

An Improved Application of the Variable Annuity

Author

Stephen A. Eadie FCIA, FSA

Mr. Stephen Eadie is an independent contributor to the Global Risk Institute on pension and income security issues. He is solely responsible for the content of the article. This is the second article Stephen has submitted to GRI. Stephen's biography is at the end of the article.



EXECUTIVE SUMMARY

Variable annuities have been used as a payout mechanism in some US pension plans that are qualified under the U.S. Internal Revenue Code for many years. This innovative payout technique has also been introduced in a large pension plan in British Columbia that is registered under the Canadian Income Tax Act. Under this technique, the registered pension plan establishes a “hurdle rate”. The hurdle rate is the pension plan fund’s targeted real rate of investment return. The difference between the hurdle rate and the plan fund’s actual investment return is used to adjust monthly pensioner payments each year.

For example, if the hurdle rate selected for the registered/qualified plan is 4% per annum and actual investment returns for a particular year are 6%, then all members participating in this payout scheme would receive a 2% increase in their monthly pensions. The key is to select a hurdle rate that is expected to be close to the average real rate of return of the plan’s underlying assets over the long-term. In that way, the pension increase average will be close to the average rate of inflation over the long term.

The variable annuity technique has been used to provide the plan’s pensioners with increases that offset inflation in order to maintain the buying power of the pensioner’s retirement income. With a well selected hurdle rate that approximates the pension plan fund’s real rate of return, and well managed investments, variable annuities have performed very well and average annual pension increases have been comparable to inflation over time.

The variable annuity can result in volatile adjustments to pensions in pay when investment markets are volatile. This is the main complaint for many considering implementing a variable annuity.

We have assessed two potential improvements to the variable annuity for current application in qualified US pension plans or registered Canadian pension plans. Our goal is to provide a more stable increase to member’s monthly pensions and to better control all post-retirement risks that pensioners are confronted with during retirement.

As a result of our assessment we recommend two important changes to the administration of a variable annuity for registered and qualified pension plans.

First, we would introduce an averaging mechanism to stabilize the year by year pension increases under the variable annuity. This would be accomplished by using a five-year recognition of each annual adjustment. We would calculate the annual adjustment over a five year period that would change the pensioner liabilities by exactly the difference between the actual investment return and the agreed upon hurdle rate. For example, if the actual change in the market value of assets was 2% more than the hurdle rate, then there would be an increase scheduled of a little more than 0.4% each year for the next five years (the actual increases would be determined so that the total pensioner liability increased by exactly 2% in this example).

In the following year, the new “adjustment” would be added to the existing adjustment. For example, if the actual change in the market value of assets was 1% less than the hurdle rate, then this year’s increase would be 0.2% (i.e. an increase of 0.4% carried forward from last year and a decrease of 0.2% from this year’s results). In this way, adjustments should be less volatile but the goal of providing pensioner increases over the long term while maintaining the balance between assets and liabilities is preserved.

Second, we would introduce a longevity risk control mechanism by introducing the concept of a “hurdle annuity”. The hurdle annuity for any member would be determined using the “hurdle rate” and the “hurdle mortality assumption” that is established for the pension plan. In this way the hurdle annuity would be uniquely defined for any pensioner.

We would then determine the ratio of the assets held for the pensioners at the end of the year to the liability for the remaining pensioners. The liability for each pensioner would be equal to the pensioner’s “hurdle annuity”. For example, if the total assets exceed the sum of the “hurdle annuity” for all of the pensioners by 2%, then we would schedule increases equal to 2% in aggregate over the next five years.

In this way, we will provide well defined pensioner increases to control the post-retirement inflation risk, control the investment risk and control the longevity risk for the pensioner group. The key will be to define a proper “hurdle annuity” basis, to establish proper control procedures for the “hurdle annuity” basis and to establish appropriate investment strategies.

With the above proposals we would have a more stable pension increase pattern and better equity for pensioners who are members of a variable annuity.

