## FINANCIAL ASSUMPTIONS IN PENSION PLAN VALUATIONS

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- What are the current practices?

0 Discussion of a paper currently being written by the Committee on Pension Principles and Related Research

MR. EDWARD W. BROWN: The first speaker, Yuan Chang, is the chairman of the Society Committec on Pension Principles and Related Research. This committee is writing a paper on selecting an interest rate. He will give some background on this paper and a description of the way the committee has approached this subject.

MR. YUAN CHANG: I happen to be the chairman of the Committee and also the original proposer of the paper, which is going to be fairly lengthy. It has taken a different approach from what most people may be used to.

Let me read a few principles from the paper and make some comments on it. Some of the statements I'm going to be reading from the paper may sound rather obvious, perhaps even trivial, to you. But I hope that you will think about the implications and, if you truly believe these statements, think about the practices that you have. Are you really doing what you should be doing in terms of what you believe, or, by the same token, are you not doing what you should be doing?

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The first principle is that an interest rate assumption is not solely dependent upon asset characteristics unless the asset cash flow matches that of the liability exactly. This statement is fairly obvious. Everybody knows that when you pick an interest rate assumption, you are not really talking about just what kind of assets you have. The fact remains that those asscts may or may not be suitable to the kind of liabilities you are dealing with.

The second principle: an interest rate assumption is dependent upon optimal investment of assets. That may be even more trivial sounding. Now what are we really trying to assume in terms of interest rates -- an optimal rate managed by whom? In what kind of investments? What is it that we're really looking at? After all, discounted value is an abstract concept. If you had no funds at all, you'd get nothing out of the assumptions. Therefore, you almost have to start with some assumption as to what a set of liabilities might be worth if you had a fund with which you could invest in something. A collateral principle: since a rate assumption presumes optimal investment of assets, an optimization is a function of the securities available at the time -- a sum of money needs to be invested. As I said before, this also sounds very obvious, but how many of you, in adopting an interest rate assumption, take that into consideration?

The third principle: an interest rate assumption is dependent upon who will manage the assets in question to obtain the "best" results in light of known liabilities, taking into consideration the cost of that management.

We are still debating on whether the following question should be a principle or not -- what makes an investment yield higher for one investment than another investment? The fact that one investment produces a higher yield than another to some of us means someone must be paying for something. And that is why it yields higher. Or it is the price being paid for something. Along with the three principles mentioned above, this leads us to the conclusion that if you take a projected set of short-term interest rates, you have a set of interest rate assumptions that is at least minimally reasonable. You can use, for convenience, one-year Treasury bill rates as an interest rate we would consider minimally reasonable.

How do you justify a rate that's higher than a series of short-term interest rates? If you believe that a higher rate is paying for something, then you'd better understand what that something might be. Now you don't have to understand everything that the price is paying, but if you can find anything at all in that -- risk, administration, etc. -- then you can work on the elimination of that for which the price is paying. To put it another way, given a risk, if you can find a way to eliminate that risk and stay in that type of investment, then you can justify the higher yield -- higher than that of a one-year Treasury bill, which is what we chose as a projected set of short-term riskless rates.

For example, say you want to invest in long-term Treasuries, which presumably are also riskless (as related to credit risk), but are long-term and pay a higher yield than one-year Treasuries. The very fact that they are paying a higher yield means you are paying for something. That something is the interest rate risk. And if you're talking about an interest rate risk -- the simple concept that if interest rates go up, market value comes down -- then you'd better have your liability coming up at the right time. If you don't, you're getting a higher yield but not being able to match your liability. On the other hand, if you can match your liability, then you have eliminated the risk for which the price was paid. Therefore, your use of the higher level of interest rate is justified. That sounds theoretical. But when you turn it around, it is the very essence of the popular concept of immunized or dedicated bond portfolios.

There are a number of other things, of course, that you can probably think of to eliminate factors that provide a higher yield and therefore justify the use of the higher yield. That is the essence of the Committee's paper.

