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## **Session 120PD**

### **Converting Defined Contribution Account Balances into Income Streams at Retirement**

**Track:** Pension

**Moderator:** C. IAN GENNO

**Panelists:** C. IAN GENNO  
MICHAEL M. C. SZE

*Summary: Defined contribution (DC) plans are often touted as being far easier for employees to understand than defined benefit (DB) plans. This may be true during the accumulation phase, but it is not necessarily so at retirement. Many DC plan members have little understanding of converting their DC account balances into income streams at retirement.*

**MR. C. IAN GENNO:** I'm a principal with Towers Perrin and national practice leader in Canada for retirement plan design and strategy. I also serve within the Society of Actuaries as a vice-chair of the Pension Section Council. Joining me today is Mike Sze. Mike is a former colleague. He is a retired partner from a global management consulting firm and now has established his own management consulting practice, and he'll tell you more about that in a few minutes.

I'd like to divide our presentation into two parts. I'm going to start out by examining some of the key risks faced by DC plan members both at retirement and post-retirement. I'm also going to offer a framework for how DC members can balance competing objectives at retirement, specifically with a view as to how they take an accumulated account balance at retirement and convert that into an ongoing income stream for the rest of their lives. Mike is then going to examine some of the practical implications of these concepts for DC plan members and show you some specific examples of how they work in real life.

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**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

First, to put our presentations in context, I'd like to start by acknowledging what I call the "myth of DC simplicity." Many DC plans have been designed by sponsors and consultants using deterministic models. The deterministic models assume that capital accumulates at a certain investment return over an employee's working career, and that at retirement the accumulated account balance is simply divided by an annuity factor and converted into an income stream. Often that's how the analysis is done, with pay replacement ratios, benefit adequacy and so forth, in designing DC plans.

For those of you who went to The Great Controversy: Current Pension Actuarial Practice in Light of Financial Economics Symposium, the notion of using deterministic models for developing plan designs and assessing their adequacy at retirement was one of the issues that was examined. The reality is that during the accumulation phase there's a wide range of potential outcomes for DC members. I'll show you an example of that in a few minutes, and Mike will show you additional examples later.

Upon transition at retirement, there are competing objectives for plan members. Plan members face some challenges in choosing strategies that help them balance these competing objectives. And then during the distribution phase there are various mechanisms for producing an income stream, that can involve complex decisions and that may need complex execution strategies over time. So it's not quite as simple as some of us have often assumed, to design or evaluate DC plans.

Some of you may have attended the session on the SOA survey on retirement plan members' design preferences. It was an excellent presentation that provided a lot of food for thought. I'll share some of the things we heard there and put them into the context of this presentation as well.

One of the statistics presented yesterday was that 57 percent of active DC members in the SOA survey indicated they would prefer a life income stream at retirement. That compares to 12 percent of people who indicated they would prefer a lump sum at retirement. (The remainder obviously is people who were uncertain about the question.) If you compare that 57 percent to 12 percent, it indicates a strong preference at retirement for a life income stream. That potentially suggests a disconnect between the lump sum capital accumulation focus that underlies the design and communication of many DC plans, and the ultimate payout preferences of DC plan members when they eventually reach the stage in their lives that they have to access that money and use it for some purpose.

One of the resulting observations is that while DC plans may offer a number of significant advantages to plan members as well as sponsors, there are certainly important issues that need to be addressed, vis-à-vis, people's desire for predictability of income and to establishing an income stream at retirement. What Mike and I are going to talk about is how we help plan members and sponsors address this.

To start, we need to identify what kinds of risks are faced by DC plan members, and I'm going to break this down into preretirement and postretirement. Preretirement, I'd like to look at three types of risks, and in a few minutes I'll show you how this translates into strategies that plan members can adopt at retirement or before retirement.

First of all, there is inflation risk. I'm defining inflation risk preretirement as the risk that investments will not provide a return that's at least in line with inflation over time. I'm going to define capital risk as the risk that an investor with a short time horizon or an investor with very little risk tolerance will be subject to volatility in the value of his or her account balance, particularly in the period that's leading up to retirement. And I'm going to define pension conversion risk as the risk that, for any investments that are intended to be used to purchase an annuity—not necessarily your entire account balance, but the portion of your account balance that you intend to earmark for purchasing an annuity—the cost of securing a pension or buying an annuity will not vary in sync with any short-term changes in the value of your account balance. So it's a mismatch risk.

For the postretirement period, we also have inflation risk. The character of the inflation risk changes a bit here. The focus is more on the erosion of purchasing power over time, particularly in a scenario where you've already made the decision to purchase an annuity. So you're now likely to have a fixed income stream, and you're at risk that that fixed income stream will be diminished in purchasing power over time. Then there is return risk. If you self-annuitize, the return risk is the risk of an inadequate return relative to your own personal objectives or needs. Longevity risk, of course, is the risk of outliving your savings. With these risks in mind, it'll help us evaluate what DC plan members can do as they approach retirement and then during their retirement years.

DC plans are typically intended to reflect a different sharing of risk and return between plan sponsors and members than DB plans, with members taking a greater degree of responsibility and ownership for managing their own retirement savings. As a result, I should probably step back for a minute (before we get too far into how to address these risk issues) and just ask the question: Why should DC plan sponsors care? If, as a plan sponsor, I've made an employment deal with my employees to transfer some or all of the risk and let them manage this as they best see fit, why should I be very concerned about what happens to the account balance at retirement and what kinds of risks plan members face in addressing those decisions? Isn't the point of a DC plan in part simply to help plan sponsors break out of the traditional paternalistic paradigm of looking after their employees from cradle to grave, and enable their employees to manage their retirement money on their own?

I would suggest DC plan sponsors should still care about this, for a number of reasons. First, there's a steady growth of DC prevalence across North America. As DC plans become more prevalent, they're going to start to play a greater role in

plan members' decisions, not just with respect to how to manage their own money, but also with decisions about staying with an employer. It'll affect attraction patterns, retention patterns and, potentially, degrees of employee engagement. So certainly the growth of DC plans demands that plan sponsors need to think more about how these plans work and how they influence their workforce.

We have a maturing membership in DC plans. As the baby boom segment of the population that embraced DC plans quite strongly during the 1980s and 1990s ages and gets closer to retirement, some of the issues that we're discussing are going to become amplified for them as concerns. So it's important for plan sponsors to try to address those concerns.

There's a greater emerging liability for plan sponsors to assist and educate plan members. There's a need for plan sponsors, particularly in the United States with 401(k) plans, to think about what kinds of payout options are going to be offered to plan members.

We are entering an environment where more and more people are contemplating phased retirement. This was another SOA survey result that emerged from yesterday's presentation. More and more people are contemplating working during their retirement years to help support themselves. Phased retirement creates additional challenges for people in terms of what they do with accumulated account balances and converting those into income streams.

There's also a concern that employee risks can become employer risks. An entire session on the concept of employers bearing significant risks within a DC framework was devoted to this topic at last year's SOA spring meeting.