Many pension plan sponsors use an insured annuity to provide for pensioner payments. We estimate that an insured annuity is at least 45% more expensive than the variable annuity in today’s environment despite the fact that the expected benefits are very similar. Is it prudent to continue using insured annuities as a payout strategy if a well-designed

variable annuity is available?

With the above proposals we would have a more stable pension increase pattern and better equity for pensioners who are members of a variable annuity.

In addition, we do not believe that it is prudent for pensioners to continue to manage their own assets beyond retirement. Most people do not have the expertise to manage retirement assets well and many who do have the expertise will lose that expertise as they age.

Finally, expenses could easily be accommodated in this model by simply using net investment returns after expenses in determining hurdle annuities which result in scheduled increases. In this way, actual expenses could be supported by the underlying fund assets. There would be no need to pay for unexpected losses from investment returns, increased longevity or additional expenses from outside sources. The fund supporting the variable annuities established in this way would be self-sufficient. This would be a tremendous benefit to both plan sponsors and plan members alike.

New pensioners in defined contribution retirement savings arrangements currently have two options at retirement. Purchase an annuity or continue to manage their retirement program alone.

A variable annuity program will provide a new pensioner a third option at retirement.

This updated variable annuity concept could be used as a payout strategy for defined benefit, defined contribution or target benefit pension plans. It could even be offered as a payout option for a collection of RRSP contracts. It would offer many advantages to all pension plan stakeholders as explored in this article.

It could be used to provide better access to good pensions for everyone.

I. Introduction

Variable annuity principles have been used by some pension plan managers to successfully provide pensioner benefits and managed increases to the pensions-in-pay for many years in the United States. The concept is relatively simple. Put aside enough money for each pensioner so that the pension fund can pay for their future pensions, including reasonable inflationary increases to their pensions, as long as the plan assets

earn an average real investment return (typically measured after expenses) equal to the “hurdle rate” established for the plan.

The “hurdle rate” is set equal to the expected long-term real rate of return for the underlying plan assets given the investment mandate selected for the variable annuity assets. Since the future average total investment return could be expected to be equal to the average real rate of return plus average inflation, there would be enough investment income to support the original pension and to provide inflationary pension increases.

The challenge was to set the hurdle rate equal to the real rate of return that would be achieved by the fund over the long term. If the hurdle rate happens to equal the real rate of return for the plan fund, then the fund would be able to provide pension increases that averaged the increase in inflation over time.

Unfortunately hurdle rates did not equal the actual average long-term real rate of return for the fund but, generally the average fund return was close enough to the actual required real rate of return. Pensioners received reasonable or generous increases over time that were relatively stable. There were down years when pensions had to be decreased but that only occurred when “markets were down”. For many pensioners, when decreases happened they recognized that “it could have been worse” and “I am ahead of the game”.

Originally designed to provide a method to determine pensioner increases in a defined benefit program, little thought was placed on how such a system would work in an environment where the supporting assets are fixed at retirement. If a pension plan suffered losses for improved longevity or because of additional expenses, the plan sponsor would simply contribute additional amounts to pay for any shortfall.

Plan assets were managed on a relatively conservative basis. A balanced investment mandate with equity exposure typically limited to 50% of the underlying assets was thought appropriate to provide the necessary expected returns over time. Such investment approaches did provide relative stability and it was thought that there was no need to adjust annual increases. If increases were below expected in a given year, no one complained because increases in other years would make up the difference.

Hurdle rates were typically set in the range of 4% per annum. A reasonable expectation for investment returns at the time. Balanced funds actually earned a 4% real rate of return leaving expectations generally fulfilled.

The solution was simple and easy to understand by all of the stakeholders.

Bottom line – a variable annuity approach worked and pensioners were well served using this payout mechanism.

II. Managing Risk in a Frozen Funding Environment

Traditional variable annuities are used to support defined benefit pension plan monthly payouts to pensioners. In a defined benefit environment, the plan sponsor was available to make up any emerging deficits. As a result, there was little need to consider the risks underlying the variable annuity portion of the pension plan assets.

