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ASSET/LIABILITY MATCHING FOR PENSION PLANS

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This session will discuss asset/liability matching, including techniques for pension plans. Application of techniques to stabilize expense and protect plan surplus against economic fluctuations will also be discussed. A case study will be presented.

MR. ROSS MARK KRINSKY: Dick Wendt is a principal and director of asset/liability forecasting at Towers Perrin. He is an editor of *Risks & Rewards*, which is the newsletter of the Investment Section of the Society, and he is also on the Pension Committee of the Actuarial Standards Board (ASB).

MR. RICHARD Q. WENDT: We will talk about a fairly complex issue—how to manage plans that have “nontraditional” benefit formulas. Most people, when they think of pension plan benefit formulas, probably think first about a final average salary formula. Many of us have seen asset/liability forecasts for final average salary plans; the recommended asset mix usually is 60% equities. That answer has almost become a tradition in the industry.

My message is that plans with other benefit formulas, aside from the final average salary formula, have greatly different characteristics. These plans will have different answers from the traditional plans. We will talk about some new pension concepts, mostly about the balance sheet impact, which is the *Financial Accounting Standard (FAS) 87* charge to shareholder equity. We will discuss how the plan sponsor can manage the balance sheet impact through contribution policy, asset policy, and expense policy—by integrating the separate policies. To focus on these issues, we will examine a case study of a plan that changed from a final average salary formula to a career average formula.

Some new pension funding concepts include “funding rebound,” “chasing your tail,” and “just-in-time contributions.” “Funding rebound” refers to a phenomenon we’ll see shortly; certain plans don’t have much room to maneuver between their highest point of funding and their lowest point of funding—plans such as career average plans, cash balance plans, and flat-dollar hourly plans. They all have a very similar characteristic—the actuarial liability, taking into account the projected benefits, is only slightly above the accrued liability.

“Chasing your tail” refers to a phenomenon in which, as the plan sponsor makes additional contributions in an attempt to eliminate the balance sheet impact, the problem could worsen in later years and future charges to shareholder equity could be significantly higher.

“Just-in-time contributions” is a concept that borrows from the manufacturing world; the plan sponsor avoids making contributions above the required minimum. But if the plan is about to become underfunded, the plan sponsor will make an extra contribution to avoid the underfunding. These are the key concepts that explain some of the issues in this case study.

There has been a recent trend of plan sponsors moving away from final average salary plans toward cash balance or career average plans. Cash balance plans seem more popular currently, while career average has been a popular formula over time. Our case study is based on an actual plan that initially had a final average salary benefit formula. The plan sponsor decided the plan was too expensive and switched to a career average plan by amending the formula.

Before this session, I reviewed the databases at Towers Perrin. Of about 700 plans in our database, approximately 80% were pure final average salary plans, approximately 10% were career average, and the remaining plans were a mixture of cash balance and some other formulas. Chart 1 is a conceptual drawing of my point about relative liabilities. For a final average salary plan, the typical ratio of the projected actuarial liability (e.g., projected benefit obligation [PBO]) to the accrued liability (accumulated benefit obligation [ABO]), is about 125%, just as a rough rule of thumb. For a career average plan, the projected actuarial liability ratio drops to about 110%. For a typical cash balance plan, the ratio is about 105%. Of course, for an hourly plan, there is no salary progression, and that plan's ratio will always be at 100%.

CHART 1
RATIO OF ACTUARIAL LIABILITY TO ACCRUED LIABILITY
FOR "TYPICAL" PLANS

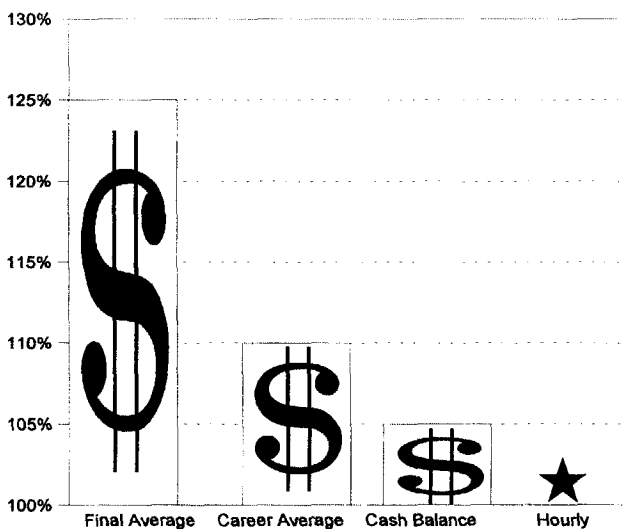
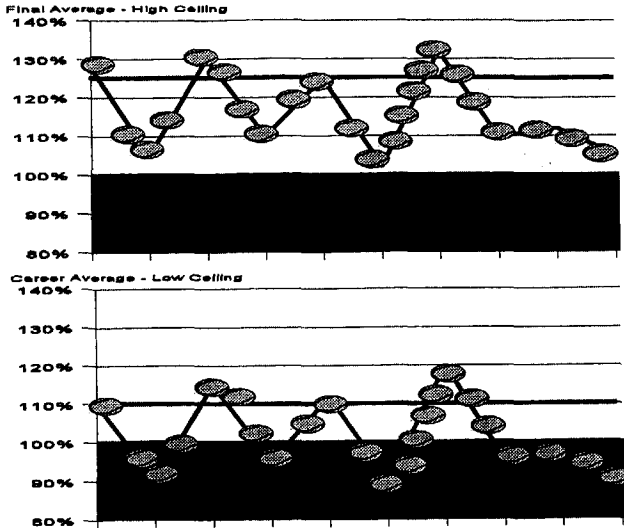


Chart 2 shows the concept of the funding rebound issue. The shaded area on the top graph is below the 100% line and indicates underfunding. When a final average plan becomes fully funded—the assets exceed the actuarial liability and contributions stop—there is a tendency for the funded ratio to fall off. Fortunately, the 25% margin provides quite a bit of protection against underfunding.

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CHART 2
FUNDING REBOUND



A career average plan does not have the same degree of margin, because it is not going to get very much over 110% funded. Even when it is adequately funded, it doesn't take many negative results to drag the funded level below 100%. Typically, the career average plan ranges quite dramatically between overfunding and underfunding. A final average salary plan does not usually experience the same degree of oscillation.

We'll now discuss the balance sheet impact. The *FAS 87* balance sheet impact requires a plan sponsor of an underfunded plan with respect to the ABO to hold a minimum liability on the corporate balance sheet; sometimes that will dramatically affect the balance sheet. It could, in fact, become a direct charge to shareholder equity. As we look at the stochastic forecasts in many asset/liability forecast studies, the tails of the distribution are quite dramatic. We will see examples in which the potential charge is approximately the order of magnitude of the assets that are in the fund at the start of the study.

