

How to *Completely* Avoid Outliving Your Money:

An Introduction to Variable Payout Annuities for Retiring Canadians¹

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Introduction:

In the Fall of 1994 I co-wrote an article that was published in the *Canadian Investment Review*, entitled: "How To Avoid Outliving Your Money". In that report, written together with York University professors Chris Robinson and Kwok Ho, we used a technique known as Monte Carlo Simulations (MCS) to argue that Canadian retirees should have a substantial exposure to equity investments in their financial portfolios even during their 70s and early 80s.

At the time, this advice contradicted a large body of conventional wisdom which argued that retirees should have a bulk of their assets in fixed income bonds and GICs. Nevertheless, based on the long-term statistical patterns of the stock market, we demonstrated that the probability of 'running out of money' before 'running out of life' was minimized by having an asset allocation that is tilted towards equity investments, even at advanced ages.

Naturally, these results generated a substantial amount of controversy at the time, and the wisdom of such advice might be questioned in light of the recent meltdown of global equity markets.

Yet, with the benefit of hindsight, retirees who listened to this message in the Fall of 1994 – and held a broadly diversified portfolio over the last eight years -- are still better off today, compared to those who remained invested purely in GICs and Treasury Bills.

However, the above-mentioned report only told half of the story. The truth is, that although I still believe that a broadly diversified portfolio of equities is a prudent asset allocation *even* during retirement, there is a more efficient method to 'avoid outliving your money' for those who are solely concerned with maintaining a standard of living during retirement. The solution is called a variable payout annuity (VPA), which is the main focus of this report.

While VPAs have been around for many years in the U.S. and the U.K., they have never been available to Canadians. The unfortunate absence of this instrument has made it difficult for Canadians to maintain a proper risk management and asset allocation strategy during retirement.

Recently, though, some Canadian companies have launched VPA products (within registered plans) which have the potential to revolutionize retirement financing in Canada. Hopefully this report will explain why these instruments are so important and timely for a properly funded retirement today.

1. How much do I need during retirement?

Imagine the following situation. You have just retired at age 65 with CPP or QPP benefits and a small company pension, which should provide a large portion of your needs on an annual basis. In addition, after many years of contributing to an RRSP, you've managed to build a nest egg of approximately \$200,000, which is currently sitting in an assortment of mutual funds, term deposits and other investments. Fortunately, your house is fully paid for, and you have no other major liabilities.

After conducting a needs analysis, taking full account of your lifestyle choices and retirement plans, you've determined that you require — in addition to your pension — approximately \$10,000 each and every year until the end of your life. Naturally, you hope that your nest egg will be able to provide this additional amount.

Before I continue, I should clarify what I mean by \$10,000 per year. This estimate assumes that today's prices — on which you based your needs — will remain the same throughout your retirement. In other words, it assumes that the inflation rate for goods and services will be zero for the next 30 years. Rather unrealistic, I'm sure you'd agree. True, inflation has averaged less than 3% almost every year since 1991. But there is no guarantee that the rate cannot or will not increase.

Therefore, a better way to deal with long-term planning (given inflation uncertainty) is to budget and state your needs in real, after-inflation terms. At the same time, you must also project your investment returns in real, after-inflation terms. Let me explain. As I said earlier, you essentially want to consume \$10,000 'today' dollars for the rest of your life. By real consumption, I mean that you will consume \$10,000 in your 65th year, \$10,000 multiplied by the first year's inflation rate in your 66th year, \$10,000 multiplied by the first and second years' inflation rate in your 67th year, and so on. However, to keep things in balance, when I talk about what your money can earn, I will look at returns in after-inflation terms as well, to account for the fact that your needs were expressed in the same framework.

Ideally, your pension plan comes with some form of inflation protection — or indexing — as well. The indexing can be implicitly tied to the consumer price index (CPI), or implicitly tied to the performance of some investment fund.

What about income taxes?

The \$10,000 that you need each year probably does not account for income taxes. So if you are planning to consume \$10,000 from your nest egg each year,

you will probably have to withdraw more than that, because of the income taxes that will be due. Everything you pull out of your tax-sheltered plan will be taxed at your marginal tax bracket because you've never actually paid income tax on that money (for the most part). Remember, those funds were deducted from income in the year that you made your contributions.

What this all boils down to is that if you need \$10,000 to live on — and you're in a 33.33% marginal income tax bracket, for example — then you will really have to withdraw \$15,000 from your nest egg. One third of it will go to Ottawa (and back, very indirectly, to you, taking the optimistic and patriotic view); the other two-thirds you will be able to consume yourself.

So, how are you going to get \$15,000 out of your portfolio each and every year for the rest of your life?

Sure, your particular circumstances and lifestyle might require more or less than \$15,000 each year, but the question remains the same. How do you make your money last?

The main message of this report, is that a combination of fixed and variable payout annuities are your best insurance policy for making sure that your money will grow and last for the rest of your life. But, before we get to that, let us look at some of the alternatives.

One way to fund retirement consumptions, which is quite popular, is to set up a systematic withdrawal plan (SWP) that sells an appropriate number of stocks, mutual funds or bonds each month, to create the desired cash flow. This is like a reverse dollar-cost averaging strategy. Instead of buying an arbitrary number of units with a fixed amount of cash each month, you are selling an arbitrary number of units to create a fixed amount of revenue each month. Then, to account for any price inflation in your consumption needs, you increase the amount withdrawn under the systematic plan on a yearly basis.

Will an SWP protect you from running out of money?

The answer to this question very much depends on the asset allocation in your investment portfolio during your retirement years. The \$200,000 will have to generate exactly 7.5% in order to create \$15,000 each year — after inflation and before taxes. Unfortunately, money market instruments will earn you nowhere near that amount. So you have a clear choice: you can invest in these relatively safe investments, knowing that eventually you will have to encroach on your capital and may run out of money; or you can invest a bit more aggressively, and hopefully build your capital. (Or, of course, you can always decide to reduce consumption.)

The math is relatively simple. If your money earns a fixed 5% in real terms, and you consume \$15,000 (in real terms) each and every year, you will run out of money in precisely 22 years. That's because the present value of \$15,000, discounted at the rate of 5%, is exactly equal to \$200,000. Stated differently, a \$200,000 mortgage, amortized at a rate of 5%, will be paid off in exactly 22 years, when the annual payments add up to \$15,000.

Okay, you say to yourself, if I can earn a consistent 5% every year (in real terms), my money will last for exactly 22 years. That's plenty of time, right? Statistics tell us that a man at age 65 has a 23% chance of living to age 87 (22 more years); a 65-year old woman has a 40% chance of living to age 87. So let's put two and two together and see what happens.

In other words, there is a 23% (40%) chance of outliving your money, if you earn 5% each and every year. Why? Well, the odds of outliving your money are the odds of being alive when the money runs out. If you know exactly when the money will run out, and you know the odds of living to that point, put them together and you have the odds of outliving your money.

Similarly, if your \$200,000 nest egg earns a fixed 4% in real terms, you will run out of money even sooner — in exactly 19 years — because you are earning less. And the odds of living for 19 more years are, not surprisingly, higher than the odds of living for 22 more years. The chances are 33% for men and 52% for women. So if you earn 4% real return each and every year, the odds of running out of money are 33% and 52% respectively. Another way of saying this is that slightly more than three of every ten men (and one of every two women) will outlive \$200,000 invested at 4%, if their annual pre-tax needs are \$15,000.

The same formula applies in the other direction. If your capital can earn 6% in real terms, you won't run out of money for 27 years. For a 65-year-old, 27 years may seem pretty far out in the future. Indeed, men at that age have only an 8% chance of living that much longer (and running out of money); women have a 20% chance. These figures are low, but not entirely comforting, especially for women.

Finally, if you are lucky or smart enough to have your capital earn a real return of 7.5% each year — you'll notice it works out to \$15,000 each year — you will never run out of money.

So the issue really boils down to the following. The longer you live, the more your money has to earn to maintain your standard of living. This, indeed, is a true financial risk that has to be managed and monitored very carefully. In this report I will discuss some of the techniques that are available to reduce the risk using insurance products.

2. Will I live longer than my money?

To get a sense of mortality patterns, the following table illustrates how long people can expect to live. I have chosen age 65 as the standard baseline for retirement, although similar numbers can be generated for any age.