The paper is not written just for pension valuations. It is also written to answer the question of interest rate assumptions for many different purposes. These could range from an insurance company doing a premium calculation or a reserve calculation to tort damage, what life is worth, how do you price a structured settlement, etc. You can even talk about a new financial project: what is the proper interest rate to assume to evaluate the worth of the project so that you can make your proper choices and proper decisions? In this paper,

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aside from the theory, we go into a sct of applications. I just mentioned a number of these applications. The paper emphasizes two sets of applications. One is the multi-employer situation, where, as you know, interest rates have become rather controversial. And the other, of course, is plan valuation.

MR. EDWARD BROWN: Darrel Croot will now read Jim Jackson's remarks; Jim was unable to make the session today.

MR. DARREL J. CROOT: As actuaries, we have many publics to serve -- plan participants, plan sponsors, the financial community and so on. And we have the IRS looking over our shoulders. Each has different needs and concerns, and part of the perception problem we face is that we have tried to make one sct of numbers provide appropriate results to each of these audiences.

The financial community, through FAS 87, has in effect rejected our numbers and provided us with criteria to develop, it hopes, more useful information. Further, it has forced us to recognize that liabilities have a present value that is independent of the amount and type of assets in the plan, similarly to what Yuan just said. However, for minimum and maximum purposes, in order to avoid spurious gains and losses, the discount rate for liabilities and expected return on assets implicitty must be the same. Based on current volatility of discount rates, it is quite likely that for FAS 87 , rates will need to be changed annually -- sometimes more frequently -- while assumptions for funding are likely to remain in place for scveral years between changes. Thus, it is unlikely that adopting year-specific discount assumptions will minimize the need to use different assumptions for different purposes. This will frustrate the hopes expressed in the Committee on Pensions' paper suggesting the use of select and ultimate interest rates. For the remainder of my time, I'll stick to the minimum/maximum valuations, and leave FAS 87 alone.

There are a number of problems one encounters when implementing year-specific discount rates. The first is technical. Computer programs may need to be modified, and technicians must be trained in new procedures. Second, we must determine what it is that leads one to belicve that discount rates and investment returns should change over time. Possibly real rates are higher than expected long term, or inflation and nominal return will change. Or the yield
curve is misshaped. We must also determine what are the equivalent factors about stocks, real estate, foreign investments, etc.

Once we have determined why rates will be different in the future, we must anticipate how quickly the ultimate level will be reached. Let's say we decide on a ten-year period. Now, how smoothly should we assume the change will occur? And finally, what will happen to our current assets as the change occurs? If we had forgotten that declining discount rates lead to increased financial asset prices, the current bull market in stocks and bonds should have reminded us. This work so far is on a macro economic level. Now, we need to consider current and prospective asset mix, new money cash flow and the effect of the asset valuation method on expected returns.

Once we have completed this analysis, we are ready to set our year-specific investment return assumptions. We do frequently need to better reflect operations over the next few years.

This is particularly true with the current IRS short term view toward actuarial gains and losses. However, I'm not convinced that we are better off with very specific rates as compared to an average rate during the select period and an average rate thereafter.

Other problems can arise when using select and ultimate financial assumptions. I will mention just two we have struggled with. The first is how to handle amortization for minimum funding. We have taken the first approach mentioned in the paper, namely, that level annual installments and the amortization schedule are determined using year specific discount rates. This can result in a temporarily increasing unamortized amount. If so, it is clearly something that needs to be understood by the plan sponsor.

The second problem relates to the entry age normal cost method. As was demonstrated in the paper, in order to meet the acceptable funding method requirements, the select period must be year specific. Otherwise, spurious gains and losses occur. Under the entry age normal family of funding methods, this causes an additional technical problem. Unlike other methods, which just look forward in order to develop normal cost and actuarial liability, the entry age

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normal method looks forward and back. Because of the year specific discount rate, special procedures need to be applied to appropriately reflect back years at the select discount rates. Otherwise, spurious gains and losses will occur. This will continue to be the case even after the end of the select period. In fact, unless assumptions are changed, the procedures will have to be followed until the last participant of the plan during the select period decrements out of the active population.