And, as a final reason that DC sponsors should care about what members do with their funds at retirement, there are huge variations in potential outcomes in DC plans from one plan member to another. To illustrate this point, Chart 1 shows a wide range of potential outcomes for individual DC plan members. The illustration is for someone who's 30 years old, belongs to a plan with a 5 percent employer plus 5 percent employee contribution into a DC account balance that builds up over the course of his or her career. In this case, the investment policy that I've assumed the individual follows is one that is often suggested as a guideline by financial planners. I'm not saying this is the right investment policy to use, but it's one that people commonly hear about. So it's reasonable to postulate that somebody might actually follow this policy, which is that the amount that people will invest in equities is equal to 100 percent minus your age, expressed as a percentage.

For example, for an individual who is 40 years old today, this assumes 60 percent will be invested in equities. We've assumed the balance would go into bonds. If we use an assumption of passive investments, so we're not assuming any market calls or timing, just index-based investments over the course of your career, you can see

a tremendous dispersion of results by the time you retire. (I'm assuming retirement here at age 65.)

If I look at a 90 percent confidence interval, the upper level of that confidence interval is 50 percent above the mean, and the lower end of that confidence interval is 50 percent below the mean. That's a tremendous dispersion in results, and this is before you even consider the fact that this only reflects one particular investment policy. Some people are going to follow different investment policies; some people will be entirely in money market investments and GICs. Other people will be much more heavily invested in the stock market. This will produce an even wider dispersion of results among a group of employees.

This illustrates that you have a wide range of potential outcomes, and that the wide range extends into the retirement years. The only caution I would offer here is about the tail-end of this distribution. As you get into advanced ages, don't be misled into thinking that, over time, eventually everything narrows. Over time we have mean reversion. What's actually happening here is that as people get into advanced ages, the model that we've used assumes that people will adjust their consumption patterns annually to reflect the amount of capital that's still available to them. So the fact that the confidence interval narrows at advanced ages simply reflects the fact that the people with fewer assets later on in their lives are significantly adjusting their lifestyles downward. The people with more assets at retirement are consuming much more in their early retirement years because they have the cash available to them.

When considering how to convert DC account balances into an income stream at retirement, plan members face a number of competing objectives, and these objectives aren't necessarily always reflected in the types of traditional models we've used as actuaries to develop DC plans. People are challenged to balance a desire for consumption of their capital versus a desire to leave money to bequeath to inheritors. People are challenged to balance security versus enhanced returns and having protection of their purchasing power. People are challenged between achieving security again versus having liquidity and flexibility to accommodate changes in personal circumstances post-retirement. So there are several competing objectives and, depending on the vehicle or the approach people take to manage their money, they're going to better achieve one objective versus another. And they're going to sacrifice certain objectives or assign a lower priority to certain objectives.

Looking again at the SOA survey and some of the results that were presented yesterday, there were a number of objectives that plan members identified as very important in making the payout decision. Interestingly, I noticed there were some objectives that went up in importance as people approached retirement, and there were other objectives that decreased in importance. One of the objectives that got more important as employees were reaching retirement was having a predictable level of lifetime income. 69 percent of employees rated this as very important; 86

percent of retirees rated this as very important. Not outliving capital was also a major objective; 69 percent of employees and 77 percent of retirees rated that as very important. Interestingly (given how low inflation is today, compared with the 1970s and 1980s), people are very aware of the need to keep up with CPI. 65 percent of employees and 75 percent of retirees rated this as a very important consideration in their decisions with respect to how to draw down the capital from their lump sum plans.

Some of the objectives that dropped in importance as people approached retirement were issues that are often identified as potential disadvantages of DC plans if they're annuitized at retirement (rather than if people retain control of their funds post-retirement). Control of savings is one of those. 61 percent of employees said it was very important. That dropped to 54 percent at retirement. Protection against loss of value in the event of early death is traditionally cited as being a key reason why people don't buy annuities, and yet the SOA survey said only 44 percent of retirees are concerned about this as a payout issue. Access to emergency funds and leaving an inheritance were also cited, but at much lower percentage levels than I would have intuitively assumed.

The Society of Actuaries has also conducted a detailed examination of what kinds of risks retirement plan members, both DB and DC members, face post-retirement, and identified 15 different areas where plan members face risk. In a number of the conference sessions there have been handouts of a chart that the SOA has produced. It's a useful tool for making yourself more aware of some of the risks that plan members face, and also offers some ideas on ways to manage that risk.

All of these risks, in one way or another, influence plan members' decisions on what to do with their DC assets at and after retirement. There's a clear interplay between a number of these risks and what members do with their money.

So what do you do with your money as you approach retirement? Pre-retirement, traditional thinking suggests that people should invest conservatively, and investing conservatively is often interpreted, rightly or wrongly, to mean that people go into GICs or money-market vehicles or other low-volatility investment vehicles. Traditional thinking also suggests that people should prepare for a single, point-in-time decision between purchasing an annuity versus deciding to self-manage their money. Often that decision is based primarily on the question of how much other capital is available. If I have lots of other capital or other sources of retirement income, perhaps I can more readily accept the risk of managing DC money on my own. If I have few other sources of retirement income available, perhaps that drives me to annuitize. That's the traditional thinking; what I'd like to do is suggest that traditional thinking needs to be broadened, that there are actually a lot more things that plan members can and should be thinking about as they approach retirement.

In particular, there are three key things people need to do, and Mike will examine this more in his presentation and show you examples. People need to select appropriate investments to help manage their risks. People need to carefully monitor their contribution levels, not just in the last few years before retirement but over a significant period of time, so that they can make the necessary adjustments to approach or have a better chance of approaching the pay-replacement targets they're seeking. People also need to monitor the account balance growth in their DC plans well in advance of their retirement. Again, we'll show some examples of this in Mike's presentation.

From an investment perspective, thinking back to the three principal risks that I identified for you a few minutes ago—inflation risk, capital risk and pension conversion risk—what we find (perhaps not surprisingly) is that there isn't any single investment approach that uniformly addresses all three of these risk areas. So there's a decision to be made. People have to make an individual decision about which of these risks takes greater or lesser priority, and that can then help form their decisions about what particular investment strategies they should take.

In the heading of Chart 2 you'll see that I've referred to "preretirement" and "preannuitization" periods; that's a deliberate distinction on my part. We're going to draw that distinction out more in the next few minutes. Traditional thinking used to be that you have a single, point-in-time decision, and that decision often would coincide with retirement. So, at retirement I annuitize or I self-manage, and in this context what do I do before retirement? Recent research suggests that people are probably better off economically by not making that single, point-in-time decision at retirement, but either trying to spread out that decision by annuitizing over a period of time to avoid problems with short-term market timing, or, indeed, they might be better off economically by deferring the decision to annuitize until later in their retirement years. In that case, the investment strategies identified in this chart would be equally applicable during their retirement years prior to annuitization.

So at or after retirement, the plan member has to decide how to establish an income stream. You have to pay your bills on a monthly basis. How do you get a regular, ongoing income stream out of the capital you've built up? The fundamental decision is between purchasing an annuity or continuing to manage the funds yourself and taking systematic periodic withdrawals. There's a regulatory framework that influences this decision, in particular the timing of this decision, and the timing varies country by country. In Canada, for example, by age 69 you have to start drawing some of your income out through systematic, periodic withdrawals. In the United States, the age is 70½. In the United Kingdom, DC plans must be annuitized by age 75. So the regulations require you at some point to start systematic withdrawals. I point these particular ages out to you now, for different countries, because recent economic research actually suggests that the economic utility or efficiency for a plan member is optimized in many cases by deferring the annuitization decision beyond the dates that are enshrined in the legislation in the United Kingdom, the United States or Canada. This poses an interesting contrast

between what the legislation requires versus what financial economics would suggest people should do to optimize their utility.