Exhibit #1: The Conditional Probability of Survival at Age 65

To Age:	Single Female	Single Male	At Least Member of a Couple
70	93.8%	92.0%	99.5%
75	84.4%	79.9%	96.9%
80	70.9%	62.7%	89.1%
85	52.8%	41.0%	72.2%
90	31.6%	19.6%	45.0%
95	13.4%	5.8%	18.4%

Source: Society of Actuaries RP-2000 Table

The first two columns show the probabilities for a single female and a single male, respectively. The last column shows the probability that at least one person from a married couple (both currently aged 65) will survive to the specified age. The source for these numbers is the RP-2000 Table which is typically used for pension value calculations and is available from the Society of Actuaries in the U.S.

Interestingly, in many retirement planning calculations -- if no lifetime annuity is purchased -- age 85 is a typical 'assumed' life expectancy, especially in the popular press. Indeed, the table shows that at age 85 over 50% of single females and over 40% of single males will still be alive. However, for married couples, at least one of them will still be alive at age 85 in over 70% of the cases.

Consequently, if these survivors had used an age 85 life expectancy to plan their retirement income needs, they would find that their retirement resources (other than government and corporate pensions) had been used up. This **longevity risk** -- the risk of outliving one's resources -- is very substantial and is the reason why I believe payout annuities will grow in popularity.

Indeed, this is a double-edged sword. If individuals, or couples, spend their accumulated savings at too high a rate, they risk outliving their resources. If they spend at too low a rate, they risk suffering an unnecessarily frugal retirement, especially if they die sooner than expected.

This is a bigger problem than you think. No matter how old you are, you will always be worried about spending too much. In the back of your mind you will be wondering, "what if I have 5, 10 or even 15 years to go?" Taking this logical flow to its extreme; you will never be willing to spend that last dollar. Everybody dies

with leftovers! Sure, your kids, estate lawyer (and perhaps even you) might appreciate bequests, but you must admit that there is certain inefficiency in consistently depriving yourself today, on the odds there is a tomorrow.

3. What is longevity insurance and how exactly does it work?

Longevity insurance is the exact opposite of traditional life (or better named premature death) insurance. We buy life insurance because we are afraid of dying too soon and leaving family and loved ones in financial need. We buy longevity insurance because we are afraid of living too long and will need income to support those extra years of life. Insurance companies can provide this lifelong benefit by (a) pooling a large enough group of annuitants and (b) making a very careful and conservative assumption about the rate of return earned on its assets. The pooling of annuitants means that individuals who do not reach their life expectancy, as calculated by actuarial mortality tables, will end up subsidizing those who exceed it.

Here is a simple example, which illustrates the concept of longevity insurance. According to Statistics Canada, there is a 20% chance that a random 95 year-old female will die during the next year. Equivalently, if we have a large group of 95 year-old females, 20% of them will not survive for another year. Of course, we do not know exactly which 20% will die.

Now, imagine that five (5) such 95 year-old females entered the following legally binding agreement. Each of the five females contributes \$100 to a communal fund that will invest in one-year GIC paying 5% interest. Then, according to the contract, at the end of the year, the surviving females will be entitled to split the proceeds of the communal fund.

The total contribution of $5 \times \$100 = \500 will grow to \$525 by the end of the year. This is \$500 principal and \$25 interest. Moreover, if all five females are still alive – at 96 years of age – they will each receive \$105. This is precisely the \$100 investment, plus interest. Nevertheless, what happens if one of them – as expected - dies during the next year? Remember, the probability of death is 20% for any one of them, which means that the probability of survival is 80% for any one of them. Thus, one out of five is expected to die. Well, the remaining four (4) will be entitled to split the \$525, giving each a total of \$131.25. Recall that the agreement stipulated that those who die cede control of their assets to the survivors.

The remaining four (4) survivors will therefore gain a return of 31.25% on their money. The 31.25% is a premium of 26.25% over the GIC rate of 5%. The 26.25% is not a 'free lunch' or 'stolen money', rather; it is the \$105 dollars from the estate of the deceased split amongst the four survivors.

In fact, if two (2) people happen to die, the remaining three (3) will get \$175, which is an impressive 75% return on their money. In other words, the survivors' gains are comprised of their original principal, their interest, and other people's principal and interest. By pooling mortality risk and ceding control of bequests and estate values, everyone gains. Technically, this agreement is called a "tontine," also known as a pure endowment contract or a one-period life annuity contract.

Of course, with only five females in the mortality pool, almost anything (actually, only six things) can happen. They might all die, and they all might survive. However, with 10,000 such females entering a one-period annuity agreement, it is pretty much assured that the \$105,000 will be split amongst 8,000 survivors. In other words, the expected return from the contract – for the survivors - is $(105,000/8,000) = 31.25\%$. The numerator is the total return for the pool, and the denominator represents the survivors. The difference between the 5% return available in the market, and the 31.25% earned by the survivors is known as the mortality credits. In addition, the higher the probability of death – i.e. the lower the number of survivors – the greater are mortality credits. This same arrangement can be structured over many years, with survivors earning investment returns that depend on how long they live.

The same exact principle could apply with a variable investment return as well – and we will return to this concept later in the report. In fact, the returns might be even higher. Namely, the 10,000 females can invest their \$100 in a stock mutual fund that earns 5%, or 10% or even 20%. They do not know in advance what the fund/pool will earn. At the end of the year, the annuitants will learn (or realize) their investment returns, and then split the gains amongst the surviving pool. Moreover, in the event the investment earns a negative return - and loses money - the participants will share in the losses as well, but the effect will be mitigated by the mortality credits. This concept is the foundation of a "variable payout annuity," which is the symmetric counterpart to a fixed payout annuity. I have to clarify a few more things about fixed payout annuities before we can fully discuss variable payout (payout) annuities in the next section.

But, regardless of whether the payout is variable or fixed, these annuity contracts provide longevity insurance via the mortality credits. With fixed annuities the community pool has been invested in fixed income securities, and with variable annuities the pool has been invested in variable return investments, such as stocks, real estate, etc. The choices and decisions made between fixed and variable payout annuities are identical to the choices between fixed and variable accumulation products. The optimal allocations should depend on the participant's risk aversion, comfort with the fluctuating stock market, time horizon, and budgeting requirements.

Now, things might get a bit sticky if you try to run one of these 'annuity pools' with the folks around your neighborhood. Given the large sums of money that might

be at stake – as other people die and leave the pool -- you might feel like you are on the TV show ‘survivor’. The last one gets all the cash!

Indeed, the peculiar incentives this arrangement created, is one of the main reasons that tontine contracts in medieval France (named after Lorenzo Tonti) didn’t survive for very long in the more civilized 20th century.

Today, in practice, only insurance-chartered companies are allowed to create and manage this agreement - in the way we just described - to provide these mortality-contingent products. In fact, most companies go one step further and actually guarantee that you will receive the mortality credit enhancements, even if the mortality experience of the participants is better than expected. In other words, in the above-mentioned group of 95 year-olds with an expected 20% mortality rate, the insurance company would guarantee that all survivors receive 31.25% on their money, regardless of whether or not 20% of the group died during the year.

How can they provide this guarantee? Well, they make some very careful and calculated assumptions about the rate of return they will earn on their assets. Also, the greater the number of payout annuities an insurance company sells, or has on its books, the lower the risk is in providing this guarantee. These are the ultimate economies of scale. In other words, the risks might be significant if they only sold 5 such policies, but with 500,000 policies, the probability of an adverse outcome is close to zero.

4. How much do I have to pay for fixed payout life annuities?

While it is very difficult to predict exactly how much your particular life annuity will cost – or how much income you will receive for your initial premium -- Exhibit #2 provides some indicative quotes for fixed payout annuities from a variety of insurance companies.

