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ACTUARIAL IMPLICATIONS OF DEDICATED PENSION FUNDS

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ABSTRACT

Many pension funds have recently established "dedicated" or "matched" portfolios. These are portfolios of fixed-income securities whose cash flows from interest and maturities match the expected benefit payment stream on a block of liabilities. Attainment of the initial yield to maturity is therefore assured, since there is no need either to sell securities before maturity or to reinvest proceeds. Since that yield is generally much greater than the interest assumption, dedicated portfolios are often used to justify reducing current costs, contributions, and reported liabilities through an increase in the interest assumption. With particular reference to ERISA, this paper explores the actuarial mechanics of pension funding under dedication, including the selection of assumptions, the valuing of assets, funding of the initial change in unfunded liability, and funding of subsequent gains and losses.

This paper assumes that the plan sponsor, actuary, and investment adviser have decided to establish a dedicated portfolio for current retirees at an interest rate well above the current actuarial assumption, and that current contribution levels can be prudently reduced by reflecting the assured higher yield. This paper does not explore the funding and investment policy issues that enter into the decision to establish a dedicated portfolio.

I. VALUATION OF LIABILITIES

A. *Split- versus Single-Rate Interest Assumption*

Two basic approaches to increasing the interest assumption are possible. One is to increase the assumption for the matched liabilities only, to reflect the rate which the dedicated portfolio will earn. The assumption on the nondedicated portion would be held at a level which is deemed satisfactory for the long term. *This might be lower than the prededication assumption.* The result is a split-rate assumption.

The alternative is to use a single-rate assumption for all liabilities, blending the assumptions which would otherwise apply to the matched and unmatched liabilities separately. A single-rate assumption can reproduce either the cost or the liabilities produced by a split-rate assumption, but not both.

Increasing the interest assumption for all liabilities has the advantage of simplicity. However, there are several advantages in increasing the assumption for only the matched liabilities:

1. Some plan sponsors feel that dedication effectively divides the fund. The split-rate assumption explicitly reflects the differing investment objectives of the portions. A market rate applies to the dedicated portion and a standard interest-rate/salary-scale relationship to the nondedicated portion.
2. The results better match those of an annuity purchase, which is often considered as an alternative to dedication.
3. An objective of dedication is often to ensure that the assets supporting a particular liability are sufficient for full funding—for instance, to avoid a write-off on a plant closing. This may require a sharp reduction in the value of that liability, rather than a lesser percentage reduction of the overall liability. A split-rate assumption can help accomplish this.
4. As the matched liabilities and assets diminish over the years, the dedicated proportion of the total fund will decrease. As a result, the overall interest rate earned by the fund may decrease as well. If a single average rate is used, actuarial gains in the early years would be offset by later losses, creating an inappropriate cost pattern. The interest assumption might eventually have to be lowered. The use of a graded interest assumption could avoid this problem, but would add complexity.

B. *Selecting the Assumptions*

The only assumptions generally required to value matched liabilities are interest and mortality. In the selection process, it is useful to note the relative insignificance of events which may occur only in the distant future. Under the 1971 Group Annuity Mortality Table for males and a 13 percent interest assumption, 90 percent of the liability for an immediate life annuity at age 65 is associated with the first ten years of payment, and 99 percent with the first twenty years. Even drastic contingencies, if they can occur only after twenty years, can initially be covered with modest additional reserves that are appropriately invested.

The mortality assumption used in valuing the matched liabilities should be chosen with care. Mortality improvement should be fully anticipated, since there can be no interest assumption increases to offset any future strengthening of the mortality assumption.

The interest assumption should be selected with reference to the yield to maturity of the dedicated portfolio. It will be somewhat less than that yield, because of the contingencies discussed below. A theoretical way to quantify the effect of these contingencies on the interest assumption is as follows:

1. Construct the dedicated portfolio without regard to the contingencies.
2. Determine the additional investments needed to provide for the contingencies, for example, to provide replacement income in the event of specific possible defaults.
3. Determine the interest rate that equates the matched liabilities to the market value of the dedicated portfolio, including the additional investments.

The contingencies for which interest margins might be required are the following:

1. *Inadequacies in other assumptions.*—The interest assumption is traditionally used as a repository for margins against inadequacies in other assumptions. A dedication program may remove the margin, leaving an inadequate funding basis for the nondedicated liabilities. A substantial dedication program, however, offers an opportunity to strengthen other assumptions, reducing the need for margin in the dedicated portion.
2. *Future benefit increases for retirees.*—These are often implicitly prefunded through margin in the interest assumption. Some such margin can of course be maintained. While this is not generally done, its omission means that the sponsor is funding benefits of declining purchasing power, and his ability to grant future ad hoc increases may be seriously impaired.
3. *Defaults.*—The question of margins for default can be avoided entirely by confining the portfolio to United States government and agency securities. This would cut the yield, at this writing, by about 200 basis points compared to a typical portfolio of investment-grade corporate bonds. This considerably overstates the appropriate margin for default, since it reflects government securities' greater liquidity, call protection, and exemption from state and local income taxes, among other factors. Since dedication is a risk-avoidance technique, portfolios are typically confined to high-grade securities with very minor risk of default.
4. *Calls.*—Industrial bonds are generally callable ten years after issue, utilities after five. If rates have fallen enough to make calling the bonds attractive to the issuer, the fund will be unable to reinvest the proceeds at a high enough rate to maintain the cash flow expected from the original investment. Call protection can be obtained by confining the portfolio to noncallable securities, such as government and government agency securities, corporate securities that are noncallable, zero-coupon bonds, and GICs, or by investing in corporate bonds whose coupons are low enough to render a call improbable.