Traditional thinking says that people need to make a decision between an annuity and self-management; they need to make this decision at or shortly after retirement. Typically, traditional thinking suggests that the decision is based primarily on risk tolerance and on the relative balance between the desires to achieve enhanced investment returns and bequeath assets versus the desire to protect against outliving the assets.

Looking again at the SOA plan member design preference survey that was discussed yesterday, there were several common strategies identified that people adopt at retirement. Keeping the principal intact was the most common strategy that people adopted. Some people said, "If I'm going to manage the money myself, and draw down a certain amount of money on an annual basis, how much do I take out?" It's hard to know the right amount to take out because you don't know how long you're going to live. You don't know what your future investment returns are going to be. Yet you have to come up with a strategy to follow. And 36 percent of employees, declining to 25 percent of people during their retirement, said, "I'm going to keep my principal intact. I'm going to draw down the investment returns, but I'm never going to touch the principal."

Twenty-two percent of employees and 19 percent of retirees—essentially the same percentages, given the confidence intervals for the survey—said they were either going to buy an annuity or self-annuitize. In other words, they have some strategy for attempting to manage longevity risk either on their own or through a financial product. They also have some notion of actually drawing down or consuming a portion of their capital on a regular basis over time rather than leaving their capital preserved and untouched.

Some people say they're going to make withdrawals as needed. 20 percent of employees anticipate just drawing down the money as they need it during their retirement years. Interestingly, only 6 percent of retirees actually said they manage their income stream by making withdrawals as needed.

Of further interest, 14 percent of employees and 32 percent of retirees either weren't sure or didn't know how to answer the question. In other words, if you're a DC plan sponsor, one-third of your retiring plan members don't know what to do with their money, regarding conversion into an income stream. And, given some of the other answers to the survey, a significant portion of the remaining two-thirds of retiring plan members know or think they know what they're going to do, but may be adopting strategies that are economically inefficient (such as only drawing down interest and never touching their principal, unless they have a very strong desire to bequeath the assets, that overrides all other objectives). This is a strong illustration of lack of knowledge on the part of plan members, both in terms of what to do, or, if they think they know what to do, what the unintended consequences may be.



So what can people do at and after retirement to manage their money? The fundamental decision, again, is annuity purchase versus self-management with systematic withdrawals. You can execute these strategies in several different ways. You can self-annuitize. You can purchase annuities. Or you can take a mixed or balanced approach. I'd like to examine each of these approaches with you.

To self-annuitize, one of the key questions people have to address, first of all, is asset mix. How do I invest the money? The second question is the withdrawal pattern. How do I consume the money? Many traditional actuarial models presume that the consumption pattern, once it's initiated, will be a constant amount withdrawn per year. They presume that people have income needs or consumption needs that are level over the course of their lifetimes or increasing with inflation to remain level in terms of constant purchasing power. This is an assumption that's being challenged. From a financial economics perspective, the literature clearly suggests that people's ability to draw down retirement assets and their intention to consume is not, in fact, a level function. Instead, it's a function of the amount of capital that's available and a function of your anticipated ability to continue to consume for the remainder of your lifetime. Those of you who attended the Great Controversy symposium, you heard David McCarthy from The Oxford Institute of Aging talk about people's consumption patterns over time.

The other issue is the probability of ruin. The question is how you manage the risk of outliving your savings. Counter to traditional thinking, there's a lot of research that's been published recently in the *North American Actuarial Journal (NAAJ)* and some other financial journals that suggests that a fairly high equity exposure strategy can help people manage the risk of ruin. Traditional thinking previously had suggested that if you want to manage the risk of ruin during your retirement years, you'd better stay away from equities.

Some published financial models suggest that over the long term people can actually lower their probability of ruin by increasing their equity exposure. A recent *NAAJ* article said that for a female, age 65, an 80 percent equity/20 percent bond asset mix would optimize the risk of ruin. It actually lowered it for one model down to a 27 percent risk of ruin—80 percent equities, 20 percent bonds! Quite different from what I thought of 10 years ago as a typical investment pattern for people to adopt during retirement. For a male, age 65, with a shorter life expectancy, the optimal point in this portfolio shifts to around a 60 percent equity exposure, with a resulting 17 percent risk of ruin. The economically optimal strategies for using the asset mix to help address the probability of ruin may seem counterintuitive to us as actuaries.

The second approach is purchasing annuities. Annuities provide, obviously, valuable protection against longevity risk, but at the same time annuities can pose significant concerns for plan members. In the absence of inflation protection (if that's not built into the annuity product), or in the absence of a variable annuity product, people are concerned about the effect of inflation over the remainder of

their lifetimes. People are concerned about lack of liquidity, the fact that they're making an irreversible commitment. People are intuitively concerned, although they have trouble evaluating it, but there's certainly a notion among plan members when I talk with them that there are significant loads, profit margins and expense margins built into annuity pricing. That concern alone, rightly or wrongly, often pushes plan members away from buying annuities. And in today's environment, people are also concerned about very low interest rates. They're concerned about buying an annuity in a low interest rate environment, and what that means in terms of potentially making a poor market-timing decision.

As evidence of how widely held and significant these concerns are for individual consumers, all you need to do is look at the size of the individual annuity market in North America relative to the amount of assets that are available at retirement. There's quite a mismatch between the size of the annuity market versus the pool of assets that potentially is available to be annuitized. It illustrates very dramatically that people are shying away from buying annuities; instead, they're going to self-manage the money. But there are some strategies available that can make annuities a very sensible way of drawing your income during your retirement years.

You can seek a balance between fixed annuities and escalating or variable annuities. In a sense, this is analogous to the concept of preretirement (or even postretirement if you're managing your own money) of making asset allocation decisions between being exposed to equities versus bonds. It's a direct parallel to saying in the annuity market, "I want to select financial products that do or don't expose me to greater degrees of potential volatility in the future." If you examine the parallels between the financial products, the annuity products, versus the asset allocation decisions that people make, you can apply some of the same concepts to the annuity purchase decision as you apply to asset allocation decisions in a self-managed context.

If you are seeking a balance between annuities and self-management, then you can extend some of the things I've just mentioned and think of it as a two-step approach. The first step is to say, "I need to make a risk-based asset allocation decision, and that's going to lead to underlying decisions about my investment profile or the types of investments I want to be exposed to." In a very simple framework, you can consider various asset classes and say, "I have a range that goes from GICs and money markets exposing me to relatively lower volatility up to equities that potentially expose me to some higher volatility." I would suggest you make this decision first in terms of the fundamental types of risks that you want to be exposed to, and then overlay against that the types of financial products that are available to manage longevity risk. That would include variable annuities, escalating annuities and fixed annuities, each of which behaves in a different way in helping plan members address the types of risk they face both with respect to volatility and consumption, as well as with respect to longevity.

One comment that I would make here for Canadian audience members is that variable annuities aren't available in the Canadian marketplace. This significantly shrinks the types of products that are available to people to manage their longevity risk adequately.