**Exhibit #2: Sample Payouts from Fixed Annuities:
Monthly Income per \$100,000 in RRSP**

MALES with a 10-year guarantee

	Age 60	Age 65	Age 70	Age 75	Age 80
Best	\$664.82	\$724.38	\$797.77	\$879.92	\$956.22
Average	\$645.08	\$706.14	\$781.21	\$863.77	\$940.73
Worst	\$610.38	\$666.89	\$736.11	\$812.61	\$884.93

Source: CANNEX on July 17, 2002

FEMALES with a 10-year guarantee

	Age 60	Age 65	Age 70	Age 75	Age 80
Best	\$622.56	\$672.31	\$738.01	\$821.01	\$911.71
Average	\$606.50	\$660.13	\$729.57	\$814.89	\$904.81
Worst	\$570.04	\$616.92	\$678.90	\$756.61	\$840.97

Source: CANNEX on July 17, 2002

Please note that these numbers can change on a daily basis, and the quotes listed in this report were valid on July 17, 2002. You might want to check with the companies directly for their most recent numbers. For example, a 65-year-old single female with \$100,000 in her RRSP can purchase a fixed payout life annuity from an insurance company that will provide her with \$659.60 per month for the rest of her life, no matter how long she lives. Furthermore, if she dies before age 75 – which is within ten years of buying the annuity -- the insurance company will continue making payments to her beneficiary or estate for the remainder of the ten years. Of course, this guarantee costs money as well, and the annuitant will get a slightly reduced monthly cash flow, compared to the ‘no guarantee’ case.

The same \$100,000 within an RRSP will buy (from the same insurance company) an annuity that will provide a male with \$721.82 per month for life. The additional \$60 per month that a male will receive is a direct result of his lower life expectancy. Note from Exhibit #1 that while a 65-year-old male has a 20% chance of reaching age 90, a female has a 32% chance. Thus, if the money must last for longer – for the female -- the payments must be smaller as well.

Notice from Exhibit #2, that numbers from different companies can differ quite substantially for the best to the worst insurance company quotes. The difference of close to 10% between the best and the worst should indicate the importance of searching for the highest value. The same pricing gap applies in the 65 year-old female case as well.

The reason the annuity payouts are consistently lower for one insurance company, versus another, might be related to their credit risk. It would make sense for highly rated companies to offer lower payouts on their annuity – since you pay for safety – and lower rated companies to offer higher payouts to compensate for their riskiness. This is akin to the classical relationship between more risk and more return.

Exhibit #3: Credit Ratings for Canadian Annuity Companies

	Moody's	S&P
Canada Life	Aa3	AA
Clarica	Aa3	AA
Empire Life	*	*
Equitable Life	*	*
Great West Life	Aa2	AA+
IA Pacific Life	*	*
Imperial Life	*	*
Industrial Alliance	*	*
Manulife Financial	Aa2	AA+
Maritime Life	A1	AA
Standard Life	Aaa	AAA
Sun Life Assurance	Aa2	AA+
Transamerica Life	*	AA

Source: *The Insurance Journal*

* Not available or unrated by Moody's or S&P

Consistent with this idea, Exhibit #3 displays the credit rating issued by Moody's and Standard & Poor's -- the two best known credit rating agencies in the world -- for most of insurance companies that sell annuities in Canada. When you consider the potential 30 to 40 year horizon of a payout annuity, strong credit worthiness should be a priority. Although it is important to note that ComCorp – which is a type of deposit protection fund for insurance companies – stands ready to bail out any Canadian insurance company in the event of financial difficulties. Thus, provided your annuity payments are not 'too large', you should continue to receive your monthly cheque, even in the event of financial distress.

You can therefore view a life annuity as a bet with the insurance company. You are betting (and hoping) that you will exceed your median life span; they are betting (and perhaps hoping) that you will not. Of course, they wish you personally no harm, but your prolonged health is definitely not the insurance company's first priority.

Now, I may be guilty of over emphasizing the adversarial nature of the relationship -- i.e., I win, you lose – rather than the valuable social function performed by the company as an intermediary that pools risks. But I am simply

trying to illustrate the gamble implicit in the purchase of a life annuity, just like with life insurance.

With that in mind, if the 65-year-old male (female) exceeds the median life span of approximately 14 (20) more years, he (she) will have won the bet, and will end up earning a return that is greater than the average interest rate that applied at the time of purchase. If he or she falls short of the median life span, the return will be inferior.

**Exhibit #4: Fixed Payout Annuities (FPA) per \$100,000 RRSP:
Impact of Guarantee Period and Purchase Age**

Male

Guarantee Period	55	60	65	70	75	80
0	\$611.33	\$664.15	\$739.96	\$847.17	\$1,102.11	\$1,209.30
5	\$608.47	\$659.77	\$730.94	\$827.55	\$956.43	\$1,116.51
10	\$600.97	\$647.29	\$707.33	\$780.58	\$860.55	\$934.06
15	\$589.21	\$626.75	\$670.05	\$713.52	\$749.47	\$775.05
20	\$574.47	\$601.49	\$627.98	\$648.89	\$662.14	\$668.82
25	\$557.49	\$574.35	\$587.51	\$595.39	\$599.04	\$600.63

Source: CANNEX on July 17, 2002

Female

Guarantee Period	55	60	65	70	75	80
0	\$568.49	\$609.45	\$665.69	\$746.73	\$870.90	\$1,044.90
5	\$568.04	\$608.28	\$662.21	\$739.12	\$850.83	\$1,001.43
10	\$564.69	\$602.49	\$651.88	\$718.29	\$801.58	\$889.85
15	\$558.83	\$592.00	\$632.61	\$680.08	\$726.84	\$762.66
20	\$551.16	\$578.24	\$607.34	\$635.22	\$655.22	\$666.52
25	\$541.72	\$561.61	\$579.03	\$591.42	\$597.96	\$600.85

Source: CANNEX on July 17, 2002

Exhibit #4 takes an average of the five best fixed annuity quotes available on July 17, 2002. Notice the consistent impact of guarantee period on the payout. The longer the guarantee period, the lower the payout. Yet, the younger the annuitant at time of purchase, the lower is the impact since there is a greater change that they will actually survive for the entire guarantee period. Thus, for example, a 55 year-old that desires a 5 or 10 year guarantee pays less than a 1% - 2% premium for this privilege. But, an 80 year-old will have to pay up to 25% for the same guarantee. This is because the chances of the 80 year-old surviving for the entire guarantee period are much smaller.

Another interesting aspect of life annuities is that the monthly payments that you can receive increases the longer you wait before buying the annuity. For example, in Exhibit #4, a 65-year-old male (female) can get \$739 (\$665) per month from a

\$100,000 initial premium, with no guarantee period. But if they waited another 10 years to make the purchase, until age 75, the male (female) would get \$1,102 (\$870), for life. That's an increase of between 30% and 50%, simply for deferring the purchase for 10 years.

What's the catch? Why is the number so much higher, the older the purchase age? Well, once again life probabilities are the key. At age 75, a male's median life span is 83.5 years (86.5 for women). This translates into an average of 9 (12) more years of payments, as opposed to 14 (20) more years when you annuitize at age 65. The fewer the years over which the payments must be amortized -- which is synonymous with a shorter life expectancy --- the larger the monthly payments will be. So the lesson is: the longer you wait, the more you will get per month.

Of course, this is cheating a bit since I am comparing apples and oranges. If you annuitize at age 65, you start receiving your monthly check immediately, whereas if you wait for 10 years, you won't receive any payments during that period. And if you need to withdraw and consume funds from the \$100,000, you will most likely have less than \$100,000 left in 10 years' time. But, the basic lesson in actuarial pricing theory should help you understand the very strong impact of age on the fair purchase price.

Another important fact to note is that insurance actuaries use mortality tables that are biased toward a much longer life. They do not really use the Statistics Canada life tables to calculate life expectancy and mortality probabilities; they use tables that assume people live longer than the population average. Interestingly, this is because people that purchase annuities, are healthier and wealthier than average, and therefore *do* have the tendency to live longer.

For example, the insurance actuaries (selling you the life annuity) believe that your probability of survival until age 85, is 65% for females (53% for males). Compare this to the tables in Exhibit #1 where the number is 52.8% for females (and 41.0% for males.)

So which is it then? What are the TRUE odds of living for twenty more years? Why is there such a big difference in estimates and why are there different mortality tables?

This is known as adverse selection. Insurance companies are aware that people who are willing to bet that they will live longer than the average, actually believe that they will. (Do the buyers of annuities know something that the insurance company doesn't? Is grandma still alive at 102?) To mitigate the mortality risk, they therefore price the life annuity with the healthiest people in mind.

