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Cash Balance Plans in a Traditional Defined Benefit World

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1. Introduction

This paper is a “big picture” discussion of cash balance plans and how they fit into the regulatory environment for traditional defined benefit (DB) plans. I will be taking the point of view that cash balance plans are a “square peg” made to fit into the “round hole” of regulations designed with traditional DB plans in mind. I’ll also look at some of the basic differences between cash balance plans and traditional DB plans, noting that, if we were starting from scratch, we would probably design regulations for cash balance plans very differently.

The current regulatory framework for DB plans was developed around plans with nonportable benefits that would typically be paid around age 65, rewarding those who have long service with the company. Conversely, cash balance plans are portable and create significant benefits for those with shorter service, but they have design features that are mandated by the regulatory environment that assumes benefits will be paid at or near age 65. For example, the “accrued benefit” includes interest credits through normal retirement, which enables cash balance plans to satisfy the $133\frac{1}{3}\%$ rule¹ for anti-backloading purposes. The “square peg” is being forced into a “round hole,” but at a price—the inclusion of interest credits through normal retirement age in the definition of the accrued benefit is the primary reason that some claim cash balance plans discriminate on the basis of age.

¹ Internal Revenue Code § 411(b)(1)(B) describes the $133\frac{1}{3}\%$ rule, which is one of three methods by which a DB plan can satisfy the accrued benefit requirements of § 411(b).

It is my premise that the “square pegs”—cash balance and other hybrid plans—should have their own regulatory “square hole” rather than being forced to fit into the regulatory framework that was built around traditional DB plans. In this paper, I’ll look at some specific issues where cash balance plans don’t fit the traditional mold, and I’ll also speculate about which regulatory changes would provide the best fit for cash balance plans.

2. Design Features: Traditional Plans versus Cash Balance Plans

The primary difference between cash balance plans and traditional DB plans is that the cash balance benefit is defined in terms of an individual account balance rather than an annuity benefit payable at “normal retirement age.” (For regulatory reasons, the normal retirement benefit must be such an annuity, but it is determined in relation to the cash balance benefit, not vice versa.) This account balance is hypothetical—contributions to the plan are not made for each individual, the interest earned on account balances is not tied to actual investment returns, and the sum of the account balances does not equal the assets in the plan. If the cash balance account did exhibit these characteristics, the plan would be classified as a defined contribution plan (DC plan) rather than a DB plan. This cash balance design feature—benefits determined by an account balance that makes the plan look like a DC plan—is at the root of all the other differences between cash balance and traditional DB plans.

2.1 Points of Difference

The following is a brief discussion of some other differences between cash balance and traditional DB plans. Note that these are *broad generalizations* that are *not true in all cases*, but are “typical.” Some of these points of difference include:

- *Age benefits are expected to be paid:* In cash balance plans, the benefits are usually paid upon termination of employment, regardless of age. In a traditional DB plan, benefits are expected to be paid at “retirement age,” commonly between ages 55 and 65. It is not uncommon for a traditional DB plan to allow no distributions prior to retirement age.
- *Expected form of benefit payment (and determination of payment amount):* In cash balance plans, the benefit is normally paid in a lump sum equal to the cash balance account. Although other forms

of benefit must be offered, they are generally calculated in relation to the cash balance. For traditional DB plans, the normal form of benefit is an annuity. Although lump sums may be offered, the calculation of the lump sum is based on the actuarial equivalent of the annuity benefit.

- *Pattern of benefit accrual:* In cash balance plans, the value of the benefits tends to accrue evenly over time, as a “career average” benefit. In traditional DB plans—especially final-average-pay plans—the incremental value of the benefit accruals increases near retirement age. In particular, if there are subsidized early retirement benefits, the value of the benefit jumps up at early retirement eligibility.
- *Effect of job changes (i.e., multiple jobs) on benefit accrual:* In traditional DB plans (particularly final-average-pay plans), long service with one company tends to create the largest benefit—breaking up service among two or three companies with identical plans will produce smaller benefits in total. For cash balance plans that have equivalent interest credits before and after termination, multiple jobs with equivalent plans would generate the same cash balance as a single job (assuming the participant stays at each job until vested.) In actuality, since participants are likely to receive a lump sum, multiple jobs under the cash balance scenario have the potential to produce a greater benefit than a single job—if the participant invests the lump-sum benefits and earns a greater return than he or she would have earned in the plan.
- *Effects of terminations and benefit payments on plan—gains and losses:* In general, vested terminations at ages prior to retirement eligibility in traditional DB plans tend to produce actuarial gains for the plan. If the benefit is then paid out as a lump sum, there may be a loss due to the use of lump-sum factors mandated by Internal Revenue Code (IRC) Section 417(e)², but the gain due to early termination usually outweighs the loss due to the payment of lump sums. Thus, in general, terminations prior to early retirement age improve the funded status of the traditional DB pension plan. In contrast, vested terminations at ages prior to “retirement eligibility” for cash

² IRC § 417(e)(3) describes the limitations on mortality tables and interest rates that can be used in calculating a lump-sum payout from a qualified DB plan. A qualified plan cannot pay a lump sum of an accrued benefit that is less than the amount that would be calculated using 417(e) factors.

balance plans often produce an actuarial loss, as the value of the lump sum paid is typically greater than the accrued liability, regardless of the funding basis.

2.2 Comparison of Sample Plans

In the following discussion, I'll be comparing a typical cash balance plan with a typical traditional final-average-pay plan. The plan designs are not necessarily the most common, but have many features that are considered typical for that type of plan.

- *The sample traditional final-average-pay plan:* This sample plan provides a benefit of 1% of final average pay (highest five years) times benefit service payable at age 65. A participant is eligible for early retirement at age 55 with 10 years of service, with the benefit reduced 4% for each year retirement precedes the attainment of age 65. If the participant has 25 years of service, the early retirement benefit is 100% at age 62 and only reduced 2% per year prior to age 62. The plan pays lump sums based on GATT³ assumptions (GAM 83 blended mortality and 30-year Treasury rates). For purposes of comparing the benefit with the cash balance plan, we'll assume that lump sums that are actuarially equivalent to the age 65 benefit are payable prior to retirement eligibility, even though that is not always the case. Lump sums are based on the actuarial equivalent of the immediate early retirement annuity for those who are eligible to retire.
- *The sample cash balance plan:* This sample plan provides a cash balance benefit, which grows with 5% pay credits and interest credits based on 30-year Treasury rates. The plan pays a lump-sum benefit equal to the cash balance account upon termination of employment. If the participant chooses an annuity, the plan conversion factors are based on GATT assumptions (GAM 83 blended mortality and 30-year Treasury rates.)
- *The sample participant—Joe Employee:* In the following examples, we'll look at the differences in benefit accruals under the sample

³ The phrase "GATT assumptions" refers to the 417(e) factors that were modified by the General Agreement for Trades and Tariffs that became law in December 1994.

plans for a typical participant—Joe Employee. We'll assume that Joe is a plan participant from age 25 to age 65. We'll compare what happens to Joe's benefits if he works with one employer for 40 years or works with three employers with identical pension plans for 10, 15, and 15 years, respectively, for both the cash balance plan and the traditional final-average-pay plan.

2.2.1 Assumptions

The assumptions have been kept simplistic for ease of illustration. The ages at termination from the various jobs (35, 50, and 65) were chosen intentionally to avoid the use of early retirement subsidies in the comparison. The 30-year Treasury rate is assumed to stay level at 6.5%, and is used both for crediting interest to the cash balance accounts and to determine the value of lump sums under the traditional plan. Salaries are assumed to increase at 4% per year. Appendices A and B show the benefit accruals and pay history underlying the charts and discussions.

Figure 1 represents the increase in Joe Employee's present value of benefits payable as a lump sum over the course of his employment history. The present values for the multiple job scenarios are calculated as the sum of the lump sums if all three were paid simultaneously. The cash balance plan, since it has level pay and interest credits, supplies an equivalent benefit whether Joe Employee participates in all three plans or one.

Note that, prior to early retirement eligibility, the cash balance benefit is significantly more valuable than the traditional plan. After attaining retirement eligibility, the traditional plan supplies the most valuable benefit if Joe Employee stays under one plan for his entire career. If Joe does change jobs and plans, however, the traditional plan provides the least valuable benefit. In essence, a participant is penalized for changes in employment under traditional final-average-pay plans, while participants under cash balance plans are not.

Table 1 summarizes Joe's benefit accruals under the various multiple job scenarios, and Figure 2 compares the annuity benefits payable at age 65 under the various three job and single job scenarios. It is assumed that the cash balance account from each job earns 6.5% after termination (whether assets remain in the plan or not), and is converted to an annuity at 6.5% and GATT mortality at age 65. In a true-to-life scenario, we would assume that a participant would receive the lump sum at termination of employment and earn greater than 6.5% in some

years and less than 6.5% in others. The 6.5% assumption is used for ease of comparison purposes only.

It is interesting to note in this example that the cash balance plan generates the same total benefit whether or not the participant stays with one employer, whereas the traditional plan participant receives a much smaller benefit if his service is spread among multiple plans.

Figure 3 shows the lump-sum value at termination under the various job scenarios. Note that, at the earlier ages, the cash balance benefit produces a much greater benefit while the traditional final average plan produces the greatest benefit close to retirement age.

Figure 4 compares the value of the lump sums under the multiple job scenarios assuming that Joe Employee does not receive a lump sum or an annuity on termination, but defers the lump sum or annuity until age 65.