Investing in low-coupon bonds sacrifices some yield compared to other corporate bonds, because of their attractiveness to taxable investors seeking capital gains as well as call protection. However, there is greater sacrifice in investing in noncallables, so the low-coupon approach is generally adopted. A portfolio containing callable bonds must be closely monitored if interest rates fall. Otherwise they may be called, or may be close enough to being called that they cannot be sold for a value adequate to permit reinvestment that preserves matching.

Since shortfalls may arise because of actual or threatened calls, it is useful to determine the effect of an unanticipated drop in interest rates. If the effect would be substantial, the problem is not one of margin but of whether the liabilities can be considered matched at all. If the effect is modest enough to be overcome by a small additional reserve, the interest assumption should be lowered enough to produce that additional reserve.

5. *Payment stream deviations.*—The mortality element makes it impossible to forecast benefit payments precisely. The possible mortality losses themselves should, over the long run, be offset by mortality gains if the mortality assumption is appropriate. Even so, short-term mortality losses can create interest losses by requiring the sale of securities to meet the "unscheduled" benefit payments. The interest assumption must be adequate to cover possible mismatching covered by mortality fluctuations.

   Even if the benefit payments could be forecast precisely, a problem would remain. It is simple to match precisely a schedule of payments coming due within the next two years. As the time horizon extends, however, perfect matching becomes more difficult and may be ultimately impossible because of a lack of appropriate investments. There are also voluntary deviations from matching. Because of scarcity of bonds maturing in certain years or yield curve irregularities, in some instances it will be best to arrange for investment cash flow to occur before it is needed. Occasionally this will be less costly even if the reinvestment rate is zero; more frequently, it will prove superior only if the reinvestment can be made at a modest rate. In the actual selection of securities, it is advantageous to optimize the portfolio on a "best estimate" reinvestment assumption. However, the actuary may wish to provide margin in the interest assumption sufficient to generate an extra reserve covering the possibility of a lower reinvestment rate. If the reinvestment contingency arises only in the distant future, the additional reserve is probably inconsequential.

Another very important consideration in selecting the interest assumption is the shape of the yield curve. A problem can arise if the yield curve is not flat—that is, if long-term yields differ from short-term yields. For example, suppose that the yield for the first year is 20 percent and for all subsequent years is 12 percent, and that this is the equivalent to 13 percent for all years. The use of a 13 percent assumption would create a large (illusory) gain in the first year and an understatement of liabilities in all

subsequent years. Or suppose the situation is reversed, and in the second year the plan sponsor finds himself unexpectedly—and unnecessarily—amortizing a loss.

While the latter situation is uncomfortable, the former is dangerous. Further, it can arise not only from an inverted yield curve but also from lower-yield reinvestments, calls, or defaults in future years. Providing a margin in the interest assumption does little good if the gains in the early years are "spent" rather than accumulated against later-year deficiencies.

There are two basic approaches to this problem. One is to use an interest assumption which grades down (or up) over the years. The other is to use a single interest rate equivalent to the appropriate graded rates, but with an asset valuation method which levels out the effect of the yield curve. This approach is discussed in Section II.

II. VALUATION OF ASSETS

A. *Prededication Method*

One asset valuation approach is to continue with whatever actuarial method was being used previously. This requires that the initial interest assumption for the matched liabilities be set not with reference to market yields, but rather at the level that equates the liabilities to the actuarial asset value. Further, as the actuarial value changes each year, the interest assumption must be reset to equate the liabilities to the new asset value. Without these annual changes the dedication would not serve its purpose of effectively carving out the assets and liabilities from the valuation. The resulting gains and losses may complicate the funding standard account, as discussed in Section IV.

This approach has the advantage of not requiring IRS approval for a change in funding method.

B. *Market Value*

A second approach is the use of market value. This also requires annual changes in the interest assumption to correspond to changes in the market yields. While this can complicate the funding standard account (Sec. IV), the method is conceptually simple and avoids some of the problems that can arise with the amortized cost approaches discussed below.

C. *Amortized Cost—ERISA Basis*

Valuing each security at amortized cost would avoid the need to change interest assumptions annually, since each security would produce its targeted yield each year. Apart from the contingencies discussed under Sec-

tion I, and the margins allowed, there would be no interest gains or losses, and the dedication would function exactly as intended.