Perhaps, stretching the imagination, we might compare purchasing a life annuity to an all-you-can-eat buffet at your favorite restaurant. Initially, it always seems

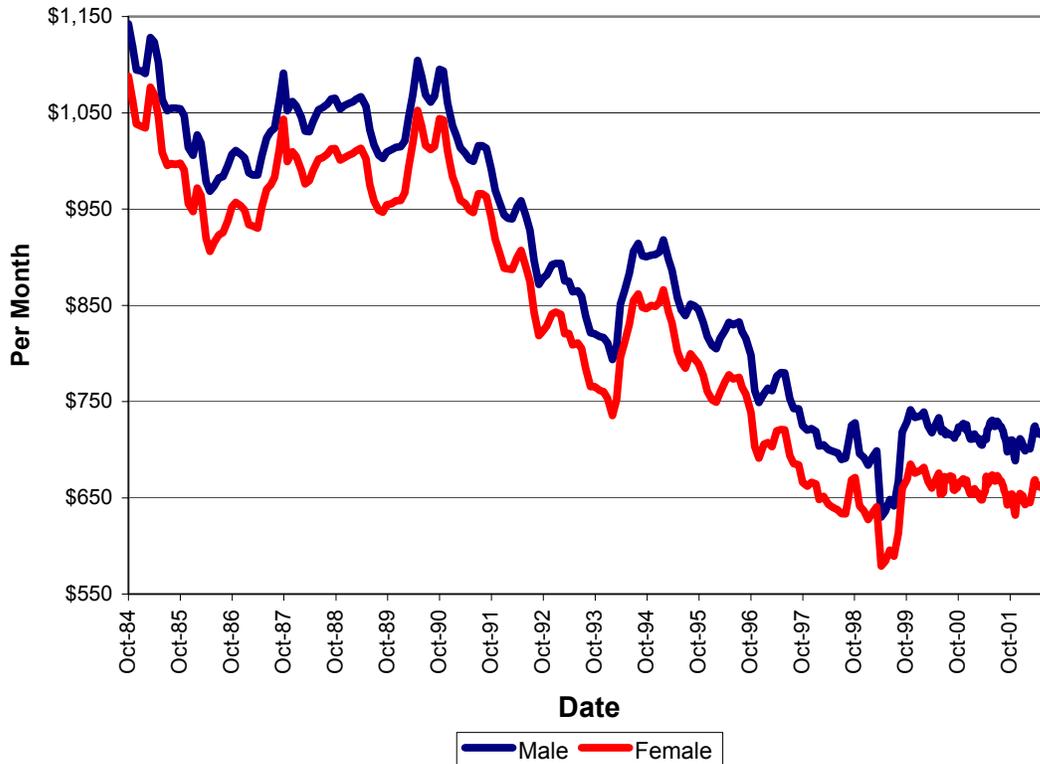
like a good deal because you can eat as much as you want. “What a bargain,” you think to yourself. “I can eat as much as I want at a fixed price.”

But think again. The restaurant owners know what they are doing. The buffet is priced to take into account the eating habits and capacity of the average diner. Furthermore, the restaurant will factor in the principle of adverse selection. Chances are, if you choose the buffet, you are hungrier than average — thinking that you will get a better deal because you will be eating so much. The only way you “win the bet” on the buffet is if you eat more than the average consumer. But remember: we are not just talking about any average consumer; we are talking about the average consumer who actually chooses the buffet.

5. Why aren't fixed payout annuities enough to protect my standard of living?

Despite the clear benefits from longevity insurance, there are quite a few problems with a diet that consists solely of fixed annuities.

**Exhibit #5: Canadian Fixed Annuity Payouts
at age 65 for a \$100,000 premium:
Period 1984 –2002**



Source: CANNEX and IFID Centre

First, as you can see from Exhibit #5, the current payout rates from fixed payout annuities are at a historical low. A 65 year-old would have received as much as \$1,150 per month in the early 1980's, in exchange for the same \$100,000 initial premium. Today the \$100,000 buys closer to \$675 per month.

In fact, we are currently at historical lows on the interest rate cycle and this may be one of the worst times to 'lock in' an interest for the rest of your life. Recall that once you purchase a life annuity you can no longer cash-in or sell the insurance contract. Thus, even though the mortality-adjusted rates of return from a fixed payout annuity might be very high, it is impossible to separate the mortality credits from the fixed-income instrument.

**Exhibit #6: Imagine you live to age 95: What is the return from an FPA?
Assuming it is purchased with no guarantee period, at age:**

	55	60	65	70	75	80
MALE	6.86	7.36	8.09	9.12	12.01	12.14
FEMALE	6.26	6.58	7.01	7.62	8.55	9.51

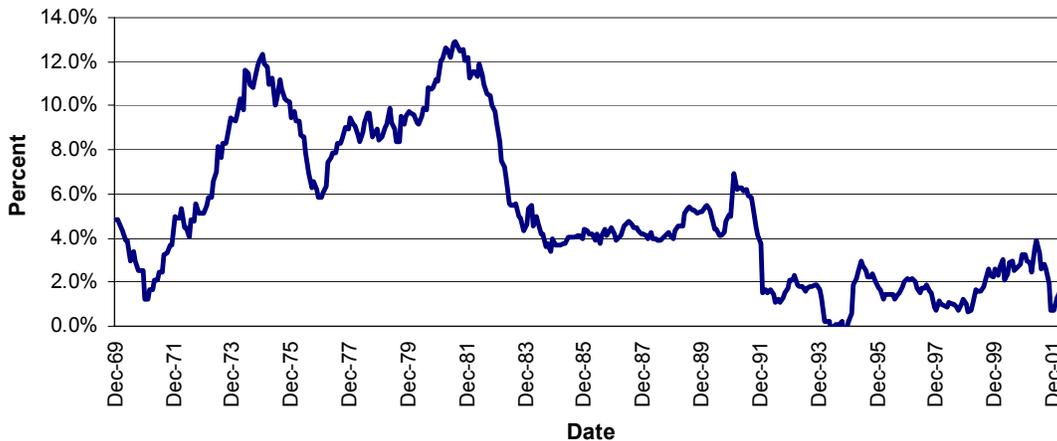
*Source: CANNEX on July 17, 2002 and IFID Centre calculations
Note: A guarantee period will reduce the implied investment return.*

As you can see from Exhibit #6, a 65 year-old male (female) that purchases a life annuity is implicitly earning an 8.09% (7.01%) conditional on surviving to age 95. This number is obtained by computing the internal rate of return (IRR) of 30 * 12 monthly payments of \$739 (\$665), against an initial investment of \$100,000.

Furthermore, if the annuitant does not actually survive to age 95, their implied rate of return will be even lower. This is purely a factor of the historically low interest rate environment we are currently experiencing. Buying a fixed payout life annuity is akin to buying a fixed income (coupon bearing) bond, with some additional mortality credits. In an era where bonds are only paying 5% to 6% interest, the appeal of the fixed annuity is greatly reduced. This is similar to the reluctance of most Canadians to lock-in GICs at historically low values of 5% to 6%.

Another consideration for variable over fixed payout annuities – and one which is very much tied to the current low interest rate cycle – is inflation, which I discussed earlier in the context of retirement budgeting. Remember, that the fixed amount of money you will be receiving each month from the insurance company, must be used to purchase goods and services that tend to increase in price over time.

Exhibit #7: Canadian Inflation Rate: 1970-2002 Change in CPI over 12 month period ending...



Source: CANSIM

Exhibit #7 displays the inflation rate in Canada during the last 30 years, as measured by changes in the level of the Consumer Price Index (CPI). Notice that although the inflation rate in Canada is currently at close to 2%, this number is at the low end of the historical record. In fact, as recently as the early 1990's the inflation rate was closer to 7%, and in the early 1980's it went as high as 13%.

At the time of writing – late September 2002 – inflation has taken an unexpected jump upwards of the 2% region and might even be headed to 4% and higher in the near future.

Inflation is a very important consideration when contemplating a fixed payout annuity, since the nominal value of the payment will remain fixed for the rest of your life. And, in real terms (after inflation is taken into account) the value of your payments will decline over time. In other words, while your current monthly annuity cheque might 'buy you' a certain basket of goods, there is no assurance the same basket will be affordable in the future.

