the way that we create and manage pensions. The Canadian Institute of Actuaries believes that we ought to push pension enrollment to a later date in life as a result of these demographic shifts.

Are actuaries the best people to decide on how to make pensions work better in an age when we are changing the way that we work? Will these kinds of recommendations result in the right outcomes for Canadians, and for companies?

In this paper, we look into understanding what is possible for pension planning when the focus isn't on actuaries' point of view on running the numbers to avoid risk. To be an informed leader, does one only have to understand economics, actuarial science, and mathematical calculations to succeed at this task? Or, perhaps, ought we to be looking at different metrics and our management knowledge and instincts connected to leadership principles as well?

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How Actuaries Work And How Leaders Ought To Work

"Canadians are living longer than ever, and many are choosing to work beyond age 65," said John Dark, president of the Canadian Institute of Actuaries, recently stated.[1] "It makes sense to update our country's retirement income programs to reflect this fact."

In his statement on the future of pensions, Dark was suggesting that every pension strategy in Canada align with a simple idea: that we ought to push pension enrollment to a later date in life, with the Canada Pension Plan/Quebec Pension Plan deferring its benefits from the age of 65 to 67, and deferring Registered Retirement Saving Plan income payouts to 75, instead of 71.

This may seem to be a given. Dark is right; we are living longer lives and many people are, in fact, working long past the age at which they retired in the past. It is no longer a given that people will end their working life when they turn 65, on the dot.

At the same time, however, we have to understand that Dark's recommendations come from a very specific place, namely that of the actuarial profession. Is this set of estimates, and his associated recommendations, going to have the effect that he assumes it will? Or is Dark seeing possible policies from within the silo of his professional knowledge?

Actuaries are number crunchers, and they're wonderful at achieving that goal. Their aim is to predict what might happen in the future, based on statistical analysis of data to determine retirement age, termination rate, life expectancy, and lots of other figures that affect how we determine pension frameworks and plans.

Most of the time their numbers are helpful, but there gaps between what we believe that we are getting from actuarial numbers and what we need to understand in a business setting.

[1] Gibillini, N. (2019). Canada's actuaries urge governments to raise retirement age. BNN Bloomberg, April 15. Retrieved from https://www.bnnbloomberg.ca/canada-s-actuaries-urge-governments-to-raise-retirement-age-1.1244550

We need clarity on whether conventional actuarial methods actually make the impact we need them to make.

In this paper, we look into understanding what is possible for pension planning when the focus isn't on actuaries' billable hours and running the numbers to avoid risk. To be an informed leader, do you have to understand economics, actuarial science, and mathematical calculations just to succeed? Is their analysis is actually helpful to decision making? Are actuarial tables the most important thing for business decisions on pensions? Will these kinds of recommendations result in the right outcomes for Canadians?

The paper will make the argument that what is needed in pension management is more transparency. It's not about being a financial hero, but about making things happen that work for your business.

Actuarial Decisions: It's All About The Numbers

Many business and organizational leaders are dissatisfied with the current limitations of risk management practices, and pensions are not exempt from this worry.

When actuaries come to the table armed with reams of data, it helps people in leadership positions feel confident that they are going to do the right thing. Everyone is constantly looking for more accurate calculations, more precise mortality projections, more precise assumptions on demographic changes, and with today's technology, we can go deep on adding precise science to the mix, almost every step of the way.

That's why many business leaders rely on actuaries to provide them with best case scenarios for pension management.

One of the problems is, however, even with the best of intentions and mathematical prowess, we aren't always able to work in a way that protects pensions over the course of generations. And when we see a set of actuarial tables that seem, at least superficially, to present us with a solution that is based on quantitative science, we sometimes don't step back and look at all of the other factors that will have an effect on pensions over the long term, and which can put us at risk.

It's a complex issue that we're going to dig into, but, the truth is, the search for accuracy in numbers sometimes cloud our human judgment and intuition. Sometimes, we'd be better off to be approximately right than precisely wrong.

What Is Risk Management When It Comes To Pensions, Really?

Actuaries are perceived to be the primary key to insuring against pension risks.

When it comes to pensions, risks are grouped into two categories, each of which have their own type of risks, namely defined contribution (DC) and defined benefits (DB) plans.