Internal Revenue Code section 412(c)(2)(B) authorizes the use of an amortized cost basis, without regard to market value. Notice to the IRS is required, but not IRS approval. Unfortunately, there are several problems:

1. An election under this section must apply to all bonds, not only the dedicated portfolio. This may or may not be desired.
2. The amortization basis runs from initial cost at purchase. This is inappropriate if the dedicated portfolio uses bonds already held by the fund, rather than exclusively new purchases. The amortization basis in that instance should run from market value at date of dedication rather than from initial cost at purchase, if the interest assumption is to be based on current market rates.
3. The amortization basis runs to earliest call date. This is apparently an error in the law. Earliest call date is appropriate for bonds bought at a premium, but maturity date should be used for bonds bought at a discount.
4. Special accounting is required to track the amortized cost value of each security.
5. Yields on the fund will vary from year to year depending on the differing yields for different maturities. Unless a precisely graded interest assumption is used, this will produce fluctuating gains and losses.
6. As discussed in Section IV, dedicated portfolios may be rebalanced annually, for any of several purposes:
   a) To adjust the matching to reflect mortality gains or losses during the year;
   b) To add new retirees;
   c) To recognize cost-of-living adjustments;
   d) To improve the portfolio in respect to yield, call protection, or quality.
   If the rebalancing involves the sale of existing securities, there are the following considerations:
   e) Capital gains or losses may have to be recognized and amortized;
   f) New securities may be valued on a basis which gives them a substantially different yield than existing ones;
   g) The interest assumption may have to be adjusted to reflect the yield on the new securities.

D. *Amortized Cost—Individual Basis*

Rather than make the ERISA election on amortized cost, it may be preferable to adopt an amortized cost basis within the general IRS asset valuation guidelines. Such a basis, which would require IRS approval,[1] would specify that the dedicated portfolio is valued at amortized cost

[1] Some actuaries treat a dedicated portfolio as "a type of asset not previously held by the plan," so that a change in asset valuation method is not a change in funding method, per IRS Reg. 1.412(c)(2)-1(b)(2).

running from market value at date of dedication to maturity value at maturity date. The nondedicated securities would continue to be valued as before, and the value placed on the entire fund would be restricted to a 20 percent corridor on either side of market value.

A drawback is that a change in market interest rates could create a wide gap between the actuarial (amortized) value of the dedicated portfolio and its market value. If the dedicated portion of the fund is large, then the overall 20 percent corridor might require an undesirable compensating adjustment of the actuarial value of the nondedicated fund. This can be avoided by resetting the dedicated interest assumption to the current market rate and restating the asset amortization schedule. It might be possible for the asset valuation method to include this fresh-start provision and the conditions that trigger it, so that a new IRS approval is not needed.

This method overcomes some of the disadvantages of the ERISA amortized cost basis. On the other hand, it requires IRS approval and the 80–120 percent market value limits, with the possible need for adjustment if those limits become significant. It shares the problems of the ERISA amortized cost basis on the items numbered 4–6 above.

E. *Amortized Cost—Aggregate Basis*

Under this approach, amortized values for individual securities are not tracked separately. Instead, the actuarial value of the entire dedicated portfolio starts at market value and is written up or down each year by the amount that, together with interest, produces the initially targeted yield, that is, the initial yield to maturity, less margins. The nondedicated fund would be valued as before, with the 80–120 percent limits applied overall. The yield each year for the dedicated fund would then be exactly as assumed, avoiding investment gains and losses. It would not be affected by trading of securities, market fluctuations (unless the 80–120 percent limits come into play), or any of the contingencies discussed in Section I above. If the earning power of the fund improves because of high reinvestment rates, astute rebalancing, or simply excessive margins in the initial assumption, the yield rate governing future write-ups can be raised. In the opposite case, it can be lowered.

This approach has the attractive features of eliminating any investment gains or losses and effectively taking the matched assets and liabilities "out of play." It eliminates all the disadvantages of the ERISA amortized cost method. Unlike that method it does require IRS approval and may require tinkering if the 80–120 percent limits become significant.

If future increments to the dedicated fund are set up for new retirees at substantially different rates, they can be either handled as separate dedicated portfolios with their own interest assumptions and amortized

value schedules, or merged. Rebalancing the existing portfolio would generally have no effect.

F. *Discounted Cash Flow at Dedicated Rate*

Another approach is to value the dedicated portfolio by discounting its cash flow (from interest and maturities) at the rate used in valuing the liabilities. This valuation method would produce results similar to those under the amortized cost method; it would produce identical results if the interest assumption were equal to the yield to maturity. Margins would be incorporated by appropriately reducing the anticipated cash flow.

G. *Discounted Cash Flow at Nondedicated Rate*

The discounted cash flow method could also be used without adopting a current market interest assumption on the liabilities. Using a lower rate for valuing both liabilities and assets would reflect the dedication by increasing the asset value rather than decreasing the liability. This approach provides a natural link between dedication, other forms of immunization, and active bond management, by producing similar valuation results for portfolios with similar yields but different structures. The 80–120 percent market value limits might become a serious impediment, however, if the dedicated assets are a substantial portion of the fund.

III. INITIAL CHANGE IN UNFUNDED LIABILITY

Dedication may produce a fully funded plan, in which case the ERISA full-funding limitation applies and no contribution is due. If the plan as a whole is not fully funded, several funding issues arise concerning amortization of the initial change in both assets and liability.