This is the reason I urged readers to formulate all their retirement needs in real, after inflation, terms.

**Exhibit #8: What will a \$1,000 monthly annuity payment buy you?
Assuming it is not linked to inflation via the CPI
This is the REAL value of your NOMINAL payment.**

Years in The Future	Realized inflation rate during each year in the future...						
	0%	1%	2%	4%	6%	8%	10%
1	\$1,000	\$990	\$980	\$962	\$943	\$926	\$909
5	\$1,000	\$952	\$906	\$822	\$747	\$681	\$621
10	\$1,000	\$905	\$820	\$676	\$558	\$463	\$386
15	\$1,000	\$861	\$743	\$555	\$417	\$315	\$239
20	\$1,000	\$820	\$673	\$456	\$312	\$215	\$149
25	\$1,000	\$780	\$610	\$375	\$233	\$146	\$92
30	\$1,000	\$742	\$552	\$308	\$174	\$99	\$57
35	\$1,000	\$706	\$500	\$253	\$130	\$68	\$36

Exhibit #8 demonstrates the impact of inflation on the purchasing power of your money. Imagine you start receiving annuity (or for that matter, pension) payments of \$1,000 per month. If the inflation rate remains at zero for the next 35 years, your monthly cheque will continue to have the same purchasing power as it does today. The real value of your payment will be 100% of the nominal value. However, if inflation is a benign sounding 1% per year, then after 10 years the real value of your payment will decline by 10%. You will only be able to purchase \$905 worth of goods -- in today's dollars -- even though you are getting a monthly cheque of \$1,000. In fact, after 35 years the real value of your payments will decline to \$705 per month, which is a reduction of close to 30% in purchasing power. And, if inflation materializes at a higher rate -- say 4% per year for example -- then your annuity payment will lose as much as 75% of its value during the next 35 years.

Now, you might wonder whether you should care about an event that is 35 years into the future, but even after 15 years a 4% inflation rate will cut the real value of your monthly payments in half. Furthermore, when you are buying a life annuity, you should be thinking long term, since, after all, it is longevity insurance.

The lesson from this should be clear. Un-expected Inflation is the fixed payout annuities biggest enemy. And, in today's close-to-zero inflation environment, surprises can only be in one direction.

Now, there is a way to protect yourself against the ravages of inflation, and that is to purchase an escalating annuity. With these types of payout annuity, your payments will be adjusted upwards every year by anywhere from 1% to 5% depending on your initial request. Thus, for example, your first year's payment might be \$1,000 while the next year's payment will be \$1,010, etc. This way you

can keep up with inflation as long as there are no big surprises or change to inflation. In fact, if you want *even more* protection from inflation, you could purchase payout annuities that have increases based on the actual inflation rate each year.

Of course, as you might suspect, nothing is free in life and you will have to pay for the increases by taking a reduced benefit upfront. Thus, although your payments will go up over time, the initial payment will start at a much lower level. The higher the rate at which your payment increases each year, the lower your initial payment will be.

**Exhibit #9: The Escalating Annuity: Pseudo Inflation Protection
How much of an Up-front Reduction Do You Pay?**

Initial Age:	1%	3%	5%
55	-10.7%	-30.7%	-48.8%
60	-9.6%	-28.1%	-44.2%
65	-8.7%	-25.1%	-40.1%
70	-7.6%	-22.1%	-35.4%
75	-6.4%	-18.8%	-30.5%
80	-5.2%	-15.4%	-25.3%

*Source: Hypothetical Unisex Calculations by The IFID Centre
Not including any additional loads.*

Exhibit #9 provides some (theoretical) indication of the steep price you would have to pay upfront to provide an increasing annuity benefit over time. For example, if you want your payments to increase by 3% each and every year, then you will have to start your initial annuity benefit at 30% of the payout from a non-increasing annuity. Thus, instead of \$1,000 on a fixed (non increasing) annuity, you would only start with \$700 per month, for the same \$100,000 in initial premium. The reason for this reduction would be that you would have to pay for the increases down the road so that the entire cash stream ‘balances out’ over time.

In any event, regardless of the precise mechanics of the calculation, although escalating annuities might mitigate some of the problems with anticipated inflation, it does not solve the problem of un-expected inflation. Moreover, the up-front price may be too large to bear. Indeed, escalating annuities are not very popular in Canada because of the blatant reductions in initial payments and perhaps because consumers are not as worried about inflation as they should be.

**Exhibit #10: The increasing value of annuity mortality credits:
How much must you earn above the pricing rate,
to justify waiting to annuitize?**

Age of Annuitant At Time of Purchase	Spread Above Pricing Interest Rates (in Basis Points = 1/100%)	
	Male	Female
55	48	26
60	69	41
65	106	67
70	183	107
75	308	189
80	511	349
85	838	652
90	1339	1200
95	2052	1971

Returning to a theme I alluded to earlier, Exhibit #10 demonstrates the pure mortality credits that come from purchasing a fixed payout annuity. While the credits are very high at older ages, they are less than 150 basis points until age 70 for a female and 65 for a male, which might provide some justification for avoiding these products until the extra credits become substantial. Remember that the power and appeal of annuities come from the risk sharing attributes of dispersing the assets of the deceased amongst the survivors. However, if the number of deceased is not expected to be that large – i.e. the annuitant is relatively young – the relative benefits of the annuity contract are greatly reduced.

Furthermore, most people tend to purchase joint-life annuities -- which pay-off as long as one of the two members of the couple are still living – and with some guarantee periods, which further reduce the mortality credits until advanced ages.

Indeed, the relatively small mortality credits until the mid 70s and early 80s might not compensate for the ‘loss of liquidity’ that comes from being unable to rebalance your investment portfolio. While it may seem odd to discuss a fixed payout annuity within the context of a balanced investment portfolio, the fact is that an FPA is simply a bond (mixed with some mortgages) with an ‘annuity wrapper’. You are getting fixed income coupons together with enhanced mortality credits. The only problem is that you can’t trade ‘out of’ the fixed income portion of your portfolio.

To understand the welfare loss from a lack of liquidity – i.e. the inability to rebalance a payout portfolio between fixed income and other assets – I offer the following example. Consider a hypothetical investor (or policyholder) with \$100,000 to invest. The investor decides to allocate 50% to a fixed income (risk

free asset) and 50% to a risky equity mutual fund. I make the critical assumption that the investor has picked this allocation because it maximizes his or her subjective tradeoff between risk and return.

Now, to continue the desired tradeoff between risk and return, the 50/50 balance must be maintained by reacting to market movements and rebalancing the portfolio if the proportions change in any substantial way. In other words, rational behavior requires frequent and continuous trading and rebalancing, even if the overall philosophy is one of buy and hold. This is a critical point and one that lies at the heart of the substantial gains from having access to both fixed and variable investment/asset classes.

Suppose, for example, that the general stock market drops 30% within a short period of time. And, as a result, the value of the equity account drops from \$50,000 to \$35,000 ($= \$50,000 \times 70\%$). The investor now has only \$85,000 in total, of which, by construction, 41% ($= \$35,000 / \$85,000$) is in the equity account, and 59% ($= \$50,000 / \$85,000$) is in the fixed income account. The investor is holding a non-optimal portfolio, which, in theory, should be rebalanced.

A rational investor will want to sell a portion of (or transfer from) the fixed income account into the equity account to re-establish the optimal 50/50 mix between fixed and variable investments. Specifically, the investor will want to transfer \$7,500 from the fixed income account to the variable account so that \$42,500 is invested in fixed assets, and \$42,500 is invested in variable assets. The objective is to maintain the delicate 50/50 mix.

My main point is that liquidity restrictions on the fixed income account (i.e. the inability to rebalance or sell a fixed payout annuity) will impede the optimal process of re-allocation. This is the forgone opportunity cost. Even the prudent buy-and-hold investor will want to rebalance assets after a substantial market movement. This effect will be more pronounced the larger the drop in equity market values. In other words, if the market falls by a substantial amount – as we have recently experienced in global markets – a rational investor will seek to rebalance assets by selling from the fixed income account and buying into the variable (risk, equity) account.