MR. THOMAS P. BLEAKNEY: My topic today is actuarial myopia. What I would like to do is show you some statistics we have all seen, with a different twist. Chart 1 represents the yields of Standard and Poor's (S\&P) for the last six ycars. The myopic actuary looking at that might well say 1981 was pretty lousy. But the rest of those years look pretty good, and therefore, we can certainly look to future returns well up into the teens.

Of course, this is the yield on stocks. Perhaps we should look at what has happened to bonds (Chart 2). Again, we see a beautiful year in 1982, and 1985 was not bad either. Again, it looks like we can justify rates much the same.

The more cautious part of the myopic actuary might say, "We also have to recognize that if we have a final salary plan, there is more than the investment side of the ledger driving the costs." How do the salary increases look compared to the investment return? So we put together three sets of statistics. Chart 3 compares stock and bond yields to the rate of growth each year in the average wage using Social Security wage averages. In the last few years, these yields have been quite high. If we overlook a little of what happened in 1980 and 1981, we can justify very, very comfortable yields relative to the wages that are driving the liability side of the ledger.

I have had occasion to present statistics similar to this to a client, and some of you have had similar dealings where clients say, "Look what we did in the last quarter -- raise your interest assumption three points." There is a fairly large problem in dealing with this situation. For example, look at the person who is representative of your retirement program. Take someone who was born in 1900, went to work in 1925 at the age of 25 , retired in 1965 at the age of 65 and now is more or less completing his or her expected life span at the

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Annual Yields on Corporate Bonds


## CHART 3

Wages, Bonds and Stocks: 1980-1985


CHART 4
Annual Yields on Stocks

age of 86. Obviously, 1986 is a little less convenient example than an earlier year might have been, but it is still not atypical of the situation. What we have to look at is not just what has happened in the last three or four or five years, but what has happened over the working life span of the employee we are talking about. Fortunately, statistics I am using are based upon the Ibbtson and Sinquefield studies which go back to 1925.

Let's look at what has happened to the stock market from 1925 to 1985 (Chart 4). While it is obvious that returns are comfortably above the $0 \%$ level, when I present statistics like that to clients, they begin to wonder what is going to happen. There are a lot of negative returns in there, and the returns will bounce all over the place. How can we make any sense out of that? One way is to look at a longer span than just annual rates of yield. That is, don't just look year by year at the rate of yield, but take extended periods, which are much more representative of the kind of extended periods that we actuaries are allowing for. The average length of those extended periods, with some degree of arbitrariness, is 20 years of service at the time of retirement.

Chart 5 takes the statistics that are represented in this chart and translates them into 20 -year annualized rates of yield for five-year periods ending from 1945 to 1985. This tames down the picture. What it shows is if we are completely invested in S\&P stocks and we can say that the future is going to be a reflection of what has happened in the past, then we can look to something comfortably over $7 \%$-- something that could go above $10 \%$ and perhaps even into the teens if we are particularly optimistic.

However, we don't invest just in stocks. Also we cannot just look at the positive side of the ledger; we also have to look at the bad side of the ledger -- what is driving the costs, as well as what is helping to pay those costs. If you take a similar compilation of the stocks, bonds, wage increases, and prices (just for the sake of those plans which have cost-of-living increases), and put them all together, you get Chart 6. Let's look a little more carefully at what this means. Take, for example, the 20 -year period ending in 1985. We have seen very comfortable stock yields above $8 \%$, bond yields are not quite as good; and the wage and price increases are very close to what we have seen in the yields on bonds. We have seen variations over previous 20 -year periods.

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CHART 5
Annualized Yields on S\&P 500 Stocks


CHART 6
Prices, Wages, Bonds, Stocks


At this noint. for the client with a final salary plan, the key factors are not so much the absolute levels of investment return, but the spreads between the returns and wage increases.

In Chart 7 the spread from the previous table has been taken out by itself. One set of bars shows the excess of 20 -year stock yields over the wage increases on an annualized basis. The other set shows the deficiencies in the bond yields compared to the growth in wages during the same 20 -year period.