If the market value is less than the ABO at the end of the year, the plan sponsor has to set up a minimum liability on the balance sheet in an amount equal to the deficit. In addition, if there is an existing prepaid expense, which means the sponsor has previously paid cumulative contributions higher than cumulative expense (i.e., an asset on the corporate books), the sponsor now has to reverse that asset. So the accounting transaction is a net charge equal to the combination of the deficit and the prepaid expense. If there is already a balance sheet liability because the expense charges have previously exceeded cumulative contributions, then the effect will not be as dramatic.

Some plan sponsors might even have a negative expense (i.e., income), and with zero contributions they are actually accumulating an additional asset on their balance sheet equal to the difference of the zero contribution and the negative expense. Even if the contributions are zero and the plan is fully funded, the prepaid expense may still grow.

The particular plan sponsor we were talking about had a final average salary plan. The sponsor wanted to control its pension expense, so it amended the plan to a career average formula. Expense level dropped and it even became negative. In recalculating the PBO on the new career average formula, the reduction in PBO eliminated the remaining initial transition obligation and the remaining prior-service cost. This plan will now generate a growing prepaid expense on the balance sheet, and because the initial transition obligation and prior-service cost have been eliminated, an intangible asset is no longer available as an offset.

Furthermore, because the plan now has a career average formula with the maximum funded ratio at 110% (as we saw in the discussion of funding rebound), the plan will have a higher probability of being underfunded. So the sponsor has really a little bit of a problem that had not been anticipated.

Some financial managers say the charge to shareholder equity is not a big deal. They see potential charges of \$100 million to their balance sheet and say, "Oh, we don't care. It's only a paper transaction. It's accounting. We shouldn't let the accounting drive the issue." Many plan sponsors say, "We don't even want to be concerned with that whatsoever." That is one point of view that is prevalent.

Other managers do get concerned about the amount of the charges. Just the very size of looking at a \$100 million charge for a moderately to large-sized company is staggering. Their thinking is that a \$100 million charge to shareholder equity may give a perception to the outside world that they don't know how to manage their company, that they are letting unplanned things happen, and that they are not being good financial and corporate managers. Also, they think of the "headline" issue; they do not want to be mentioned in *Pensions & Investments* or *The Wall Street Journal* as a company showing a big hit to the balance sheet and raising questions that they would find difficult to answer.

Some companies have borrowed money from banks or other sources and may have a debt covenant that specifies a minimum level of tangible assets. The way the accounting works is that the charge to shareholder equity, even if offset by an intangible asset, will actually reduce the level of tangible assets. That is a potential problem that might concern plan sponsors.

Pension expense is reported on the income statement and ultimately goes to the bottom line and reduces corporate retained earnings. But the charge to shareholder equity goes directly to retained earnings and does not go through the income statement. The amount of the charge to equity is calculated fresh each year, when it applies. The charge does not accumulate from year to year; in each year, the amount is recalculated.

Table 1 is an example of the balance sheet impact. In the base case, a plan is underfunded initially—it has a \$104 million ABO and a market value of \$76 million. Due to that deficit, there is a required minimum liability of \$28 million, of which it already has an accrued expense of \$13 million as a liability on the books. Therefore, the plan sponsor only needs to set up an additional \$15 million liability and, fortunately for that plan sponsor, it can fully offset that \$15 million with an intangible asset (subject to a maximum of \$20 million due to the limitations on the intangible asset). That offset avoids the charge to shareholder equity, although it still puts an additional liability on the financial statement of that plan sponsor.

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**TABLE 1
EXAMPLE OF BALANCE SHEET IMPACT**

	Base Case (millions)	Lower discount and asset loss (millions)
ABO	\$104	\$121
Less market value adjustment	<u>-76</u>	<u>-61</u>
Minimum liability	28	60
Less accrued expense	<u>-13</u>	<u>-13</u>
Additional liability	15	47
Less intangible asset	<u>-15</u>	<u>-20</u>
Charge to equity	\$0	\$27

If the worst-case scenario were to happen (shown in the last column of Table 1)—the discount rate drops 2% and the assets suffer a 20% loss—then the ABO would increase from \$104 to \$121 million. The assets would drop \$15 million, and that would create a need for a minimum liability of \$60 million. Thirteen million dollars is already on the books as an accrued expense, and now an additional liability of \$47 million is required. Only \$20 million of that can be offset, because that is the amount of the remaining prior-service cost and the remaining initial transition obligation. The net effect for that worst-case scenario is that the plan sponsor's retained earnings are reduced by \$27 million.

Table 2 is another example. We will assume a small surplus in the plan. So with \$104 million of liabilities, the plan will start with assets of \$105 million, and we will further assume a prepaid expense of \$10 million. Now, if at the end of the year the liabilities stay the same—there is no dramatic change in discount rate or anything unexpected—and the market value just drops very slightly to \$103 million, just below the liabilities, the plan has a minimum liability of \$1 million. Nevertheless, because there is an existing prepaid expense (an asset), the plan sponsor has to reverse the \$10 million prepaid expense and add the minimum liability; the net result is an additional liability of \$11 million. Fortunately, here the additional liability can be fully offset by an intangible asset.

**TABLE 2
ANOTHER EXAMPLE OF BALANCE SHEET IMPACT**

	With prepaid expense (millions)	Small asset loss (millions)	Discount drop and asset loss (millions)
ABO	\$104	\$104	\$121
Less market value adjustment	<u>-105</u>	<u>-103</u>	<u>-84</u>
Minimum liability	0	1	37
Plus prepaid expense	10	10	10
	Reversal of Prepaid		
Additional liability		11	47
Less intangible asset		<u>-11</u>	<u>-20</u>
Charge to equity	\$0	\$0	\$27

If the worst case occurs, with the liability increasing and the assets dropping further, the plan sponsor must endure a \$27 million hit to shareholder equity. These examples show that the prepaid expense account hangs over the head of the plan sponsor as a potential future reversal. At some point, if it is ever reversed, it will be a tremendous hit to the balance sheet.