In DC plans, each member of the plan (and sometimes his or her employer) pays into an account each month. These contributions are used to purchase assets, such as mutual funds or some other asset. At retirement, these assets can be withdrawn. This means that the risks associated with DC plans are linked to the performance of the asset: if the company provides limited, choices for assets, such as stock options alone which may be non-performing, or the employee chooses the wrong asset in a large list of possible assets, such as in the case of mutual funds, then that employee's future earnings may be negligible.

There are therefore internal and external factors that can lead to DC plan risks for those receiving the pension, but, no matter what, employers using this kind of pension also may, in some cases, bear an ethical risk with respect to their responsibility to employees. Relying on the market alone to ensure that an employee has a pension puts the burden on the employee to understand their options and their personal risks.

In a DB scheme, employers use formulas that usually depend on the number of years worked and salary of the employee to calculate a fixed amount to pay the employee a pension when he or she retires.

This means that the risks associated with DB plans are linked to internal more than external factors. This is because the risk of varying rates of return to pension assets falls on the employer, which is, in real terms, its leadership team and its internal financial management and effects on wages, as well as shareholders and customers.[2]

[2] Almeida, J. F. C. R. D. (2017). Genetic algorithms applied to asset & liability management (Doctoral dissertation).

In order to mitigate DB risks, a higher level of liquidity may be required. There is a need to recognize the necessity of moving towards compliance with all government regulations in order to stabilize company assets. In addition, robust structural risk assessment protocols and internal stress testing must be undertaken to quantify and understand the impact of sensitivities and exposure when it comes to the guarantee of pension assets to current and past employees. Actual recent economic, market and peer institution stresses must be used to inform the assumptions of these stress tests and assess the effectiveness of the firm's mitigation strategies.

Those are a lot of risks.

Pensions, theoretically, are much simpler when it comes to risk analysis than, for example, insurance provision, which also relies heavily on actuarial information. In insurance, risk is assessed based on imperfect random population data, and you need to build in profit factors because the insurers need to make money. This means that any data analysis of risk that takes place is skewed by these determinants. For pensions, the numbers are much more predictable, since it's pretty simple to determine when people will retire, for example.

A firm can follow a risk-based approach, therefore, and rely on actuaries to try and churn the numbers in the right way to make decisions.

But here's the challenge. Actuarial tables are based on aggregate numbers, and aren't necessarily predicting risk in a way that helps. What are aggregate numbers? They are facts about a collection of a large-scale group of people. We don't complete an actuarial analysis on every single human being on the planet. Aggregate figures might tell us that twenty per cent of people in Canada are likely to save ten per cent of their income every month in a savings account, but will that mean that the same will be true for an individual

working at a pharmacy in Orillia? Not necessarily. We group people together and made predictions based on what we assume that they will do based on past experience. But what we get are probabilities, not facts.

When business leaders see the precise numbers that actuaries put on the table, they sometimes take it as a given that these are facts. That nothing will ever go wrong. But we tend to forget that actuarial valuations are only estimates, a snapshot of a scenario to be used as a guide, not precise measurements of what is to come.

Just like an engineer building a bridge using only statistics needs to consider what happens in the case of an earthquake, rather than just what happens during the average rush hour, pension managers also need to consider the likelihood of a large scale event getting in the way of perfect predictions. For example, when companies go bankrupt, or even economies melt down, as they did in 2008, we realize that some risks are truly unknown. We never know when double digit inflation is going to hit, which no one wants to pay for, so there is the conflict between different parties, namely managers past and present, neither of whom want to pay for a possible future risk.

Let me give you an example.

In some current DB plans, actuarial recommendations provide an actual dollar figure for the maximum contribution to a plan. Let's pretend that dollar figure is $100 per employee per month. Some employers assume that if they contribute that $100, then the plan will be fully funded. What they set aside from their decision making process is the fact that if they put $100, there is an 85 per cent probability that the plan will become fully funded in 50 years.

This kind of thinking has led to some expensive lessons in pension conversions, some of which have tossed out DB plans altogether, only to have to reconvert back to DB later once business leaders found out the effects of these choices.

Fighting The Risks, The Right Way

So, what does a business leader do to find the right information for choosing the right pensions?