If we take this logical argument to the extreme, the only way to make up for the inability to adapt to market movements is to compensate with an enhanced yield on the fixed annuity. Stated differently, a rational investor will be willing to waive his or her ability to instantaneously rebalance the portfolio in exchange for an enhanced yield on the fixed account. My definition of liquidity yield is meant to provide the same level of economic utility for the constrained investors, as the un-enhanced risk-free asset provides to the unconstrained investor.

The upshot from this analysis is as follows. Offering a fixed payout annuity that does not allow one to re-adjust an asset allocation over time is akin to offering a

bond fund without access to a parallel equity fund. Longevity insurance and life annuities should be viewed as a 'wrapper' that is placed 'around' conventional asset classes and investment products. Just like it would be ridiculous to restrict ones investment portfolio prior to retirement to 'only' include fixed income products, it would be equally ridiculous to impose the same type of restrictions in the retirement phase.

We are now ready for detailed discussion of variable payout annuities.

6. What are variable payout annuities and how do they work?

To better understand the mechanics of a variable payout annuity – and as a precursor to our technical discussion about risk and return characteristics -- here is a helpful way to visualise the product.

Imagine a payout annuity that is paid in shares, instead of cash. Essentially, each month, instead of getting a check for \$1,000 you get 10 shares of ABC Company; regardless of what these units are actually worth.

Of course, you can't eat shares of ABC Company or buy food in with those shares, so the insurance company provides you the added service – at no risk to them -- of converting those shares to cash based on their value at the time of payment. So, if the shares happened to appreciate during that month, you would get more money and thus a higher annuity payout compared to last month. If the shares depreciated, you would get less. This is the essence of a Variable Payout Annuity (VPA).

Obviously, when you initially purchase this type of Variable Payout Annuity, the insurance company offering the product will take the premium you pay-in, and immediately invest the funds in shares of ABC Company. As a result, the insurance company is pretty much indifferent to the movement of ABC – in other words it does not care if it goes up or down – since it *de facto* makes payments to you in ABC Company Shares. Sure, the payment for the VPA is in cash, but they are just converting those shares to cash on the day they send you the payment. They are certainly not in the business of speculating on the direction of ABC. They completely hedge this exposure by setting up actuarial reserves that are held in ABC shares.

Now, let us think of this transaction from the point of view of the insurance company. What happens if people start living much longer than expected? Will the insurance company run out of ABC shares?

Well, just like with a fixed payout annuity, the insurance company is on the hook to make those share-based payments to all survivors as long as they are alive. A prudent company will make sure to continuously monitor the reserves that are being held, and make sure they have enough money set aside to make good on

these obligations. This is the main function of the insurance company. They evaluate mortality risk, price it and hedge against it. Once again, in the above case the insurance company will set aside reserves in ABC shares.

What happens if the ABC company tanks?

Each and every month, the annuitant receives the value of ABC shares. If the price of the shares continues to go down each month the annuitant will get less and less. But, as long as the ABC company doesn't hit zero, the annuitant will get something at the end of each month. They can never technically run out of money.

Of course, Linking your payout annuity to one particular company is ridiculously risky. And common sense dictates that we all invest prudently by holding a diversified portfolio or collection of stocks and bonds. In practice, variable payout annuities are actually linked to well-diversified funds or broad-based market indices.

So, instead of the ABC Company, think of an equity-based fund whose Net Asset Value (NAV) is currently \$10 per unit. The unit fluctuates each and every day. In any given day, week, month or year, the price can increase or decrease relative to the previous period. Instead of getting fixed annuity payments, or fixed payments in shares, you get fixed payments in 'fund units'. Each month, the insurance company promises to send you the value of 50 'fund units'. The insurance company converts these 'fund units' into cash using the NAV.

So, is the annuity fixed, or floating? Well, as Einstein pointed out in his theory of relativity, that depends on your frame of reference. If you take my analogy to the extreme, all payout annuities are fixed. They are fixed in an asset of reference and converted to the cash value.

Exhibit 11 provides sample payouts at various ages, and various anticipated interest rates, compared to the payout from a fixed annuity. For example, a 70 year old male with \$100,000 in his RRSP, will be get \$832 per month, for the rest of his life if he purchases a fixed payout annuity. However, if he decides to purchase a variable payout annuity, his payments will fluctuate depending on the performance of the underlying index or fund portfolio he decides to 'link' his payment to. Furthermore, his initial payment will depend on the AIR he chooses. I'll explain exactly what AIR is in a minute. For now, think of it as a way of controlling the future income flow. If he selects a 0% AIR, his initial payment will be \$452 -- notice that this is half of what he would obtain in from the fixed annuity -- but if he selects an AIR of 6%, his initial payment will be a much higher \$765. The higher the AIR the higher the initial payment. The issues and choices are exactly the same for females, although the initial payments will obviously be lower.

**Exhibit 11a: Variable Payout Annuity:
Comparing ages and AIRs for Males.**

Male	55	60	65	70	75
F.P.A.	\$587	\$642	\$721	\$832	\$990
AIR=0%	\$225	\$277	\$350	\$452	\$599
AIR=3%	\$361	\$416	\$493	\$602	\$755
AIR=5%	\$466	\$521	\$600	\$709	\$865
AIR=6%	\$523	\$577	\$655	\$765	\$922

**Exhibit 11b: Variable Payout Annuity:
Comparing ages and AIRs for Females.**

Female	55	60	65	70	75
F.P.A.	\$551	\$595	\$658	\$748	\$885
AIR=0%	\$198	\$240	\$299	\$384	\$511
AIR=3%	\$328	\$373	\$436	\$525	\$659
AIR=5%	\$432	\$476	\$539	\$629	\$764
AIR=6%	\$488	\$531	\$593	\$683	\$819

Source: Standard Life, August 2002

7. So who is AIR and why do I care?

The Assumed (or Anticipated) Interest Rate, denoted by AIR, represents the benchmark investment return that must be earned by the underlying portfolio, before payments can actually increase.

**Exhibit #12: Variable Payout Annuity
Per \$100,000 Premium + Female Age 70**

A.I.R.	Initial	-20%	0%	+20%
0%	\$384	\$307	\$384	\$460
3%	\$525	\$407	\$509	\$611
6%	\$683	\$515	\$644	\$773

Source: Standard Life, August 2002

In most cases the annuitant has a choice of AIRs. Choosing an AIR involves balancing the benefits of higher initial payments against the possibility of larger increases down the road. Thus, while some might want to accelerate their benefits (for higher needs earlier in retirement), others might want them to increase at a greater rate over time (perhaps to keep pace with inflation.)

The AIR provides an additional dimension of choice and flexibility to retirees. This is in addition to the asset allocation and asset mix selection process. One possible way of thinking about the AIR, is that it captures the amount of future market returns that you are taking, or pricing, in advance. If you (a 70-year old female) choose a 0% AIR – resulting in a \$384 initial payment – and the market subsequently increases by 20%, your payment will increase by exactly 20%, to

\$460. This is because you have ‘taken’ or ‘advanced’ zero percent of the portfolio’s future return. But, if you select a 6% AIR – resulting in a larger initial payment of \$683, and the market subsequently increases by 20%, you will only get to keep (roughly) 14% of this increase, since you already took 6% in advance. Your actual payment will only increase to \$773.

Now, sure, this is still better than \$384, or \$460 for that matter – which is what you would have received from the 0% AIR case – but over time the advantage will be eroded.