A. *Assets*

Under most methods described in Section II, the dedicated portfolio starts at market value. Two basic approaches to shifting the asset valuation upon dedication can be distinguished by whether they alter the initial asset value of the total fund. The choice between the two does not seem clear-cut and may depend on circumstances.

1. INITIAL RECOGNITION OF ASSET GAIN OR LOSS

On this basis, an initial gain or loss occurs as the dedicated portfolio is established. The gain or loss equals the difference between the prededication actuarial value and the market value of the assets transferred or sold to acquire the dedicated portfolio. Depending on the prior asset valuation method, that prededication value may be known security by

security, or it may be a proportion of the total fund value. The latter would be the case if the actuary uses a smoothing method applied to the fund as a whole. The following table illustrates this treatment for a fund with market value of $10,000,000, and with actuarial value of $9,000,000, which is acquiring a $1,000,000 dedicated portfolio by exchange of securities.

	Portion to Be Retained as Nondedicated	Portion to Be Exchanged for Dedicated	Total
Before dedication:			
Market value	$9,000,000	$1,000,000	$10,000,000
Actuarial value	8,100,000	900,000	9,000,000
After dedication:			
Market value	9,000,000	1,000,000	10,000,000
Actuarial value	8,100,000	1,000,000	9,100,000

The second line of the table splits the actuarial asset value proportionately between the two fund segments. On the fourth line, a $100,000 gain appears when the actuarial value of the dedicated fund is set to $1,000,000, in accordance with most methods for valuing such funds. The gain is due to a change in asset valuation method and should be amortized over thirty years, similarly to the changes in assumptions discussed in Section IV below.

2. NO GAIN OR LOSS

If the actuarial asset value is an aggregate method, that is, one that does not attribute a value directly to each security, an alternative exists that would generally avoid immediate recognition of any gain or loss. The asset transfer to the dedicated portfolio could be treated in the same way as a benefit payment, which generally does not produce a gain or loss. In the above example, the $1,000,000 market value transfer from the nondedicated fund would be treated like a $1,000,000 benefit payment. Such a payment would typically affect actuarial value and market value equally, reducing both by $1,000,000. Since that $1,000,000 is established as the value of the dedicated fund, the total fund would retain its $9,000,000 actuarial value.

B. *Liability*

For the purpose of discussion, suppose the following actuarial valuation:

Accrued liability at 7%:	
Active	$20,000,000
Retired	10,000,000
Assets, valued at market	25,000,000
Unfunded liability	5,000,000

A dedicated portfolio for retirees is purchased for $7,000,000 and yields 13 percent. After dedication, the valuation looks like this:

	Nondedicated	Dedicated	Total
Group covered	Active	Retired	
Interest assumption	7%	13%	
Accrued liability	$20,000,000	$7,000,000	$27,000,000
Assets	18,000,000	7,000,000	25,000,000
Unfunded liability	2,000,000	0	2,000,000
Reduction in unfunded liability attributable to dedication			3,000,000

There are two basic views of the reduction in liability due to dedication. The two result in differing funding standard account consequences.

1. ANNUITY PURCHASE ANALOGY

This view considers the transfer of $7,000,000 to a dedicated fund as a form of annuity purchase. In an annuity purchase, only the aggregate reduction in unfunded liability, not the insurer's interest rates themselves, directly enters the amortization of the funding standard account. That aggregate reduction is amortized at the interest assumption applicable to the funds not used in the purchase.

Similarly, the $3,000,000 reduction in unfunded liability resulting from the dedication would be amortized at the interest rate applicable to the nondedicated funds. The amount and amortization of previous debit and credit balances are unaffected.

Another route to the same conclusion is to view the plan as two separate plans: a fully funded plan earning 13 percent and a partially unfunded plan earning an assumed 7 percent. Apart from gains or losses, discussed in Section IV below, all future funding takes place in the latter plan, earning the 7 percent rate. In funding the remaining $2,000,000 unfunded liability, the plan sponsor must, over time, contribute the $2,000,000 plus the additional interest it would have earned had it been there from the start. That interest is assumed to be at 7 percent; contributions including interest at 13 percent will overfund the plan. Funding the original $5,000,000 at 7 percent and amortizing a $3,000,000 credit at the same 7 percent will be correct.

Departure from the annuity purchase analogy seems necessary with respect to the amortization period for the unfunded liability reduction. The gain on dedication is due to a change in assumptions: the plan actuary's redetermination of the liability at 13 percent. It should therefore be amortized over thirty years. An annuity purchase, on the other hand,

removes assets and liabilities from the plan. It is therefore an experience gain which should be amortized over fifteen years.

2. SPIN-OFF ANALOGY

This view considers the dedication as a spin-off into two separate plans, each with its own funding standard account. The debit (shown in parentheses) and credit balances in our example would look like this:

	Nondedicated	Dedicated
1. Prededication	($5,000,000) X years at 7%	
2. Allocation for spin-off, prior to assumption change	($2,000,000) X years at 7%	($3,000,000) X years at 7%
3. After assumption change: adjustment of old schedules	($2,000,000) X years at 7%	($3,00,000) X years at 13%
4. Credit for reduction		$3,000,000 30 years at 13%

Line 1 shows the prededication unfunded liability of $5,000,000 being amortized at 7 percent over X years, depending on when and how the unfunded liability arose. Line 2 shows the $5,000,000 debit balance allocated between the dedicated and nondedicated funds, before the change in assumptions. Since the spin-off moved $7,000,000 of assets and $10,000,000 of liability to the dedicated fund, $3,000,000 of the balance is allocated to it. Line 3 shows the effect of the assumption change, which is to shift the amortization of the $3,000,000 debit balance from 7 percent to 13 percent, while creating a $3,000,000 credit balance to be amortized over thirty years at 13 percent.