In fact, the variable annuity mechanism resolved the investment risk on this portion of the pension plan for the plan sponsor. Investment results that were below expectations just resulted in reduced pensioner increases. The investment risk was transferred to the pensioners. In fairness, the pensioners benefit from higher than expected pension increases when investment results were better than expected. In addition, this approach successfully managed inflation risk on behalf of the pensioners.

Longevity risk and expense risk generally remained with the plan sponsor. If members lived longer than expected, the employer made up the difference. If unusual expenses were incurred, the employer normally paid for them (although pensioners did pay for normal expenses through lower increases to their pensions as part of the variable annuity process).

There is no reason, however, that the longevity risk or the entire expense risk could not be managed through the variable annuity process.

All expenses could be included in the determination of the fund rate of return. This would result in a lower recognized rate of return on the variable annuity assets and therefore lower pension increases.

Since a net investment return after expenses is being used, return expectations must be lowered and, as a result, the variable annuity “hurdle rate” must be reduced. In other words, if we expect expenses to average 0.25% of the fund more each year in the future with this change then we should reduce our hurdle rate by 0.25% all else being equal. A hurdle rate of 3.75% works just as well as a hurdle rate of 4.0%. The lower hurdle rate just requires that we set aside more money at the outset – to pay for expenses.

With this change, the plan would be self-sufficient with respect to expenses and the expense risk (and burden) is completely transferred to the pensioners.

The longevity risk is a little more difficult to conceptualize but is actually almost as easy to implement. To transfer the longevity risk, we would introduce the concept of a “hurdle annuity”. The “hurdle annuity” is defined to be equal to the present value of the member’s entitlements determined using the hurdle rate adopted for the variable annuity, the hurdle mortality basis adopted for the variable annuity and the pensioner’s scheduled pensions at time of valuation. It is the present value of the member’s entitlements using the “hurdle assumptions”.

The hurdle annuity for the member can therefore be uniquely determined at any point in time for any individual pensioner under the variable annuity fund. Personalized and fair valuations of any and all member’s entitlements at any time.

When a new pensioner joins the variable annuity fund that pensioner must contribute an amount equal to the pensioner’s hurdle annuity at entry. This is fair the new pensioner and the existing pensioners.

To determine the annual pensioner increase at the end of each year, an actuary would determine the hurdle annuity for each pensioner and therefore the total liability for the variable annuity at that time. The actuary would also determine the value of the variable annuity’s assets. The difference between the assets and liabilities is used to determine the next pensioner increase. For example, if the assets exceed the liability by 3.2% at the time of the valuation, each pensioner gets a 3.2% increase in pension.

What is described above is a simple valuation of a pension fund that pension actuaries regularly complete on behalf of pension funds. The difference

is that the result of a pension valuation is normally used to determine how the pension fund must be augmented (determining additional special contributions) rather than being used to determine what increases (or decreases) must be made to pensions-in-pay. In other words, actuarial valuations are normally used to balance accounts through augmentation of the asset side of the balance sheet whereas actuarial valuations conducted for the variable annuity fund will be used to balance accounts by adjusting the liability side of the balance sheet.

Once the pensioner increase is granted, assets equal liabilities for the variable annuity. If more pensioners die in a year than expected, then all the survivors get a larger pension increase. If too few pensioners die, then all survivors accept a smaller pension increase.

With this change, the plan would be self-sufficient with respect to longevity and the longevity risk is completely transferred to the pensioners.

III. Managing Volatility in Pension Increases

Traditional variable annuities provide pension increases based on the variable annuity fund rate of return and the management selected hurdle rate.

For example, if a variable annuity fund earned a rate of return of 7.37% in one year and had a hurdle rate of 4%, then every pensioner would receive an increase to their pension-in- pay equal to 3.37%. A member with a pension equal to \$1,000.00 per month would now receive an increased pension equal to \$1,033.70 per month. A member with a pension equal to \$1,525.24 per month would receive an increased pension equal to \$1,576.64 per month.

For many years this system worked very well but in some years the changes to pension amounts were large and varied significantly from year to year.