If you're considering a balanced approach, or considering managing your money on your own for a period of time and then annuitizing at a later point in time, what's the optimal time to buy the annuity? The answer depends on a number of factors. I'll give you a brief overview of some of them. It depends on sex. It depends on your degree of risk aversion. It depends on your health status. It depends on the types of products that are being offered in the marketplace. All of these factors will influence people's decisions to buy annuities. Some of them are intuitively obvious to people. Risk aversion and health status are going to be intuitively apparent to plan members as key considerations.

Other considerations are not intuitively obvious to people. Sex can play a significant role in the optimal timing for buying an annuity. So can product design. In the U.S. marketplace, if a plan member is looking at variable annuity versus other types of annuity products, sometimes the underlying features or elements aren't necessarily intuitively obvious. I might need help to understand the implications of purchasing a variable annuity versus a fixed or escalating annuity.

Milevsky and Young have published papers that demonstrate that the optimal timing strategy from an economic utility perspective is typically to defer the annuitization decision until sometime in your mid- to late-70s, potentially even into your early- to mid-80s. So, thinking back to the point I made a few minutes ago about when legislation in the United Kingdom, the United States and Canada forces people to make decisions with respect to annuitization or at least establishing a periodic system of withdrawals, there's a disconnect between what the legislation imposes and what economic utility theory suggests in terms of the optimal time to annuitize.

I'll examine some of the factors in a bit more detail and see which ones push your decision either way. Which factors influence your decision to annuitize early? Which factors influence your decision to annuitize later? There are some factors that retirees are very well aware of: high risk tolerance, comfort with taking on greater equity exposure, a desire to bequeath assets upon your death and a desire to consume more in your early retirement years. These factors are all fairly obvious to plan members as issues that would make it better for them if they decide to defer the annuitization decision. Other factors, though, are less apparent to people. As actuaries, we can assess these factors and help explain them to plan members and sponsors.

Mortality is one of them. I mentioned a moment ago that female mortality, a longer life expectancy, from an economic perspective influences the utility of deferring the annuitization decision. Health or mortality asymmetry affects the utility of deferring

your annuitization decision. Interestingly here, it's not just having good or bad mortality expectation. It's actually asymmetry on both sides. You could expect that you're going to have very good mortality experience relative to the general population, or you could expect poor experience relative to the population. From a health perspective, you could be in good health or poor health, and either of those conditions increases the utility of deferring your decision to annuitize.

Annuity pricing loads—profit margins, expense margins, as well as the adverse selection loadings that are built into annuity pricing—affect people's decisions, and, in fact, increase the utility of deferring the timing of buying the annuity. Finally, there is your ability to outperform the implicit annuity return. Annuities have built into them returns based on obviously the underlying discount rate that's used for the pricing, but they also have returns built into them based on the benefit of survivorship. So, to the extent the benefit of survivorship is accruing to people in the annuitization process and the pricing process, it actually can influence people's decisions to defer annuitization. They don't know it, but it's there as a factor that influences the utility of deferring annuitization.

These factors can all influence your decision to delay buying the annuity. What can make it worthwhile for you to buy your annuity sooner? Well, there is obviously the converse of what I mentioned just a moment ago, but there are also some other factors. The availability of competitively priced immediate variable annuity products can definitely influence the decision to annuitize earlier. There's economic evidence to suggest that people are actually aware of this. If you look at the TIAA-CREF plan where variable annuities are offered as payout options upon retirement, you actually see a tremendous take-up in that annuity product compared to many other 401(k) plans that don't offer that kind of an option—or compared to, say, the Canadian marketplace where variable annuities simply aren't available. There's evidence that actually points to plan members being aware, either explicitly or intuitively, that variable annuity products can make it worthwhile for them to buy the annuity earlier rather than later in their retirement years.

For people who are healthy, escalating annuity products can also make it worthwhile to buy that annuity a bit earlier. The Society of Actuaries Pension Section is currently sponsoring research by Moshe Milevsky, York University, to develop a software tool that will be available to you as practitioners so you can test out the effect of some of these factors. You can see where the probability of ruin is if people adopt a certain investment strategy on a self-managed basis, or if people adopt certain strategies with respect to annuitization. You'll actually be able to play with some of these factors and use it to help your plan sponsors in making decisions about plan design, employee communication, types of investment options to offer to members at retirement and so forth. It should be a useful tool, and I'm expecting it'll be available on the SOA Web site sometime later this year.

To summarize, there are a number of important issues for DC plan members to think about. These are important elements of financial planning and risk

management and heighten the need for plan sponsors to think about offering good-quality employee education programs to their members. These are issues to think about before, as well as during and after, retirement. One of the key issues in particular is phased retirement, which is becoming increasingly prevalent as an employment pattern. How do we help people manage their money in the context of phasing into retirement or reducing their work hours or seeking alternative employment? You also need to look at this from plan sponsors' perspectives. There are a number of key issues that plan sponsors need to think about (and that their consultants need to help them with), like managing the hidden complexities of DC plans, and dispelling the myth that DC plans are inherently simple vehicles for delivering retirement benefits.

Plan sponsors also need to think about plan design and what types of payout options to offer, making sure that the investment options offered are appropriate for people to be able to manage their risks. Providing appropriate information, education and modeling tools is very important. Finally, DC plan sponsors need to consider advocacy. I'd like to see plan sponsors and consultants become stronger advocates for changing some of the current barriers to plan members addressing these risks appropriately. Such advocacy could take the form of trying to persuade legislators to push back the dates for mandatory annuitization in the United Kingdom, or push back the dates for mandatory initiation of systematic withdrawals in the United States and Canada.

From the insurance industry perspective, it would be helpful for plan sponsors to tell insurance carriers, "I'd like to be able to offer immediate variable annuities for my retiring DC plan members." Let's create a greater demand for that product with the insurance carriers. Pricing is another area where plan sponsors can potentially ask good questions of insurance carriers. They can ask: "Is this the best pricing? Is this product design and the associated pricing really what's going to help my plan members the most? Can we do something that's more cost-effective?"

Mike Sze will now go into detail about how this works in real life and show you some models.

**MR. MICHAEL M. C. SZE:** In my consulting work with clients on DC plans, what I find most lacking is knowledge. People don't know how to invest. They don't know when to annuitize, or whether it is good to annuitize. Some of you may have come across similar experience with clients. What you need to do in such circumstances is educate. How many of you have conducted employee education? How often is education done by actuaries instead of investment advisors? Not often.

ERISA and CAPSA both require more employee education. The people with the best knowledge on the subject are probably the actuaries, because we know how retirement benefits work, and how investment and annuities work. We should get more involved in the process.

Since you all have plenty of experience of DC plans in the United States, let me start by comparing the 401(k) in the United States with the registered retirement savings plan (RRSP) in Canada. I will then discuss flexibility and why there should be flexibility. I will compare distribution schemes under annuities and under IRA type of self-administered distribution. Here, I will discuss the risk/reward trade off. I will talk about the decision process in the choice of retirement vehicle. What drives the decision? In one word, it is "control." I will talk about what control actually means. I will end by showing how stochastic modeling can be used in the planning process.