Although these charts and examples are quite simple with somewhat unrealistic assumptions (How many people spend their careers working for three companies with identical pension plans?), they serve the purpose of illustrating typical differences between cash balance and traditional final-average-pay plans. Some interesting items to note:

- The total benefit accrued and payable at age 65 (Figure 2) under the final-average-pay plan at three separate jobs is only 66% of the benefit accrued if Joe Employee sticks with one company. This ignores any subsidized early retirement benefits that may have been earned under the long service job.
- The total cash balance at age 65 (Figure 2) is equivalent whether Joe works at three jobs or one.
- The cash balance benefits accrued at termination (Figures 3 and 4) for the first two jobs are significantly more valuable than the corresponding final-average-pay benefits. Conversely, the final-average-pay benefit is significantly more valuable than the cash balance at the third job, where Joe works from ages 50–65.
- The cash balance benefit at job No. 3 (Figure 4) earns a smaller annuity benefit payable at age 65 than does job No. 2, even though the service history was the same and the pay credits were higher. This is because the cash balance from job No. 2 will have earned an

additional 15 years of interest by age 65. In fact, extra years of interest credits for younger participants leading to larger benefits at retirement is the primary reason that some claim cash balance plans discriminate based on age.

These illustrations only confirm what we, as practitioners, already know: Cash balance plans and other hybrids provide a significantly richer, portable benefit for plan participants at younger ages while traditional plans (especially final-average-pay plans) reward long service and are more valuable at later ages.

3. Accrued Benefits and Interest Frontloading

3.1 Hurdles to Overcome in Cash Balance Plan Design

Those who design cash balance plans have a few challenges in creating a plan design that follows all the rules and regulations that exist for DB plans, yet look similar to DC plans. Two of the primary hurdles to overcome are:

- The “accrued benefit” has to be defined as an annuity at normal retirement age, even though it is anticipated that the benefit paid will be a lump sum of the cash balance account.
- The benefit accrual patterns have to pass the anti-backloading requirements of IRC Section 411. In general, cash balance plans attempt to show compliance with the $133\frac{1}{3}\%$ rule of 411(b)(1)(B), which states that a benefit accrued in a given year can't be greater than $133\frac{1}{3}\%$ of any prior year's benefit accrual.

The method used to clear both of these hurdles involves defining the accrued benefit as the hypothetical cash balance account plus interest credit to normal retirement age, converted to an annuity payable at normal retirement. Although this definition fulfills the requirement for an annuity-based benefit, it is really more of a *hypothetical number* than the *hypothetical account balance*; a participant would have to terminate employment, leave the cash balance accumulating within the plan, then opt to receive an annuity at normal retirement age in order to receive this “accrued benefit.”

3.2 Anti-Backloading Requirements

Showing compliance with the $133\frac{1}{3}\%$ rule is easiest to demonstrate by looking at a numerical example. In Table 2, if we look at Joe Employee's cash balance during his fifth year of work (age 29), we see that he had a balance at the beginning of the year of \$8,162.53, received pay credits of \$2,047.25 and interest credits of \$530.56 to give him an end-of-year cash balance of \$10,740.34. If we were to define the accrued benefit as the cash balance account, the increase in accrued benefit for the year would be \$2,577.81.

In his 10th year (age 34), he had a balance at the beginning of the year of \$23,747.99, received pay credits of \$2,490.75 and interest credits of \$1,543.62 to give him an end-of-year cash balance of \$27,782.36. The one-year "accrual" in this case is \$4,034.37, which is clearly more than $133\frac{1}{3}\%$ of the \$2,578.06 accrued in year 5. Thus, the plan would fail anti-backloading requirements.

Table 2 makes it apparent that if the current accrual is measured strictly in terms of the increase in the cash balance account, the plan will always fail the $133\frac{1}{3}\%$ test as the interest credits in each future year continue to increase as the cash balance grows.

If, however, we define the benefit accrued in a given year to include the interest credits on that year's pay credit through normal retirement, then the year 5 accrual becomes $\$2,047.25 * (1.065^{35})$, or \$18,552.70 at age 65 (see Table 3).⁴ In contrast, the year 10 pay credit increased with interest to age 65 is $\$2,490.75 * (1.065^{30})$, or \$16,474.73, which is less than the year 5 accrual and passes anti-backloading. (To actually demonstrate compliance with the anti-backloading rule, this test would be performed with no salary increases and converting the cash balance to an annuity at age 65.)

It may seem counterintuitive to include future interest credit in the accrued benefit, but the logic is sound: If the normal retirement benefit is an annuity payable at age 65, the current year's contribution to that benefit is the pay credit for the year plus interest on that pay credit to age 65.

⁴ The symbol ^ is being used in this report to denote an exponential function. For example, 3^2 would translate to "3 to the second power."

3.3 Anti-Backloading Variations: Age-Graded Pay Credits and Minimum Interest Rates

When the accrued benefit is defined as including interest credits to normal retirement, plan sponsors have some additional flexibility in designing their plans. Many plan sponsors, to imitate somewhat the accrual patterns under traditional plans and benefit those that are closest to retirement, have implemented age-graded or service-graded pay credits, with long-service or older employees receiving the greatest increases to their cash balance.

For example, let's look at a cash balance plan that has age-graded pay credits that increase by 0.5% every five years, from 3% of pay at age 30 or less to 6.5% of pay if the participant is over age 60. Assume the plan pays guaranteed interest credits of 5% on the cash balance. If we look at the accruals at age 30 and age 62 for a participant earning a level \$50,000 per year, Table 4 shows the accruals with interest to age 65.

Notice that the accrual at age 62 is significantly less than the accrual at age 30 with interest credits to normal retirement. This accrual "buffer" can be used by plan designers to offer a wider range of interest credits than those in this example, and other plan design features as well.

One feature sometimes found in cash balance plans is different interest crediting rates for active participants vs. inactive participants. For example, active participants may receive interest credits based on 30-year Treasuries, with a 1.5% reduction in interest credits for terminated participants. Although the differing interest rates appear to decrease benefits to be paid from the plan, those participants that receive a lump sum immediately following termination from employment receive no reduction in benefits from the plan. The interest rate spread also decreases the liabilities for the plan as the lower interest rate is used in determining current liabilities and accrued benefits.

Appendices C1 through C5 are sample worksheets used to test anti-backloading if we used the variable pay credit plan shown above and modify the interest crediting assumptions so that inactive participants receive something less than active participants. (This spreadsheet was developed by Stephen Hoeffner, FSA, of Aon Consulting).

On the worksheets, “PBO rate” indicates the interest credit for active employees, and “ABO rate” represents the interest credit after termination. The projected benefit obligation (PBO) is calculated using the projected unit credit method and the interest rate used for active liabilities (the PBO rate), whereas the accrued benefit obligation (ABO) is calculated using the traditional unit credit method and the interest credit used for inactive participants (the ABO rate.) When these rates differ, the current year accrual includes the current pay credit plus the “PBO/ABO spread” times the prior balance, plus interest credits through retirement age at the ABO rate.

Without going too deeply into the calculation methodology, the column labeled “Ratio of Current to Prior Min” represents the ratio of the current years’ accrual (including the “PBO/ABO spread” times the prior balance) compared to the lowest prior year accrual with interest credits through the same period. If the column labeled “Ratio of Current to Prior Min” is ever greater than 133¹/₃%, the plan fails anti-backloading. In testing a plan design, the actuary must thoroughly check the possible ranges of participant ages and possible interest rates before concluding that the plan design is nondiscriminatory.

Our sample plan design includes the pay credits shown above (3% under age 30, increasing by 0.5% every five years, with a maximum of 6.5% over age 60,) and we want to test how large of a PBO/ABO spread we can use on the interest credits and still pass the anti-backloading requirements. If the plan uses an index such as 30-year Treasuries, the actuary should test any reasonably assumable rate. Appendices C1 and C2 show illustrations where the PBO rate is 1.5% greater than the ABO rate. Appendix C1 uses a 5% PBO rate and it passes anti-backloading. Appendix C2, however, shows that if the PBO rate dips as low as 4.75%, the plan fails anti-backloading.

Appendices C3 and C4 show illustrations where the PBO rate is 1.25% greater than the ABO rate. Appendix C3 shows that the plan passes anti-backloading if the PBO rate dips as low as 4.25%. Appendix C4 shows that the plan fails if the PBO rate hits 4.20%. If the actuary is comfortable that the index used by the plan will never go lower than 4.25%, he or she can argue that the plan would never violate the anti-backloading rules. Obviously, it is easier to demonstrate that this 1.25% PBO/ABO spread passes anti-backloading than the 1.5% spread.

For a plan with level pay credits, the PBO/ABO spread can be even larger and the plan will still pass the anti-backloading test. As an example, see Appendix C5, which illustrates an anti-backloading test for a plan with 5% level pay credits and a PBO/ABO spread of 2%.

3.4 Cash Balance Liabilities and Funding Methods—ABO-Driven Liabilities

If the accrued benefit is defined as the cash balance with interest credit to normal retirement and converted to an annuity, then the present value of the accrued benefits (PVAB) is determined by discounting that accrued benefit at normal retirement back to the current age with the valuation discount rate. This PVAB is usually less than the value of the cash balance account, because the interest crediting rate is usually less than the valuation interest rate. The larger the spread between the discount rate and the rate used for plan interest credits (i.e., the greater the interest leverage), the larger the difference in values.

The funding method used to value a cash balance plan also has a significant impact on the ratio of the plan's accrued liability to the cash balance. The paper "Actuarial Aspects of Cash Balance Plans," (Lowman 2000) which was published as a Society of Actuaries cash balance study in May 2000, takes an in-depth look (in Section 4) at the variation in ratios between the accrued liability and the cash balance account (the term "account balance funding ratio" is used in the paper) using different funding methods and different interest spreads. Of the commonly used funding methods, the entry-age normal method produces the greatest account balance funding ratio, while the projected unit credit/service prorate (PUC) and traditional unit credit (TUC) method produce much smaller account balance funding ratios.