If the prededication unfunded liability of $5,000,000 is amortized over thirty years, then the credit and debit amortization amounts on the dedicated fund cancel each other. The convenient result is thirty-year amortization of the remaining $2,000,000 unfunded liability in the nondedicated fund, the same result which would occur under the annuity purchase method. For periods other than thirty years, the result is anomalous: contributions may be due to, or credits due from, a dedicated fund in which assets equal liabilities. This could be avoided if it were permissible to apply the full-funding limitation to the dedicated portion by itself, rather than to the plan as a whole. If the IRS were to require that dedication be handled under this general approach, which is consistent with the maximum deduction regulations, it would be helpful to authorize use of the full-funding limitation in this way. This would eliminate any funding standard

account balances for the dedicated portion and leave the funding focused, as it should be, on the remaining unfunded liability in the nondedicated portion. Future gains or losses on the dedicated portion would have to be dealt with. They are discussed in the following section.

IV. SUBSEQUENT CHANGES IN UNFUNDED LIABILITY

A surplus or deficit can appear in the dedicated fund for various reasons:

1. Mortality gains or losses, or changes in the mortality assumption.
2. Interest gains or losses, when margins prove redundant or inadequate.
3. Gains or losses on changes in market value (if assets are valued at market or some basis reflecting market).
4. Gains or losses on security sales (if amortized cost is used for individual securities). The security sales might be to meet unexpected benefit payments or to rebalance the portfolio for improved yield, quality, or call protection, or for other reasons.
5. Changes in the interest assumption. Such changes would typically be made to compensate for lower asset values related to item 3 or item 4 above. The new interest assumption would be chosen to equate the new asset value to the matched liabilities.
6. Changes in other assumptions affecting benefit payments (if the dedication involves nonretired participants).

It would be possible to treat the dedicated and nondedicated portions as separate plans for actuarial purposes. Any deficit or surplus appearing in the dedicated portion would then be amortized at the dedicated interest assumption. The actuary would in effect track two separate funding standard accounts, at separate interest rates, and consolidate them into a single filing.

Standard practice, however, is that any deficit appearing in the dedicated portion is compensated for by an asset transfer from the nondedicated fund to the dedicated fund. Surplus may be left in the dedicated fund but should be thought of as available to, and part of, the nondedicated fund. The experience gains or losses should then be amortized over fifteen years at the nondedicated interest rate, as indicated by two lines of reasoning:

1. Losses in the dedicated fund are made up by transfers from the nondedicated fund. The resulting shortfall in the nondedicated fund must then be made up—both principal and the lost interest. That lost interest is based on the nondedicated interest assumption. Similarly, gains transferred to the nondedicated fund are assumed to earn the nondedicated rate while being amortized.
2. Alternatively, an analogy can be made between dedication and an annuity purchase that has both dividend and assessment features. Assuming the annuity purchase is made on a basis not expected to produce material dividends or

assessments, such dividends or assessments as do occur should be treated like gains or losses on the funds not used in the purchase: amortized at the interest assumption applicable to those funds.

Under dedication, gains on the dedicated fund that are made available to the nondedicated fund are like dividends in the theoretical annuity purchase. Losses requiring make-up from the nondedicated fund are like assessments. These gains or losses should, analogously, be amortized at the nondedicated rate.

The same reasoning supports amortizing assumption changes over thirty years at the nondedicated rate. Unfortunately, a case can be made that more complex treatment is required for interest assumption changes. Following the spin-off analogy discussed in Section III, amortization amounts for prior balances in the dedicated portion could be reset for the new interest assumption. A new balance would then be established for the change. Further adjustments would be needed for any resulting transfers between the two segments. The result would be a proliferation of meaningless bases. This could also occur if the actuary is using market value and changing the interest assumption annually, even if the dedicated fund remains in balance at all times. Even if the bases can be simplified, there remains the problem of amortizing market value changes over fifteen years, while the offsetting liability changes are amortized over thirty years.

These are undue complications. As long as the dedicated portion is kept in balance, either by fortune or by transfers between the two portfolios, only the nondedicated interest assumption and the transfers into or out of that portfolio are significant for amortizing credit and debit balances. The IRS position on this is not yet clear, but it would be helpful if this reasoning were recognized. As mentioned in Section III, one way to do this would be through a special full-funding limitation applicable solely to dedication.