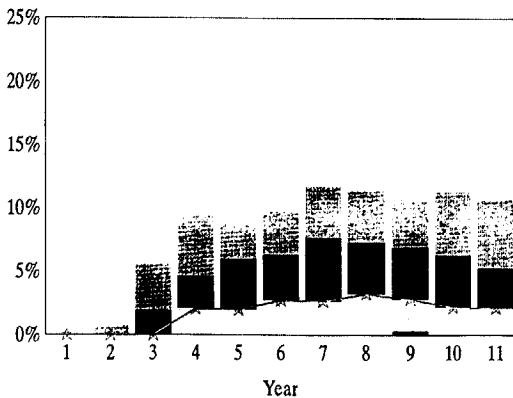
As time passes, the plan sponsor may think it has a wonderful approach to plan management, because the plan has low expense and low contributions. Contributions have no direct effect on corporate income, because a reduction in cash to make a contribution is directly offset by an increase in prepaid expense or a decrease in accrued expense.

In my experience, most sponsors view contribution levels as a secondary issue. If the sponsor happens to notice, it might be surprised to find that the prepaid expense is increasing. If there then comes a time when the plan has very bad financial results from the markets or from changes in interest rates, that whole prepaid expense (to which the sponsor never paid any attention) would suddenly be reversed and it would likely come as a big shock. One thing we try to pay attention to in our studies is to look at the prepaid expense and make sure it does not get completely out of control.

We will now discuss our case study. It is based on a real plan, although we have changed some numbers for presentation purposes. As we said, it was originally a final average salary plan, and the plan sponsor changed the plan formula to a career pay plan—a very typical career pay plan, with nothing unusual about it. The primary motivation was to reduce the expense for the plan sponsor.

Chart 3 shows the starting point of its current policy. Now this is a stochastic forecast in which we take the current mix, a 60/40 mix—60% equity and 40% fixed income—and project several hundred scenarios of future financial results. Here we are showing percentiles: 10%, 25%, 50% (median), 75% and 90%. The line, for instance, is the median. The top of the bar is 90%; down below, where the bar hits zero, is 10%.

CHART 3
BASE CASE CONTRIBUTIONS AS A PERCENTAGE OF PAY



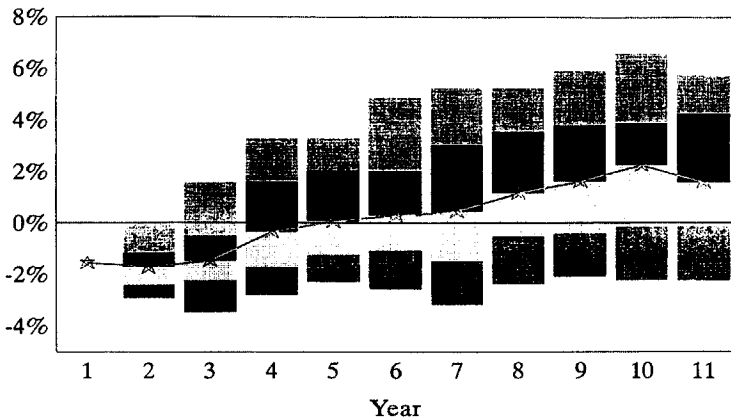
Percentiles—10th,25th,50th,75th,90th

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Obviously, the contribution cannot go below zero, so the low percentiles are exactly at zero. This is our starting point. The median contribution is level. After about four years, there is some possibility the contributions could go up to 10% of pay.

Chart 4 shows the stochastic expense. As you can see, the expense does start at a negative 2% of pay, which is treated as an income item for the plan sponsor. Although the contribution is close to zero, the negative expense means that the contribution is greater than the expense. Therefore, the plan sponsor has an increasing prepaid expense over time. There is a general increasing trend to the expense over time, which possibly suggests that the “tilt” of the expense policy should be re-jiggered.

CHART 4
BASE CASE EXPENSE AS A PERCENTAGE OF PAY



Percentiles—10th, 25th, 50th, 75th, 90th

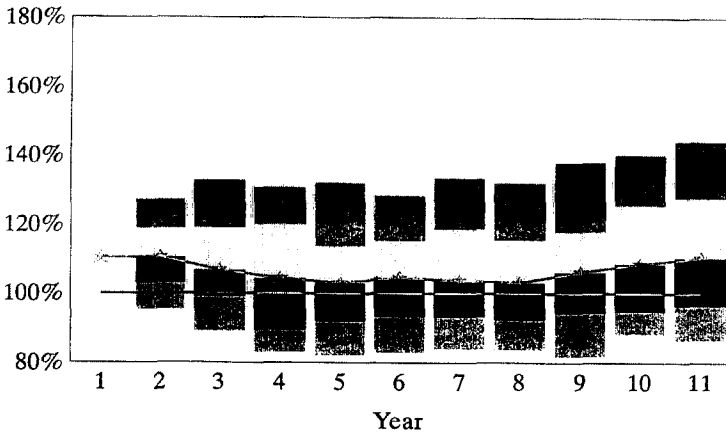
The ABO funded ratio (Chart 5) is a critical issue for the balance sheet and other funding issues. I should also mention that if the surplus were just \$1 above the ABO, there would be no balance sheet impact. It is like a computer program in which the logic says, “If there is surplus, then skip to the end and forget the whole calculation.” It is quite significant to see what percentage of the time the ABO funded ratio can drop below 100%, which is the horizontal line. At the median, the funded ratio is above 100%, but there is quite a substantial tail in that there is at least a 25% probability that the plan will be underfunded in any year.

We will look at the actual pattern of charges to shareholder equity in Chart 6. Again, this amount is the net charge that goes directly to the plan sponsor’s retained earnings. The amount cannot be negative, so we see it is a skewed distribution where only the 75–90% are above zero. There is a 50% or higher chance there might be no charge to shareholder equity in any one year. Only the tails are showing, but the tails are very extreme. You can see that in the sixth year; for instance, the 90% indicates a \$150 million charge.

Now, to put that in perspective, this is a plan that started with initial assets of about \$300 million. For a plan sponsor with a \$300 million plan, the forecast suggests that six years

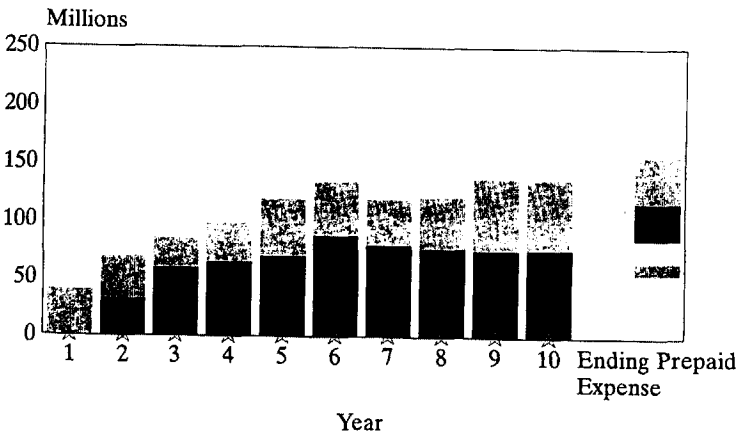
down the road there is a 10% chance of about a \$150 million or larger charge to retained earnings, or about half the plan's current assets. That is an enormous charge compared with the size of the plan. The last bar on the right of Chart 6 is the prepaid expense at the end of the forecast. At the beginning of the forecast, the prepaid expense was about \$14 million. At the median it is increasing to about \$60 million, and there is even a 10% chance that it could go up to almost \$150 million. The prepaid expense increases quite a bit during the forecast, and that may come back to haunt the plan as a potential reversal in the future.

