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CHOOSING ECONOMIC ASSUMPTIONS FOR PENSION PLANS

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1. How should an Inflation Assumption be chosen?
2. Who should and can be involved in the process?
3. What Economic Assumptions are used for Social Security (Canadian and U.S.) projections?
4. What is the future of productivity and general wage increases?
5. How are Turnover and Retirement Age Assumptions related to Economic Assumptions?
6. Are actuaries using variable or indexed Economic Assumptions? How are they doing it?
7. Should Economic Assumptions vary by plan size? By Benefit design? By valuation method? By investment strategy?
8. How should the assumptions be communicated to the plan sponsor?

MR. MICHAEL J. MAHONEY: The first thought that comes to mind when the subject of economic assumptions is raised - is inflation. To many people inflation means "price inflation" or the increase in the Consumer Price Index. To others, it means "wage inflation" or the increase in average wages. While the CPI may not be the best indication of the level of inflation, it is the one most commonly referred to. With that in mind, let's take a look at what happened during the last 30 years.

Over the 15 year period from 1950 to 1965 the CPI increased at an annual rate of about 1.9%. From 1965 to 1973, the CPI increased annually at 4.3% - more than twice the previous rate. From 1973 to 1979, the increase has been about 8.8% - or again redoubling.

To put some of this in perspective, a 5% annual rate of inflation will reduce the value of money to less than 50% in 15 years. At a rate of 10%, the value is reduced to less than 40% in 10 years.

It is no wonder then that we have seen a rash of articles and editorials referring to inflation's impact on the private pension system and Social Security. In the May 12th issue of Business Week there was an article entitled "Inflation Is Wrecking The Private Pension System" which dealt with the erosion of the purchasing power of the retirees' dollars. Referring to the private system, the article stated "...a realistic appraisal of the pension system today would have to concede that it is no longer a cornerstone of Corporate America - and may even be in a state of slow collapse."

In this environment of increasing prices, increasing wages, and increasing pension costs, it is not surprising that there has been greater pressure to pay more attention to the pension plans actuarial assumptions and in particular to those assumptions affected by the ravages of inflation.

MR. RICHARD DASKAIS: My comments will be from the standpoint of a medium-sized or large pension plan generally with an annual contribution of \$200,000 or more and fund of \$1,000,000 or more. The plan's fund is professionally invested, by a bank, by an investment counsel firm, through an unallocated insurance contract, by in-house employees of the plan sponsor, or a combination of these types of management. The plan is subject to ERISA's best-estimate requirements.

I define economic assumptions as the assumptions in those areas in which future experience is expected to depend primarily on what happens in the economy generally. These are investment return (which I will call "interest"), general increases in pay levels, and increases in the factors in the Social Security formula which are indexed to wages.

The choice of economic assumptions is a matter of judgment, which must be exercised by the actuary. The actuary may discuss economic assumptions with the plan sponsor, and perhaps the auditors of the plan or of the employer. But the views of the sponsor or the auditors should not influence the choice of economic assumptions for any particular plan. If we remember that the economic variables we're concerned with are interest, general pay level increases and Social Security, I don't see how an actuary can expect them to be different for two different employers.

The past experience of a particular employer, or his pension fund, is irrelevant in choosing economic assumptions. Let us first look at interest. There have been studies which show that there is very little correlation between a plan's investment performance in one period and its investment performance in a subsequent period. This makes sense, considering professionally managed funds, because each investment management institution is competing in the same market for the persons who will manage their clients' funds. Even if there were expected differences among managers, plan sponsors have freedom to change managers, and in fact do change managers, and in the case of large funds, the portion invested by different managers.

An actuary should not base his assumed interest rate on a plan's investment policy. If the actuary did this, he would in effect be stating that

his investment expertise is greater than that of the investment managers and others associated with the choice of investment policy. Also, just as with the investment manager, the policy can change. There is no point in basing the assumed interest over a 30 or 40 year period on the investment policy that happens to be in effect at the beginning of the period.

In summary, there is no reason to expect greater investment return for one plan than for another. This doesn't mean, of course, that I expect each plan to have the same investment return. But I can't predict which ones will do better than average and which ones will do worse.

Does this mean the actuary must assume the same interest rate for each plan? Not always.

For one thing, an actuary chooses assumptions for different plans at different times. As a practical matter, the actuary may not wish to make small changes in the assumed interest rate. I'm comfortable telling a client that I have changed my best estimate by 1%, but a change of less than 1% appears to me to be implying a precision that just doesn't exist.