Another way of avoiding funding complications is to take the position that the appropriate interest assumption for the dedicated portion is a floating assumption. Market value could be used for the assets, and the interest assumption formally defined as whatever interest rate equates the liabilities to the market value of the assets which match their payout (with appropriate margin). The rate which satisfies that condition will "float," but as long as the formal definition does not change, there is no change in the assumption. Assets and liabilities would thereby be held equal in the face of market changes (though not in the face of other experience changes such as mortality) without the need to recognize interest gains or losses or offsetting assumption changes. This would have been an entirely sensible position before ERISA; whether it remains so is yet to be determined.

V. CONCLUSION

Current actuarial practice in funding pension plans with dedicated portfolios is widely divergent. It is difficult to think of another aspect of pension funding which has inspired so many approaches with so little confidence on the part of practitioners in the acceptability of any one method. While all approaches converge over time, a sensible contribution pattern is desirable. It is hoped that this paper contributes to the actuary's ability to achieve such a pattern.

DISCUSSION OF PRECEDING PAPER

PAULETTE TINO:

This discussion represents the opinion of the author and does not necessarily represent the official position of the Internal Revenue Service or of the Joint Board for the Enrollment of Actuaries.

Mr. Bader has published a well-organized and exhaustive discussion of the issues that arise from the direct utilization of a dedicated bond portfolio (DB) in the valuation of a defined benefit plan. Mr. Bader raises some questions of a regulatory nature that I shall try to answer strictly on the basis of well-known regulatory positions.

Direct utilization of the DB involves calculating a liability for designated future benefit payments using a valuation interest rate predicated directly or indirectly on the yield of the DB which is different from (generally higher than) the valuation interest rate used for calculating the balance of the plan liabilities. The designated future payments will be paid from the assets associated with the DB liabilities and such an associated fund is treated as earning interest exactly at the DB valuation interest rate. Essentially, for valuation purposes, two sub-plans have been created: the DB sub-plan with its assets and liabilities, and the other sub-plan (call it sub-plan O) associated with the rest of the plan assets and liabilities. The DB sub-plan is kept fully funded, as is necessary when a spread-gain funding method is used in order to satisfy the IRS requirement that the normal cost remain level as long as the actuarial assumptions are realized. More generally, it is necessary to maintain the DB sub-plan on a fully funded basis as a result of the impossibility of assuring that the investment of future contributions would yield the higher DB valuation interest rate.

The plan as a whole remains a single plan within the meaning of Section 1.414(l)-1(b)(1) of the IRS regulations. Accordingly, the plan has a single funding standard account (FSA) even though (a) the various amortization bases are determined and maintained using the valuation interest rate of the sub-plan in which they arose, (b) the FSA is of necessity calculated in two parts, and (c) the plan credit balance is the sum of the separately calculated credit balances. The full funding limitation applies only to the plan as a whole, each item entering its calculation being brought forward at its related valuation interest rate.

Does the adoption of an arrangement involving the direct utilization of the DB constitute a change in funding method?

On the asset side, the answer is "yes" if the method used to determine the actuarial value of the assets has been changed as a result of establishing the DB. On the liability side, the answer also appears to be "yes," because "the funding method of a plan includes not only the overall funding method used by the plan but also each specific method of computation used in applying the overall method" (Section 1.412(c)(1)-(b) of the Regulations). It appears that the adoption of a dual interest rate for calculating the liability of a single plan, the assets of which are available to pay benefits to all employees covered by the plan, must be viewed as a specific method of computation. This calls for (among other items) a statement as to the expected rate of earnings of such assets. In order to make it possible for independent actuaries to duplicate the results of a valuation, the funding method should:

a. designate the future benefit payments valued in the DB sub-plan,
b. define the actuarial value of the assets associated with the DB sub-plan and its expected earning rate,
c. define the method used to keep the DB sub-plan fully funded (i.e., by transfer of assets or liabilities).

At what interest rate should the base created as a result of the change in the interest rate used to value the designated payments to the DB interest rate, be amortized, and what is the length of its amortization period?

Since the base was created as a result of a change in actuarial assumptions (here the interest rate), the new DB interest rate should be used as the basis of the amortization, the length of which should be thirty years. Mr. Bader shows that the annuity purchase analogy would suggest using the interest rate of sub-plan O and an amortization period of fifteen years which is incompatible with the amortization period mandated by the Internal Revenue Code for a base created as a result of a change in actuarial assumptions.

The spin-off analogy, as shown in Mr. Bader's paper, leads to an interest rate and an amortization period that satisfies the Code requirements. Also, under the spin-off analogy, as of the date of implementation of the DB arrangement and after the change to the DB rate, the net of the outstanding balances of the bases associated with the DB sub-plan is necessarily equal to zero and, thus, also equal to the unfunded liability of the DB sub-plan.

In view of the fact that the DB sub-plan is kept fully funded, must bases be established in the DB sub-plan as a result of experience gains or losses, transfers of assets or liabilities, changes in actuarial assumptions, and so on?

The adoption of any specific method of calculation does not change the need for the plan to comply with the basic rules governing the calculation of the FSA. Therefore, the fact that two distinct sub-plans have been created for valuation purposes does not mean that such rules can be suspended for either one (or both) of these sub-plans. As a general rule, the bases must be established in each and every sub-plan. Of course, if the DB sub-plan is kept fully funded by appropriate transfer of assets, a fifteen year experience base in that sub-plan will be exactly canceled out by the fifteen year base due to the transfer of assets. But if the DB sub-plan is kept fully funded by transfer of liabilities, a thirty year base created as a result of a change in interest rate will not be exactly canceled out by the fifteen year base due to the transfer of liabilities. See, however, the next question.