To illustrate this concept using real life statistics, we prepared the following sample data for a hypothetical pension plan investment fund that earned the median pension plan asset return for pension plans in Canada over the period from 2001 to 2015.

Year	Fund Return	Increase Using 4.0% Hurdle Rate	Annualized Cumulative Increase
2002	-3.9%	-7.9%	-7.90%
2003	13.5%	9.5%	0.42%
2004	10.1%	6.1%	2.28%
2005	11.8%	7.8%	3.63%
2006	12.3%	8.3%	4.55%
2007	1.5%	-2.5%	3.34%
2008	-15.9%	-19.9%	-0.35%
2009	16.2%	12.2%	1.14%
2010	10.4%	6.4%	1.71%
2011	0.5%	-3.5%	1.18%
2012	9.4%	5.4%	1.55%
2013	14.2%	10.2%	2.25%
2014	11.9%	7.9%	2.67%
2015	5.4%	1.4%	2.58%

You will note that using this data we would decrease every pension-in-pay for a variable annuity with a 4.0% hurdle rate by 7.9% at the end of 2002. It just happens that we started the variable annuity in a down year for investments.

We would then increase everyone’s pension by 9.5% at the end of 2003. Quite a volatile situation but reflective of investment rates of returns for typical pension plan funds.

A substantial market correction as occurred during 2008 would also create pressures. Members would not be happy with a 19.9% reduction in the pensions at the end of 2008, no matter what just happened in the markets.

What is also very instructive is the Annualized Cumulative Increase that has been granted over this time period. This is the geometric average, measured on an annual basis, of the past increases. For example, at the end of 2010, the member had received increases between 2002 and 2010 that “averaged” 1.71% per annum. This compares favourably to inflation over that time.

Just as important to recognize, the cumulative annual decrease was 0.35% at the end of 2008. Yes this is a decrease but most of the decrease resulted in the removal of previously granted increases. All that being said, a large decrease is hard to manage

for pensioners and so should be avoided.

We could change the rules so that each increase is spread out over a five-year period in aggregate as illustrated below. In other words, we schedule increases to occur over the following five-year period, not all at once.

Year	Fund Return	Increase Using 4.0% Hurdle Rate and 5-year Recognition	Annualized Cumulative Increase
2002	-3.9%	-1.58%	-1.58%
2003	13.5%	0.32%	-0.63%
2004	10.1%	1.54%	0.09%
2005	11.8%	3.10%	0.83%
2006	12.3%	4.76%	1.60%
2007	1.5%	5.84%	2.30%
2008	-15.9%	-0.04%	1.96%
2009	16.2%	1.18%	1.86%
2010	10.4%	0.90%	1.76%
2011	0.5%	-1.46%	1.43%
2012	9.4%	0.12%	1.31%
2013	14.2%	6.14%	1.70%
2014	11.9%	5.28%	1.97%
2015	5.4%	4.28%	2.14%

This change in method results in a smoother and more stable increase environment. The pensioner does suffer a decrease the first year but that decrease is only 1.58% of his pension not 7.9% of his pension as was required before the five-year recognition period was applied.

At the end of 2008 a decrease equal to 0.04% is scheduled. I would expect most pensioners would have been delighted to have received such a small decrease at the end of 2008. Anyone managing their own risks (members of traditional DC plans) would not have been so fortunate.

The annualized cumulative increase over the entire period is 2.14%, lower than the 2.58% annualized cumulative increase without any deferred recognition of increases. This reflects the positive returns during the period from 2012 to 2015 that have not been totally reflected at the end of 2015. The annualized cumulative increase is also more stable.

From the above, staggered recognition of increases over a five-year period is advisable and will result in a much more manageable result for the pensioners. We tested a shorter, three-year recognition period as part of our research and concluded that the resulting increases remained too volatile. A ten-year recognition period is too long.

It is also important to notice that the annualized cumulative increases reflect the general level of inflation in the Canada over the period being illustrated. Adopting a variable annuity solution with a 4% hurdle rate and a typical pension plan investment mandate would have produced acceptable results over this time period.