Some plans are not professionally managed in full in the sense that there are material constraints on the investment manager. For example, the trustees of a few small multiemployer plans we work for have adopted a very conservative investment policy for a large portion of their fund - Certificates of Deposit and intermediate range government bonds. For those plans, I assume a lower interest rate than I otherwise would. Incidentally, this policy has proved to be a superior investment policy over the last few years.

My ideas on interest also apply to pay increases. All U.S. employers compete in a large, fairly-well integrated labor market. There's little reason to expect general pay increases over a long period to be different for different employers.

The indexed Social Security formula factors, and the Consumer Price Index, are indexed to national average wages and prices so there's no reason to expect different rates of increases for different plans.

So far, I have tried to make a case for generally using the same economic assumptions for each plan. But how should the economic assumptions be chosen?

Under one theory, the interest rate is separated into three elements, a true or real interest rate, an element for inflation, and a risk premium.

Similarly, general increases in wage levels are separated into two elements, inflation and real wage increase. This is not so much a theory as a definition of real wage increase. Let's assume for the purpose of discussion, that for pension funds the excess of the risk premium over the losses it compensates for is immaterial. The difference between interest and general wage increases is the difference between real interest (after inflation) and real wage increases.

Real wage increases in the economy generally appear to come principally from two sources, from increases in productivity and increases in the employees' share, vis-a-vis the owners, of their employers' revenues. Even with a significant shift in the share, the effect on the percentage rate of change in wages will be insignificant in relation to the inflation and productivity. So the difference between the interest rate and rate of general wage increases comes down to the difference between true interest and productivity increases, if we continue to pursue this theory. Various commentators seem to believe that true interest is, or should be, 2% to 4%, and that productivity has been 1% to 3%, so we (have) an excess of interest over wage increases of perhaps 0% to 2%.

I have some qualifications and reservations about the theory.

First, productivity is usually measured per hour worked. But the general wage increase we actuaries are interested in is the increase in annual wages, because pension plans base pensions on annual pay, not hourly pay. To the extent that there is an increase in paid time off or other benefits such as insurance and pensions, real wages per hour increase faster than real wages per year. Accordingly, I think that perhaps the difference between interest and annual wages may be 1/2% more than the difference between interest and wages per hour.

A more important reservation is my belief that supply and demand forces are important in setting interest rates. Investors and the users of capital do not bargain on the level of real interest rate, add inflation and a risk premium, and decide on the price of a bond or a stock. Many investors, such as pension funds and insurance companies, as a practical matter must invest, and they will buy whatever looks best in the market even if the real return they expect is negative. Similarly, many users of capital must raise capital, and will have to pay whatever the market forces them to pay. Each group, however, considers its expectation of inflation in determining the amounts, types of securities, and timing characteristics of the investments it buys or sells. Consequently, inflation expectations are reflected in interest rates, but not as neatly as some theories might lead one to believe.

The actuary should choose the long-range economic assumptions, and then make any necessary adjustment for any difference between the long-range assumptions and his expectations for the next few years. The actuary cannot be confident about any long-range assumptions, but he is responsible for doing the best he can. Further, best-estimate assumptions should not be conservative. We owe the plan sponsors, administrators, and the participants our best estimates, but we should clearly label them as best estimates. Then the plan sponsors can act conservatively if they choose to.

Parenthetically, I would like to note some experience with multiemployer

plans. It is made clear to the trustees that the actuarial assumptions are not conservative, and specific margins for conservatism are recommended. The trustees, without exception in my limited experience, have adopted benefits that produced the margins for conservatism that have been recommended. The trustees are perfectly capable and willing to act as trustees, if the actuary doesn't pre-empt the job.

Once the long-range interest rate is chosen, the actuary should compare it with the rate at which the fund can currently be invested. I will call this the "current" rate. It's not the rate now available on short-term investments. It's the rate now available on long-term fixed income securities. This rate can be measured by the yield available on long-term government bonds, or high grade corporate bonds. These yields are readily available. If the currently available yield is materially different from the actuary's estimate of the long-range interest rate, and the fund assets are significant, some adjustment of the long-range interest rate is appropriate.

Theoretically, some estimates of future long range rates are available in the market. For example, by comparing the current yield on a 10 year government bond and the current yield on a 30 year government bond, we can calculate an equivalent yield for something that resembles a 20 year bond to be bought 10 years from now. Another estimate of long-range interest rates is available from the yields at which 20 year Treasury bond futures are trading on the Chicago Board of Trade. These go out almost 3 years.