Now, very few, if any, plans are $100 \%$ in stocks or bonds. Many plans are somewhere near the 50-50 level. Let's review an asset allocation of a 60-40 ratio of stocks to bonds and the converse, $40-60$ (Chart 8 ). Here is the most important consideration which the actuary, deriving his economic assumptions, has to look at, to the extent that the actuary has to look to the past. In the last three 20 -year periods, and within the range of the $60-40$ or $40-60$ type investment mix, and under the rationalized -- not case specific -- statistics, we don't see spreads that give you any great deal of comfort. It doesn't make too much difference whether we are in stocks or bonds. We have a spread of approximately $1 \%$. If we were to say that is exactly what is going to happen in the future forever, the investment return assumption should be set at $1 \%$ above the assumption that you make for general wage increase. This does not include any implication of the salary growth because of promotion, longevity, etc. If you have a salary seale which does not split that out, then you have to subtract that as well. But if you are looking at just the relationship between general wage increases and investment return and you look at just what has happened in the last 20 years, you have approximately $1 \%$.

If you go back five years and do the same thing, you would not even be able to justify $1 \%$. The same thing holds true if you went five years before that. We did have a period, starting just after World War II and extending up into the 60 s, when we were showing very comfortable spreads. If we can say that the experience after World War II is what will happen, that we will be more likely to have that superior kind of return over the period in which we are running our valuation, that is fine. Maybe somebody can draw some marvelous cycles and say we're heading back into that.

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CHART 7


Spreads: Yields over Wage Inflation


We certainly cannot look at just what has happened in the last three or four years .- we have to look at a more extended period.

MR. GERARD C. MINGIONE: Mr. Chang, the implication was made that in order to justify a higher assumption, an actuary would have to be confident that the duration of his liabilities was such that there was no price risk or future investment return risk due to duration of bonds. Docsn't that presume that the actuary is inherently conservative and that he is not looking for the best estimate, but rather the safe estimate for investment return? I'm not sure that we agree on what our role is.

MR. CHANG: I don't think I said that you have to eliminate interest rate risk to be able to justify a higher yield. I think I said in order to justify a higher yield for a particular reason -- if you can find a risk that you can maneuver to eliminate -- you can use the higher yield with impunity. That does not mean you cannot use an even higher yield if you find something else that you would like to be able to justify. There is going to be a lot of debate on "Can I justify $20 \%$ because I have a great investment manager?" or "Can I justify $50 \%$ because I know gold will go up in the next 10 years, and if it has been to 800 before, it can get there again?" These are somewhat flippant justifications, but if we can put it in the more analytical structure -- that is, begin with something that is minimally reasonabic -- then no one can criticize us for being unreasonable. Then let's try to eliminate the different types of risk for which higher yields are being paid -- at least move to steps without any criticism whatsoever. That docs not mean that you cannot justify a higher yicld by other reasons as well.

MR, PETER D. CRUTCHETT:: I was very interested by the figures shown by Tom Bleakney and would be interested to know what typical rates of difference between the discount rate and the rate of wage growth the plan actuaries in the U.S. have used over the last 20 years.

MR. BLEAKNEY: I know the standard deviation is huge. I tend to use something in the 1.5 to 2 range, which shows that I am not myopic in that sense, and I go back to what happence in the earlicr cras. But I have seen statistics that have been gathered. At least one firm, The Wyatt Company, gathers

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statistics on that, and it scems to me it has ranges that vary widely. There is one problem with a statistic along this line in that the salary growth portion of it is of ten times ambiguous. Some make a clear distinction of the portion of salary growth which occurs because of promotion, longevity, etc., so the general wage part is clear. Others do not.

MR. BROWN: What would be the practice in London?

MR. CRUTCHETT: In the U.K., it has been the practice over the last five to ten years for actuaries to use a $.5 \%$ to $1 \%$ yicld gap if no specific promotional scaic is being used, or a 1.5 yield gap if there is a promotional scale being used. Obviously, there has been considerable variation about that. We had a very bad period back in 1974 when large negative investment returns were being carned. Actuarics, of course, have been very prudent since then. But pressure has been put on the profession, particularly through government circles and Inland Revenue, for actuaries to widen their yield gap assumptions. This is something which some actuaries are not very happy about. Just because we have had high investment returns coupled with low inflation over the last few years, that shouldn't influence us to widen what we, after all, are assuming is the long-term yield gap between salary inflation and investment returns.