CHART 5
BASE CASE
ABO FUNDED RATIO



Percentiles—10th, 25th, 50th, 75th, 90th

CHART 6
BASE CASE—CHARGE TO SHAREHOLDER EQUITY



Percentiles—10th, 25th, 50th, 75th, 90th

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As we look at those charts, what is our reaction? First, the expense on average is about 2.5% below the contributions, principally because it started at a negative level and never really made any headway against the contributions. Second, there is about a 50% chance of underfunding in any year. Third, there is about a 40% chance of zero contributions. That is a symptom of what we called the “funding rebound.” The plan either is fully funded much of the time or is underfunded much of the time, and very rarely is there any in-between. Finally, there is about a 10% chance that the equity charge in any one year would be above \$100 million, and there is a substantial increase in the prepaid expense over the ten-year forecast horizon.

A plan sponsor’s initial reaction to solve this problem is, “OK, let’s increase our funding.” It is obviously true that if the sponsor makes more contributions, then the plan will likely have a higher funded ratio. But, we have seen that if the plan sponsor makes higher contributions and does not change the expense policy, then there will be an increase in the prepaid expense item. Paying higher contributions will eliminate the balance sheet impact in the short term, but in the long term the prepaid expense increases. Paying larger contributions is just solving a temporary problem; down the road, it could eventually become a bigger problem.

Also, one factor may not be obvious. The plan sponsor has to be very careful how the extra contributions are invested; there is some leverage involved. When the sponsor makes the extra contribution, a larger prepaid expense is created, which is a fixed item. The contributions are being invested in the stock market, or possibly in derivatives, real estate, bonds, or whatever. The comparison of the fixed prepaid expense to contributions invested in risky assets creates a possible mismatch.

Table 3 illustrates this point. It shows an example of putting \$30 million extra contribution into the plan to solve a short-term funding problem. If the plan somehow loses \$7 million of that \$30 million, the plan sponsor is right back in the problem. That \$30 million changes an accrued expense of \$13 million to a prepaid asset of \$17 million, and that \$17 million is a fixed amount.

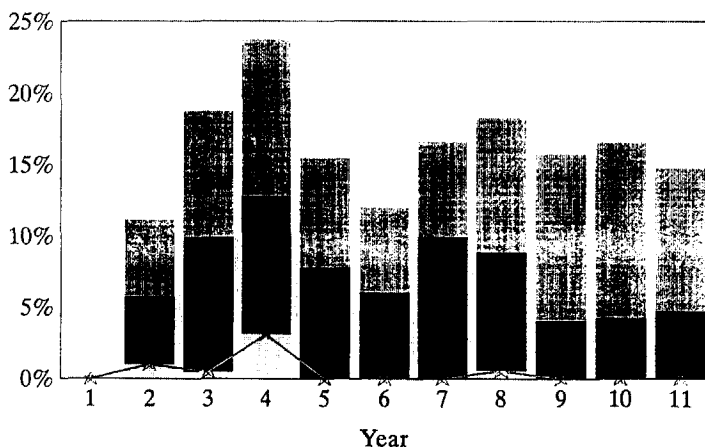
**TABLE 3
EXAMPLE OF BALANCE SHEET IMPACT WITH ADDITIONAL CONTRIBUTION**

	Base Case	With \$30 Million Contribution	Asset Loss
ABO	104	104	104
Less market value adjustment	<u>-76</u>	<u>-106</u>	<u>-99</u>
Minimum liability	28	0	5
Less accrued expense	<u>-13</u>		
Plus prepaid expense		+ 30	<u>17</u>
Additional liability	15	0	22
Charge to equity	0	0	2
			Small asset loss causes charge

Now the question is, what does the plan do with that \$30 million? If it is invested poorly—if the plan were to lose \$7 million in total or just out of that \$30 million—the sponsor is back where it started and now has a \$2 million charge to shareholder equity.

In an earlier session the panelists talked about making extra contributions in early years to avoid PBGC notices in later years. Well, the plan sponsor has to be careful when investing those extra contributions because there is some leverage here. If the plan sponsor is not matching the liabilities in the correct way, then it may not be solving the problem. If the sponsor invests all the extra contributions in a very bad investment, it could be very embarrassed at the end. Chart 7 shows where we examine the strategy of paying maximum contributions in each year. The contributions are much higher; the 90% level of the maximum contributions is between 20% and 25% of pay; whereas in the base case, 90% are around 10% of pay.

CHART 7
MAXIMUM CONTRIBUTIONS
CONTRIBUTIONS AS A PERCENTAGE OF PAY



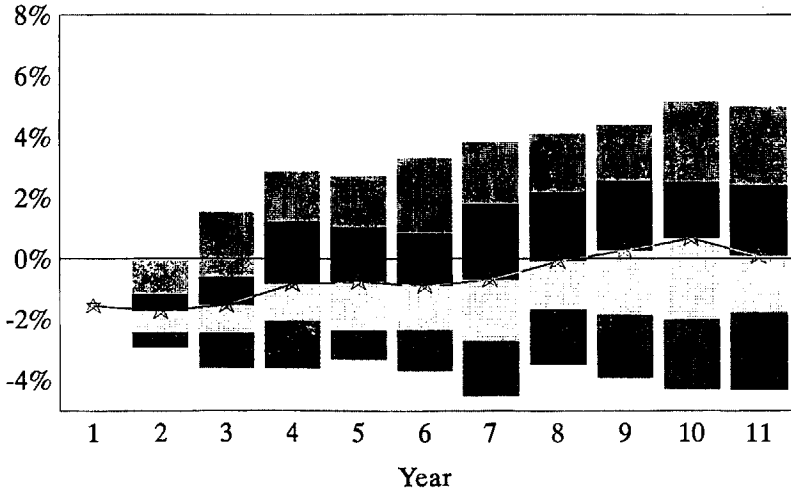
Percentiles—10th, 25th, 50th, 75th, 90th

With higher contributions, the expense is reduced (Chart 8). More assets in a plan provide a larger expected return on assets. Everything else being equal, that effectively reduces the expense, and we can compare that with the base case. We see that the 90% of the base case expense is in the 6–8% range at the end, and the 90% expense for the maximum contribution example is in the 4–6% range.