In the case where a cash balance plan has an opening balance because of past service, the TUC method will often generate higher accrued liabilities than the PUC method with a service prorate. This occurs when the opening balance projected with interest only is greater than the service prorate of the projected balance with pay and interest credits. This can also occur when active participants and inactive participants receive the same interest credit on their cash balance account. (The crediting rate for inactive participants is used to project the ABO while the active crediting rate is used to project the PBO.)

For example, if we look at Joe Employee's cash balance (Appendix B) at age 45 with 20 years of service, it is \$93,275. His projected cash balance benefit is \$576,085 at age 65. The service prorate of his age 65 benefit is $\$576,085 * 20/40 = \$288,043$. By contrast, his accrued benefit with interest credits to 65 is $\$93,275 * 1.065^{20} = \$328,668$. If we assume a discount rate of 8%, the PUC service prorate liability becomes \$61,799 while the unit credit liability is \$70,515. The TUC liability in this case is greater than the PUC accrued liability.

When calculating the liabilities for the corporate balance sheet, however, the FASB accounting rules⁵ do not allow the PBO—which is based on the PUC method—to be less than the ABO, which is based on the TUC method. This necessitates using the PUC service prorate method with an ABO minimum—if the PBO is less than the ABO (on a year-by-year, decrement-by-decrement basis), the PBO is set equal to the ABO.

Let's look again at Joe Employee's liability at age 45 and see if using the PUC service prorate method with no accrued benefit minimum is a reasonable funding method. At age 45, the PUC service prorate of Joe's projected cash balance at age 65 is \$288,043, while his account balance at age 45 with interest credit to age 65 is \$328,668. The prorated projected benefit is less than the current benefit with interest only. If the PUC method is used without an ABO minimum, the liability for the retirement benefit would be based on a benefit less than Joe has already earned, clearly understating the liability.

To avoid this type of problem, I would suggest that, similar to FASB accounting standards, the standard for valuing cash balance plans should be that the accrued liability cannot be less than the PVAB. The IRS also takes a conservative stance concerning what funding methods are reasonable with cash balance plans. According to the response to question No. 9 in the *Gray Book* (1999), although the IRS does not automatically approve a change to the PUC method for cash balance plans, it has approved a number of funding method changes to PUC service prorate, as long as the accrued liability cannot be less than the PVAB. In actuality, most actuaries may be employing an "ABO minimum" standard in their valuations—if they are not, they should be.

⁵ Financial Accounting Standard 87—also known as FAS87—describes the rules for calculating the liabilities of a DB pension plan for the corporate financial balance sheet.

When a plan has liabilities that are significantly affected by the ABO minimum, we'd say the liabilities are "ABO-driven." Plans that are typically ABO-driven would include plans that have just converted from a prior plan with opening balances and/or transitional benefits, and plans with uniform interest credits for active and inactive participants. Plans that would not be ABO-driven would include brand new plans with no opening balance and plans with a spread between the PBO and ABO interest credits.

For an example of a plan that is not ABO-driven, look at the previous example of Joe Employee's ABO minimum, but assume that there is a 1% spread between the PBO rate and the ABO rate. The ABO minimum at age 45 becomes $\$93,275 * 1.055^{20} / 1.08^{20} = \$58,390$, which is less than the PBO of \$61,799.

4. Age Discrimination, Accrued Benefits and Other Cash Balance Issues

4.1 Age Discrimination and Cash Balance Pension Plans

As mentioned previously, the inclusion of interest credits through normal retirement age is the primary reason why some believe that cash balance plans discriminate based on age. As an example, in Table 1 and Figure 4 it was shown that Joe Employee's annuity benefits converted from his cash balance at job No. 2 (ages 35–50) were greater than his annuity benefit from job No. 3 (ages 50–65). This approach measures the benefit accrual strictly in terms of the annuity benefit payable at normal retirement. If the comparison is instead made on the value of the lump sum at termination or an annuity that is payable immediately, the benefit from job No. 3 would be at least as great as the benefit from job No. 2.

According to an article published in the *Virginia Tax Review* last spring (Shea et al. 2000), the argument that cash balance plans discriminate based on age fails to satisfy the statutory requirements for a finding of age discrimination on at least two scores. First, the critics' method for determining benefit accrual rates by reference to an annuity beginning at normal retirement age is fundamentally flawed. The authors point out that, under the critics' method, virtually all traditional DB plans would fail the age discrimination rules after normal retirement age, and most traditional contributory DB plans would fail the rules before normal retirement age. According to Shea and his co-authors, Congress clearly couldn't have intended that result. In fact, they demonstrate that the plan

design Congress cited with approval in the 1986 Conference Report would fail the critics' test for age discrimination!

Second, Shea and his co-authors note that a declining rate of benefit accrual does not violate the age discrimination rules unless it can be shown to be attributable to an employee's attainment of any age. According to them, the decline the critics observe is not attributable to age discrimination but to the "inflation protection that is automatically built into cash balance plans" through the guaranteed interest credits that cash balance plans continue to provide after termination of employment. Take away the guaranteed interest credits (for example, by making them contingent on continued service) and the observed decline in benefit accruals disappears altogether. Shea and colleagues note that even the Social Security system would flunk the critics' age discrimination test due to the pre- and postretirement inflation adjustments built into the Social Security retirement benefit formula.

If cash balance plans were tested for discrimination based on the present value of a lump sum or the value of an immediately payable annuity rather than an annuity beginning at normal retirement age, they would not be found age discriminatory. Conversely, if we test traditional plans on a lump sum or immediate annuity basis, we would find that they discriminate against younger workers. Cash balance plans eliminate much of the bias against younger workers and, ironically, are accused of discriminating against older workers because of it.

As an example, assume that three participants at ages 25, 40, and 55 were hired in each of our sample plans with a starting salary of \$30,000. Further assume that each participant works five years and terminates employment at ages 30, 45 and 60, respectively. Appendix D contains the calculation of the benefits at termination and age 65 for these sample participants. Table 5 summarizes the benefits for the sample participants at termination and at age 65.

At termination, the three participants in the cash balance plan each have a cash balance account of \$9,206. Similarly, upon termination the three participants in the traditional plan each have an annuity benefit of \$135.41 per month payable at age 65. Each plan is nondiscriminatory when considering the form of benefit that is "normal" for that plan. However, if the cash balance is converted to an annuity payable at age 65, the plan does appear to discriminate against older workers. And likewise, if the traditional plan annuity is converted to a lump sum, that plan appears to discriminate against younger workers. Do these plans discriminate? If so, how?

The primary difference in the value of these benefits is that the cash balance benefit continues to grow with interest following termination, whereas the traditional final-average-pay plan benefit does not. These additional interest credits act to negate the effects of inflation on the value of the cash balance account, whereas the final-average-pay plan benefit has no such feature to keep the value of the annuity benefit on par.

For instance, the 30 year old that received a lump sum of \$1,651 based on a 6.5% GATT rate would have to earn 6.83% per annum in the future to purchase an equivalent annuity (still based on 6.5% and GATT mortality) of \$135.41 per month when he turned 65. And, if inflation averaged 2% per year over the 35-year deferral period, the \$135.41 per month would only be worth \$67.71 per month in today's dollars.

In comparison, the 30-year-old cash balance plan participant who terminates employment will continue to receive plan interest credits on his balance, which offsets the effect of inflation. Many plans actually encourage participants to receive their lump sums by crediting less interest following termination than while active. Whether the plan credits a lower rate or not, a typical 30-year-old vested terminated participant would probably receive a lump sum which, if invested properly, will generate sufficient returns to increase the value of the benefit at retirement. The one potential shortfall is that many younger participants prefer to pay the tax penalty and spend the lump sum rather than save it for retirement.

In summary, the cash balance plan offsets inflation by increasing the benefit with interest following termination where the traditional DB plan does not. The question of age discrimination then, hinges on whether it is discriminatory to provide this hedge against inflation.

In the recent *Eaton v. Onan Corp.* (2000) case, the court found no inherent age discrimination in cash balance plans because of the additional interest for younger participants. Additionally, the court agreed with Shea et al. (2000) that the legislative precedent shows that the Age Discrimination in Employment Act (ADEA) rate of benefit accrual rules do not apply to employees who have not reached normal retirement age. The court also concluded that in the case of a cash balance DB plan, the rate of benefit accrual should be defined as the increase in the participants' cash balance from one year to the next.

4.2 A “Common Sense” Definition of the Accrued Benefit?

We’ve looked at the method of calculating the accrued benefit by including interest credit on the cash balance account through normal retirement and converting it to an annuity. We’ve also considered the effect of interest leveraging and various cost methods on the relationship between the accrued liability and the cash balance account. But there’s a question that lurks in the background—does it make sense to value cash balance plans this way?

Consider a participant who terminates employment with a vested accrued benefit. If the plan was a traditional DB plan, the accrued benefit is determined by the terms of the plan at that time and will not change. In contrast, what happens to the accrued benefit for a cash balance participant who terminates? The accrued benefit is the cash balance projected to normal retirement and converted to an annuity. Is that benefit definitely determinable at termination? No, the benefit payable at normal retirement will vary based on interest rates. Only the cash balance is definitely determinable at termination.

Consider also the question of valuing the liability for this vested termination. If it is assumed that all vested participants receive lump sums upon termination, is it legitimate to determine the accrued liability after termination of employment using the interest leverage? No, if the cash balance is immediately payable and the valuation assumption is that the participant will receive a lump sum, the liability should be determined as an immediate lump sum. So, the accrued liability (the value of the cash balance account) is not equal to the PVAB (the cash balance account projected to normal retirement age, converted to an annuity and discounted back.) Why? Because, by definition, the accrued benefit is determined assuming a lump sum will not be paid until normal retirement age.

Herein lies, in my opinion, the main logical inconsistency regarding cash balance plans: The cash balance benefit is designed to be portable, with participants receiving lump sums upon termination, yet the associated accrued benefit is determined assuming that the cash balance will remain in the plan earning interest through normal retirement age. Does that seem like a common sense way to determine the accrued benefit? Not really. Does it follow the existing regulations? Yes.

