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A New Hybrid Defined Benefit Plan Design

Wayne E. Dydo*

Abstract

Traditional defined benefit plans can be difficult to understand and complex to administer. Hybrid plans (cash balance and pension equity) arose in part to address the former issue, but at a price of greater administrative and litigation risk. I introduce a design for defined benefit pension plans that is easy to communicate to participants, allows for accrual patterns that closely replicate those of the two most common forms of hybrid pension plans, and avoids the controversial nondiscrimination issues that currently trouble sponsors of hybrid plans. The design defines the benefit as a fixed percentage of pay payable over a period of time, which period is built up over a participant's employment. When translated into a lifetime pension commencing at normal retirement age, an interesting pattern of accrual rates develops. Numerical examples and illustrations are provided, along with suggested uses for this type of plan.

Key words and phrases: *hybrid pension plan, actuarial equivalent, Section 417(e), Internal Revenue Code*

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1 Introduction

A nontraditional or hybrid defined benefit plan exhibits some of the characteristics of a defined contribution plan from the perspective of the participant, but is funded and administered like a traditional defined benefit plan. The benefit formulation under a hybrid plan is something other than a lifetime annuity commencing at normal retirement age. The cash balance hybrid establishes a notional account for each participant that each year is credited with a percentage of pay and an interest credit, both at plan-specified rates. The pension equity hybrid defines the benefit as a lump sum equal to an accumulated percentage of final average earnings. The accumulated percentage results from annual percentage credits that generally vary by age or a combination of age and service.

The popularity of hybrid plans can be traced to two features: (i) the presentation of the benefit as a lump sum that participants understand, and (ii) the accrual pattern, i.e., the way the benefits build up during a participant's employment with the plan's sponsor. A hybrid plan's accrual pattern typically provides more benefit during the earlier years of employment than is the case with traditional defined benefit designs.

Despite the popularity and appeal of hybrid designs, the courts, regulators, and politicians are attempting to significantly alter the utility of these types of plans. For example, in July 2003 the federal district court for the southern district of Illinois ruled in the *Cooper v. IBM* case¹ that both the pension equity plan and the cash balance formulas in IBM's plan violate federal age discrimination law because the rate of accrual for the age 65 annuity benefit declines with age. This decline occurs because of the time value of money: \$1,000 invested at age 25 will produce a higher lifetime annuity at age 65 than \$1,000 invested at age 45, assuming a positive investment return each year.

In this paper I introduce a new defined benefit plan design, called an *annuity certain plan*, which employers may find appealing given the current legal and political complications surrounding hybrid defined benefit plans. The annuity certain plan design has several attractive attributes:

- it reduces mortality risk for the sponsor,
- it simplifies the plan valuation,
- it encompasses a simple benefit formulation that participants can understand, and

¹Cooper v. IBM Personal Pension Plan, 274 F.Supp.2nd 1010 (S.D. Ill. 2003).

- its benefit formulation depends solely on service and annuity factors at normal retirement age.

This last feature implies that benefit accrual rates do not decrease on account of age, thus avoiding a principal objection currently being raised against hybrid plans.

The paper is organized as follows: Section 2 gives an overview of the annuity certain plan design. More details of the design and uses of annuity certain plan are described in Section 3. Closing comments are given in Section 4.

2 Annuity Certain Plans

2.1 An Overview

By law,² a tax-qualified defined benefit plan is required to provide a lifetime benefit commencing at retirement. As this commitment extends over decades, it subjects both the plan and the participant to mortality risk, albeit in opposite ways. The plan could end up paying benefits over longer than expected time periods if the participant lives longer than expected, whereas a participant who dies prematurely forfeits substantial benefit value. Providing a lump sum option, however, allows the plan to remove the mortality risk if the participant chooses the lump sum option, but at a high cost to the plan, especially in a low interest rate environment.