Now look at the ABO funded ratio (Chart 9). There is substantial improvement in the ABO funded ratio because now the 25% is typically above the 100% level. So at the price of putting in all these extra contributions, we have, in fact, improved the tail of the funded ratio distribution. Yet, there is still a substantial probability of underfunding, now at the 90% level. It is still very comparable with the base case. In summary, paying maximum contributions shows some improvement, but at a very heavy price, and the prepaid expense at the end of the forecast now is tending as high as \$225 million (Chart 10).

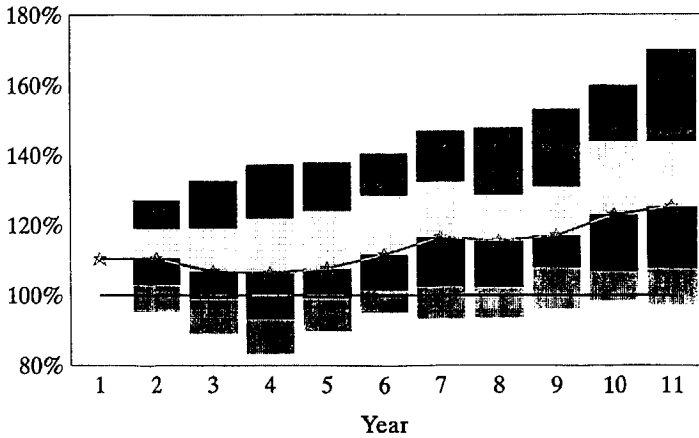
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CHART 8
 MAXIMUM CONTRIBUTIONS
 CONTRIBUTIONS AS A PERCENTAGE OF PAY



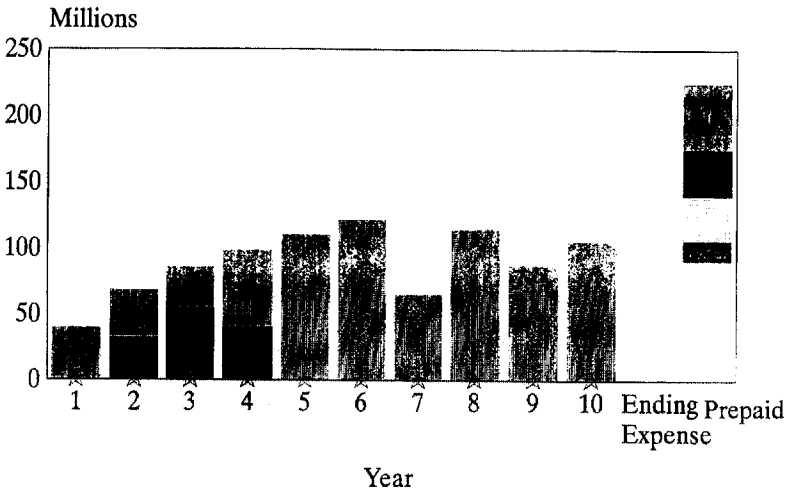
Percentiles—10th, 25th, 50th, 75th, 90th

CHART 9
 MAXIMUM CONTRIBUTIONS
 ABO FUNDED RATIO



Percentiles—10th, 25th, 50th, 75th, 90th

CHART 10
 MAXIMUM CONTRIBUTIONS
 CHARGE TO SHAREHOLDER EQUITY



Percentiles— 10th, 25th, 50th, 75th, 90th

The net diagnosis: contributions on average over ten years are about 1% of pay higher than the base case. (The plan sponsor planned to pay higher contributions, but that is still a very heavy price to pay to try to solve this problem.) The expense is about 1% of pay lower. (That seems good, but a naive observer would probably say, “Yes, it is good to have 1% lower expense.”) The prepaid expense is up approximately 80% over the ten years, so that is a definite negative. The funded ratio is up 15%, so that is positive. There is a lower chance of a deficit, so that is positive. After 1999, there is less chance of an equity hit. Many positive results happen from this approach, but they come at a heavy cost. It is creating a problem that can occur in future years with that prepaid expense growing substantially.

Now we will turn to the so-called “just-in-time contribution” strategy. The plan sponsor pays minimum contributions each year. Then just before the end of the year, the sponsor estimates the liabilities and assets as of the end of the year. In other words, is the plan likely to be overfunded or underfunded with respect to the ABO as the year is coming to a close?

If the plan is likely to be overfunded, the sponsor does not have to do anything. Just keep on schedule with the minimum quarterly contributions. If, on the other hand, it looks like the plan will possibly be underfunded, then the plan sponsor will make an additional contribution and eliminate the deficit. Now the contribution has to be made before the close of the year and be large enough to ensure that the deficit is avoided. On the *FAS 87* accounting basis, the money physically has to be there, as opposed to the funding basis in which the sponsor has until September 15 of the next year to make the contribution.

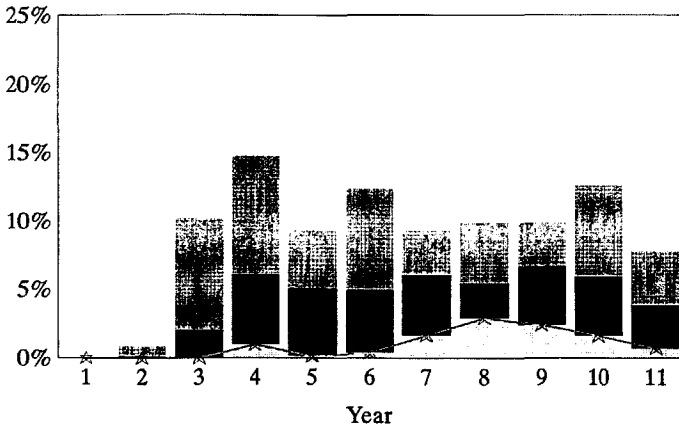
The extra contribution must be large enough to ensure that there is no deficit at the end of the year. If the sponsor misjudges and there is still a deficit, even \$1 of deficit, the extra

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contributions will have been for naught, due to the way the mathematics of the balance sheet impact work. If the deficit is so large that the plan sponsor cannot fund the deficit without exceeding the maximum tax-deductible contribution limit, then it would not generally be feasible to make the additional contribution. Again, the deficit must be eliminated to solve the problem.