So, should the accrued benefit be defined differently? Some take the position that the accrued benefit for a cash balance plan should be set equal to the cash balance. One of the many pension reform proposals of 2000 would have done just that.⁶ Although that particular proposal didn't come close to becoming law, the accrued benefit still could be legislated to be equal to the cash balance. In fact, in the previously mentioned *Eaton v. Onan* (2000) case, the court concluded that the rate of benefit accrual should be defined as the increase in the participants' cash balance from one year to the next—that is, the cash balance account is the accrued benefit!

In many ways, defining the accrued benefit as the value of the cash balance account would be a more common sense definition for the accrued benefit. However, that would cause other problems. For instance, plans that used age-graded pay credits may be deemed discriminatory against younger employees if the accrued benefit is defined as the lump sum.

In contrast, if the accrued benefit were defined as the value of the cash balance account, it would bring opportunity for positive plan design changes as well. For instance, plan sponsors have been limited in the range of interest rates they can pay on the cash balance account due to IRS regulations and the possibility of the whipsaw effect. Whipsaw refers to what happens if the plan uses guaranteed interest credits that are greater than 417(e) rates used for lump-sum conversions: The plan could be forced to pay lump sums that are greater than the cash balance account. If the accrued benefit were defined as the cash balance account, the whipsaw issue would become moot and plan sponsors could provide interest rates greater than the 417(e) rates, if they so desired.

For example, if a plan sponsor wanted to offer some sort of subsidized early retirement under cash balance, it could use annuitization factors based on interest rates that are greater than 417(e) rates if participants had met some age and service requirement. These alternate factors would produce larger annuity benefits than factors based on the 417(e) rates, thus encouraging participants to draw annuity benefits rather than receive a lump sum. Under current

⁶ A proposal that contained a provision defining the accrued benefit for cash balance plans as the value of the cash balance account was considered by the Senate Finance Committee in 2000. However, the proposal never made it to the Senate floor as a bill, according to information provided by Gretchen Young of Aon Consulting.

regulations, this sort of early retirement subsidy could not be implemented without generating a whipsaw effect—the value of the lump sum would have to be increased to match the value of the subsidized early retirement annuity.

In the end, I would not necessarily recommend an immediate switchover to define the accrued benefit as the value of the cash balance account. I do, however, believe that is the inevitable direction that legislation and case law (e.g.—the *Eaton v. Onan* 2000 case) will end up taking us. If and when the definition of the accrued benefit for cash balance plans is redefined as the cash balance account, great care should be taken to ensure that all regulatory issues (anti-backloading, whipsaw, plan conversions, etc.) are dealt with properly.

I'm sure some would suggest that, if the cash balance plan doesn't have a basis in annuity benefits, it's no longer a DB plan, but I would disagree. The cash balance plan pay credits and interest credits are defined in the plan, not based on actual contributions and actual earnings. The benefit is defined by the plan; the contribution is not.

4.3 Retirement versus Vested Termination—What's the Difference?

A concept we've had since the beginning of DB time is that of "normal retirement." The very definition of a DB has always been based on an accrued benefit that is payable at this normal retirement date.

From the perspective of the DB plan, how does one define retirement? In general, we would say that the date benefits commence is the retirement date. If someone leaves the employment of the company at an early age and receives a lump-sum payout of his or her benefit, we don't usually think of that as a retirement—it's a cashout of a vested termination. We think this way—particularly with traditional plans—because of the manner in which the benefit amount is calculated. An early retirement benefit is usually determined by applying an early retirement factor (unique to that pension plan) to the normal retirement benefit based on the retirement age. For a vested termination cashout, however, the benefit is generally defined as the actuarial equivalent (using statutorily mandated factors) of the normal retirement benefit.

However, under cash balance, there really is no difference between a vested termination cashout and a retiree lump sum. If a 35-year-old participant and a 60-year-old participant have the same service and pay history, they will receive the same lump-sum benefit under a cash balance plan (assuming that the pay credits are not graded.) The line between retirement and vested termination has been blurred.

As an example of how we compartmentalize our thinking on vested termination versus retirement, consider the Schedule B attachment to the annual IRS Form 5500 filing. On Schedule B, we show sample “termination rates” at certain ages (25, 40, and 55) and we show an expected retirement age. This expected retirement age is based on our assumed retirement rates for ages typically over 55. But why is a person who is, say, over 55, considered to be a retiree while a participant in his or her 40s is considered to be a vested termination? In my opinion, more relevant items to show on the Schedule B for cash balance plans would be average age, expected future service, and an “expected payout age.”

Another point to consider is that, because cash balance plans typically pay lump sums of the cash balance account at all ages, the sum of the account balances is a very real measure of the termination liability of the plan. I think it would make sense to report the sum of the cash balance accounts and the account balance funding ratio on the Schedule B as well. Reporting requirements (Schedule Bs, etc.) should be modified to reflect the fact that we now have two types of DB plans: traditional plans with annuity benefits and cash balance plans with hypothetical account balances that are payable at any age.

4.4 Current Liability for Cash Balance Plans

There is an issue involving the treatment of cash balance plans under current liability⁷ that some pension practitioners may not be aware of. IRS regulations, particularly Notice 90-11, spell out the methodology for valuing optional forms of payment for current liability purposes. In general, the normal form of benefit (an annuity) must be valued as an immediate annuity at decrement age. Any optional forms of benefit that do not fall into the category of nondecreasing annuity (which include lump sums under cash balance) must be

⁷ Internal Revenue Code § 412(l) defines the rules for valuing the “current liability” of a qualified DB plan. The current liability is used in the calculation of the minimum required contribution, the maximum tax-deductible contribution and the full funding limitation.

valued as the actuarial equivalent of the normal form of benefit deferred to normal retirement age. For a cash balance plan, the lump sum then is valued as the current cash balance projected to normal retirement age using stated plan interest credits, converted to an annuity, then valued using the current liability interest rate.

Depending on the relationship between a plan's guaranteed interest credit assumption, annuity conversion rate, and the current liability rates, this can lead to widely disparate results. If the plan's guaranteed interest credit rate is lower than the current liability discount rate, the lump sum valued for current liability could be significantly lower than the actual cash balance. Conversely, if the guaranteed crediting rate is higher than the current liability rate, the lump sum valued is greater than the actual cash balance.

Some actuaries argue that the language in IRS Notice 90-11 implies that a current liability interest rate should be used to project the account balance to normal retirement rather than the plan factors. If this were true, the issue described here would go away. The IRS to date has not issued any clear written guidance about how to apply IRS Notice 90-11 to cash balance plans, but the probable interpretation is that the IRS wants practitioners to use plan factors to project the cash balance to normal retirement.

The oddity of this ruling is striking in that the most likely form of benefit—a lump sum of the cash balance that is payable immediately—is the only form of benefit that cannot be valued as such.

Let's look at a numerical example to illustrate this point. Assume Joe Employee has a cash balance at age 45 of \$100,000. The plan uses 30-year Treasuries (currently at 6.5%) as a basis for interest credits, and the range of discount rates allowed for current liability purposes is 6.0% to 7.0%. The present values in Table 6 could be used in the calculation of current liability for the cash balance lump sum if Joe were to decrement at his current age.

Under the strictest interpretation of IRS regulations, present value No. 4—the \$100,000 cash balance lump payable upon termination—is the only one of these values that could *not* be used to calculate current liability, yet it is the only

lump sum that Joe could actually *receive*! (If the alternative interpretation of IRS Notice 90-11 is correct, \$100,000 would be the value used.) By juggling interest rate assumptions, it is possible to approximate Joe's \$100,000 lump sum in this case. However, if the plan's minimum interest rate is outside the range allowable for current liability, this may not be possible. The present values in Table 7 are calculated in the same manner as in Table 6, except that the plan has a 4% minimum interest credit.

Given the initial purpose of current liability—to estimate the liability of a plan if the plan were to purchase annuities at current interest rates—it seems nonsensical to mandate that an immediately payable cash balance lump-sum benefit be valued as the actuarial equivalent of the deferred-to-age-65 benefit. This is especially true considering that the participant cannot actually receive the benefit in that form. Given the IRS position on reasonable funding methods for cash balance plans (a change to PUC service prorate has been approved only if an accrued benefit minimum is employed; see *Gray Book* 1999, question No. 9), it is surprising that the IRS would not only support but mandate this type of method to be used for current liability.

In practice, it is unknown how many actuaries value the current liability for their cash balance plans in this manner. Many may be unaware of the implications of IRS Notice 90-11 on valuing lump sums under cash balance, some may interpret the notice differently, and others may be ignoring the ruling, deeming it an inappropriate method of valuing the current liability of a cash balance plan. My personal opinion is that the IRS should (1) clarify its position on how to apply Notice 90-11 to cash balance plans, and (2) declare that the normal form of benefit for a cash balance plan with lump sums payable at all ages is the lump sum, thereby eliminating the need to value the lump sum as the actuarial equivalent of the normal retirement annuity.

4.5 A Brief Look at Wear Away

The most controversial issue pertaining to cash balance surrounds the conversion of traditional plans to cash balance and the wear away of prior accrued benefits. It appears that a likely legislated solution for wear-away will be some sort of "A+B" approach. Upon conversion to a cash balance form of benefit, participants will be guaranteed that their benefit will never be less than "A"—the value of the prior plan benefit—plus "B"—accruals under the cash balance plan following conversion. There is still a matter of dispute, however, over what benefits to include in the "A" portion.