The annuity certain plan attempts to reduce the employer's mortality risk by defining the benefit as a temporary, but guaranteed, benefit. The plan may be thought of as an extended severance plan. The participant receives a defined percentage of pay (career average or final average) payable for a fixed period of time commencing at normal retirement age. As the payments continue whether the participant is alive or dead, these payments are called an "annuity certain." The period of time over which the benefit is paid will vary by the amount of time the employee has worked for the employer (service): the longer the service, the longer the benefit will be paid. If benefits are allowed to start before normal retirement age, the size of the retirement benefit is reduced using a fixed interest rate.

A defined benefit plan must express the plan's benefit as a lifetime annuity commencing at normal retirement age, which for the remainder of this paper is assumed to be age 65. This benefit is called the

²Section 411(a)(7) of the Internal Revenue Code of 1986, as amended; Treas. Reg. Section 1.411(a)-7(a)(1).

accrued normal retirement benefit. The accrued normal retirement benefit would be determined from the pension benefit payable for the calculated period of time (I refer to this as the annuity certain benefit) using an actuarial equivalence assumption set of unisex mortality (as prescribed in section 417(e) of the Internal Revenue Code) and a fixed low interest rate (possibly different from the rate used to reduce the benefit for early commencement).

Determining the participant's monthly retirement benefits paid from the termination of employment is not particularly difficult. At the moment of the termination of employment, let

n = Participant's years of service;

Ben = Participant's monthly retirement benefits;

f_{65} = Fraction of participant's final average monthly salary;

m = Number of months credited for each year of service; and

N = Total number of months credited.

The participant's monthly retirement benefits paid from the termination of employment is

$$\text{Ben} = f_{65} \times \text{Final Average Monthly Salary}, \quad (1)$$

which is paid for $N = mn$ months.

For example, suppose the plan pays $f_{65} = 45\%$ of the participant's final average monthly salary for $m = 4$ months for each year of service, commencing at age 65. A participant with $n = 20$ years of service would lead to $N = 80$ months of pension payment, with each payment equal to 45% of the participant's monthly final average salary. These payments would start when the participant reaches age 65 and continue thereafter for the 80-month period irrespective of the survival of the participant.

A short period of payment for the short-service employee may seem inadequate, but keep in mind that the payments are substantial, equaling 45% of average monthly salary. Below I show that the equivalent lifetime annuity benefit for an employee with 5 years of service is 5.65% of average salary, which is a typical lifetime pension for short service.

Commencement of retirement benefits at 55 or later could be allowed, but the annuity certain benefit must be reduced for each year retirement age precedes age 65. If i is the discount interest rate, let f_x denote the fraction of participant's final average monthly salary at termination of employment at age x that is used to determine the benefit paid. It follows that

$$f_x = f_{65} \times (1 + i)^{-(65-x)}.$$

For example, if the discount rate were $i = 6\%$, then instead of the 45% of average salary payable at 65, the monthly benefit would be reduced to 25.13% of average salary if payments were to commence at age 55. The length of the certain payment period does not change.

As noted above, a tax-qualified defined benefit plan must express an accrued normal retirement benefit in the form of a lifetime annuity. This accrued normal retirement benefit is defined as the actuarial equivalent of the accrued annuity certain benefit payable at normal retirement age (65) using 4% interest and section 417(e) mortality. The relatively low interest rate minimizes the likelihood of section 417(e)-required benefit improvements.

Specifically, section 417(e) of the Internal Revenue Code requires the present value of any optional form of benefit that is not paid over the lifetime of the participant be at least as great as the present value of the normal retirement benefit computed using the prescribed mortality table and interest rate (currently the 30-year Treasury security rate). For the annuity certain plan this means the annuity certain benefit under the plan must be at least as great as the actuarially equivalent annuity certain benefit computed from the accrued normal retirement benefit using the section 417(e) required interest and mortality.