My estimate of the long-range interest rate is about 8%. I don't have full confidence in this. It might turn out to be 9% or 10%, or it might turn out to be 6% or 7%.

The currently available yield on many indexes is 10% to 11%; let's call it 10% for the purpose of discussion.

How can we blend the long-range rate with the current rate? Since I'm familiar with select and ultimate mortality rates, the first thing that comes to mind is a select and ultimate interest rate. This sounds fine, until we think about the theory and the mechanics.

Theory first. Select and ultimate mortality rates are based upon the observed effect of selection, and the period over which it disappears. There is nothing "select" about today's investments. I just expect the rate at which fixed income investments can be made will decline from today's 10% to an average of 8% over some distant period. But I know that there will be material fluctuations in the rate. The analogy to select and ultimate interest rates is far from perfect.

Next, mechanics. If your valuations are all done by discounting future benefit payments, then it's easy to calculate present values with varying interest rates. But if you use commutation functions, the calculations become more complex. Also, I have not found a satisfactory choice of the right interest rate to use for determining the entry age normal cost. The theoretically correct rate might be the 8% ultimate rate, but this produces the practical problem of a material negative accrued liability for each new entrant.

Gains and losses must be considered carefully if you use select and ultimate interest rates. Suppose we assume that the interest rate will grade from the current 1980 rate (10% in my example) to the ultimate rate (8% in my example) over 5 years. This means that we assume rates will decline by .4% each year. In 1981, if the experience is exactly as we assumed, the current interest rate will be 9.6%. Suppose we're right. If we assume next year that this grades over 5 years to 8%, the decline each year is .32%, or different from the .4% we assumed in 1980. This one can be solved by assuming grading at a specified rate rather than over a specified period. Then it's possible for the experience to match the assumptions.

In our firm we have used a reasonably simple way to handle the difference between the 10% current rate and the 8% assumed long-range rate. Even if I'm confident of the 10% and the 8%, I have little confidence that I can predict the precise pattern of the change. Therefore, I choose a pattern that is extremely convenient to work with. I assume that all current assets can be invested to yield 10%, in a portfolio having the characteristics of a 20 year mortgage, i. e., level combined payments of principal and interest. I further assume that all future contributions, and payments from the present portfolio, will be invested at 8%.

Based on these assumptions, I can do the valuation with relatively little complication. All present values are calculated on an 8% interest basis.

Then I calculate the premium at which a 20 year 10% mortgage would sell to yield 8%, and apply this premium to this market value of assets, resulting in what we call a "liability adjustment". If the valuation calculates an accrued liability directly (e.g. entry age normal or unit credit) the liability adjustment is subtracted from the accrued liability. If the valuation method is frozen initial liability or aggregate cost, the liability adjustment is subtracted from the present value of benefits before the normal cost is calculated.

The mechanical valuation procedures do not have to change with a change in the current rate, as long as we do not change the 8% long-range rate. All of the funding standard account calculations are made on the 8% long-range rate.

If, in fact, the current interest rate changes by next year from 10% to 8%, the liability adjustment will disappear. If the fund was invested in a fixed income portfolio having the characteristics of 20 year mortgage, it would have appreciated so that the net result is no gain or loss due to the change in the current interest rate.

MR. HAROLD J. BROWNLEE: The topic of the day is "Economic Assumptions." Several questions are in order. Which assumptions are economic assumptions? What choices do we have for each of them? How do we, in fact, choose economic assumptions? What happens if we make a poor choice?

The assumed rate of investment return, commonly called the interest assumption, is certainly an economic assumption because it is affected by a multitude of economic factors, among them the supply of and the demand for various types of investments, government fiscal policy and

central bank monetary policy. Future levels of wages and salaries are economic in nature too because they are determined in the marketplace. Similarly, employee turnover can be classified as an economic assumption, although some would say it is not. The same is true of rates of early retirement and postponed retirement.

In multi-employer plans and others supported by cents-per-hour contributions it is commonly assumed that the annual number of hours for which contributions are made will remain level, which is usually, but not always, equivalent to assuming that the number of workers and the average hours worked per year will remain level. This too is an economic assumption because it depends on the future economic health of the employer or employers supporting the plan.

Although other assumptions have economic impact, the ones mentioned are the only ones I will cover in this brief discussion. Here is the order I will use:

1. The constant workforce
2. Retirement rates
3. Turnover
4. Interest and salary scale

The Constant Workforce

The technically simple multi-employer plan has one collective bargaining agreement with a single contribution rate for all participants. The complex variety has many, perhaps thousands, of bargaining agreements with different expiry dates and different contribution rates. In either case the plan's trustees must set benefit levels which they and their actuary believe can be supported by the expected flow of contributions. What should they expect?