That is not to say that a 4% hurdle rate is always right or that a typical balanced approach used for pension plans will be appropriate for variable annuity funds. It will be important to adopt proper investment strategies and to then determine an appropriate hurdle rate based on that investment strategy. Neither the hurdle rate nor the investment strategy should be determined in isolation.

The five-year recognition strategy could be adopted for any defined benefit pension plan. Aggregate increases could be tracked and scheduled. By scheduling the increases each year, the liability could be maintained at the same level as it would have been had the entire increase been recognized immediately.

The actuary will, however, determine an actuarially equivalent annual increase for the five-year recognition period to keep the liability in balance. This is because not all pensioners in the variable

annuity program will survive the entire five-year recognition period. In other words, it is not sufficient to simply grant 20% of the raw increase each year. In actual fact, you must grant the actuarially equivalent increase which will be slightly higher than 20% each year.

Of course a defined benefit pension plan could just adopt a process whereby they grant increases at some amount that is close enough and based on management discretion. For example, if the average age of their pensioners was 75, then the required annual increase over the five-year period should be about approximately 24% of the raw increase not 20%. They could schedule an annual increase equal to 24% of the current pension for everyone over the next five-year period. This is not necessarily fair to the older pensioners (an 85 year old would be entitled to increases of about 26.5% to be fair) and would be generous to younger pensioners (a 65 year old would be entitled to increases of about 22.8% to be fair).

Defined benefit pension plans, by their nature allow for rough justice and a one size fits all increase of 24% of the raw increase could be justified.

For a variable annuity solution in a collective defined contribution environment, a five-year recognition period should probably be adopted on a strict actuarial equivalence basis for each member. An actuary would determine each pensioner's scheduled increases on an actuarial equivalence basis (the calculation is relatively trivial for actuaries and their technical assistants) and those increases would be scheduled each year. The actuarial equivalence calculation would take into account previously scheduled increases.

To illustrate how this would work, assume a 75 year old pensioner just enters the variable annuity and has \$1,000 monthly pension. The raw increase for the year for the variable annuity is determined to be 3.0%. The pensioner's pension would therefore be increased to \$1,030.00 per month if the full increase was recognized immediately. Instead this pensioner would be entitled to an increase to \$1,007.20 immediately, to \$1,014.40 in one year, to \$1,021.60 in two years, to \$1,028.80 in three years and to \$1,036.00 in four years. These new pensions would be recorded.

If in the next year the plan has a 1% decrease that would mean that his pension would reduce from

\$1,030.00 to \$1,019.70 under immediate recognition.

Under the five year recognition program, an actuary determines that the five-year actuarial increase to be 23.9% of the raw increase (decrease). The new scheduled pensions are \$1,011.98 now (not \$1,014.40), \$1,016.72 next year, \$1,021.42 in two years, \$1,026.10 in three years and \$1,023.62 in four years. Notice the decrease in four years. This pension was scheduled to be \$1,036.00, the same as the year prior but is now decreased to reflect the final year for the newly recognized 1% decrease.

This may seem complicated but it is easy to understand conceptually and to implement by experienced pension administrators.

For defined contribution pension plans, and for defined benefit pension plans, where individual equity is deemed to be required, an actuary could determine the actuarial equivalent scheduled pensions on an individual by individual basis and, as a result, keep the variable annuity assets and liabilities in balance.

The process would be simple, determine the raw total increase using fund returns, expenses and member entitlements – hurdle annuities as a base. Once the raw increase is determined, calculate new scheduled pensions to be recognized over a five year period on an individual by individual basis. Revalue the new scheduled pensions as a check.

At the same time, hurdle annuity amounts to be applied in one year's time could be determined for all the existing pensioners as a starting point for next year's calculations. In fact, a proper administration system for a variable annuity program would be able to calculate and store a member's hurdle annuity amount at any relevant date. A valuation would just involve summing the results.

With the above proposals we would have a more stable pension increase pattern and better equity for pensioners who are members of a variable annuity.