If the annuity certain plan provides a benefit only at normal retirement age, section 417(e) will be satisfied so long as the plan's actuarial equivalent interest rate is less than or equal to the section 417(e) rate. A 4% plan rate should satisfy this requirement. If a reduced annuity certain benefit is provided before normal retirement age, then section 417(e) will be satisfied as long as the early commencement discount rate is not too large. A careful examination of the actuarial formulas involved in determining whether or not section 417(e) is satisfied will show that the rate needs to be tested only at the earliest retirement age and for the longest expected annuity certain period under the plan.

Table 1 shows the age-55 ratio of the minimum annuity certain benefit under 417(e) to the annuity certain benefit under the plan formula. Various section 417(e) interest rates and plan early commencement discount rates are illustrated. The certain period is 15 years and the plan's actuarial equivalence rate is 4%. A ratio of 100% or lower means that section 417(e) is satisfied. For example, if the plan uses a 6% early commencement discount rate and allows benefit commencement as early as age 55, then for all plan benefits less than or equal to 15 years in duration, section 417(e) is satisfied so long as the section 417(e) rate is 5.1% or higher. Notice that if the plan's formula allows for four months

of payment for each year of service, then 45 years of service would be needed to accrue the 15-year period benefit.

Table 1
Ratio of 417(e) Minimum Benefit to Plan Formula Benefit
For 15-Year Annuity Certain Benefit at Age 55

417(e) Rate	Early Commencement Discount Rate					
4.50%	4.50%	5.00%	5.50%	6.00%	6.50%	7.00%
4.50%	92.9%	97.5%	102.2%	107.2%	112.3%	117.7%
4.75%	90.2%	94.6%	99.2%	104.0%	109.0%	114.3%
5.10%	86.6%	90.8%	95.2%	99.8%	104.6%	109.6%
5.25%	85.1%	89.2%	93.5%	98.1%	102.8%	107.7%
⋮						

The accrued normal retirement benefit, expressed as a percentage of final average annual pay, can be determined as follows: let

n = Number of years participant has worked for employer;

m = Number of months of payment earned for each year of employment; and

x = Participant's retirement age, $x = 55, 56, \dots, 65$;

r = Actuarial equivalence rate, which is the interest rate used in converting a benefit from one form to another;

f_x = Percentage of average monthly earnings payable at age x . Generally, if i denotes the early commencement discount rate and 65 is the normal retirement age, then

$$f_x = f_{65} (1 + i)^{-(65-x)};$$

$P(x, n)$ = Participant's accrued retirement benefit percentage at age x ; and

$$k = (1 + r)^{-m/12}.$$

Note that the actuarial equivalence rate, r , is an effective annual rate specified in the plan document that is used to determine the value of a benefit form under the plan in order to convert the form into an equivalent form. The quantity $\ddot{a}_{\overline{m/12}|r}^{(r)}$ is the value of 1 payable in equal

monthly installments at the beginning of each month for m months at an effective annual rate r . Thus $12f_x\ddot{a}_{\overline{m/12}|r}^{(r)}$ represents the value of the benefit earned for the first year of service expressed as a percentage of final average monthly earnings and payable monthly beginning at age x . The value of the benefit earned for the second year of service is k times this amount because k represents the discounted value (at rate r) of 1 deferred for $m/12$'s of a year. Similarly, the value of the benefit earned for each successive year of service is k times the value of the benefit earned for the prior year of service. Dividing by $12\ddot{a}_x^{(12)}$ converts the benefit into a lifetime annuity at age x . It follows that

$$\begin{aligned}
 P(x, n) &= f_x \times \left(\frac{\ddot{a}_{\overline{m/12}|r}^{(r)}}{\ddot{a}_x^{(12)}} \right) (1 + k + \dots + k^{n-1}) \\
 &= \left(\frac{\ddot{a}_{\overline{m/12}|r}^{(r)}}{\ddot{a}_x^{(12)}} \right) \left(\frac{1 - k^n}{1 - k} \right) f_x. \tag{2}
 \end{aligned}$$