**Exhibit #13: A Monte Carlo Tale of Four A.I.R.’s...
...and One Stock Market Path**

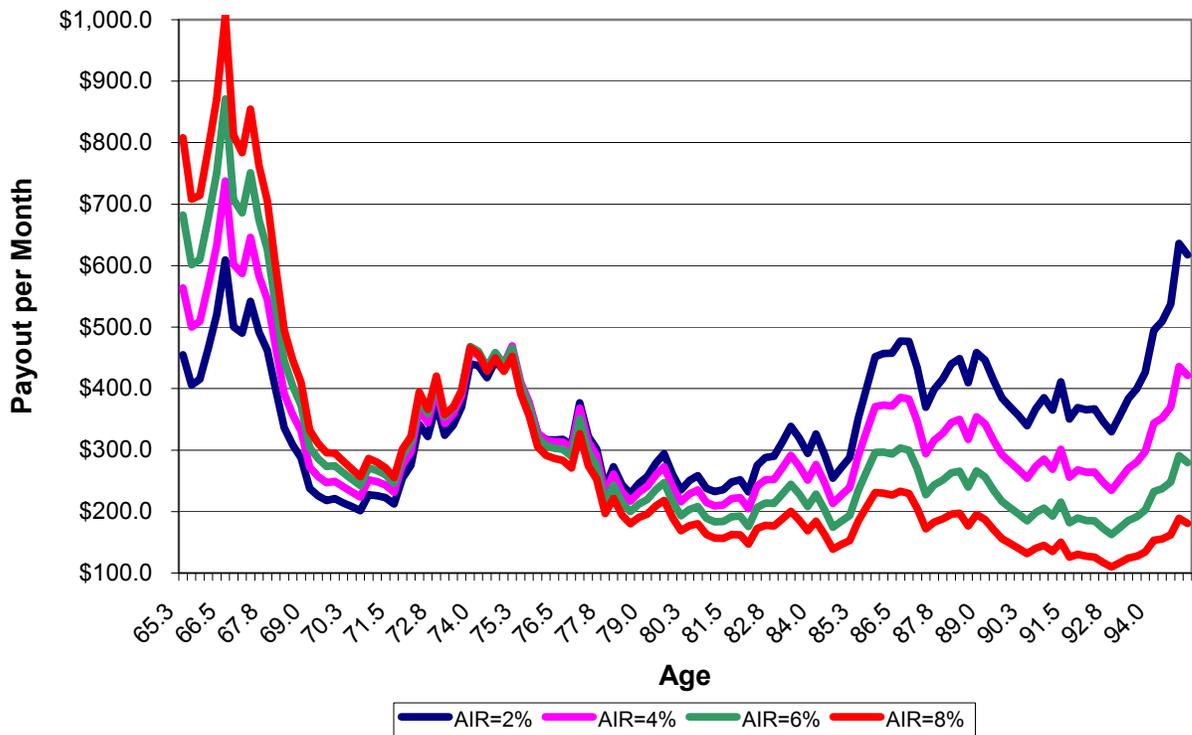


Exhibit #13 displays the evolution in the annuity payments over time for someone that purchases a variable payout annuity at age 65. Note, that they have a choice of the assumed or anticipated interest rate. Depending on the number they select, their annuity will start with differing amounts. While the higher AIR of 8% leads to a much higher initial payment of \$842, per \$100,000 of premium, the relationship is reversed over time.

Exhibit #14: Results of the Monte Carlo Simulation
 Starting with a \$100,000 initial premium at age 65,
 What is the range of potential outcomes depending on AIR?

	2.0%		4.0%		6.0%	
	Worst	Best	Worst	Best	Worst	Best
65	\$467	\$467	\$582	\$582	\$708	\$708
70	\$345	\$1,306	\$393	\$1,476	\$427	\$1,648
75	\$373	\$2,493	\$382	\$2,561	\$383	\$2,599
80	\$438	\$4,533	\$414	\$4,117	\$379	\$3,775
85	\$533	\$7,623	\$438	\$6,626	\$384	\$5,313
90	\$644	\$13,353	\$517	\$10,088	\$385	\$7,585
95	\$812	\$22,928	\$585	\$15,961	\$386	\$10,559

*Note: Assuming 5,000 LogNormal returns with mean of 11% and volatility of 18%
 IAM2000 Table fit to Gompertz Mortality at age 65.
 Range consists of a 90% confidence interval bracketed by the Best and Worst outcomes.*

Exhibit #14 displays the results of a Monte Carlo Simulation (MCS) applied to various AIR values over time. For example, at a 6% AIR, the initial payment at age 65 will be \$708 per month. Then, depending on the performance of the underlying mutual fund units (i.e. the stock market) the payments will either increase or decrease in the next period. And, over time, the payments will certainly fluctuate. The chart displays the expected (90% of the time) range of these fluctuations. At age 80, for example, the worst case scenario is likely to be an income of only \$379 per month, which is slightly more than half of the original starting income. In the best case scenario, the monthly payment grows to (an amazing) \$3,775 per month. Clearly, the range is wide, but the potential upside seems to compensate for the downside risk.

From an actuarial (statistical) point of view, at issue, all payment streams are equivalent in present value terms – regardless of the AIR you selected – and the decision is one of personal convenience and preferences. For those retirees who are interested in ‘front loading’ their retirement benefits and gaining more in the near future, at the possible expense of the distant future, they should select a higher AIR that will yield relatively higher initial payments. While those who might have other sources of income earlier in retirement, and who want to ‘back load’ their retirement benefit, should select a lower AIR. Their initial payment will certainly be lower, compared to the high AIR choice, but their payments will increase at a faster rate and will most likely be higher, later in retirement.

8. So how does this differ from a RRIF?

There are a couple of important differences between a Registered Retirement Income Fund (RRIF) and a Variable Payout Annuity (VPA), although at first glance, they may appear quite similar.

- The RRIF does not contain any longevity insurance. And, while you might theoretically be able to withdraw funds from a RRIF for the rest of your life, the amount of these payments will likely decline over time.
- The RRIF is not an investment product per se, but rather an arbitrary label that is placed on a tax-sheltered portfolio that is then subjected to certain minimum withdrawal rates. Thus, in some sense, comparing a RRIF to a VPA, is akin to comparing an RRSP to any term-life, whole, or universal life insurance policy. One is primarily an insurance product – perhaps with some savings as a byproduct – while the other is primarily a savings product.
- In the event of your demise, the entire value of the RRIF (after taxes are dealt with) will be passed on to your heirs and estate. The same is not true with a VPA. In all likelihood, unless you have purchased a VPA with a guarantee period or survivorship benefit – both of which will reduce your initial payment -- there will be nothing left for the estate. Remember, this is why you get the enhanced mortality credits. It is because you have given up the right to your investment assets upon your demise.

9. When is the best time (age) to purchase a variable payout annuity?

In previous writings and research reports, I have argued that consumers and retirees should not annuitize ‘too early’ in the life cycle. My concerns were mostly related to the problems and issues I noted earlier in the section on fixed payout annuities.

However, once variable payout (payout) annuities are available many of these concerns are mitigated and the optimal age to annuitize becomes much earlier. Of course, for those with strong bequest (or estate creation) motives, the right time to annuitize, might be never. But, for those who are eventually interested in annuities, and who are concerned about outliving their financial resources, the recent availability of (fairly priced) fixed, variable, and inflation-indexed annuities, is an important development for Canadians.

**Exhibit #15: When is the “optimal” age to annuitize an RRSP?
 ...and what is the value of the “option” to wait?
 Female (Male)**

Current Age:	Assuming ONLY Fixed Annuities are available to annuitant.		Assuming BOTH Fixed and Variable Annuities are available to annuitant	
	Optimal Age	Option Value	Optimal Age	Option Value
60	80.2(75.2)	21.1%(13.4%)	70.8(64.1)	3.4%(0.6%)
65	80.2(75.2)	14.8%(7.5%)	70.8(now)	1.3%(0.0%)
70	80.2(75.2)	8.5%(2.5%)	70.8(now)	0.04%(0.0%)
75	80.2(75.2)	2.9%(0.03%)	Now(now)	0.0%(0.0%)

Source: M. Milevsky and V. Young “The Real Option to Delay Annuitization”, June 2002.

*Note: Assuming moderate risk aversion; market earns equity premium of 6 % average, with 20% volatility
 The risk-free pricing rate is 6%, and insurance loads are 50 bp on FIA and 100 bp on VPA
 IAM2000 Underlying Mortality Table*

Exhibit #15 is an excerpt from a research report I recently completed entitled: “The Real Option to Defer Annuitization (RODA): It is Not Now-or-Never”. While this is neither the place nor the time to cover the intricacies of the arguments in that paper, the main insights of that paper are as follows:

- The mathematical model indicates that the option to defer (wait before) annuitization, is worth much less when the individual has the ability to invest in a money mix of variable and fixed annuities.
- This should make intuitive sense because the individual will be able to closely match the investing strategy before annuitization with the money mix of annuities.
- The optimal time of annuitization and the value of the ‘real option’ to wait are greater when the insurance loads are higher.