There are many types of savings plans in the United States, of which 401(k) is the most prevalent. What are the main features of a 401(k) plan? There is automatic enrollment, qualified investments and contribution limits. How do these features compare to those of an RRSP in Canada? There is automatic enrollment upon employment in the United States. In Canada, RRSP is subject to separate enrollment by the employer. There are many investment options in both the United States and Canada, but our experience shows that most participants invest in mutual funds. There are contribution limits in both countries, but the U.S. limits are much higher. For instance, the maximum dollar limit in the United States is \$40,000; in Canada it's \$14,500. There is a combined limit equal to 25 percent of pay in the United States. This is comparable to the 403(b) limit in the United States. If people take full advantage of the limit, they can retire with more income than when they are working.

In the United States, people are required to start to draw down their retirement savings account at age 70-1/2. Withdrawal before age 59-1/2 will attract a 10 percent penalty. If there is termination of employment, a participant may rollover the 401(k) account balance into an individual IRA. In case of hardship, a participant may withdraw money without penalty. All these indicate that there is much flexibility in the distribution process.

Chart 3 compares 401(k) in the United States to RRSP in Canada. RRSP in Canada is like 401(k), but there is no automatic enrollment upon employment. Employees may be enrolled any time after employment. The contribution limit is substantially lower, as I have said before. In the United States there is a 10 percent early withdrawal penalty on top of service charge and regular income tax. In Canada, there is no early withdrawal penalty. Of course, the amount withdrawn will be treated as regular income for tax purposes. A loan is typically not allowed in Canada. And the discrimination test is not as stringent in Canada as in the United States, but there is much similarity in principle.

There are two phases in the DC process: a savings phase and a distribution phase. There is tax deferral during the savings phase, and when retirement incomes are distributed from the savings fund, they are taxed as ordinary income.

Let us compare self-administered distribution and distribution through an annuity. We will begin by asking what an annuity is. Well, buying an annuity is an investment choice. Basically, the annuity purchaser makes an investment decision, which is irreversible and will affect him for the rest of his life. Variable annuities in the United States provide some relief, but by and far buying an annuity locks the purchaser into an investment rate for life. Having said that, the decision to annuitize should be made very carefully. On the positive side, the purchaser relinquishes all investment risk to the insurance company selling the annuity. On the negative side, the purchaser also gives up all potential investment opportunities. If a person is not completely satisfied with the interest rate the insurance company is using to quote the annuity price, he is not fully committed to that investment. A phase-in annuitization process would really make sense.

What about choosing an IRA type of self-administered distribution process? If that process is adopted long-term, isn't it just like a self-insured variable annuity contract? Just as in a variable annuity contract, the person retains the reward of all potential gains. But the down side of the arrangement is that the person also retains the risk of poor investment return. Would a person feel comfortable taking that risk for the rest of his life? If not, then there must be annuitization at some later date. Thus, in the long run, the two processes will complement each other. A person should not choose one over the other. Rather, he should adopt both processes at different stages of his life. This is the principle of diversification.

Now, let us address the issue of control. Many people think that if they purchase an annuity, they will be giving all their money to an insurance company. They are losing control over their financial welfare. They want to keep control, so they keep their money, and out of fear of loss, they put all their money in GICs or bank savings accounts. What is the effect of their action? They have given up control of their money to the bank or financial institution, which has sold them the GICs or the savings accounts, and at a much lower interest rate than implied in the annuity purchase. A further issue on control, many older people are terrified of outliving their wealth. They are so afraid of eating into their capital that they are not spending. What control do they have? They are actually controlled by their own fear. All this argues for the phase-in annuitization process.

What is the bottom line in terms of managing your investment risks? There are three types of people. If you are very rich, and you can never outspend your savings, then it makes no difference what you do. It doesn't matter where and how you invest. It hurts your ego when you lose 10-20 percent of your fortune. But it does not affect your livelihood. At the other extreme, if you have very little savings, any investment decision is not going to make it sufficient for you in a short time. You may end up being a welfare case. However, most of us are in the

middle. We save, but we also need investment income to add to our retirement basket. If that is the case, we cannot take too many long-term risks. We should allow the investment to work for a while but ultimately we need to annuitize. When should we annuitize? When the interest rate offered by the insurance company is adequate in providing us a reasonable income. Don't be greedy and wait. Some say: "I want to leave some money to my children." Why do that? Do you want to be more valuable to them dead than alive?

Our discussion is centered on retirement security. But retirement security depends not so much on what you do after retirement as on what you do before. Start saving when you are young, and invest aggressively when there is time to average investment fluctuations. By the time you retire, you should ensure that the accumulated fund is protected. I will demonstrate this concept through a modeling process.

There is much education involved. Both the U.S. and Canadian authorities are advocating education. But it is up to professionals like us to help people understand the basic concepts involved. I have devised a stochastic model to help with the analysis. The reason that the model is stochastic is partly because it is interesting to me, and partly because nothing is sure in life. We don't know what will happen in the future, but some events are more likely to happen than others. We have to choose what is more probable. A stochastic process shows the probability of different events. As such, it is a good tool to pinpoint the smart choice.

In the end, we are concerned about how much we have saved, and how much retirement income the savings will buy as compared to our preretirement income. This ratio of postretirement income compared to preretirement pay is called the pay-replacement ratio. The stochastic study concentrates on the savings fund accumulation and the pay-replacement ratios under various demographic and economic scenarios. These results depend on several input parameters: current age, retirement age, current pay, pay increases, current wealth as a percentage of pay, contribution rate and investment policy. The investment policy changes with a person's age. For a young person age 20-40, he will probably invest aggressively with 70 percent in stocks and 30 percent in fixed income. Between 40-55, he will probably choose a 50/50 distribution. When he gets older, between 55-60, he may invest conservatively with 30 percent only in stocks.

We apply this investment strategy to a person of current age 30 (starting age), who expects to retire at age 60. His current pay is \$50,000 and his current savings is 3 times pay. His pay increases are 5 percent per year. We call this the baseline scenario, and perform stochastic simulation to find the distribution of fund accumulation at age 60, and the distribution of pay-replacement ratios at that age. We then change parameters and rerun the simulation to obtain results under other scenarios. The following is a summary of several different comparisons performed.



Chart 4 shows the impact of starting age on the accumulated fund. Scenario 1 is the baseline scenario, with starting age equal to 30. The other scenarios are starting age 45 and 55 respectively. The horizontal axis is percentile confidence level. The vertical axis shows the amount of accumulated fund for each confidence level. Look at the line representing the result for age 55. This is the lowest curve on the graph. On the other hand, under our baseline scenario, the person starts at age 30. On a 50 percent confidence level basis, the person would have accumulated a fund equal to 20 times pay on retirement. But a more conservative person will not be comfortable with a 50/50 chance. At 75 percent confidence level, the person would have accumulated eight times pay, which is normally considered to be very good fund accumulation.

Chart 5 looks at pay replacements, which are more important for retirement security. Under the baseline scenario, there is a 50 percent chance that the person would have a pay replacement of 60-70 percent. This is what we normally expect from a DB or a DC plan. For a person who needs to be more secure, at 75 percent confidence level, the person would only get 50 percent pay replacement. The analysis points to the fact that a more risk-averse person must start very young in order to get at least 50 percent pay replacement upon retirement.

Chart 6 shows how pay replacements depend upon the retirement age. In the baseline scenario, we have assumed that the person retires at age 60. What happens if he wants to retire early at age 55? The graph shows that the pay replacement decreases by over 10 percent. If he will delay his retirement to age 65, the graph shows that the pay replacement increases by over 10 percent. Given such results, we applaud the current social trend of phased retirement.