In their fascinating book, The Tyranny of Uncertainty, Dr Nabil Abu el Ata and Rudolf Schmandt, both global experts on risk management for banking systems, write:

The Greek philosopher Heraclitus said, "No man ever steps in the same river twice, for it's not the same river and he's not the same man." But we continue to treat risk with a static and closed view of systems. We ignore the hidden influences that may be formed by design or through environmental factors, as well as those caused by changes in the dynamic system over its lifetime. **We pretend that our perception of risk is objective, remains constant, and unaffected by human dynamics.** And so we are surprised when dynamic complexity suddenly causes a risk to appear.[3]

Given what we know about pension management, Abu el Ata and Schmandt are entirely correct.

John C. Bogle, who died recently, was a career investor both credited with creating the first index fund, and a major philanthropist. He stated that "I think we give far more credence to past returns in the stock market than they even remotely deserve. The past is not prologue. The stock market is not an actuarial table. As has been mentioned, and John Maynard Keynes told us back in 1936 – and I put a lot of numbers on this – it's the sources of the returns … that determine future returns, not the recurrence of an ongoing event that comes up on a standard probability distribution curve."

What does Bogle mean when he makes this claim? And why does it matter? He's pinpointing the key difference between actuarial science and DC pensions in particular, but really, he's showing us the essential flaw in our human logic. We want to believe that we can predict the future, but as his long life in the market proved to him, we cannot do that. While the market may be the most efficient place to put our money, institutional investments can be challenging to create and maintain.

[3] Abu El Ata, N. A., & Schmandt, R. (2016). The Tyranny of Uncertainty. London: Springer.

Business leaders have to start with the assumption that they are not going to be able to predict the future, no matter how much information they have, and no matter how convinced their actuarial experts are that the data they have collected is correct. That data is probably correct, but there are limitations on how it can work. Aggregate numbers will provide somewhat accurate probability, but they don't work all of the time.

So Is Actuarial Work For Pensions Becoming Obsolete? No. The fact is that we need to bring actuarial work to light. Actuarial thinking is the key to pension resilience, but we may need to use unconventional methods to get to the heart of the data and use it in the right way. What we need to know is that the data that actuaries collect and use is not always the be-all-and-end-all of our decision making process.

Let's take a look at why this is the case.

With medical science and big data, we may be able to better pinpoint individual mortality, and, therefore, what the optimal age of retirement should be, but we still need to take this data with a grain of salt. Why is this the case? Actuaries use, as the foundation for their work, something called the Lee-Carter model of mortality. It is an algorithmic matrix of age specific mortality rates ordered monotonically by time, and has been used since the 1990s as the primary means to calculate the lifespan of a human being. In 2010, however, mathematical research showed that the trend can change over time in particular due to various medical and social progresses, but, perhaps even more importantly, **the algorithm is inaccurate when medical and social changes are used to help people at or over the age of retirement.**[4] What does this mean? Well, in simple terms, if people retired from Company X are at or over the age of retirement, and a medical breakthrough happens in cardiac health care, then people who are older are more likely to decrease their immediate risk of death than people who are younger. For pension managers, this is important, especially in the case of DB schemes but also important for all people who face future retirement, where all of a sudden the actuarial tables upon which they made decisions, say, 30 years previously, are completely inapplicable to their retired workforce. As a result, Company X may be now paying out retirement benefits for an extra 10 years for a significant portion of their workforce.

[4] Debonneuil, E., Loisel, S., & Planchet, F. (2018). Do actuaries believe in longevity deceleration?. Insurance: Mathematics and Economics, 78, 325-338.

Given this kind of disconnect, even within actuarial science itself, how can leaders in business use actuarial data productively?

- **Use asset liability management techniques.** Findings from the field suggest that companies "need to make sure they will have a sufficient asset inflow to be able to make the future defined payments, in many cases with decades of uncertainty between the initial agreement and the actual payment of employee benefits. Fund managers need then to choose from a number of existing techniques, such as gap analysis, cash flow matching, standard immunization or portfolio insurance."[5] In other words, it's important to manage pensions in the same way that you manage other assets: through constant risk management techniques. This is only a start, however; there are flaws in some of these processes that are akin to those in actuarial analysis.