10. Is there a proper asset allocation mix in a variable payout annuity?

It makes no sense to offer a money market and bond fund in the savings portion of a personal pension plan, without offering an equity fund to complete the risk and return spectrum. So, too, it makes little sense to offer fixed payout annuities without offering variable payout annuities to balance out the risk. Clearly, the latter is the symmetric extension of the former. And, indeed, since there is a proper asset allocation involving savings (accumulation) products, the same applies to dis-savings (consumption stage) products.

The only important distinction is that asset allocation with payout annuity products forces us to elicit two more psychological variables from the user. Classical (accumulation) asset allocation models require a user’s time horizon and risk aversion level. Modern consumption-stage models require a user’s subjective health estimates and bequest motives.

Desired Bequest & Liquidity Needs

Exhibit #16: The Intuitive Tradeoff...

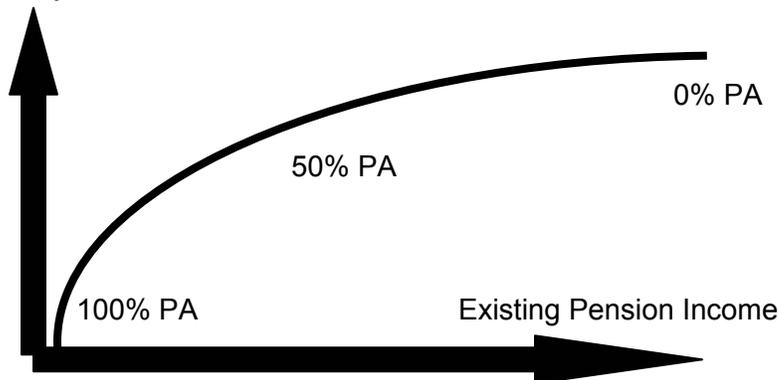


Exhibit #16 provides a graphical illustration of the tradeoff between the desire for bequest and liquidity needs, and existing pension income. The greater the desire for creating and estate, or bequest value, the lower the demand (or need for) payout annuities (PA).

To this end, I now provide a series of hypothetical allocations depending on risk aversion and strengths and desire for bequest. In the first case (Exhibit #17) I assume an individual with very strong (100%) estate creation motives. This individual has substantial pre-existing pension wealth and is not worried about outliving wealth. In this case, the optimal allocation is to maintain non-annuitized assets and simply allocate wealth between stocks and bonds based on personal attitudes toward risk.

**Exhibit #17: Hypothetical Case #1:
Age 65, 100% Estate Motive**

Risk Aversion	Bonds	Stocks	FPA	VPA
1 (low)	0%	100%	0%	0%
2	36%	64%	0%	0%
3	56%	44%	0%	0%
4	68%	32%	0%	0%
5 (high)	74%	26%	0%	0%

**Exhibit #18: Hypothetical Case #2:
Age 65, 100% Consumption Motive**

Risk Aversion	Bonds	Stocks	FPA	VPA
1 (low)	0%	0%	0%	100%
2	0%	0%	36%	64%
3	0%	0%	56%	44%
4	0%	0%	68%	32%
5 (high)	0%	0%	74%	26%

Assuming Zero Mortality and Expense Risk Charge
& Complete Asset Allocation Flexibility...

**Exhibit #19: Hypothetical Case #3:
20% Estate & 80% Consumption Motive**

Risk Aversion	Bonds	Stocks	FPA	VPA
1 (low)	0%	20%	0%	80%
2	7.2%	12.8%	28.8%	51.2%
3	11.2%	8.8%	44.8%	35.2%
4	13.6%	6.4%	54.4%	25.6%
5 (high)	14.8%	5.2%	59.2%	20.8%

Assuming Zero Mortality and Expense Risk Charge
& Complete Asset Allocation Flexibility...

In Exhibit #18, I assume the exact opposite. Namely, the individual has 100% consumption motives and they have no interest in creating any estate value. In this case, the optimal allocation is to annuitize 100% of assets, and allocate the annuities between stocks (variable payout) and bonds (fixed payout) depending on attitudes towards financial risk.

Finally, Exhibit #19 lists the more realistic case of an individual with both estate creation (20%) and consumption (80%) motives. The optimal allocation becomes a mixture of all four assets. Notice the symmetry between the bonds and stocks on the one side, and the fixed payout and variable payout annuities of the other side.

In summary, financial planners, brokers and agents have become accustomed to linking asset allocation to risk aversion. Individuals that are very risk-averse are told to allocate greater proportions of wealth to fixed income products, while individuals that exhibit risk tolerance are told to hold more stocks and riskier assets.

When it comes to retirement planning and the de-cumulation of wealth, an entirely new dimension of economic preferences must come into play. This new and critical dimension is the strength of consumption versus bequest motive. Therefore, the greater the emphasis on consumption versus bequest motives, the greater the role of payout annuities in the optimal retirement portfolio.

11. Conclusion.

With the large bulk of baby boomers getting closer to their golden years, a great deal of public interest is shifting towards how individuals should finance their retirement. Although a substantial portion of retirement needs are usually provided by company and government pensions, there is often a large gap that can only be funded with discretionary savings. In Canada, the preferred retirement savings vehicle is the RRSP. These allow individuals to accumulate wealth in a tax-favored manner.

Alas, at or near the age of retirement, Canadians must collapse their RRSP.

Historically, the two viable alternatives were to either convert the RRSP to a Registered Retirement Income Fund (RRIF) -- which is akin to a systematic withdrawal plan -- or to purchase a fixed payout life annuity.

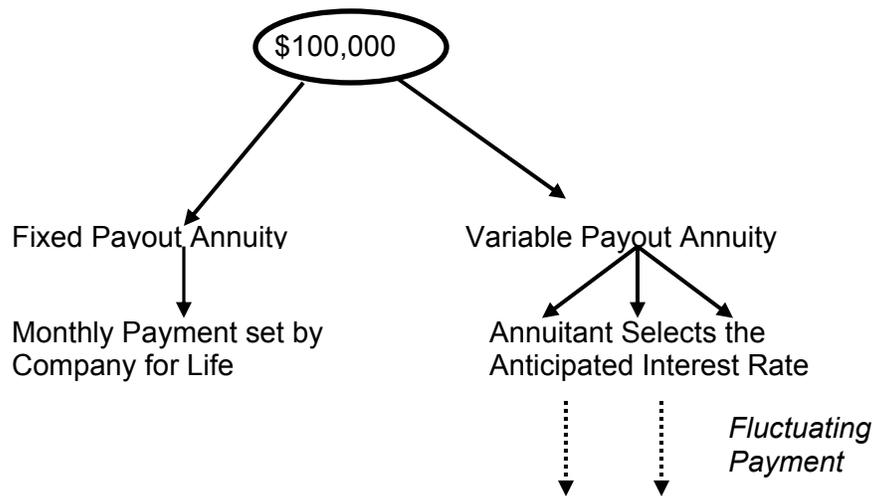
The RRIF alternative provides the retiree full discretion and asset allocation control over the management of funds, but with a minimum required annual withdrawal rate, and with absolutely no longevity insurance or protection against outliving his or her resources. This is critical since there is a substantial chance that the RRIF will not provide enough to maintain a desired standard of living during retirement.

In contrast, purchasing a fixed payout life annuity -- often referred to as annuitization -- involves paying a non-refundable lump sum to an insurance company. In exchange, the insurance company guarantees a constant life-long payment stream that can not be outlived, but is usually terminated upon death. Although fixed payout annuities contain the most basic form of longevity insurance, they come bundled with many undesirable features that *de facto* make them un-appealing for most retiring Canadians.

These unavoidable features include complete illiquidity and irreversibility, zero inflation protection, a low implied interest rate that must be 'locked in' for the life of the annuitant.

However, a third alternative has recently emerged for Canadians at the end of the RRSP stage of their life. This novel alternative merges the benefits of a RRIF -- with its complete asset allocation flexibility and potential for growth -- and the pure longevity insurance of a fixed payout annuity.

Exhibit #20: Universe of Fixed and Variable Payout Annuities



The ability to link annuity payouts to the performance of an external index means that Canadians no longer have to 'lock in' a fixed interest rate, if-and-when they desire to annuitize their tax-sheltered assets. Furthermore, these products will be able to disentangle the so-called mortality credits from the interest rate credits, and thus allow for proper asset allocation all the way to the end of the human life cycle.

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