Formula (2) presents the participant's accrued lifetime annuity benefit payable at age x as a percentage of final monthly average earnings given the participant has n years of service. Formula (2) shows that each year's accrual is k times the previous year's accrual and is independent of the age of the participant when the benefit is accrued. The factor k is the ratio of the annual accrual in one year to the annual accrual in the prior year for a given commencement age. So the series of accrual rates for a given commencement age forms a decreasing geometric series: the longer the payment period per year of service, the greater the rate of decrease. This decreasing series of accrual rates ensures that the accrual rules of section 411(b) are satisfied and also distinguishes this type of plan from other hybrids. Also notice that these accrual rates (percentages of final average pay paid as a lifetime annuity) depend only on service and age at commencement, not current age, so the plan satisfies the requirement of the law that the rate of accrual is independent of age (e.g., the accrued normal retirement benefit for a 40-year-old with ten years of service is the same as for a 50-year-old with ten years of service).

Table 2 shows the accrued normal retirement benefit expressed as a percentage of final average annual pay using the above example of the plan paying $f_{65} = 45\%$ of monthly average pay, $m = 4$ months of payment per year of service, $r = 4\%$ actuarial equivalence rate, $i = 6\%$ early commencement discount rate.

Table 2
 $P(x, n)$ for Various Years of Service (n)
And Commencement Ages (x)

Years of Service (n)	Commencement Age (x)			
	65	62	60	55
1	1.16%	0.90%	0.76%	0.51%
5	5.65%	4.38%	3.71%	2.49%
10	10.95%	8.49%	7.19%	4.83%
20	20.55%	15.94%	13.51%	9.07%
30	28.98%	22.47%	19.05%	12.79%

3 Design and Uses of Annuity Certain Plans

3.1 Other Design Features

The key variables of the plan are the pay replacement percentage, f ; the period of payment per year of service, m ; and the normal retirement age, 65. The replacement percentage could be integrated, (e.g., 30% for average pay up to covered compensation and 45% for excess pay). The periods of payment could vary by years of service, e.g., six months of payment for the first five years of service and four months thereafter, depending upon the desired accrual pattern.

Optional annuity forms probably should be restricted to the straight life and 50% joint and surviving spouse forms. With respect to pre-annuity-commencement death benefits, there are a number of choices. As a minimum, the plan would need to provide the pre-retirement surviving spouse annuity required under the law: 50% of the accrued normal retirement benefit, reduced to an early commencement date selected by the spouse using plan actuarial equivalence assumptions, and converted into a 50% joint and survivor annuity as if the participant had survived to that date and selected the 50% joint and survivor annuity as the optional form. Or the plan could provide the full accrued annuity certain benefit to the spouse, if the spouse survives to the earliest retirement date for the participant. Or the plan could provide the full annuity certain benefit to any designated beneficiary.

3.2 Comparison with Cash Balance and Pension Equity Plans

A typical age-graded cash balance plan might have the benefit structure shown in the first row of Table 3. With respect to a pension equity plan, the second row of Table 3 shows a reasonable age-graded design, where the entries in the table are the points (percentages) of final five-year average pay that serve to define the lump sum value under the plan.

Table 3
Pay Credits for a Typical Age-Graded Plan Design

Plan	Age Groups						
	< 30	30-34	35-39	40-44	45-49	50-54	≥ 55
CBP	5%	6%	7%	8%	9%	11%	13%
PEP	5%	6%	8%	9%	11%	14%	18%

Notes: CBP = Cash balance plan, and PEP = Pension equity plan.

Table 4
Months of Payment Accrual
For a Service-Graded Annuity Certain Plan

Service (in Years)	1-5	6-10	11-15	16-20	21-25	≥ 26
Accrual (in Months)	6	6	5	5	4	3

Now consider a service-graded annuity certain plan as defined in Table 4. Assume that the benefit is 40% of final five-year average pay and a 4% interest rate is used to define the reduction for pre-65 commencement and to determine actuarial equivalence. If the value of the annuity certain at ages under 65 were to be paid as a lump sum using the 4% rate and if the cash balance plan credits 5% interest each year at year end and pay credits are also made at year end, then the lump sum value of the annuity certain plan, the accumulated value of the cash balance account, and the value of the account under the pension equity plan for an employee hired at age 35 and achieving 4% annual pay increases are almost identical as shown in Figure 1. Similar results (almost identical value curves) are obtained for other hire ages.