IV. Comparing a Variable Annuity to an Insured Annuity

Would a pensioner be better off having his pension benefit insured?

From one point of view – of course – an insured annuity provides a guarantee that the pension will be

paid – but at a cost. The pensioner almost certainly will receive his pension during his lifetime. In the Canadian marketplace a life insurer's guarantee is very solid. Insurance companies that provide insured annuities are highly regulated and must remain financially sound. In addition, annuitant's are protected against the very unlikely event of an insurance company's failure through Assuris. While there are never complete guarantees in life, this is about as close as it gets.

From another point of view, almost definitely not. We need to consider the price of insuring a pensioner in the Canadian market place. Insured annuities are prohibitively expensive today. **The cost of providing that guarantee is probably too high.**

The premium to purchase a non-indexed insured annuity of \$1,000 per month for a pensioner aged 65 with a spouse aged 65, payable for the member's lifetime with 60% continuing to the spouse upon the member's death was estimated by us to be approximately \$212,000 on October 31, 2016 using methods and assumptions recommended for solvency valuations by the Canadian Institute of Actuaries. In other words, industry estimates of an annuity premium for this pension was \$212,000 on October 31, 2016. This estimate uses a 3.1% assumed interest rate.

Therefore, we estimate it would cost a member or plan sponsor \$212,000 to fully insure this pension, and the insured annuity would provide NO future increases. The member would have a guaranteed flat income.

The hurdle annuity for this member, assuming a 4% hurdle rate and the industry standard private mortality basis would be approximately \$187,000. This despite the fact that the variable annuity promises future increases to the pension-in-pay and includes a substantial guarantee that the benefits will be paid. The insured annuity costs 13% more without inflation protection.

While it is unlikely that you would be able to find an insured annuity that provides full inflation protection, we determined the cost of providing a 2.0% increase each year as part of an insured annuity. The premium for the pension described above would increase to approximately \$271,000 if a 2.0% annual increase was included. In other words the insured annuity is **at least 45% more expensive** than the variable annuity in today's environment

despite the fact that the expected benefits are very similar.

If the \$271,000 premium was deposited to the variable annuity being considered, the initial monthly pension would increase to approximately \$1,450. This pension would have to drop substantially for the member not to be better off under the variable annuity.

We do not believe it is prudent to use insured annuities at the current price levels for any pension but especially for those that include inflation protection.

V. Comparing a Variable Annuity to Individual Investment Accounts

Would a pensioner be better off investing his pension assets individually?

From one point of view – of course – a member who invests on his own has complete control. The assets in the member's investment account are owned by the member and are available to the member's estate on the member's death. Complete control and ownership can be very valuable. Some Canadians do very well investing their pension assets on their own.

From another point of view – definitely not. An individual will pay more for the same investment services than a large collectively managed pension fund. In addition, collectively managed pension funds tend to achieve much higher long-term after-expense investment returns than individuals achieve. Not always – just **ALMOST ALWAYS**.

The purpose of this paper is not to demonstrate that an investment program for a large pension plan has an advantage over an individual investor's investment program in terms of lower expected investment fees or higher expected long-term investment returns. There have been many papers written that demonstrate the long-term investment advantages enjoyed by large pension funds.

The point is that, even if an individual could expect to achieve a long-term after-expense investment return equal to that achieved by the variable annuity fund, there would still be very good reasons for the individual to want to use a variable annuity as a payout option rather than managing his pension assets on his own.

The first reason is that the variable annuity will allow a member to receive a higher retirement income during his lifetime without the worry of outliving his investment.

As noted above, the hurdle annuity for a pensioner aged 65, a spouse aged 65, and an initial monthly pension of \$1,000 payable for the member's lifetime with 60% continuing to the spouse upon the member's death was estimated by us to be approximately \$187,000 on October 31, 2016.