Most often original benefit levels and later increases apply to all service so that the plan has an accrued liability. By assuming that the future flow of contributions will be the same from year to year the actuary can determine how much will be available to amortize the unfunded accrued liability. This is what is left after deduction of the expected expenses and the expected normal cost. He then has an idea of how long it will take to amortize the accrued liability and whether the plan will meet minimum funding standards. Fluctuations in the workforce and the flow of contributions give rise to gains and losses.

If an industry is expanding, the level workforce assumption is conservative. Generally, both labor and management trustees are optimistic about the future of their industry and assure the actuary that any downturn in employment is temporary. It is clear that a temporary downward fluctuation will have little adverse effect on plan funding, but that if employment levels off at 90% or less of that expected, the plan may have serious problems. This is, of course, due to the fact that the employees thrown out of work are those with the least service so that the accrued liability does not decrease as rapidly as the contributions. Unless there is sufficient margin, a change to a more conservative assumption is seen

as a cutback in the plan and can cause severe friction on the board of trustees. Hence, it is important that the actuary, whether he chooses to assume level contributions, increasing contributions or decreasing contributions, should be keenly aware of the problems that can arise if the assumption is too optimistic.

Retirement Rates

So far I have not used that ugly word "inflation." Now I'll start. Many things affect an individual's decision to retire. One of them is the belief, or hope, that he (or she) can live reasonably well on the income that he will have. In making his own economic assumptions one question he should consider is the effect of possible high future inflation rates on living "reasonably well." An employee who has a reasonable expectation that his retirement income will increase after he retires as the cost of living goes up may decide in favor of earlier retirement than an employee who expects that his pension will be level after he retires but that its initial amount will be affected by increases in salary before he retires or by collectively bargained improvements in pension contributions. This is another way of saying that some participants who expect continuing inflation will choose to stay on the job longer than they would otherwise have done.

The actuary may not change his retirement assumption to recognize this, but he should be aware of whether it will result in gains or in losses.

Turnover

Assuming that turnover is an economic assumption, what do we know about it? These are the principal effects of leaving a job:

1. The person takes another job
2. The person leaves the labor force voluntarily, e.g., to raise a family
3. The person leaves the labor force involuntarily, e.g., there are no other jobs available

When times are good and the economy is expanding we see high voluntary turnover. In a recession we see lower voluntary turnover but an increase in involuntary turnover. This can vary, of course, from industry to industry and from company to company. Our problem is that if the termination rate of the participants in a particular plan is strongly affected by business cycles, in what way should this affect our choice of a turnover assumption?

Our actuarial training tells us that we should use experience rates based on a study that extends over more than one complete business cycle. The practical difficulty is that such studies are rarely available. In practice we may have three or four standard tables among which we vacillate depending on the experience of the most recent two or three years.

Interest and Salary Scale

At long last I have arrived at what most plan sponsors believe are the

"real" economic assumptions. I will consider them together because it has become traditional to do so, although it is my opinion that there is a great deal less linkage between them than many consulting actuaries seem to believe. They both seem to be affected by inflation, but it is in different ways.

Some thirty years ago I read in The Economist that western countries have a trio of economic objectives:

1. Full employment
2. Free collective bargaining
3. Stable prices

The Economist went on to point out that you can have any one or any two of these, but not all three at the same time. History has proved the correctness of that observation.

Expansion of the money supply and general increases in price levels go hand in hand so often that they are both referred to as inflation. I'd like to refer to them as price inflation and money inflation.

Price inflation can be caused by many things, but one of its effects is that workers try to increase their earnings rates to match it. To the extent that they succeed, there is an inflation component in their actual increase in earnings and therefore a temptation to add an inflation component to salary scale assumptions. You will note that I said "to the extent they succeed." Success is easier when the economy is expanding than when it is static or contracting. It is quite conceivable that a round of price inflation caused by changes in supply/demand relationships (such as the energy problem) could have little or no effect on salary levels.

Money inflation can also be caused by many things. When lenders expect future money inflation they try to charge a higher rate of interest to offset the expected loss of value of their money between the date loaned and the date repaid. Borrowers are often willing to pay higher interest because the expected economic conditions will still let them make a comfortable profit. An increase in interest rates may occur without any money inflation and a decrease may occur (as this spring) without deflation.