These examples show that the annuity certain plan can be designed to produce benefits that have lump sum values similar to those produced by the two most popular types of hybrid plans.

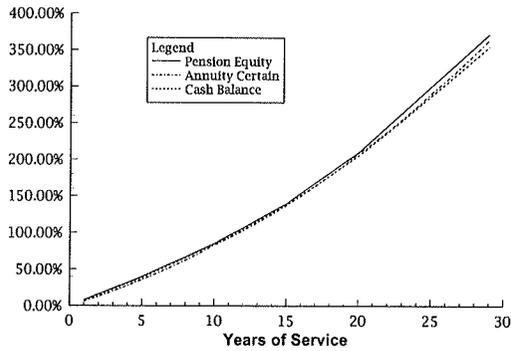


Figure 1: End of Service Value as a Percentage of Final Average Pay

With respect to valuation, the determination of funding and expense amounts could be handled easily in a spreadsheet. If no pre-retirement decrements were assumed and retirement were assumed to occur only at normal retirement age, the normal cost would simply be the discounted value (at valuation interest rate) of the number of projected payments expected to be earned during the year. Actuarial accrued liability would be the discounted value of the number of payments earned to date.

3.3 Uses of Annuity Certain Plans

Annuity certain plans might be appealing to professional service corporations whose defined contribution plans' contribution limits have been reached. An annuity certain plan would be a straightforward way for the corporation to defer additional compensation, especially because of the guaranteed series of payments (assuming he or she does not convert to a lifetime annuity) and the relative ease of valuation. Investment risk could be reduced significantly if the plan were to be funded with conservative fixed-income investments of appropriate maturities.

This design might also be used for a supplemental executive retirement plan for a larger company. Suppose, for example, that the company wished to encourage executive retirement at age 60, and that its qualified pensions plans (either defined benefit or defined contribution) provided no subsidies for pre-age 65 retirement. A 60% plan with six

months of payment for each year of service, with a maximum of 15 years counted, would allow for such early retirement by allowing the executive to defer commencement of his qualified benefits for up to 7.5 years. Used in this manner, the annuity certain plan might be viewed as a way to provide early retirement subsidies not available in the qualified plan.

In general, then, the annuity certain plan may be beneficial for executives retiring at earlier than typical ages. Executives tend to retire at earlier ages than other employees and the annuity certain form of payment provides a bridge that would allow the executives to manage their investments more aggressively over a longer period or, perhaps, delay commencement of benefits provided by other plans until normal retirement age

Also, the simplicity of the design should make it easy for executives and their financial planners to place a value on the benefit. It has been our experience that financial planners are often confused by traditional defined benefit plans. Measuring the value of the benefit from an annuity certain arrangement does not require any background in life contingencies.

The current legal and regulatory objections to hybrid plans do not apply to the annuity certain plan because benefits are based solely on service and are converted into a single life annuity using only an age-65 annuity factor. Larger corporations looking for a defined benefit plan with a hybrid-like accrual pattern coupled with an easy-to-understand formulation should consider a plan of this type.

Finally, a plan of this type could be designed to complement a company's 401(k) plan by allowing deferral of the date of benefit commencement for the 401(k) plan. This deferral period could provide employees a safeguard against market decline in the several years immediately before and after retirement.

4 Closing Comments

Defining a retirement benefit as a limited number of monthly payments, paid regardless of survivorship, linked to both the time period of employment and the earnings either throughout or near the end of the employment period, and commencing on a fixed date are the defining features of an annuity certain plan. This type of defined benefit plan can provide value accrual patterns similar to those of today's typical hybrid plans. In addition, it should not run afoul of actual and proposed legal restrictions.