The just-in-time approach is very similar to paying minimum contributions. Over a several-year period, there is very little difference in the cumulative contributions (Chart 11). Compare that with the base case. The graphs of the distributions of the contributions in every year are remarkably similar. It turns out that it does not result in extra contributions for the plan sponsor to use the just-in-time strategy. The expense is also going to be very similar to the base case because the average assets will be similar (Chart 12).

CHART 11
JUST-IN-TIME CONTRIBUTIONS
CONTRIBUTIONS AS A PERCENTAGE OF PAY

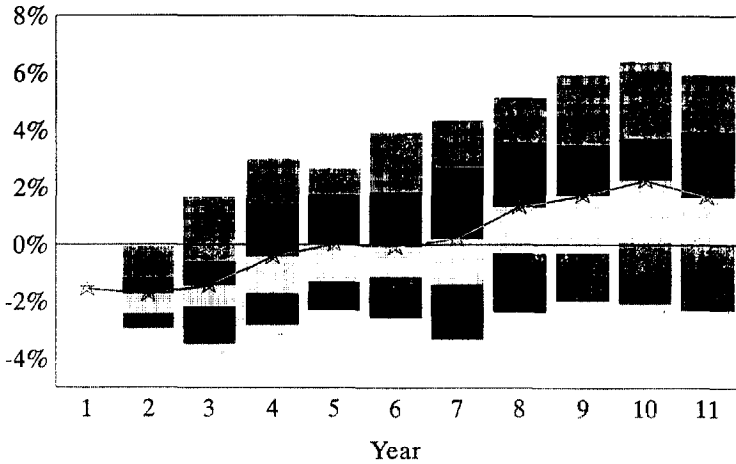


Percentiles—10th, 25th, 50th, 75th, 90th

Chart 13 shows the ABO funded ratio for the just-in-time contributions. This graph may look a little strange; it looks like we have lost some percentiles. As you can see in the sixth year, the whole range between the 25% and 50% has disappeared. That is because in those times, when the plan otherwise would have been underfunded, the plan sponsor made extra contributions to bring the funded ratio up to 100%. Therefore, anything that would have been slightly less than 100% funded automatically shows up to be 100% funded. As you can see, that does not reduce the 10%, which is the bottom tail, but this strategy definitely improves much of the results.

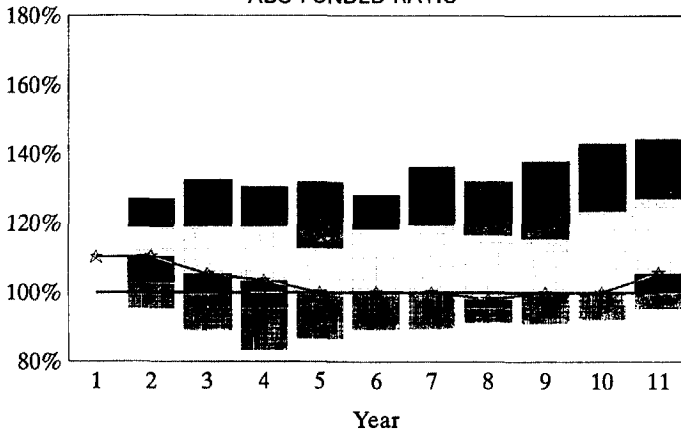
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CHART 12
JUST-IN-TIME CONTRIBUTIONS
EXPENSE AS A PERCENTAGE OF PAY



Percentiles—10th, 25th, 50th, 75th, 90th

CHART 13
JUST-IN-TIME CONTRIBUTIONS
ABO FUNDED RATIO



Percentiles—10th, 25th, 50th, 75th, 90th

Now look at Chart 14—balance sheet impact. That definitely shows an improvement. The prepaid expense is much better than for paying maximum contributions, for instance. Compare this with the base case. As you can see, this strategy improves the 75% quite a bit.

The just-in-time contribution strategy may seem a little tricky until you see it in operation. When the sponsor pays that extra, above-minimum contribution, it is

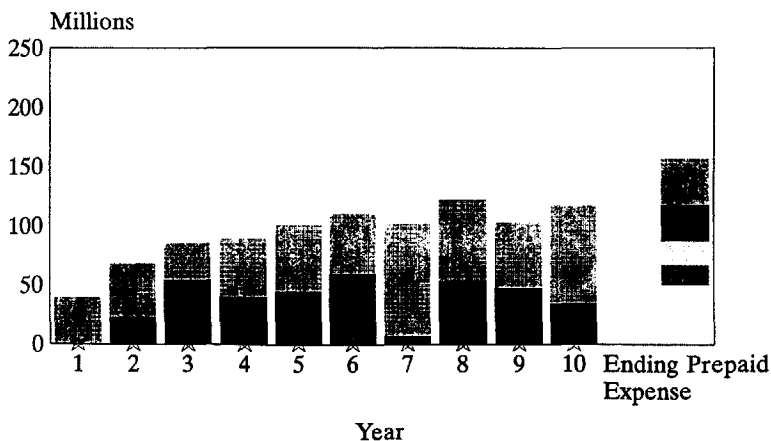
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increasing the funding standard account credit balance. So it is giving the sponsor a credit, which the sponsor then can take account of and reduce the minimum contribution in future years. It is like putting money in the funding bank, which the sponsor can then draw on later to reduce the future minimum.

Typically, what it is doing is simply making a contribution on December 31 as opposed to September 15 of the next year; it is a slight acceleration of the contributions that the sponsor would otherwise make. It is typically not really a dramatic change in funding policy, but the sponsor does have to be ready to bring in large contributions at the end of the year at very short notice.

In summary, the impact of the just-in-time strategy on the contribution and expense is a wash; in the end it made very little difference in the average contribution and average expense. There is no change in the average funded ratio, but, yes, we did make some improvements in the downside risk, so that is a positive. There was very little change in the prepaid expense, so that's a neutral item. The equity hit was improved so that is an improvement.

CHART 14
JUST-IN-TIME CONTRIBUTIONS
CHARGE TO SHAREHOLDER EQUITY



Percentiles— 10th, 25th, 50th, 75th, 90th

We will now talk about assets, as the subject of the session is asset/liability matching. When many people think about the asset/liability matching issue, they will say, “Yes, let’s set the duration of the assets equal to the duration of the liabilities.” That approach does not solve this problem; what it does is stabilize the funded ratio. So if the plan had a 100% or 101% funded ratio and you matched the asset duration to the liability duration, yes, that would stabilize the funded ratio. However, when we talk about the balance sheet impact as the driving force, the dollars of surplus or deficit relative to the ABO (not the funded ratio but the dollars) become the issue. Therefore, the calculation that would

be used for determining the asset strategy is the dollar duration. The dollar duration, if the plan is underfunded, is very difficult to use as a matching bench mark.