The effect of money inflation on the return from equity investments is obscure. It used to be the accepted wisdom that common stocks were a good hedge against money inflation. This has not been true for the past ten years or more. It may or may not be true in the future. Today the accepted wisdom is that money market funds and real estate are good hedges. I doubt that the problem is that easy to solve. After all, to foretell the future is to change the future, so that in economics the accepted wisdom is never right.

In my work we used to use salary scales which varied by age with higher rates of annual increase at the lower ages grading down to little or nothing at higher ages. Four or five years ago we began to change to a flat 3% or 4% for all ages. A year or so ago we started changing again: back to the old scales but with 3% or 4% added at each age for expected long term inflation.

My clients tend to have a large portion of their assets in Prudential's general account, which consists primarily of fixed dollar investments which are, in essence, held to maturity. The investment year method is used to allocate income to each contract.

To the extent that money inflation affects interest rates, it does so only for money currently being invested. The yields on funds invested in prior years are affected little, if at all. As a result the rate of return last year for a typical client was around 8% or a bit more even though the return on funds newly invested last year was over 9%.

Before October, 1979 interest rates had been rising gradually for thirty years. It is unlikely that they will continue to rise for thirty more years. It is more likely that they will tend to level off somewhere. Let's look at the effect of leveling off.

Let's assume that the interest rate in 1980 is 12% for new investments, that it reduces to 11% in 1981, 10% in 1982 and so on down to 6% for 1986 and all later years. Let's assume that equal annual payments are put into a fund, starting in 1980. The interest payments and repayments of principal are reinvested in the year received at the rate for new investments for that year. After 20 years, what yield has been achieved? My calculation showed 7.3% using for each year's investment a bond which is similar to a typical investment in our general account. Over thirty years the yield would be lower, around 6.7%.

This suggests that the interest assumption should be close to what the actuary feels will be the ultimate rate. The history of interest rates over the past hundred years tells us that a reasonable ultimate rate is around 4%. As we move from an era of national economics to one of global economics this may no longer be possible. A reasonable ultimate rate may now be 5% or 6% or even higher.

In practice I have for the past year or two been using 5-1/2% for multi-employer plans and 6% for other plans. I prefer not to make frequent changes in assumptions and will review this again late in 1981.

Why do I use a lower assumption for multi-employer plans? The penalty for being too liberal is quite different in a multi-employer plan than in other plans. If the interest assumption must be reduced for a single employer he may simply have to increase his contributions. If it must be reduced for a multi-employer plan it may be necessary to reduce the rate of benefit accrual because it may not be possible to increase contributions.

Conclusion

The economic assumptions receive more attention than they used to because economic conditions are changing rapidly. This tempts us to change our assumptions more often than we should. It is, however, more important than ever that we set a course for the long term objective and resist the pressures to follow every temporary change in the economic environment. Our duty is to serve the long term interests of the plan participants.

MR. H. WAYNE WOODS: My remarks today reflect Canadian experience and practices in the valuation of pension plans. The economies of our two countries are tied so closely that many of these comments could probably apply equally well in the United States.

One of the most important tasks facing actuaries in the valuation of pension plans is the determination of the economic assumptions. Not only are these assumptions difficult to determine but, their impact usually outweighs all other assumptions. Mortality, for example is relatively simple. Using GAM 71 or GA 51 with or without projection doesn't influence the results as much as the interest or salary assumption. The actuaries' task by his special training and education, is to determine the appropriate assumptions and use these to arrive at realistic funding strategies for each plan. Equally important he must be able to explain, not only to plan sponsors but also to government authorities and plan participants the reasons behind the assumptions used for the particular situation at hand.

The Private Pension Plan Committee of the Canadian Institute of Actuaries (which has recently been reorganized into 7 separate committees) has been drafting a Pension Handbook which lists the usual economic assumptions for pension valuations to be:

1. Price Inflation Rate
2. Compensation increases
3. Progression of the Canada Pension Plan benefits and contributions
4. New Money Interest Rates in the Future
5. Rate of Increase in Dividends and Market Values of Equities.

It is imperative that there be consistency between economic assumptions, and since inflation is the common denominator in all, it is logical to deal with this first. For practical purposes this "deflation factor" can be assumed to equal the average rate of future annual increases in the CPI.

While most pension valuations assume an average rate of inflation over the future lifetime of plan members, multiple assumptions are becoming more common. For example, instead of a single interest rate for the whole valuation period an initial rate is assumed for the first fifteen years and a lower rate for the remainder.