Employee groups are arguing that early retirement subsidies that have already been accrued should be included in the “A” portion of the benefit, whereas employer groups argue that early retirement subsidies should not be included. In my opinion, both groups have valid reasons for their beliefs. The employees’ perspective is obvious to the casual observer—if an employee has qualified via service for an early retirement subsidy, he or she should be entitled to that subsidy after the conversion to cash balance. The argument on the other side is that mandatory inclusion of the early retirement subsidy would be unfair to employers because many who would not have received the early retirement subsidy under the old plan would receive the benefit if the subsidy is grandfathered in. For example, if a participant is age 45 at conversion with sufficient service to be eligible for early retirement at 55, when the person terminates at age 50, he or she should not receive any additional benefits due to the early retirement subsidy (American Benefits Council 2000a).

Given that both sides seem to have legitimate arguments in this debate, it should be true that there is a solution that would be fair to both sides. An equitable solution would be for the “A+B” approach to become an “A+contingent A+B” approach. Providing an additional benefit that reflects the value of the early retirement subsidy should be contingent upon service eligibility at the time of conversion *and* the age at which the participant terminates from employment.

This contingent benefit would be determined at plan conversion, just as the “A” portion of the “A+B” benefit minimum would be. For example, let’s say an employee is entitled to \$1,000 per month payable at age 65 in a plan that offers a subsidized early retirement benefit as early as age 55. If the normal retirement benefit is reduced 3% for each year that the retirement age is less than age 65, the participant would be entitled to \$700 per month (70%) if he or she retires at age 55. Under this contingent benefit solution, the benefit at age 55 could not be less than “A”—the greater of the actuarial equivalent of the \$1,000 per month payable at age 65 or the \$700 per month payable at age 55—plus “B”—accruals in the cash balance plan after conversion. At age 54, however, the “A” portion would only include the actuarial equivalent of the benefit payable at age 65.

This approach would be more difficult to administer than the “A+B” approach that does not include the early retirement subsidies. However, it is an approach that should be considered fair by all parties.

5. Conclusions

Cash balance plans and other hybrids have become an integral part of the DB landscape. These plans, although they have many differences with traditional DB plans, are valid retirement savings vehicles and will likely continue to be the wave of the future in DB plans. As such, the regulatory framework should be expanded and/or modified to accommodate these plans.

5.1 The Prototype Cash Balance Plan of the Future

As we consider the future of cash balance plans, there are some questions we should consider. How will the DB landscape change over the next 10, 25, or 40 years? What will be the goals of the typical DB plan, given the changing demographic needs of our country? What regulatory changes should be made to strengthen the DB system and encourage corporate sponsors to continue sponsoring DB plans?

Before we explore those questions, it is appropriate to deal with another question first: Will the accrued benefit for a cash balance plan be defined as the value of the cash balance account, or will it still be defined as the annuity at normal retirement age? The design of the cash balance plan of the future hinges on the answer to this question. I believe it is inevitable that the accrued benefit will be defined as the value of the cash balance account, so I'm going to assume that will be the case in the following discussion.

First, let's consider the goals—what do we view as the priorities of the DB system in the future?

- Cash balance and other DB plans should continue to provide significant, portable retirement benefits for employees of all ages. Vehicles should be in place that allow large and small employers alike to provide these retirement benefits to their employees.
- For younger participants, rollovers of lump-sum distributions to retirement savings vehicles should be encouraged while immediate spending of lump sums should be discouraged.

- Recent studies indicate that, as the baby boomers reach retirement age over the next 30 years, it will be difficult to find qualified workers in many areas (Hoeffner 2000). Retirement-age participants should be given options that allow them to maximize their potential in the work force while continuing to build up their retirement savings (i.e., in-service withdrawals). Additionally, design features that encourage participants to receive annuities at retirement age rather than lump sums would be beneficial.
- The private pension system should work in partnership with Social Security to strengthen the “three-legged stool” of Social Security, private pensions, and personal savings.

Assuming that the accrued benefit will be defined as the value of the cash balance account, what would be the ideal regulatory environment to achieve these goals? And, what would the prototype cash balance plan look like in that environment?

- The typical cash balance plan will have uniform pay credits for all ages, and anti-backloading issues will not present a major stumbling block as most plans will fall within a safe harbor. However, there will be some plan sponsors that want to use age- and/or service-graded pay credits—a specific nondiscrimination test similar to the current anti-backloading test should be used for these plans.
- The current issue of whipsaw should go away. Plans will use a variety of interest rate credits for different purposes. Active employees will often receive a larger interest credit than inactive participants, which will encourage participants to roll over their lump sum when they leave employment. Participants at retirement age may be offered retirement subsidies using conversion factors based on interest rates greater than 417(e) rates. Nonstandard forms of benefits would have to prove to be nondiscriminatory against non-highly-compensated individuals.
- Funding liability calculations would remain virtually unchanged, with the exceptions being a fix of the methodology for current liability lump sums and the mandatory use of ABO minimums with projected funding methods.

Note that these “prototypical” features are not all that different from those found in today’s cash balance plans. Today’s plans are good models, but they are constrained in many ways due to the regulations that force them to fit into the mold of a traditional DB plan.

Another area in which corporate sponsored cash balance plans could prove invaluable would be in partnering with Social Security to strengthen the “three-legged stool” of Social Security, private pensions, and personal savings. Serious consideration should be given to developing a cash balance and/or defined contribution plan that works in conjunction with a privatized portion of Social Security to provide a benefit that is not portable, but continues to grow as participants move from one participating employer to another. Basically, employers would participate in this “common plan” by contributing additional monies with payroll taxes that are funneled into the same account as a privatized piece of Social Security. The plan could be contributory as well, giving employees the ability to augment their retirement savings in a safe manner.

5.2 If I were in Washington...

If my assumption that the accrued benefit will someday be defined as the value of the cash balance account turns out to be true, it would make sense for actuaries and other benefits professionals to be involved in the reconfiguring of cash balance regulations from the start. The best way to approach this would be for Congress to form a commission that would work under and report to the ERISA Advisory Council.

This commission would have a three-fold task: (1) review how current regulations apply to cash balance plans, (2) develop alternate rules and guidelines that would provide the framework for future regulations with the accrued benefit defined as the cash balance account, and (3) recommend a course of action and transition to implement these changes to Congress. The commission should comprise of benefit consultants (small- and large-plan) and IRS actuaries, with representatives from Congress, the Department of Labor, the Social Security Administration, and employee interest groups.

The recommendation to form this commission may sound like “pie-in-the-sky” dreaming, but I do believe it would be the best course of action. Rather than watching individual court cases and legislative changes continue to alter the course of DB plan regulations in small iterations, let’s attack the issues head-on and make some wholesale changes, if necessary.

In reality, this type of commission might never be formed for a number of reasons: Who would fund it? Does Congress see the need for this type of action? Would a group with such a diverse makeup be able to function and get things done? Maybe this type of committee will never be formed, but I still think it's a good idea.

If there is no broad-scale reform of the cash balance regulatory framework on the horizon, the best we can do is make proper adjustments to the current regulations for cash balance plans. The following summarizes what I would recommend, if I were in Washington:

- For funding issues, I would require funding methods to use an “ABO minimum”—the accrued liability should never be less than the PVAB under cash balance.
- For current liability purposes, I would define the lump sum as the “normal form” of benefit for any plan that allows lump sums at all ages. This would eliminate valuing immediate lump sums as though they were based on a benefit deferred to normal retirement.
- For changes in reporting requirements for cash balance plans on the Schedule B attachment to the 5500, I'd include a disclosure of the sum of the cash balance accounts, and compare it to the associated current liability to get an “account balance funded ratio.” In addition to the disclosure of “expected retirement age” and termination rates, I would disclose an “expected benefit payout age” based on the demographics of plan participants and the decrement assumptions—the average attained age plus the average expected future service would suffice.
- If Congress addresses the wear-away issue, I'd propose an “A+contingent A+B” approach for minimum benefits following plan conversions.

Most of these changes are comparatively minor and would not have a huge fiscal impact on plan sponsors. The implementation of an “ABO minimum” would only affect plans where actuaries had been using what many actuaries would consider an unreasonable funding method.

The change in current liability method would raise the current liability in many cases and could potentially lead to additional funding charges and PBGC variable premiums for plans that are not very well funded. The wear-away issue will continue to be controversial until Congress legislates a solution—I believe the solution I’ve proposed would be fair to all parties.

Having made all these recommendations, I have to throw in the disclaimer here that they are based on my opinion alone. They do not necessarily represent the opinion of my firm or any of our clients. Right or wrong, these are just the opinions of one actuary.

One of the strengths of our nation’s system of government is that a multitude of voices can be heard and have an influence in the determination of policy. Unfortunately, that strength can become a weakness in that changes in legislation tend to be done on a piecemeal basis and wholesale changes and/or reforms are very difficult to enact. It is also difficult to get a handle on “big picture” solutions—what should the retirement benefit landscape look like 30 years from now, and how do we get there from here?

Hopefully, as actuaries, we can positively influence the direction of changes in legislation regarding retirement benefits (even if it occurs slowly,) bearing in mind that our constituents include not only the corporate plan sponsors and the participants in their plans, but our nation as a whole.