Since the DB sub-plan is kept fully funded, could the bases created in such sub-plan at the time of the adoption of the arrangement and, in future years, as a result of its on-going operation, be considered fully amortized at the end of each plan year by applying the full funding limitation only to the DB sub-plan?

As mentioned at the beginning of this discussion, the full funding limitation applies to the plan as a whole and not to each of its parts separately. On the other hand, the desired effect could be achieved by means of systematically combining and offsetting the bases. The operation would have to encompass all plan bases allowed to be combined and offset but would be carried out separately for the bases associated with each sub-plan.

JOHN W. PENNISTEN:

Mr. Bader has prepared a most thorough follow-up and expansion of a preceding presentation on this topic [3].

Two aspects of dedicated pension funds deserve further discussion. One issue is whether current high income from fixed-income investments should be used to reduce current employer costs or to provide periodic and substantive post-retirement benefit increases to pensioners and survivor beneficiaries. Most of the historically high yield now obtainable on fixed-income securities represents compensation for the erosion of creditor capital by anticipated future inflation. This same inflation will also erode the annual benefits of retirees under private pension plans. In the United States, Social Security and other governmental plans provide regular cost-of-living increases. Only occasionally, if at all, do private pension plans grant post-retirement increases to protect annual pension values. If the general public cannot obtain satisfactory post-retirement living standards through defined

benefit pension plans, it can and will obtain such living standards from other sources.

The second issue relating to current high investment yields which are not expected to continue long-term is the use of select and ultimate assumptions for inflation. Such assumptions include not only select and ultimate interest rates, but also salary scales with select and ultimate elements and a separate assumption for prospective post-retirement benefit increases. The mechanics, including annual gain and loss analysis, of select and ultimate interest rates and salary scales in pension calculations, are not difficult and have been outlined previously [5]. Select and ultimate pension assumptions do require modern high-speed computers in addition to commutation functions. On this point, the discussion at the end of Fortier's work [2] is relevant. The IRS apparently frowns upon having the select period automatically begin anew at each valuation date. Further, if there is such automatic renewal, then periodic gain and loss analysis is much more complicated.

Select and ultimate assumptions for inflation, where current high market interest rates are not expected to continue long-term, permit comparable assumption structures to be used for all pension plan calculations: annual funding, FASB, PBGC, lump sum benefit commutations and so on. Another advantage of select and ultimate assumptions for inflation is in promoting better understanding of pension costs. Plan sponsors, participants, accountants and regulators can quantify in dollars the effects of alternative intermediate-term inflation levels. Select and ultimate rates do require some extra work, at least in initial programming, but perhaps this is preferable to the following alternatives.

The private defined benefit pension plan movement has stagnated, if not actually declined, over the past several years. This trend has been well documented [4, esp. p. 42][1]. If integrated final average salary offset plans will not provide the general public with reasonable and understandable accrued benefits, portability, and post-retirement benefit protection, then further migration to profit-sharing, 401(k), IRA's, and other individual account plans will continue. Under individual account plans, little if any of the investment yield from the reinvestment of account balances after retirement goes to reduce employer contributions for other people. Instead, the inflation element of post-retirement investment income remains with the individual participant to give at least some protection against erosion of his or her living standards by inflation. If actuaries do not want to use the low-cost, high-speed computer hardware available in the late twentieth century, in addition to the commutation functions developed in the late nineteenth century, then perhaps they ought to remember that while defined benefit plans regularly require actuaries, defined contribution plans do not.

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3. "Panel: Actuarial Implications of Immunization, Dedication, etc.," *PCAPP*, XXXII (1982-83), 140.
4. "PBGC Data Show Reversions Brought Firms $443 Million," *Pensions & Investment Age*, August 22, 1983, 3.
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CLYDE D. BEERS:

Mr. Bader's timely paper is a welcome addition to the literature. I would like to share some situations where the dedication is done in a slightly different context than the retiree dedication discussed in the paper.

In several instances I have worked with dedication of projected benefits for active employees. In that case future salary increases mean that liabilities remain significant even considering twenty years of discounting for interest.

In the normal situation, prefunding of retiree increases is not desired; in fact, dedication is usually discussed for purposes of cost reductions. However, consider a dedicated fund designed to match future retiree payments including assumed 6 percent increases in benefits every third year.

Ongoing valuation: Actuarial accrued liability

The technical problems associated with dedication are evident in designing a practical method of ongoing valuation. Assume that valuation results are desired at a basic valuation rate (perhaps 7-9 percent in today's environment),and at a special rate on the dedicated assets (perhaps in the 12-14 percent range). The goal is to value assets and liabilities on a consistent basis.