Let's assume that a pensioner aged 65 invests \$187,000 on his own and starts to receive a \$1,000 monthly pension and accepts all the annual increases to his pension that he would have received from the variable annuity program. This pensioner will run out of money at age 90, if the pensioner survives until then. The pensioner will receive no further payments beyond age 90. The pensioner's spouse will receive no payments. The pensioner has spent all of the investment assets including the amount set aside to provide a spousal pension. It is expected that 40% of pensioners aged 65 will survive to age 90 or beyond. In other words, **40% of pensioners using this strategy will obtain a very bad result.**

If instead, the pensioner wants to allow only a 10% probability of outliving the savings, then the pensioner has to maintain payments until age 96. This will cause a reduction in the pensioner's starting income from \$1,000 monthly to about \$780, a 22% drop in income. Of course, the pensioner will have more assets left in the investment account should the pensioner die before age 96.

The pensioner has three choices:

- accept a 40% chance of outliving the assets;
- accept a 22% (or larger) drop in income; or
- accept a variable annuity.

The second reason is that the variable annuity will ensure that a pensioner's assets will be invested well during the pensioner's entire lifetime.

The variable annuity solution includes professional investment management at a very good price. There are many automatic safeguards in the governance procedures for the investment fund supporting the variable annuity. A pensioner will not have to actively manage investments beyond retirement.

We do not believe that it is prudent for pensioners to continue to manage their own assets beyond retirement. Most people do not have the expertise to manage retirement assets well and many who do have the expertise will lose that expertise as they age.

The variable annuity does have one major disadvantage when compared to individual management of assets. Under a variable annuity, the pensioner agrees that the pensioner's survivors will have no claim to the variable annuity's assets (except for a survivor spousal pension). This is the same agreement that exists under an insured annuity. We think this is a fair compromise to obtain the obvious advantages offered through a variable annuity program.

VI. Fairness for Members in a Variable Annuity Fund

Any program that allows and requires members to share risk must establish processes to ensure fairness among the members. A variable annuity program is no different.

Fairness with respect to the investment risk is ensured by providing that all members participate in the same investment fund. All members receive the same investment returns and pay the same proportionate investment expenses. All members should also be represented in the investment process through an investment oversight committee. The oversight committee ensures that the investment policy established for the variable annuity fund remains appropriate.

Fairness with respect to the inflation risk is managed through the actuarial equivalent increase processes described earlier in this paper. Since all increases are determined on an individual basis based on the aggregate experience of the variable annuity program this risk is controlled much more effectively than it could be individually.

Fairness is also enhanced by selecting an appropriate hurdle rate that is based on the programs investment policy.

Longevity risk is controlled in a variable annuity program. Those who die younger allow assets that would otherwise be available to them to be used to support payments made to those who survive to older ages. This is also what happens in a defined benefit pension plan. In a variable annuity, however, pension increases are determined using the member's own personal characteristics providing more individual fairness.

Fairness for the longevity risk must be maintained by selecting an appropriate hurdle annuity mortality assumption. Ideally the mortality assumption would reflect expected mortality rates (including future improvements in the mortality rates) for the members of the variable annuity program. From a practical sense this is impossible because the variable annuity program will not likely be large enough to provide credible mortality statistics and certainly such credible information will not be available when the variable annuity is first established. Further, new members are expected to join the variable annuity program on a continuous basis.

As a result, a mortality assumption must be selected to reflect the most likely future mortality statistics for a relatively small and unknown group. Fairness would dictate that we should select the best available public mortality basis that reflects the most likely characteristics of the future variable annuity program's population.

In Canada, the current public mortality tables used by pension actuaries are the Canadian Pension Mortality Tables (CPM-2014) with improvement scale B (CPM-B) applied on a generational basis. These tables are available for a general population of pension plan members, a population of pension members from the public sector and a population of pension plan members from the private sector (CPM2014-Priv). The tables are available for separately for males and females.

We believe that the CPM-2014 tables and the CPM-B improvement scale are the best available for our purposes. We also expect that members of the variable annuity program will generally come from the private sector and we would therefore select the CPM2014- Priv table is the best choice for an initial mortality assumption.