Chart 7 shows the impact of pay increases. If the pay increase is 3 percent per year instead of 5 percent in the baseline scenario, the pay replacement will be enhanced by over 20 percent. What is the reason for that? It is because the final pay depends heavily on future pay increase. When pay increase is 3 percent per year, the final pay is smaller. So the person's retirement benefit expectation is lower. Consequently, his retirement income appreciation is better.

How would initial wealth affect retirement income? Our baseline scenario assumes that the savings of the person at age 30 is three times pay. His retirement income is expected to be 60-70 percent of pay. What if his initial wealth is only one times pay? Chart 8 shows that his pay replacement decreases by about 30 percent. What if he has five times pay to start with? His pay replacement increases by about 30 percent. These results emphasize the importance of starting young. By starting young, the savings at age 30 will be high, and the ultimate retirement income will be reasonable. Otherwise, the retirement income may be inadequate. Many people do not see the need to start saving early. If they start saving at age 40, the initial wealth at age 40 is zero, there will not be enough time for them to accumulate enough retirement savings.

Chart 9 shows the impact of contribution rate on pay replacement. While contribution rate is important, the impact is much smaller than the starting age, or the expected retirement age. This behavior may be reasonable to actuaries, but it needs to be carefully demonstrated to the public.

Chart 10 illustrates the impact of investment policy on pay replacement. The baseline scenario assumes that the person will change his investment strategy according to age. This is tested against a conservative investment policy of investing 30 percent in stocks all the time, and against an aggressive investment policy of investing 70 percent in stocks all the time. The pay replacement results under the aggressive investment strategy are better than those under the baseline scenario, which, in turn are better than those under a conservative scenario. The reason for the results is the loss of opportunity cost for more conservative scenarios. An aggressive investor will have built up so much gain in good years that he can stand some bad years, so that in the end the aggregate results are substantially better.

**MS. JUDITH E. LATTA:** Do you have any comments about the various pools of assets that people have? Is it by definition, if you had personal savings, should you use personal savings first as opposed to anything in a qualified vehicle? Could you comment on those sorts of tradeoffs, those sorts of choices that hopefully people have personal savings besides qualified?

**MR. GENNO:** We probably both have perspectives. Personal savings come in different forms. People can have personal savings that are liquid and some that are illiquid. Often these days in North America, one of the biggest illiquid assets that people have is their home. It's very difficult to access the capital in that home, absent vehicles like reverse mortgages, which sometimes people are apprehensive about using. So, if I look at liquid assets, a typical concept would be to use liquid assets that are outside of qualified vehicles first and retain the tax-qualified status of investments as long as you can. Having said that, looking at how the capital gains tax structure works, with some of the recent changes in the United States, and the tax structure that's currently in place in Canada with respect to capital gains, this is changing that balance in terms of whether people access capital or not. It's starting to shift asset mixes as well, so people are more inclined to hold investments that are producing capital gains outside of qualified vehicles and hold interest-producing vehicles within their qualified vehicles.

**MR. SZE:** That is a very important issue. As a matter of fact, many consultations I gave were on this issue. For a person with a mixture of stocks and bonds, we need to advise them on what part of the portfolio should be in tax-deferred vehicles such as 401(k) or RRSP. The strategy hinges on the tax-deferred nature of the qualified plan. For assets outside the qualified plan, capital gains are taxed at a lower rate than dividends and interest. The best strategy is to keep fixed income assets in the qualified plan, and stocks outside the qualified plan. Furthermore, choose stocks that do not pay dividends but have much anticipated capital gains.

Many people would advise that if you have money, put it into a 401 (k) plan. They say that it is good irrespective, since you get tax deductions from such contributions. This is not always true. It all depends upon the time horizon involved. For long time horizon, it is obviously good to contribute to the 401(k). However, for short time horizon, such as one year, the money deposited at the beginning of the year will be distributed as ordinary income at the end of the year, and will be taxed at your top tax bracket: which is 35 percent in the United States and 50 percent in Canada. Why put money in there? Why not just invest the money in some instrument that will generate a capital gain, which will be taxed at a much lower rate in both the United States and Canada?

**MR. BRADLEY C. FOWLER:** I was thinking about the session on the great controversy and whether some of what was being talked about over there applied to DC plans. It seems that the problem of providing a stream of retirement income is no different in a DC plan than in a DB plan. The main difference is who ultimately is the sponsor—the individual or the plan sponsor? The conclusion I'm coming to is that the cost of an ironclad guarantee is very, very expensive. Fundamentally what's being talked about in the controversy is the cost of providing a virtually risk-free guarantee. What we've been talking about here is effectively that the benefit stream becomes variable, and for considerably less money, meaning a much lower allocation to fixed income or a much lower allocation to a fixed annuity, a retiree has the prospect of doing considerably better but also has the prospect of having to scale down his retirement income at some point. That is the risk function. I'm wondering then, thinking back on the DB side, if maybe sponsors behave the way they do because sponsors and the community as a whole have not adopted the notion that a pension guarantee in a DB plan is absolute, but only somewhat contingent still on the financial viability of the sponsoring organization. If it goes down, then everyone who's a stakeholder, in fact, suffers to some extent, and that includes participants in the pension plan. To get from that version of the promise to the basically ironclad guarantee or the insured version of the promise does, in fact, have a very high price, namely, the requirement that the fund be invested fully in annuities. That, in turn, probably has a fairly high impact on the level of benefits that are actually affordable. I'd be interested in your thoughts on the same question.

**MR. SZE:** As you know, in the United States, as well as in Canada, there is a swing toward DC plans basically because of what you have mentioned, that the cost for the risk guarantee is getting too high for employers. So they convert a DB plan to a DC plan, passing the risk to the employee, who ignorantly accepts it without complaint. This reminds me of my recent experience in Egypt. There the DB benefits are also not guaranteed. Without such a guarantee, a DB plan is just like a DC plan. I believe that it is all a matter of guarantees. Without guarantee, DB and DC plans have the same effect.

A longtime participant of a DC plan may miss the sense of security provided by a DB plan, and may want to go back to a DB plan, even if he has to pay for the cost

of the risk guarantee. I was in Bhutan a few years ago. In the mid-1980s, based on World Bank's advice, they changed their DB state pension scheme to a DC scheme so that they wouldn't need to worry about underfunding. But, in the early 1990s, they reviewed the pension program again, and felt that the DC benefits were inadequate and too risky for people. I was there in the late 1990s. They were in the process of switching back to a DB plan. It is true that the cost of risk guarantee is high. But somebody will have to bear it, whether that someone is the country or the individuals.

**MR. GENNO:** I've seen evidence of that in certain industries in North America, as well, with some interest expressed on the part of plan sponsors to start moving back toward a DB framework or at least a balanced framework.

**FROM THE FLOOR:** I'm from the State Teachers' Retirement System of Ohio, and I actually work on the health side. One of my concerns with your presentation is that you didn't talk at all about health care costs as people age. One of the things we're experiencing with our pension is that we have to increase our premiums and do a lot more cost-shifting through plan-design change. For people who are already retired and had certain expectations about out-of-pocket expenses and premiums, we're getting a tremendous amount of member noise. I mean, people just are not prepared. So, it's a real concern when I hear that people are adjusting their incomes downward as they get older because their capital base is decreasing, but the reality is that for a lot of people when they get much older, their medical costs can go up considerably. With all the uncertainty in health care today, I'm not sure how much the government is going to continue to subsidize. I know it'll be there, but what percentage of subsidy? I think that's a huge unknown, and I don't see a financial or investment analyst talking to people about planning for health care costs as they reach retirement.