The ongoing actuarial accrued liability and gain and loss problems associated with dedication can be solved as follows:

a. Freeze the cash-flow produced by the dedicated fund until it materially differs from the initial dedication.
b. Value all plan liabilities at the basic valuation rate.
c. Value cash-flow in (a) at the basic valuation rate.
d. Value cash-flow in (a) at initial yield-to-maturity.
e. Actuarial accrued liability is then (b) − (c) + (d), with no gain or loss from year to year.

Assets under this approach would equal the discounted present value of

future cash-flow discounted at the initial yield-to-maturity rate, also producing no gain or loss.

The only remaining problem is the 80/120 percent corridor around market value. This must be addressed by the asset valuation method and by assumption changes, if the dedicated assets are significant in comparison to the total fund.

Ongoing valuation: Present value of accumulated benefits

For purposes of computing the present value of accrued benefits (which is compared to the market value of assets), a consistent present value can be obtained by the following:

a. Freeze cash-flow as described above.
b. Value accumulated benefits at the basic valuation rate.
c. Value cash-flow in (a) at the basic valuation rate.
d. Use market value of dedicated assets.
e. The present value of accumulated benefits is then (b) − (c) + (d), with the *interest rate* on the dedicated fund changing each year to reflect the actual market yield-to-maturity.

In general, the ongoing valuation problems are more technically imposing than the initial dedication. The above is just one possible solution that appears to be manageable without too much extra calculation work.

(AUTHOR'S REVIEW OF DISCUSSION)
LAWRENCE N. BADER:

Ms. Tino's thoughtful discussion is particularly helpful for the insight it offers, unofficial though it may be, into the thinking of IRS actuaries on dedicated portfolios. Most actuaries would like to treat the dedicated portion of the plan as a black box, with assets transferred to or from it to maintain the dedication and with all the "actuarial work" being done on the nondedicated portion, at the nondedicated interest rate. Ms. Tino points out several respects in which the Code and IRS interpretations thereof make the "natural" treatment of dedicated portfolios unacceptable.

Of particular concern to many actuaries is the IRS position that adopting a split interest assumption is a change in funding method. In support of this position, Ms. Tino cites Reg. 1.412(c)(1)-(b), which states that a funding method includes "each specific method of computation." She then notes three elements of split interest valuations that mark it as a change in funding method.

The first element, designating which future benefit payments will be val-

ued at the dedicated rate, would be regarded by most actuaries as part of the interest assumption just as the designation of separate turnover tables for salaried and hourly plan participants is part of an assumption, not an element of a funding method.

The second element, defining the actuarial value of the dedicated portfolio, is part of the plan's asset valuation method. I agree that if the valuation of the dedicated portfolio is different from the prededication method, the change requires IRS approval under existing regulations. I do not think this bears on the question of whether adoption of a split interest valuation for liabilities is a change in funding method.

The third element is the method used to keep the dedicated portfolio dedicated. This investment policy question may affect the credibility which the actuary gives to the dedication in setting the interest assumption. That makes it part of the support for the actuarial assumptions, but does not seem to make it part of the actuarial funding method. The actuary can use a current market interest rate for all or some liabilities with no dedication at all. Further, the method of maintaining dedication does not enter the calculations of liabilities once the assumption is determined. It is not needed to enable "independent actuaries to duplicate the results," and therefore does not appear to be part of the funding method.

While actuaries must defer to definitive IRS positions in complying with Internal Revenue Code Section 412 funding requirements, IRS insistence on a right of approval for split-rate assumptions seems to me not only questionable but ineffectual. Actuaries and plan sponsors who do not wish to file for approval would merely adopt single-rate assumptions which blend the dedicated and non-dedicated rates, thereby achieving comparable results (though the split-rate assumption has certain advantages, as discussed in Section I.A. of the paper).

Mr. Pennisten goes beyond the actuarial focus of the paper to provide perspective on the ownership of the "extra" yields occasionally available on fixed-income investments. Retirees certainly have a reasonable claim. But so does the employer, who bears the right of inadequate returns and may also have to meet other unanticipated costs associated with inflation: costs of medical benefits, replacement of plant and equipment at values not covered by depreciation.

I share Mr. Pennisten's concern about the perceived inadequacy of the private pension system's provision of post-retirement benefit protection. Unfortunately, the alternatives are not dramatically better. Mr. Pennisten mentions that "social security. . . provides regular cost-of-living increases." Those who were planning on their 1983 cost-of-living increases might not agree. The growth of IRA's and 401(k) plans is a fact of life, and a beneficial

one, but these plans do not really solve the post-retirement inflation problem either. The virtues of defined benefit plans have a way of being rediscovered when the market falls, as in 1973-74.

Mr. Beers mentions some alternative uses of dedication, including the provision of post-retirement increases (an interesting application that responds to Mr. Pennisten's concern). He also presents an alternative valuation approach. The alternative is essentially to subtract from the liability (determined at the nondedicated rate) the present value (at the same rate) of the "excess" yield of the dedicated fund.

This is reminiscient of Section II.G. in the paper, where, however, the asset changes instead of the liability. Mr. Beers' approach has the advantages of being far more likely to avoid difficulty with the 80/120 percent market value corridor, and of being usable for a FASB 35/36 calculation. His approach does not require explicit dedication and can theoretically produce similar results for other forms of immunization or for active bond management.