MR. BROWN: What kind of absolute numbers would you be using for investment returns? What would be the interest assumptions that you would use in the U.K.?

MR. CRUTCHETT: Over the last few years, it has been about $9 \%$; but those rates have started to fall. Again, pressure is being put on to reduce that. The government actuary has just produced a paper to go with the Chancellor of the Exchequer's recent announcement in the last budget to tax pension fund surpluses returned to employers, and also to determine whether a pension fund is in surplus. The government actuary is now using an $8.5 \%$ rate of investment return coupled with a $7 \%$ salary increase assumption, which is obviously going to put pressure on the profession to come down into line.

MR. VINOD VEDVYAS: I am interested to know why you would use 20 years. For instance, if your objective were to use a long-term estimate which represents the average duration between working lifetime and the retirement period, would you come up with a different differential -- salary versus interest rate?

MR. BLEAKNEY: To be honest, it is quite arbitrary. To be even more honest, I was playing around one night on my PC and tried various periods. The 20 -year period just seemed to provide the stability that was appropriate without losing some sensitivity. The only arbitrary argument I could give is the one I did give in the course of my presentation -- that is, that 20 years roughly approximates the period of retirement. But that is the full life expectancy, and you should probably be using something in between if you are looking for the average time you are holding the money.

MR. VEDVYAS; Would you come up with a better number if you were trying a different period which would roughly approximate the average working lifetime?

MR. BLEAKNEY: It would be closer. If you look at the statistics, if you combine two or three periods, you will be drawing the yield and wage increases together rather than spreading them. There would probably be even less of a differential. It would be an interesting exercise to use, for example, 30 years, to see what that does, because that is certainly more. Another aspect of this that would be more accurate is the total effective yield illustrating a build-up of funds during an average career, rather than averaging the rates over the career.

MR. CROOT: I want to make a quick comment on the last question regarding the differential between interest rates and salary scales. Tom correctly pointed out that average increases in wages usually do not include increases due to seniority or merit. Almost all published figures do not distinguish between those two items. Our experience has been that the piece attributable to seniority and/or merit is worth $1.5 \%$ to $2 \%$, depending upon the type of company involved, so that when that is added to the average wage increase or the general wage increase, you get a totally different number from the national average wage increase. If you take a salary scale that is graded by age with

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an average increase of $6 \%$, the implications on cost are substantially different if the scale starts out at $12 \%$ and ends at $3 \%$ comparcd to one that uscs $6 \%$ for all ages.

MR. LEROY B. PARKS, JR.: I want to respond to Tom's request for information about The Wyatt Company survey. It includes over 900 pension plans -- not only Wyatt plans but plans serviced by other actuarial firms -- and covers plans that include 1,000 or more active plan participants. We have found that the intercst rate from year to year has increased. I believe the 1985 survey had an average interest assumption of $7.5 \%$. That is the intercst assumption used in determining the funding for the plan. The spread between the interest assumption and the salary increase assumption has increased over time. In the most recent survey, it was $2.2 \%$.

MRS NEELA RANADE: I am a member of the Committee on Pension Principles which is preparing the paper. J. would like to mention some of the viewpoints which the members had in judging whether 20 years was the appropriate period. One of the viewpoints was that with each step you are taking a snapshot, and it is a closed group valuation. So you should look at the entire period for the closed group except that after a point -- such as 30 years -- the interest rates would not be relevant. So I would say 20 to 30 years might be a good number. One of the things we would look at in the paper is, "After what point docs it really not matter how much the rates differ because of discounting?"

MR. JAMES G. PATERSON: Our office has been using the year specific approach for about 10 years, and I am very comfortable with it. I heard some of the arguments of why some people are finding it an awkward method to use in practice -- we do not find that. It changes the way we view the selection of assumptions. In fact, for the ultimate rates we tend to look at 25 to 50 years of past history and use that as a guide before selecting ultimate rates. We then use current rates to help us determine the near term. Then the problem is with interpolating between the next few years and 15 and 20 ycars out. It also raises another interesting issue, particularly with an accrued benefit valuation method.