**MR. GENNO:** Often the investment education is being done by people who are purely on the investment side, or the retirement planning education is being done purely by people on the investment side. They completely miss the boat on the other risks that people face during their retirement and other needs for income. There were 15 different risks that I showed on the slide with the Society of Actuaries' research on postretirement needs and risks. Easily five or more of those deal with sudden changes in people's health status, people's ability to look after themselves, their need for long-term care and escalating costs of medical care. These are very significant risks that people face. You're right, they are absent from most retirement planning education. There's such a narrow focus on investment issues without looking at how people need to have adequate resources to provide for financial needs that will invariably hit them later in their retirement years. They are quite different from what they may anticipate as their intended consumption pattern at the time of retirement. That's a very good point.

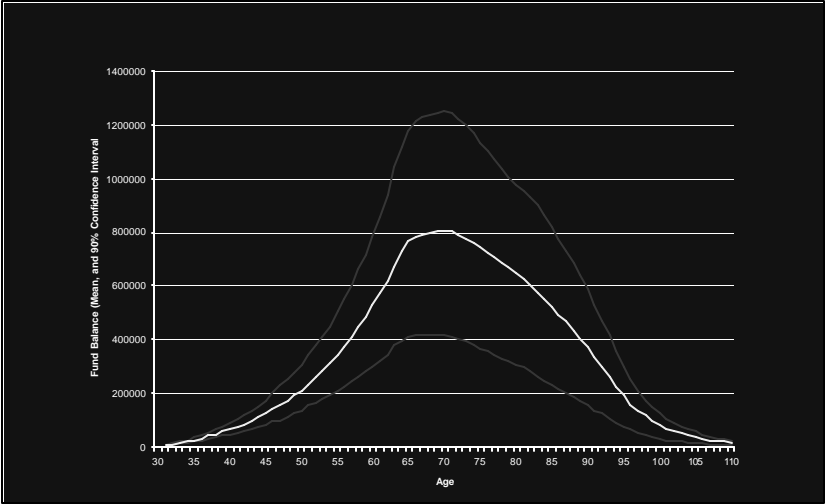
**MR. SZE:** Actually, I have to mea culpa. I didn't talk about that because it wasn't on the topic, but you are right that medical concerns are a big expense. As a matter

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of fact, when I consult with individuals, I always do full lifetime financial planning. In the postretirement income part you always need to talk about your lifestyle expenses, and later on your health care expenses. There always has to be a reserve, a blip for retirement community around age 70 or 75. So, technically all of those should be taken into consideration.

Chart 1

DC account balance build-up/draw-down: range of potential outcomes



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Chart 2

Possible investment approaches to manage risks, pre-retirement / pre-annuitisation

	Inflation risk	Capital risk	Pension conversion risk
■ Domestic equity	✓	✗	✗
■ Foreign equity	✓	✗	✗
■ Balanced funds	✓	✗	✗
■ Bonds	–	✗	✓
■ Money market	–	✓	✗
■ GICs	✗	✓	✗

- ✓ manages the risk well
- manages the risk somewhat
- ✗ manages the risk poorly

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Chart 3

### Comparison of 401K in U.S. vs RRSP in Canada

	401K	RRSP
Enrollment	Automatic allowed	No automatic
Contribution limit	Higher \$ limit; no % pay limit	Lower \$ limit; 18% pay limit
Withdrawal	Early withdrawal tax penalty	No penalty on withdrawal
Loan	Allowed	Restricted
Discrimination test	Tough restrictions	None