What can we expect the inflation rate to be over the next 30 - 40 years? Can we rely on the past to predict the future? Looking at the last 50 years the Canadian CPI increase was on the average approximately 3%. This rate varied from minus 9.8% in 1931 to plus 14.2% in 1948. Looking at 10 year intervals the values varied from an average of minus 1.6% (the lowest) from 1929 to 1939 to plus 6.88% (the highest) during the period 1969 to 1978. The CANADIAN INSTITUTE OF ACTUARIES publishes annually a Report on Canadian Economic Statistics which is invaluable to pension actuaries.

Rates of interest are constantly fluctuating in the investment market, however, a generally accepted economic theory is that there is a direct linear correlation between interest rates and inflation. The underlying basis of that theory is that in a free market economy, the supply and demand for investment capital will result in gross rates of interest on riskless investments gravitating towards their "natural" levels. This level equals the true underlying rental value of capital in real terms plus compensation from borrowers to lenders for the anticipated future declining purchasing power of money.

Temporary aberrations and random fluctuations arise frequently to disturb the smoothness of the above correlation over the short term. However, it is extremely difficult if not impossible to measure those temporary aberrations and random fluctuations until well after they have occurred. To be able to ascribe with any degree of confidence swings in the general levels of interest rates when they occur to anything other than real changes in the economy's perception of the trend of future price inflation has been impossible. Furthermore, the above theory has stood up fairly well in the past in the light of empirical evidence measured over time horizons that are sufficiently long to dampen or eliminate the effects of temporary aberrations and random fluctuations. Thus, when a stream of payments can be expected to increase at the same rate as general price inflation, the net capitalization rate will be equal to this true underlying rental value of capital commonly referred to as the real interest rate. Alternatively, the long term rate of price inflation implicit in the current economy can be deduced by deducting this "constant" real rate of return from the gross rate of interest available in the market.

Real interest rates (i.e., the excess of rates of interest over price increases) have shown considerable variability in the last 50 years. Looking at 10 year periods, they have ranged from a high of just under 6% per year in the 1930's to a low of around minus 2% per year in the 1940's. The average real interest rate in Canada over the last 50 years was 1.86%. The average real interest rate in the first 25 years of this period was about one-third of a percentage point below the 50 year average of 1.86%, and the average real interest rate in the second 25 years was about one-third of a percentage point above that 50 year average.

The data seem to suggest that when there is a prolonged period of unexpected price deflation, as occurred in the 1930's, real interest rates will tend to be on the high side. Conversely, when there is a prolonged period of unexpected price inflation as occurred in the 1940's and 1970's, real interest rates tend to be on the low side. But the most significant inference that may be drawn from the historical data is that the people and institutions comprising both sides of the investment market eventually do adjust their expectations of future price inflation and that the major determinant of a change in the market rate of interest is in fact a change in the expected rate of price inflation.

Historically, it has been possible to obtain a rather higher "risk-free" yield than that on Government of Canada Bonds, by purchasing other bonds, such as those issued by the Provinces. However, yields on corporate bonds in excess of those obtainable on provincial bonds should not be considered risk-free. Some actuaries consider that such additional yields should be treated as margins to cover additional risks and expenses. This point of view could also be applied to equities. However,

if investment returns on the fund have been consistently better than would be expected from the indices, it may be appropriate to anticipate that this will continue at least part-way into the future by assuming that higher new money rates will be earned by the fund.

Over the longer term new money rates are probably usually assumed to be between 2.5% and 4% in excess of assumed C.P.I. increases, depending on one's view as to what classes of bonds may be considered risk-free and the extent, if any, to which one should anticipate superior yields resulting from non-risk-free investments.

Some assumptions are necessary to enable us to project the cashflow resulting from equity investments. There are several methods of doing this. In general terms, however, the assumptions should be consistent with the remainder of the economic assumptions. Probably the long term yield on equities resulting from the assumptions should not be less than that assumed for fixed-income securities, although there is, of course, a greater element of risk involved. Hence, many actuaries assume that yields on equities, both presently held and still to be purchased, would be equal to that which they assume for fixed-income securities, with any excess or short-fall in yield emerging in future valuation reports as actuarial gains or losses from the interest assumption.

Empirical evidence confirms that average wages and salaries have consistently increased at a faster pace than general price inflation. These historical increases in real compensation are primarily due to increases in productivity in the economy as a whole, although there are other possible factors as well such as a redistribution of the national income pie towards wages and salaries and away from some of the other segments. This empirical evidence and theoretical considerations leads to the conclusion that the higher rate of increase for wages and salaries is a permanent feature of our economic system.