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We always present two results for our clients. One is the current rates. With the high spread between rates of return and rates of wage increase, current normal costs are particularly low. We also show the results using the ultimate assumptions to give clients some idea of where we think the rates will be 10 or 15 years in the future. I would be interested in any comments anyone can make about experience with the year specific rates.

MR. BLEAKNEY: Under the entry age actuarial cost method, I feel that the normal cost should be based upon the ultimate rate, so that I do not run into the practical problems mentioned by Mr. Jackson. It is more difficult with the accrued benefit method because of the nature of the method. With the entry age method, I find great comfort in viewing the cost as the level rate of pay -- if you are talking about a pay-based plan -- which will go on forever in the model. Whatever is not covered by that level rate of pay is what is left over for the unfunded liability. To mess around with that level rate of pay because of a short-term aberration does not strike me as appropriate.

MR. CROOT: It is very simple if you do that. However, you create gains and losses between successive years if actual experience is equal to expected. That is classified by the IRS as an unacceptable actuarial cost method. That's been our discussion with them on that subject

MR. BLEAKNEY: I also have trouble with that simply because if your entire valuation is based upon the year specific rates for the present value of benefits, then the normal cost is not part of that -- it is simply the present value of benefits. The normal cost is independent of the present value of benefits. That is where the gains and losses are occurring. At least, I feel comfortable with that model.

MR. MARK G. BEILKE: When looking at long-term rates, I have problems with going back 20 to 50 years. Are there any theoretical studies or statistics on what would happen if you netted out great aberrations like Nixon's wage-price freeze or the capitalization of the defense industry during war time?

MR. BLEAKNEY: I do not know of any such studies. I wish I knew more about the underlying economics. It is relatively easy to play around with the

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statistics, but it is overwhelming to try to determine what those statistics really mean. I have some difficulty, though, when you start playing around with the statistics and just look at what is good or bad. For example, we have come most of the way out of the tremendous economic impact that the foreign oil prices had on the U.S. and Canadian economy. Yet, if you were to take that out, you really would not be realistic, because you are subject to that impact again in the future. Oil price changes have to balance themselves out.

MR. BEILKE: In looking forward as actuaries, should we be looking as if the world will stay exactly the way it is now, or should we be incorporating into our assumptions things like the dercgulation of the banking industry and what that will mean to interest rates? There are a lot of things happening in the world. Should we say stock will take off because the Middle East is going wild, or should we really incorporate those things and be able to argue them to whomever is scrutinizing our assumptions? Should we say that our assumptions are the way they are based on the way the world is now?

MR. BLEAKNEY: My personal opinion is that the answers to your qucstions are yes. The trouble is figuring out what those questions really mean. I think you should bring in everything you can possibly bring to the problem. I, for one, have difficulty going beyond looking back with a little bit of minor shifting of what the present portends.

MR. CHANG: It seems to me that an actuary -- in looking at all assumptions into the future -- is trying to get at what might really happen. When you do this, though, no one really knows whether the current economy is a new secular trend or part of another cycle. There are strong arguments for both sides. But those arguments are really economic arguments - I am not entirely sure they are actuarial. I'm not trying to define or confine the actuarial turf. But actuaries might do better to use references from economists. Economists do not all agree, there is really no definition of a consensus anymore in that field. Somewhere along the line, we ought to be able to separate what is an economic field, usc as much reference as possible from that field, and analytically build up the assumptions that we need for the particular kinds of situations we have to face.

MR. MAREL K. BATES: I would propose that one way to think about this is that we should discount almost everything that happened prior to 1979 or 1980 , and not just because the policies of our government, the British government and other governments changed at that time. I think the change in government was more the effect of the overturning of a style of economic thought which ruled for 40 or 50 years. Policies can change, and they will change again in the future. But one thing that will not change is that the general public knows a lot more about economics, and it is not so easy to fool all of the people. So I would argue that we are in a new era, and we have been for about half a decade now.