Here we take a typical plan that might have a liability duration of about ten and a funded ratio of about 75%. To have a dollar duration match on that plan, it means that the assets must have a duration of about 13.5. We know that 30-year bonds will have a duration of about 10, 11 or 12, depending on the interest rate. So even a portfolio of 100% 30-year bonds would be hard-pressed to be properly matched to those liabilities.

In fact, very few plan sponsors would choose that type of approach. They tend to shy away from long bonds. They would prefer to have some equity investments in a plan, because that gives the plan some hope of improving its funded status over time. Giving up equity eliminates any chance of growing out of the deficit. We rarely find a plan sponsor that wants to go completely to dollar duration matching or anything close to it. It is true that 30-year zero discount bonds have a duration of 30; but just as plan sponsors are reluctant to purchase long-term Treasury bonds, they seem even more reluctant to invest in long strips. It is just part of their outlook.

For another approach, we ran a new investment policy, with the 40% bond component replaced by long T-bonds. This strategy does make some improvement; it does reduce the contributions and it does reduce the volatility. It also reduces the expense and contribution about 25 basis points lower than the base case. The funded ratio is higher and it is also less volatile.

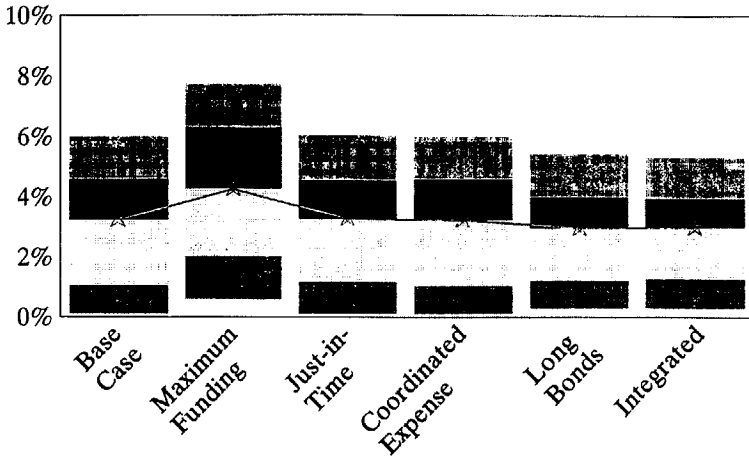
The ending prepaid expense was about the same as the base case. In looking at the summary of the results, there was still a substantial probability of an equity hit. The asset policy alone, even going to long bonds for 40% of the portfolio, did not solve the problems.

What we will move to now is what we consider the integrated answer, putting everything together, taking the just-in-time funding policy, long-duration bonds, and also trying to wear down the prepaid expense by changing the expense policy. We will set our expense policy to have approximately a 1.5% higher expense on average over time. The change in expense has to be done properly. If you increase the expense by lowering the discount rate, you have also increased the plan liability. You would have shot yourself in the foot by doing that, so to speak. Yet by changing the expected rate of return on assets, you can exert a big control over expense. Lowering the expected return will increase the expense and reduce the prepaid asset that shows up ultimately on the balance sheet.

Chart 15 is a summary of the different strategies we have discussed. What we are showing here over a ten-year period is the average contribution. The one bar that stands out is the maximum funding. That is larger and higher than the others. Remember we said that strategy was paying much higher contributions than the other approaches. It is solving part of the problem, but it is doing it at a heavy cost. So for that one reason we would discard the maximum funding approach as a good solution to the problem. The final bar on the right is the integrated policy. That is the policy we are suggesting as the best answer, which takes into account the just-in-time strategy, the coordinated expense strategy, and the long-bond asset strategy together. As you can see, it has some good characteristics: the tails are better than any of those other strategies, and certainly the median is very comparable with the base case. It looks like it has very good attributes.

ASSET/LIABILITY MATCHING FOR PENSION PLANS

CHART 15
COMPARISON OF THE APPROACHES
AVERAGE CONTRIBUTIONS AS A PERCENTAGE OF PAY



Percentiles—10th, 25th, 50th, 75th, 90th

Chart 16 shows the expense. Here we see that the maximum funding strategy has low expense, because it is bringing in extra assets, lowering the expense. The coordinated expense strategy, in which we said we're going to adopt a policy of raising our expense, does show a higher expense, and it is about 1.5% higher on the median compared with the base case.

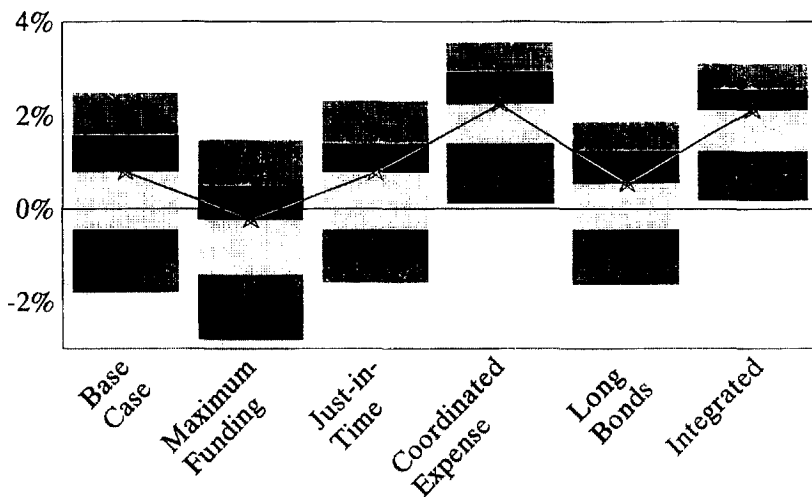
The expense level is really the downside of the integrated strategy. However, it is solving another aspect of the problem, which is the disparity between contributions and expense. Perhaps the plan sponsor has to be convinced that it should adopt that part, but it does help to solve the long-term problem.

Chart 17 shows funded ratios for the various strategies. In looking at the end of the tenth year as a benchmark of what a typical year in the future looks like, we see that the integrated approach does an excellent job of eliminating the deficit. The 10% is just about as good as the 10% on the maximum funding bar, and that shows that the integrated strategy reduces that downside risk. The median funded ratio is not as good as the maximum funding strategy, but that is not the issue. We only need to get over that 100% hurdle by a very small amount. We do not need to have tremendous growth in the median funded ratio. We just need to beat the hurdle.