Appendix A
Joe Employee's Benefit Accruals
Traditional Final-Average-Pay Plan—Multiple Job Scenarios

FAE Plan	
FAE %	100%
N for FAE	5
Service limit	40
ER eligibility	55
Reduction	4% per year 100% at 62
ER eligibility	0—No 1—4% per year 2-100% at 62

Age	Total service	Salary	FAE	FAE Plan % of pay	Accrued benefit	Def 65LS factor	PV lump sum	ER eligible?	ER benefit	Life annuity	PV of ER lump sum
25	0	35,000	35,000	0	0.00	0.740077	-	0	0		
26	1	36,400	35,000	1	29.17	0.788465	276	0			
27	2	37,856	35,700	2	59.50	0.840033	600	0			
28	3	39,370	36,419	3	91.05	0.894991	978	0			
29	4	40,945	37,157	4	123.86	0.953567	1,417	0			
30	5	42,583	37,914	5	157.98	1.016002	1,926	0			
31	6	44,286	39,431	6	197.15	1.082556	2,561	0			
32	7	46,057	41,008	7	239.21	1.153504	3,311	0			
33	8	47,899	42,648	8	284.32	1.229143	4,194	0			
34	9	49,815	44,354	9	332.66	1.309789	5,229	0			
35	10	51,808	46,128	10	384.40	1.395782	6,438	0			
36	11	53,880	47,973	11	439.75	1.487502	7,850	0			
37	12	56,035	49,892	12	498.92	1.585306	9,491	0			
38	13	58,276	51,887	13	562.11	1.689619	11,397	0			
39	14	60,607	53,963	14	629.57	1.800896	13,605	0			
40	15	63,031	56,121	15	701.52	1.919629	16,160	0			
41	16	65,552	58,366	16	778.21	2.046352	19,110	0			
42	17	68,174	60,700	17	859.92	2.18164	22,512	0			
43	18	70,901	63,128	18	946.92	2.326124	26,432	0			
44	19	73,737	65,653	19	1039.51	2.480492	30,942	0			
45	20	76,686	68,279	20	1137.98	2.645495	36,126	0			
46	21	79,753	71,010	21	1242.68	2.821958	42,081	0			
47	22	82,943	73,850	22	1353.92	3.010786	48,916	0			
48	23	86,261	76,804	23	1472.08	3.212957	56,757	0			
49	24	89,711	79,876	24	1597.52	3.429522	65,745	0			
50	25	93,299	83,071	25	1730.64	3.661628	76,044	0			
51	26	97,031	86,393	26	1871.86	3.910497	87,839	0			
52	27	100,912	89,849	27	2021.60	4.177457	101,342	0			
53	28	104,948	93,443	28	2180.33	4.463952	116,795	0			

Age	Total service	Salary	FAE	FAE Plan % of pay	Accrued benefit	Def 65LS factor	PV lump sum	ER eligible?	ER benefit	Life annuity	PV of ER lump sum
54	29	109,146	97,180	29	2348.52	4.771571	134,474	0			
55	30	113,512	101,067	30	2526.68	5.102067	154,695	2	2,172.94	12.36306	322,371.09
56	31	118,052	105,110	31	2715.34	5.457365	177,823	2	2,389.50	12.18628	349,429.35
57	32	122,774	109,314	32	2915.04	5.839601	204,272	2	2,623.54	12.00188	377,848.26
58	33	127,685	113,686	33	3126.38	6.251187	234,523	2	2,876.27	11.80961	407,611.61
59	34	132,792	118,234	34	3349.96	6.694875	269,131	2	3,148.96	11.60937	438,689.81
60	35	138,104	122,963	35	3586.42	7.17382	308,740	2	3,442.96	11.40115	471,044.81
61	36	143,628	127,881	36	3836.44	7.691649	354,103	2	3,759.71	11.18502	504,629.30
62	37	149,373	132,997	37	4100.73	8.252534	406,097	2	4,100.73	10.96115	539,384.46
63	38	155,348	138,316	38	4380.02	8.86136	465,755	2	4,380.02	10.72984	563,962.83
64	39	161,562	143,849	39	4675.09	9.523824	534,297	2	4,675.09	10.49149	588,584.09
65	40	168,024	149,603	40	4986.77	10.24664	613,171	2	4,986.77	10.24664	613,171.38

FAE – Final Average Earnings

PV – Present Value

ER – Early Retirement

APPENDIX A (continued)

6.50%	Assumed 30-year Treasury rate
4%	Assumed salary increases
35,000	Pay at starting age
25	Starting age

Lump sums based on: 6.50% interest GAM83MF GAM Unisex
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Multiple job scenario	
10 years	Job 1
15 years	Job 2
15 years	Job 3

Job 1 service	Job 2 service	Job 3 service	Job 1 acc. ben.	Job 2 acc. ben.	Job 3 acc. ben.	Total NRA acc. ben.	PV Job 1 lump sum	PV Job 2 lump sum	PV Job 3 lump sum
0	0	0	0.00	0.00	0.00	0.00	-	-	-
1	0	0	29.17	0.00	0.00	29.17	275.96	-	-
2	0	0	59.50	0.00	0.00	59.50	599.78	-	-
3	0	0	91.05	0.00	0.00	91.05	977.83	-	-
4	0	0	123.86	0.00	0.00	123.86	1,417.25	-	-
5	0	0	157.98	0.00	0.00	157.98	1,926.05	-	-
6	0	0	197.15	0.00	0.00	197.15	2,561.17	-	-
7	0	0	239.21	0.00	0.00	239.21	3,311.20	-	-
8	0	0	284.32	0.00	0.00	284.32	4,193.66	-	-
9	0	0	332.66	0.00	0.00	332.66	5,228.49	-	-
10	0	0	384.40	0.00	0.00	384.40	6,438.46	-	-
10	1	0	384.40	39.98	0.00	424.38	6,861.55	713.60	-
10	2	0	384.40	83.15	0.00	467.55	7,312.70	1,581.88	-
10	3	0	384.40	129.72	0.00	514.12	7,793.87	2,630.09	-
10	4	0	384.40	179.88	0.00	564.28	8,307.17	3,887.25	-
10	5	0	384.40	233.84	0.00	618.24	8,854.86	5,386.59	-
10	6	0	384.40	291.83	0.00	676.23	9,439.41	7,166.22	-
10	7	0	384.40	354.08	0.00	738.48	10,063.47	9,269.81	-
10	8	0	384.40	420.85	0.00	805.25	10,729.95	11,747.48	-
10	9	0	384.40	492.40	0.00	876.80	11,442.01	14,656.66	-
10	10	0	384.40	568.99	0.00	953.39	12,203.14	18,063.18	-
10	11	0	384.40	650.93	0.00	1,035.33	13,017.13	22,042.59	-
10	12	0	384.40	738.50	0.00	1,122.90	13,888.16	26,681.65	-
10	13	0	384.40	832.04	0.00	1,216.44	14,820.73	32,079.83	-
10	14	0	384.40	931.89	0.00	1,316.29	15,819.70	38,351.11	-

<u>Job 1</u> <u>service</u>	<u>Job 2</u> <u>service</u>	<u>Job 3</u> <u>service</u>	<u>Job 1</u> <u>acc. ben.</u>	<u>Job 2</u> <u>acc. ben.</u>	<u>Job 3</u> <u>acc. ben.</u>	<u>Total</u> <u>NRA</u> <u>acc. ben.</u>	<u>PV Job 1</u> <u>lump</u> <u>sum</u>	<u>PV Job 2</u> <u>lump sum</u>	<u>PV Job 3</u> <u>lump sum</u>
10	15	0	384.40	1,038.39	0.00	1,422.79	16,890.36	45,626.16	-
10	15	1	384.40	1,038.39	71.99	1,494.78	18,038.34	48,727.22	3,378.40
10	15	2	384.40	1,038.39	149.75	1,572.53	19,269.77	52,053.70	7,506.81
10	15	3	384.40	1,038.39	233.61	1,656.39	20,591.32	55,623.61	12,513.71
10	15	4	384.40	1,038.39	323.93	1,746.72	22,010.30	59,456.73	18,548.10
10	15	5	384.40	1,038.39	421.11	1,843.90	23,534.82	63,574.92	25,782.58
10	15	6	384.40	1,038.39	525.55	1,948.33	25,173.73	68,002.15	34,417.36
10	15	7	384.40	1,038.39	637.67	2,060.45	26,936.91	72,765.05	44,684.51
10	15	8	384.40	1,038.39	757.91	2,180.69	28,835.48	77,893.67	56,853.98
10	15	9	384.40	1,038.39	886.75	2,309.54	30,882.12	83,422.29	71,240.43
10	15	10	384.40	1,038.39	1,024.69	2,447.48	33,091.40	89,390.25	88,211.45
10	15	11	384.40	1,038.39	1,172.25	2,595.03	35,480.04	95,842.71	108,198.04
10	15	12	384.40	1,038.39	1,329.97	2,752.75	38,067.29	102,831.69	131,707.07
10	15	13	384.40	1,038.39	1,498.43	2,921.21	40,875.68	110,418.04	159,337.26
10	15	14	384.40	1,038.39	1,678.24	3,101.02	43,931.50	118,672.76	191,798.97
10	15	15	384.40	1,038.39	1,870.04	3,292.82	47,265.68	127,679.43	229,939.11

NRA – Normal Retirement Age

PV – Present Value

ER – Early Retirement

Appendix B
Joe Employee's Benefit Accruals
Cash Balance Plan—Multiple Job Scenarios

CB Plan		6.50%	Assumed 30-year Treasury rate
5.00%	% of pay	4%	Assumed salary increases
6.50%	Interest crediting while active	35,000	Pay at starting age
4.50%	Interest crediting after termination	25	Starting age