Statistics also show that there was much less variability in the increase in real wages and salaries (i.e., the excess of wage and salary over price increases). This excess averaged 2.33% per year over the last 50 years in Canada, although there seems to have been a secular downtrend in the rate of that increase over the last 3 decades. The averages for ten year periods ranged from a low of 1.86% in the 30's to a high of 3.04% in the 50's. In the last 2 decades the excess of salary and wage increases over increases in prices have been at approximately the same average rate being just over 2%. These rates do not include merit and promotional increases which the actuary should reflect in his valuation according to the particular characteristics of the group being valued.

The social security assumption in Canada usually involves integration with the Canada and Quebec Pension Plans (C/QPP) and in some cases but to a lesser extent with the Old Age Security (OAS). The benefits under the C/QPP is expected, and in fact is legislated, to increase 12-1/2% until the Year's Maximum Pensionable Earnings reaches the Industrial Composite Index of Wages and Salaries and thereafter will follow that index. Since both the C/QPP are fully indexed to the Industrial Composite before the retirement age of 65, this catching up will take a number of years with today's high inflation. The assumptions used in Canada usually reflect this catch-up feature over a few years and

thereafter to assume increase in Social Security benefits equal to the salary assumption.

It must be remembered that the foregoing was based on averages across Canada. The actuary can use this statistical evidence as background as he relates his economic assumptions to a particular industry and geographic area.

Whatever the actuary decides, his assumptions must be consistent and relate to all factors inherent to the valuation. This includes plan design and valuation method. Of course in the end, whatever scenario he wishes to go with, the valuation must contain a certain element of conservatism. Usually in Canada an implicit approach is taken when submitting the results to government authorities. For internal fund management purposes however, many more valuations are now being done with explicit assumptions.

The plan sponsor plays an important role in all this and an important challenge to the actuary is to communicate his results appropriately. The main tool is the valuation report which outlines the general background to the assumptions chosen and their interrelationship. Some sponsors just want the "cost" and no explanation while others appreciate the difference between "costs" and "funding". The best way for an actuary to communicate to an enlightened, willing sponsor, is in my opinion, by personal meetings and discussions.

For those actuaries responsible for Canadian valuations, you should refer to the CANADIAN INSTITUTE OF ACTUARIES Recommendations for Valuation of Pension Plans that went before Council for approval last Sunday. Like the Recommendations of the Academy it provides guides for conduct in the valuation of pension plans by its members. This includes the provision of a salary projection for final salary plans which was not present in the first edition that went to Council. These Recommendations supplement both the Guides to Professional Conduct and Opinion CIA - 4 relating to actuarial principles and practices.

MR. MAHONEY: Before taking questions from the audience I would like to briefly outline an approach which was used by a non-actuarial organization to revise actuarial assumptions for a public employee retirement system. Their approach focused on the difference between the interest rate and the salary scale. At the time of their review, the current interest rate and salary scale were 7.5% and 5.5%, respectively.

First the firm analyzed the real rates of return on various fund investments. Then they reviewed the system's current philosophy and made a projection of new investments by type. The results were an estimated real rate of return on investments over the next 40 years of 2.5% to 3.5%.

Based on a Department of Labor productivity study and their own judgment they concluded that the productivity increase over the next 40 years would average about 2% to 3% annually.

Salary increases for the system were compared to the increases in general wages. Thirty years ago average salaries for the system were about 25% higher than general wages, and now they were about 50% higher than general wages. It was determined that this practice would

not continue and that in the future average salaries in the system would not increase as rapidly as general wages. Based on the projected productivity and the wage comparison it was determined that wage increases from causes other than inflation would be 1% less than the real rate of investment return.

Finally a long range inflation assumption was arrived at through a review of the long range Social Security estimates and other sources. The final results were: 6% inflation, 9% interest and an 8% salary scale.

MR. MAHONEY: I have a question for the panel. Do you make any modifications in your actuarial assumptions if the plan provides for automatic cost of living increases or if such increases are provided on a regular ad hoc basis?

MR. DASKAIS: The answer is no. We have several negotiated plans which provide for future increases. We recognize the cost of future increases for IRS purposes as they become effective as required by Revenue Ruling 77-2. But I understand that FASB 35 and 36 will require reporting of present values of accrued and vested benefits to be based on the ultimate bargained level.

MR. DENNIS M. MORRIS: Presently, IRS approval must be obtained before the actuarial cost method can be changed. Do you foresee this being extended to actuarial assumptions? Do you foresee the possibility of the IRS dictating a range of assumptions?