- **Support open resource sharing in business and actuary work.** Assessing high risk impact issues, such as those detailed above, has to be achieved in a collaborative way if they are to be useful to pension planning. Companies need to learn from each other not after a pension has failed, but as it is evolving. For example, the Colleges of Applied Arts and Technology (CAAT) Pension Plan in Ontario calls for real governance that help all parties to evaluate the risk, so that there is no "too big to fail" thinking.[6]

- **Suggest different risk assessments for different data sets.** Research in the field shows that probability distributions of different risks can have different forms. Some risks are linear, others are barrier-like, others are logistical, and, as a result, not all risks can be presented by a single numerical estimate.[7] Exponentially growing risks are linked to new technologies such as AI or medical technologies such as nanosurgery, and may not be presented by a single annual probability. What this means is that, therefore, that leaders have to dig deeper than data to assess when, where, and how risks may have effects on their pensions.

[5] Almeida, 2017.
[6] https://www.caatpension.on.ca/en/news/everyone/caat-plan-wins-pension-performance-award-membership-growth-strategy
[7] Turchin, A., & Denkenberger, D. (2018). Global catastrophic and existential risks communication scale. Futures, 102, 27-38.

- **Develop an internal corporate social responsibility mandate that balances actuarial findings with employee engagement.** Partnering with employees needs to become more fundamental to the examination of how to sustain pensions; not only is this a matter of risk management when a broad range of social norms need to be taken into consideration, but creating a focus on corporate social responsibility, such as creating training programs for employees to learn about how they can make informed choices about retirement, will allow firms to adapt more readily to shifts in the social and economic space. An ethical company is one that is able and willing to make decisions between right and wrong rather than one that focuses on making decisions between succeeding and failing.

- **Hold actuaries to account.** Pension actuaries hold a particular set of knowledge and experience that is key to pension development and innovation, but they need to step up as risk managers and be accountable for results in collaboration with the industry – lawyers, investment managers, accountants, and most importantly, with the real pension market, namely the businesses that sponsor pension plans. Actuaries need to be seen as risk managers, and they need to apply knowledge of business, economy, law, finance and accounting and become experts in understanding their clients' interest and needs, know what the clients can and cannot afford before anyone see it coming, to quantify, guide and manage unexpected events.

The Future Is Clear: Actuarial Analysis Is More Important Than Numbers

It is always the unknown unknowns that impact performance, which means that true resilience comes from managing the unexpected. The essence and art of actuarial science is to do exactly that. But that's not how conventional valuations have been regularly understood and used in today's pension market, and in boardrooms.

Actuaries do a pretty good job in analyzing mortality and demographic movements. But when it comes to predicting market performance and viability over the long term, conventional methods tend to fail more often than not.

This is where leadership is important.

It's a leader's job to ask questions. Businesses need to sort out the data itself from what to do with the data. What this means that we may need a better pension planning model to build randomness into the process, taking into account real life common sense and human experience, as well as the foibles of human nature. It is difficult to do this, however, when actuaries speak a 'foreign' language. But a leader can bring the conversation back to risk, market performance and viability over the long term in order to shift the focus of the work. It is the compounding interest, the rate of returns and the inflationary spiral that we truly need to worry about, rather than only facts about when people are likely to retire.

The goal of pensions is to help people and their spouses to achieve financial security in their old age, which means we simply cannot ignore purchasing power in our calculations. But can a company afford it? If actuaries think that the harsh actuarial reality is in conflict with management interests, who will stand up to explain exactly how expensive such a commitment is? It doesn't matter whether it is a DC or DB plan; we need to understand the true actuarial cost of retirement financial need and act accordingly.

Pensions used to start with companies themselves, rather than actuaries, and we have to get back that model. GM's president revolutionized investment management for pensions, and Procter & Gamble started the first pension program before the first pension actuary ever existed. While we're still looking for better ways to assess risk, leaders have to be the first point of call when it comes to decision making, and it's important for you to explore all of the possible internal and external factors that are specific to your industry and company that may have an effect on your pension outcomes.

There is no direct way to shift away from the changes that we are currently undertaking as a society; our economic, social, and political boundaries are shifting in a large scale and significant way. This means that we need to imagine a different future for pensions, and one in which there is an agreement as to what is important to mitigate risk and to keep our employees, our companies, and our global society, safe and secure. What we need is clear thinking around market forces and how they effect pensions and businesses.

If we are to truly lead in pension management, then we need to create, implement, and adapt to a new way of thinking about our futures.

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