Age	Total service	Salary	FAE	FAE plan % of pay	FAE Accrued benefit	Cash Bal. BOY balance	Accrual pay credit	Interest credit	EOY balance	Job 1 BOY balance	Pay credit	Interest credit	EOY balance
25	0	35,000	35,000	0	-	-	1,750.00	-	1,750.00	-	1,750.00	-	1,750.00
26	1	36,400	35,000	1	29.17	1,750.00	1,820.00	113.75	3,683.75	1,750.00	1,820.00	113.75	3,683.75
27	2	37,856	35,700	2	59.50	3,683.75	1,892.80	239.44	5,815.99	3,683.75	1,892.80	239.44	5,815.99
28	3	39,370	36,419	3	91.05	5,815.99	1,968.50	378.04	8,162.53	5,815.99	1,968.50	378.04	8,162.53
29	4	40,945	37,157	4	123.86	8,162.53	2,047.25	530.56	10,740.34	8,162.53	2,047.25	530.56	10,740.34
30	5	42,583	37,914	5	157.98	10,740.34	2,129.15	698.12	13,567.61	10,740.34	2,129.15	698.12	13,567.61
31	6	44,286	39,431	6	197.15	13,567.61	2,214.30	881.89	16,663.80	13,567.61	2,214.30	881.89	16,663.80
32	7	46,057	41,008	7	239.21	16,663.80	2,302.85	1,083.15	20,049.80	16,663.80	2,302.85	1,083.15	20,049.80
33	8	47,899	42,648	8	284.32	20,049.80	2,394.95	1,303.24	23,747.99	20,049.80	2,394.95	1,303.24	23,747.99
34	9	49,815	44,354	9	332.66	23,747.99	2,490.75	1,543.62	27,782.36	23,747.99	2,490.75	1,543.62	27,782.36
35	10	51,808	46,128	10	384.40	27,782.36	2,590.40	1,805.85	32,178.61	27,782.36	2,590.40	1,805.85	32,178.61
36	11	53,880	47,973	11	439.75	32,178.61	2,694.00	2,091.61	36,964.22	32,178.61	-	2,091.61	34,270.22
37	12	56,035	49,892	12	498.92	36,964.22	2,801.75	2,402.67	42,168.64	34,270.22	-	2,227.56	36,497.78
38	13	58,276	51,887	13	562.11	42,168.64	2,913.80	2,740.96	47,823.40	36,497.78	-	2,372.36	38,870.14
39	14	60,607	53,963	14	629.57	47,823.40	3,030.35	3,108.52	53,962.27	38,870.14	-	2,526.56	41,396.70
40	15	63,031	56,121	15	701.52	53,962.27	3,151.55	3,507.55	60,621.37	41,396.70	-	2,690.79	44,087.49
41	16	65,552	58,366	16	778.21	60,621.37	3,277.60	3,940.39	67,839.36	44,087.49	-	2,865.69	46,953.18
42	17	68,174	60,700	17	859.92	67,839.36	3,408.70	4,409.56	75,657.62	46,953.18	-	3,051.96	50,005.14
43	18	70,901	63,128	18	946.92	75,657.62	3,545.05	4,917.75	84,120.42	50,005.14	-	3,250.33	53,255.47
44	19	73,737	65,653	19	1,039.51	84,120.42	3,686.85	5,467.83	93,275.10	53,255.47	-	3,461.61	56,717.08
45	20	76,686	68,279	20	1,137.98	93,275.10	3,834.30	6,062.88	103,172.28	56,717.08	-	3,686.61	60,403.69
46	21	79,753	71,010	21	1,242.68	103,172.28	3,987.65	6,706.20	113,866.13	60,403.69	-	3,926.24	64,329.93
47	22	82,943	73,850	22	1,353.92	113,866.13	4,147.15	7,401.30	125,414.58	64,329.93	-	4,181.45	68,511.38
48	23	86,261	76,804	23	1,472.08	125,414.58	4,313.05	8,151.95	137,879.58	68,511.38	-	4,453.24	72,964.62
49	24	89,711	79,876	24	1,597.52	137,879.58	4,485.55	8,962.17	151,327.30	72,964.62	-	4,742.70	77,707.32
50	25	93,299	83,071	25	1,730.64	151,327.30	4,664.95	9,836.27	165,828.52	77,707.32	-	5,050.98	82,758.30
51	26	97,031	86,393	26	1,871.86	165,828.52	4,851.55	10,778.85	181,458.92	82,758.30	-	5,379.29	88,137.59
52	27	100,912	89,849	27	2,021.60	181,458.92	5,045.60	11,794.83	198,299.35	88,137.59	-	5,728.94	93,866.53

Age	Total service	Salary	FAE	FAE plan % of pay	FAE Accrued benefit	Cash Bal. BOY balance	Accrual pay credit	Interest credit	EOY balance	Job 1 BOY balance	Pay credit	Interest credit	EOY balance
53	28	104,948	93,443	28	2,180.33	198,299.35	5,247.40	12,889.46	216,436.21	93,866.53	-	6,101.32	99,967.85
54	29	109,146	97,180	29	2,348.52	216,436.21	5,457.30	14,068.35	235,961.86	99,967.85	-	6,497.91	106,465.76
55	30	113,512	101,067	30	2,526.68	235,961.86	5,675.60	15,337.52	256,974.98	106,465.76	-	6,920.27	113,386.03
56	31	118,052	105,110	31	2,715.34	256,974.98	5,902.60	16,703.37	279,580.95	113,386.03	-	7,370.09	120,756.12
57	32	122,774	109,314	32	2,915.04	279,580.95	6,138.70	18,172.76	303,892.41	120,756.12	-	7,849.15	128,605.27
58	33	127,685	113,686	33	3,126.38	303,892.41	6,384.25	19,753.01	330,029.67	128,605.27	-	8,359.34	136,964.61
59	34	132,792	118,234	34	3,349.96	330,029.67	6,639.60	21,451.93	358,121.20	136,964.61	-	8,902.70	145,867.31
60	35	138,104	122,963	35	3,586.42	358,121.20	6,905.20	23,277.88	388,304.28	145,867.31	-	9,481.38	155,348.69
61	36	143,628	127,881	36	3,836.44	388,304.28	7,181.40	25,239.78	420,725.46	155,348.69	-	10,097.66	165,446.35
62	37	149,373	132,997	37	4,100.73	420,725.46	7,468.65	27,347.15	455,541.26	165,446.35	-	10,754.01	176,200.36
63	38	155,348	138,316	38	4,380.02	455,541.26	7,767.40	29,610.18	492,918.84	176,200.36	-	11,453.02	187,653.38
64	39	161,562	143,849	39	4,675.09	492,918.84	8,078.10	32,039.72	533,036.66	187,653.38	-	12,197.47	199,850.85
65	40	168,024	149,603	40	4,986.77	533,036.66	8,401.20	34,647.38	576,085.24	199,850.85	-	12,990.31	212,841.16

FAE – Final Average Earnings

BOY – Beginning of Year

EOY – End of Year

Appendix B (continued)

CB Plan		6.50%	Assumed 30-year Treasury rate
5.00%	% of pay	4%	Assumed salary increases
6.50%	Interest crediting while active	35,000	Pay at starting age
4.50%	Interest crediting after termination	25	Starting age

Job 2 BOY balance	Pay credit	Interest credit	EOY balance	Job 3 BOY balance	Pay credit	Interest credit	EOY balance	Sum of jobs 1,2,3
-	-	-	-	-	-	-	-	1,750.00
-	-	-	-	-	-	-	-	3,683.75
-	-	-	-	-	-	-	-	5,815.99
-	-	-	-	-	-	-	-	8,162.53
-	-	-	-	-	-	-	-	10,740.34
-	-	-	-	-	-	-	-	13,567.61
-	-	-	-	-	-	-	-	16,663.80
-	-	-	-	-	-	-	-	20,049.80
-	-	-	-	-	-	-	-	23,747.99
-	-	-	-	-	-	-	-	27,782.36
-	-	-	-	-	-	-	-	32,178.61
-	2,694.00	-	2,694.00	-	-	-	-	36,964.22
2,694.00	2,801.75	175.11	5,670.86	-	-	-	-	42,168.64
5,670.86	2,913.80	368.61	8,953.27	-	-	-	-	47,823.41
8,953.27	3,030.35	581.96	12,565.58	-	-	-	-	53,962.28
12,565.58	3,151.55	816.76	16,533.89	-	-	-	-	60,621.38
16,533.89	3,277.60	1,074.70	20,886.19	-	-	-	-	67,839.37
20,886.19	3,408.70	1,357.60	25,652.49	-	-	-	-	75,657.63
25,652.49	3,545.05	1,667.41	30,864.95	-	-	-	-	84,120.42
30,864.95	3,686.85	2,006.22	36,558.02	-	-	-	-	93,275.10
36,558.02	3,834.30	2,376.27	42,768.59	-	-	-	-	103,172.28
42,768.59	3,987.65	2,779.96	49,536.20	-	-	-	-	113,866.13
49,536.20	4,147.15	3,219.85	56,903.20	-	-	-	-	125,414.58
56,903.20	4,313.05	3,698.71	64,914.96	-	-	-	-	137,879.58
64,914.96	4,485.55	4,219.47	73,619.98	-	-	-	-	151,327.30
73,619.98	4,664.95	4,785.30	83,070.23	-	-	-	-	165,828.53
83,070.23	-	5,399.56	88,469.79	-	4,851.55	-	4,851.55	181,458.93
88,469.79	-	5,750.54	94,220.33	4,851.55	5,045.60	315.35	10,212.50	198,299.36
94,220.33	-	6,124.32	100,344.65	10,212.50	5,247.40	663.81	16,123.71	216,436.21
100,344.65	-	6,522.40	106,867.05	16,123.71	5,457.30	1,048.04	22,629.05	235,961.86
106,867.05	-	6,946.36	113,813.41	22,629.05	5,675.60	1,470.89	29,775.54	256,974.98
113,813.41	-	7,397.87	121,211.28	29,775.54	5,902.60	1,935.41	37,613.55	279,580.95
121,211.28	-	7,878.73	129,090.01	37,613.55	6,138.70	2,444.88	46,197.13	303,892.41