MR. BROWNLEE: I think dictate is rather strong. Obviously there is a range of reasonable assumptions; and any individual assumption can be challenged. The important thing is the results and the reasons for using the selected assumptions. If actuaries are manipulating assumptions to obtain certain results then that is wrong and the profession should take steps to correct it. Similarly, if the abuse is wide-spread, then its possible the IRS would have to take corrective measures.

MR. WOODS: In Canada, I've only had experience with a couple of plans which make ad hoc adjustments. One of them funds for adjustments over a 3-year period which can create some funding problems. Regarding union plans with ad hoc future adjustments, the employer which I deal with doesn't want to fund for increases beyond those already bargained.

MR. DASKAIS: Many of our clients feel that they are being helped by not being required to fund for future benefit increases. To the extent that these benefit increases are bargained I don't believe that either the employer or the union intend for them to be anticipated. The intention of deferred increases is to bring in costs over the term of the collective bargaining agreement. Neither employers nor unions want benefit increases to be fully recognized at the time they are bargained.

MR. BROWNLEE: It's not always best, economically, to pre-fund pension increases in an inflationary period. By recognizing ad hoc increases when they come in you are paying for them with cheaper dollars.

MR. JAMES T. COLBURN: In my opinion, the actuarial assumptions should not be chosen by the actuary alone. Since the plan sponsor is a fiduciary

he should have as much input as the actuary. For example, the inflation assumption might well be chosen by the plan sponsor as inflation is not the plan's experience but the country's experience.

MR. BROWNLEE: There are three kinds of actuarial assumptions. For the first kind, such as mortality, the actuary is uniquely qualified to make the selection. The second type, such as turnover and salary scale, requires consultation with the plan sponsor as he is the primary source of information as to the Company and industry practices. Finally, the interest assumption is one on which everyone is an expert. It is true there may be a funding policy when the plan is established. But as conditions change it is up to the actuary to make changes in the assumptions so as to protect the plan participants.

MR. ROBERT STAPLE: Are you saying that even though a professionally managed fund which had a more conservative investment strategy might have an expected return that is less than a more aggressive investment strategy, that you would use the same investment return assumption for both of them? This seems to imply that the investment world is all equal in the long run. Does this mean that you would expect these different investment strategies to change at some future time? If so, wouldn't it be better to take that into account at a future date when the strategy was modified, rather than assuming in advance that it would be?

MR. DASKAIS: I am not assuming that the investment strategy will be modified in the future. I am assuming that the investment manager knows more about investment management than I do. I won't overrule him or change the expected long-term cost of the plan, because I would not pick the same investment policy as he did. Let's say I normally use an 8% long range investment result. If I were to decrease to 6% when one set of trustees decided to invest in two month governments, then I should probably also go up to 14% when the optimistic investment manager tells the trustees he will get 14%. Normally, I won't do either, with the possible exception of a multiemployer plan since winning isn't as good as losing is bad.

MR. PAUL GEWIRTZ: FASB 35 and 36 requires that we discount the present value of accumulated benefits at an interest rate that reflects the current market rates, but isn't quite the current market rate.

Dick, in the scenario you drew with an 8% long-term valuation rate and a 10% current environment, what interest rate would you use in complying with FASB 35 and 36?

MR. DASKAIS: I have not yet prepared any reports which are intended to comply with FASB 35 and 36. But it is my intention to apply the same sort of adjustment - that is, the amount representing the premium at which a 10% mortgage will sell to yield 8% - to the present value of benefits, irrespective of assets. This is because I believe what FASB 35 is seeking is the amount of fund that would be required on the benefit information date to fully provide the benefits.

MR. BROWNLEE: The final version of FASB 35 says that you should consider not only current market rates for investments but also rates at which money can be reinvested in the future.

This also relates to communication of actuarial assumptions, and with FASB 35 this problem is mainly communication with the accountant. We've prepared some calculations which demonstrate to the accountant the effect of changing reinvestment rates and in particular that the ultimate rate has a greater effect than the current rate.

MR. GEWIRTZ: FASB 35 suggests that in place of an interest rate selection, underlying rates from annuity purchase factors can be used. Do you know if insurance companies are planning to use this alternative?

MR. BROWNLEE: Yes, those are for plan termination. The problem is that FASB 35 says this is acceptable only if the accountant can obtain the underlying assumptions for the rates used. In a competitive non-par market we would never disclose the assumptions used to determine them.