Chart 18 is the graph of prepaid expense. We see that overall the integrated approach has the lowest prepaid expense at the end of the forecast, much lower even than the base case. We said we started at \$14 million, so it looks as if the median prepaid expense for the integrated strategy is about \$40–50 million. So there is some increase, which one would expect, but the integrated strategy is certainly doing better than just about all the other approaches.

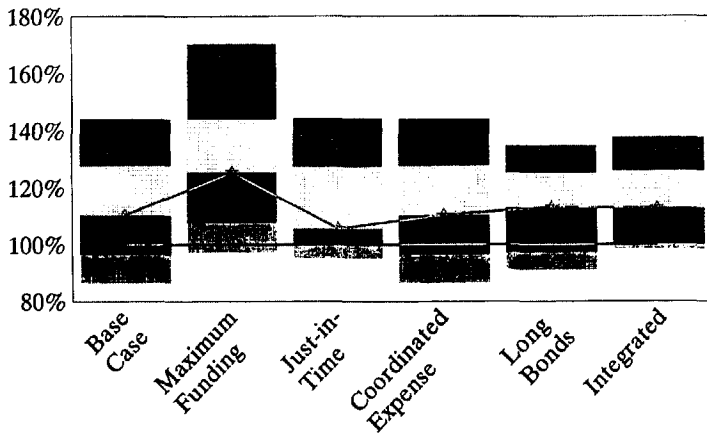
RECORD, VOLUME 21

CHART 16
COMPARISON OF THE APPROACHES
AVERAGE EXPENSE AS A PERCENTAGE OF PAY



Percentiles—10th, 25th, 50th, 75th, 90th

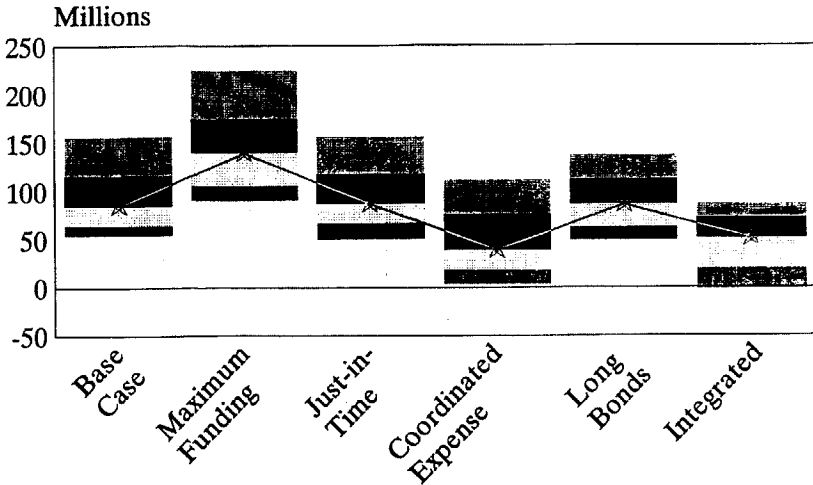
CHART 17
COMPARISON OF THE APPROACHES
ENDING ABO FUNDED RATIO



Percentiles—10th, 25th, 50th, 75th, 90th

ASSET/LIABILITY MATCHING FOR PENSION PLANS

CHART 18
COMPARISON OF APPROACHES
PREPAID EXPENSE IN LAST YEAR

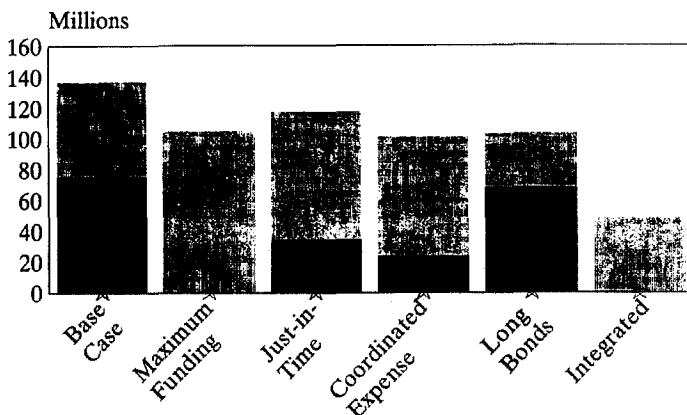


Percentiles—10th, 25th, 50th, 75th, 90th

Then there is the final answer to the problem we were trying to solve—the charge to shareholder equity (Chart 19). Yes, we have really improved that quite a bit, but we have not eliminated it. There is still a tail of the distribution, but now there is a 75% chance of there not being a balance sheet hit in the last year. The 90% is much lower than even the 75% of the other strategies, so I consider that a very excellent solution to that important problem.

A final scorecard for the integrated policy: Contributions are about 25 basis points lower, principally due to the assets kicking in with better results. The expense is 130 basis points higher on average during the ten years. In some ways, that is a negative. In other ways, that is preplanned and so we take that as a neutral. The ending prepaid expense is definitely under control. We have reduced that 50% compared with the base case scenario. Although the average funded ratio was the same as the base case, we have now just about reduced that downside risk. So that is a major improvement there. Finally, the most important issue that we were trying to solve was the equity hit. We see that the integrated strategy does an excellent job of controlling the primary problem.

CHART 19
COMPARISON OF APPROACHES
CHARGE TO SHAREHOLDER EQUITY IN LAST YEAR



Percentiles — 10th, 25th, 50th, 75th, 90th

MR. KRINSKY: What were some roadblocks to implementing this with the client? What were its major concerns in terms of changing its funding policy?

MR. WENDT: At the starting point of the study, the plan sponsor thought it had too little in stocks, and it was preparing to start a program of moving additional funds into equities. It was going toward a 70% equity allocation. If it had been left alone, it would have gone much more strongly in the equity direction. Then when we got into the forecasting phase and showed some potential issues, the sponsor was very concerned about the balance sheet impact. That led to deriving new solutions.

MR. KRINSKY: I guess the other concern is, are you giving up long-term return by moving the assets out of equities? If it was planning on moving more into equities, what is the trade-off between short-term volatility on the balance sheet and long-term returns, which will eventually lower plan costs?

MR. WENDT: Well, that's right. That is a major issue that plan sponsors need to evaluate. Many plan sponsors have the perception that they want to invest in equity to have long-term growth. In today's market many are saying there is not as much long-term growth for equities compared with current bond yields. One theory is that currently stock dividend yields are extremely low, and that may negatively affect the long-term outlook; not that they will not do better than bonds, but that there will not be the traditional increment over the bond return. As an investment, the long-term bond class is not a bad investment in today's market. Yet selling many plan sponsors on that approach is difficult.