In Canada, pension benefits legislation often requires that pension benefits be determined using a unisex mortality assumption. For members who are governed under pension legislation that requires a unisex approach, we would initially adopt a mortality assumption based on 50% female and 50% male rates. For jurisdictions that allow mortality assumptions applied on a sex-distinct basis (e.g. Quebec) we would maintain a sex distinct assumption for all affected members.

We would maintain this assumption until credible evidence is available for the variable annuity program. For example, if the membership of members subject to unisex application of the mortality assumption is found to be 60% female in the future, we would schedule a change from 50% female to 60% female in the mortality assumption over a reasonable transition period.

Unisex mortality assumptions may seem unfair but it is the law in many jurisdictions and has become accepted practice for pension plans.

Adoption of a general mortality basis could leave the variable annuity program subject to some potential anti-selection by potential members who have longer expected longevity. To mitigate the potential for anti-selection, we would limit member pensions at buy-in to equal twice the then current CPP maximum pension. We would also require the minimum member pension at buy-in to be one-half of the then current CPP maximum pension. To put this in perspective, the minimum pension in the variable annuity program would cost about \$100,000 and the maximum would cost about \$400,000.

The selected mortality basis will be used to determine actual buy-in amounts for the variable annuity, hurdle annuity amounts when necessary and actuarial equivalence for members when scheduling future pension increases as described earlier in this paper.

The selected mortality assumption would be

adopted based on the recommendation of the variable annuity's appointed actuary and would be updated or confirmed each year by the appointed actuary. The Board of Governors, as described below, would provide oversight for this important assumption.

We believe that the process described about would allow the variable annuity program to remain fair for all members involved. There will be winners and losers between the members but on a basis that is agreed to upon buy-in by all members.

Finally, to be fair, members should not be allowed any cash out options. Once purchased, a member's variable annuity must be permanent.

VII. Regulation and Governance of a Variable Annuity Fund

A variable annuity fund would normally be offered as part of a regulated pension plan. Governance of the pension plan would be provided through a pension committee or Board of Governors that would provide oversight with respect to the variable annuity's investment policies, hurdle annuity assumptions and administration. The Board of Governors would appoint an actuary, investment manager, auditor and administrator for the variable annuity. If the variable annuity program is offered as part of a regulated pension plan, then the pension plan's actuary, investment manager, auditor or administrator could act for the variable annuity program.

From a regulatory standpoint, the regulation of a variable annuity program should be similar to a regulated pension plan. Annual actuarial reports setting out the program's activities and establishing all scheduled future pension increases should be required. Annual reports would document new member entitlements.

The variable annuity program rules establish that plan assets will always equal plan liabilities but it is important to also set up proper processes to ensure that new members are treated appropriately and that pension payments are paid appropriately on an ongoing basis. Variable annuity rules for changing investment policies and hurdle annuity assumptions must be established in advance.

VIII. Summary and Conclusions

New pensioners in defined contribution retirement savings arrangements currently have two options at retirement. Purchase an annuity or continue to manage their retirement program alone.

A variable annuity program will provide a new pensioner a third option at retirement.

The variable annuity will offer many of the same advantages to a defined contribution pension plan member as are currently available to any member of a defined benefit pension plan.

A variable annuity could also be offered to retired members of a defined benefit pension plan to allow a better sharing of risks during the member's retirement. Separating out pensioner risk would mitigate risk management in the typical defined benefit pension plan immensely.

It is time to provide better retirement solutions to private sector employees. Making variable annuities available to all pensioners who want them should be the highest priority for all professionals in the retirement industry.

Introducing easily accessible variable annuities as described in this paper would be an important initial step.



Stephen A. Eadie

Stephen is a founding partner of Robertson, Eadie & Associates, a pension consulting firm in Toronto, Canada. He provides complete pension consulting advice and services to his clients across Canada. He is a past General Chair of the Society of Actuaries' Education Committee. He is vice-chair on the Canadian Institute of Actuaries Committee on Professional Conduct. He has been an education Review Panelist for the Global CERA initiative since its inception in 2010. He is co-vice chair of the Education Committee of the International Association of Actuaries.