Chart 4

Impact of Age on Accumulated Fund

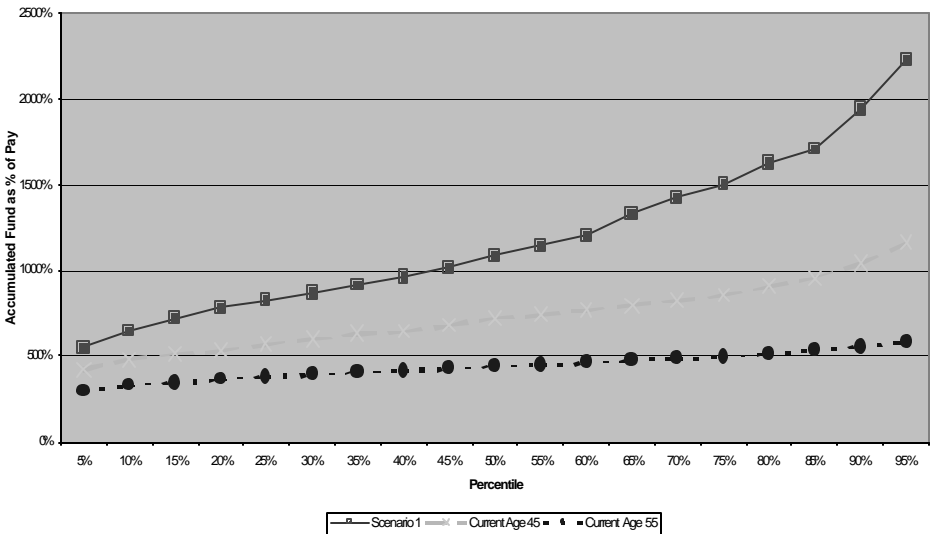


Chart 5

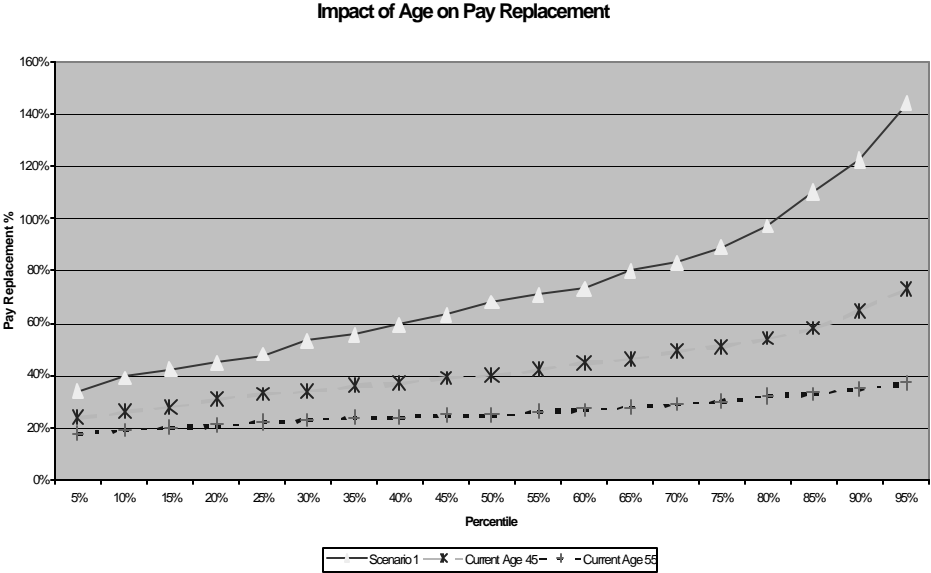


Chart 6

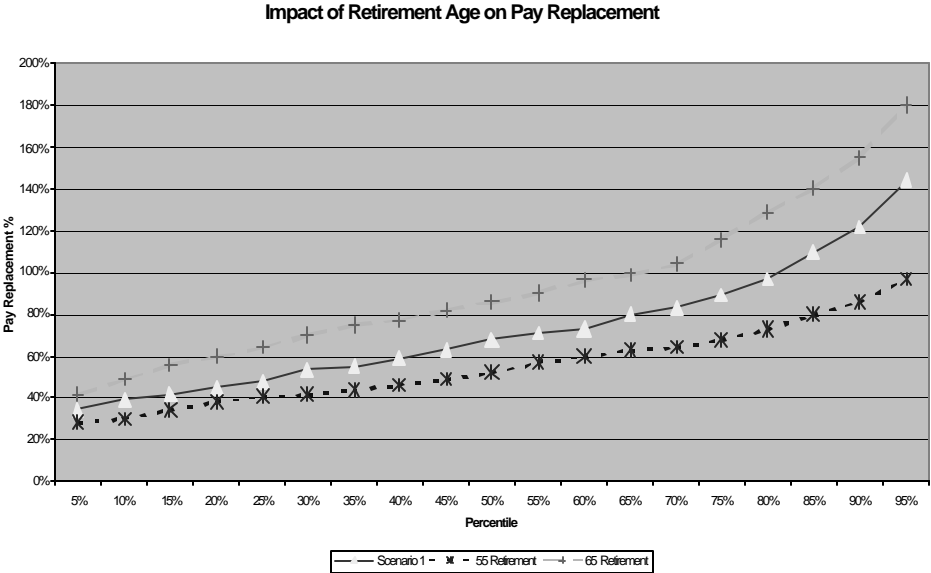




Chart 7

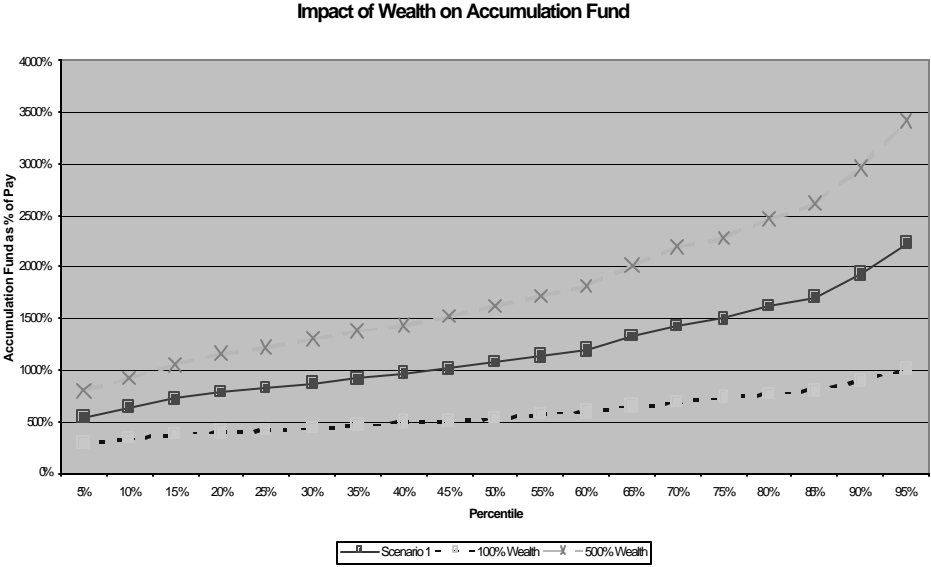


Chart 8

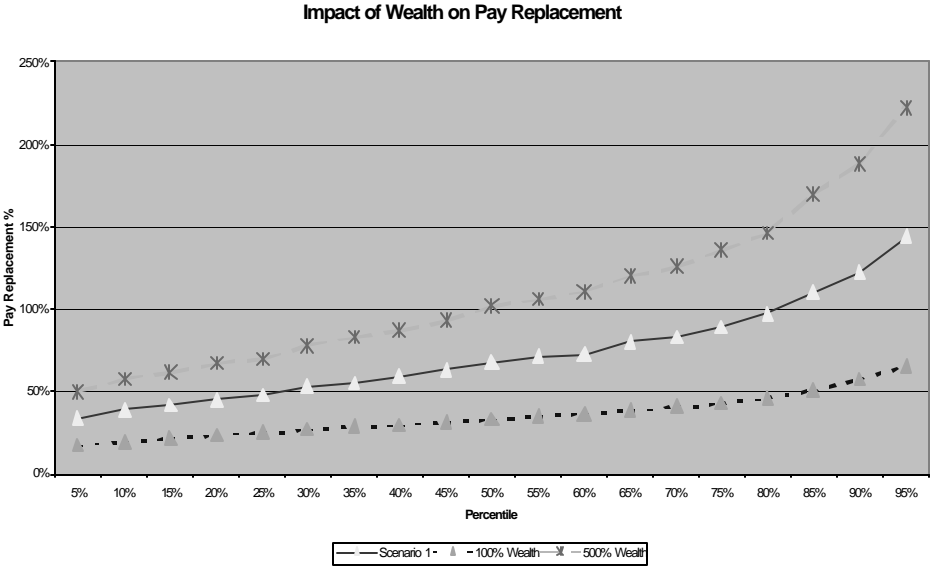


Chart 9

Impact of Contribution Rate on Pay Replacement

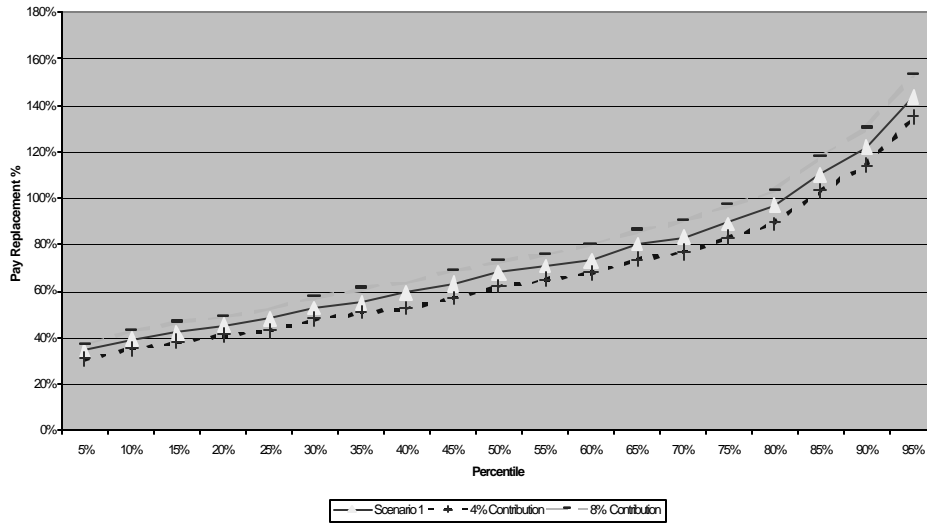


Chart 10

Impact of Investment Policy on Pay Replacement