Job 2 BOY balance	Pay credit	Interest credit	EOY balance	Job 3 BOY balance	Pay credit	Interest credit	EOY balance	Sum of jobs 1,2,3
129,090.01	-	8,390.85	137,480.86	46,197.13	6,384.25	3,002.81	55,584.19	330,029.66
137,480.86	-	8,936.26	146,417.12	55,584.19	6,639.60	3,612.97	65,836.76	358,121.19
146,417.12	-	9,517.11	155,934.23	65,836.76	6,905.20	4,279.39	77,021.35	388,304.27
155,934.23	-	10,135.72	166,069.95	77,021.35	7,181.40	5,006.39	89,209.14	420,725.44
166,069.95	-	10,794.55	176,864.50	89,209.14	7,468.65	5,798.59	102,476.38	455,541.24
176,864.50	-	11,496.19	188,360.69	102,476.38	7,767.40	6,660.96	116,904.74	492,918.81
188,360.69	-	12,243.44	200,604.13	116,904.74	8,078.10	7,598.81	132,581.65	533,036.63
200,604.13	-	13,039.27	213,643.40	132,581.65	8,401.20	8,617.81	149,600.66	576,085.22

BOY – Beginning of Year

EOY – End of Year

Appendix C1

Cash Balance Anti-Backloading Testing Program

(Testing 133^{1/3} % Accrual Rule)

	Input
ABO rate	3.50%
PBO rate 1	5.00%
PBO rate 11	5.00%
EE age	30
EE service	0
Initial balance	0

Transition years	0
Points	30
Initial pay credits	3.00%
Initial total credits	3.00%
Interest differential 1	1.50%

Pay credits		
Age		
Minimum	Maximum	%
0	30	0.03
31	35	0.035
36	50	0.04
41	45	0.045
46	50	0.05
51	55	0.055
56	60	0.06
61	99	0.065

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffmt'l" balance %	EOY "PBO" balance %	Current "PBO" rate %
30	3.000	3.000	100.00	PASS	0	30	0.03	0.00	3.00	3.00	3.00	5.00
31	3.545	3.105	114.17	PASS	1	31	0.035	3.00	3.545	6.55	6.65	5.00
32	3.600	3.214	112.01	PASS	2	32	0.035	6.65	3.60	10.25	10.48	5.00
33	3.657	3.326	109.95	PASS	3	33	0.035	10.48	3.66	14.14	14.51	5.00
34	3.718	3.443	107.99	PASS	4	34	0.035	14.51	3.72	18.22	18.73	5.00
35	3.781	3.563	106.12	PASS	5	35	0.035	18.73	3.78	22.51	23.17	5.00
36	4.348	3.688	117.89	PASS	6	36	0.04	23.17	4.35	27.52	28.33	5.00
37	4.425	3.817	115.93	PASS	7	37	0.04	28.33	4.42	32.75	33.74	5.00
38	4.506	3.950	114.07	PASS	8	38	0.04	33.74	4.51	38.25	39.43	5.00
39	4.591	4.089	112.30	PASS	9	39	0.04	39.43	4.59	44.02	45.40	5.00
40	4.681	4.232	110.62	PASS	10	40	0.04	45.40	4.68	50.08	51.67	5.00
41	5.275	4.380	120.44	PASS	11	41	0.045	51.67	5.28	56.95	58.76	5.00
42	5.381	4.533	118.71	PASS	12	42	0.045	58.76	5.38	64.14	66.19	5.00
43	5.493	4.692	117.07	PASS	13	43	0.045	66.19	5.49	71.69	74.00	5.00
44	5.610	4.856	115.53	PASS	14	44	0.045	74.00	5.61	79.61	82.20	5.00
45	5.733	5.026	114.07	PASS	15	45	0.045	82.20	5.73	87.94	90.81	5.00
46	6.362	5.202	122.30	PASS	16	46	0.05	90.81	6.36	97.18	100.35	5.00
47	6.505	5.384	120.83	PASS	17	47	0.05	100.35	6.51	106.86	110.37	5.00
48	6.656	5.572	119.44	PASS	18	48	0.05	110.37	6.66	117.03	120.89	5.00
49	6.813	5.768	118.13	PASS	19	49	0.05	120.89	6.81	127.70	131.94	5.00
50	6.979	5.969	116.91	PASS	20	50	0.05	131.94	6.98	138.91	143.53	5.00
51	7.653	6.178	123.87	PASS	21	51	0.055	143.53	7.65	151.18	156.21	5.00
52	7.843	6.395	122.65	PASS	22	52	0.055	156.21	7.84	164.05	169.52	5.00
53	8.043	6.618	121.52	PASS	23	53	0.055	169.52	8.04	177.56	183.49	5.00
54	8.252	6.850	120.47	PASS	24	54	0.055	183.49	8.25	191.75	198.17	5.00
55	8.473	7.090	119.50	PASS	25	55	0.055	198.17	8.47	206.64	213.58	5.00
56	9.204	7.338	125.43	PASS	26	56	0.06	213.58	9.20	222.78	230.26	5.00
57	9.454	7.595	124.48	PASS	27	57	0.06	230.26	9.45	239.71	247.77	5.00
58	9.717	7.861	123.61	PASS	28	58	0.06	247.77	9.72	257.49	266.16	5.00
59	9.992	8.136	122.82	PASS	29	59	0.06	266.16	9.99	276.15	285.47	5.00
60	10.282	8.420	122.11	PASS	30	60	0.06	285.47	10.28	295.75	305.74	5.00

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffrent" balance %	EOY "PBO" balance %	Current "PBO" rate %
61	11.086	8.715	127.21	PASS	31	61	0.065	305.74	11.09	316.83	327.53	5.00
62	11.413	9.020	126.53	PASS	32	62	0.065	327.53	11.41	338.94	350.40	5.00
63	11.756	9.336	125.92	PASS	33	63	0.065	350.40	11.76	362.16	374.42	5.00
64	12.116	9.663	125.39	PASS	34	64	0.065	374.42	12.12	386.54	399.64	5.00
65	12.495	10.001	124.94	PASS	35	65	0.065	399.64	12.49	412.14	426.13	5.00

BOY – Beginning of Year; EOY – End of Year; EE – Employee
 ABO rate – interest credit paid to inactive participants;
 PBO rate – interest credit paid to active employees

Appendix C2

Cash Balance Anti-Backloading Testing Program

(Testing 133^{1/3} % Accrual Rule)

	Input
ABO rate	3.25%
PBO rate 1	4.75%
PBO rate 11	4.75%
EE age	30
EE service	0
Initial balance	0

Transition years	0
Points	30
Initial pay credits	3.00%
Initial total credits	3.00%
Interest differential 1	1.50%

Pay credits		
Age		
Minimum	Maximum	%
0	30	0.03
31	35	0.035
36	50	0.04
41	45	0.045
46	50	0.05
51	55	0.055
56	60	0.06
61	99	0.065

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffint'l" balance %	EOY "PBO" balance %	Current "PBO" rate %
30	3.000	3.000	100.00	PASS	0	30	0.03	0.00	3.00	3.00	3.00	4.75
31	3.545	3.098	114.45	PASS	1	31	0.035	3.00	3.545	6.55	6.64	4.75
32	3.600	3.198	112.55	PASS	2	32	0.035	6.64	3.60	10.24	10.46	4.75
33	3.657	3.302	110.74	PASS	3	33	0.035	10.46	3.66	14.11	14.45	4.75
34	3.717	3.409	109.02	PASS	4	34	0.035	14.45	3.72	18.17	18.64	4.75
35	3.780	3.520	107.37	PASS	5	35	0.035	18.64	3.78	22.42	23.03	4.75
36	4.345	3.635	119.56	PASS	6	36	0.04	23.03	4.35	27.37	28.12	4.75
37	4.422	3.753	117.83	PASS	7	37	0.04	28.12	4.42	32.54	33.46	4.75
38	4.502	3.875	116.18	PASS	8	38	0.04	33.46	4.50	37.96	39.05	4.75
39	4.586	4.001	114.62	PASS	9	39	0.04	39.05	4.59	43.63	44.90	4.75
40	4.674	4.131	113.14	PASS	10	40	0.04	44.90	4.67	49.57	51.03	4.75
41	5.265	4.265	123.46	PASS	11	41	0.045	51.03	5.27	56.30	57.96	4.75
42	5.369	4.404	121.93	PASS	12	42	0.045	57.96	5.37	63.33	65.21	4.75
43	5.478	4.547	120.49	PASS	13	43	0.045	65.21	5.48	70.69	72.81	4.75
44	5.592	4.694	119.12	PASS	14	44	0.045	72.81	5.59	78.40	80.77	4.75
45	5.711	4.847	117.84	PASS	15	45	0.045	80.77	5.71	86.48	89.10	4.75
46	6.337	5.005	126.62	PASS	16	46	0.05	89.10	6.34	95.44	98.33	4.75
47	6.475	5.167	125.31	PASS	17	47	0.05	98.33	6.48	104.81	108.01	4.75
48	6.620	5.335	124.09	PASS	18	48	0.05	108.01	6.62	114.63	118.14	4.75
49	6.772	5.508	122.94	PASS	19	49	0.05	118.14	6.77	124.91	128.75	4.75
50	6.931	5.688	121.87	PASS	20	50	0.05	128.75	6.93	135.68	139.86	4.75
51	7.598	5.872	129.38	PASS	21	51	0.055	139.86	7.60	147.46	152.01	4.75
52	7.780	6.063	128.32	PASS	22	52	0.055	152.01	7.78	159.79	164.73	4.75
53	7.971	6.260	127.33	PASS	23	53	0.055	164.73	7.97	172.70	178.05	4.75
54	8.171	6.464	126.41	PASS	24	54	0.055	178.05	8.17	186.22	192.01	4.75
55	8.380	6.674	125.57	PASS	25	55	0.055	192.01	8.38	200.39	206.63	4.75
56	9.099	6.891	132.05	PASS	26	56	0.06	206.63	9.10	215.73	222.44	4.75
57	9.337	7.115	131.23	PASS	27	57	0.06	222.44	9.34	231.78	239.01	4.75
58	9.585	7.346	130.48	PASS	28	58	0.06	239.01	9.59	248.59	256.36	4.75
59	9.845	7.585	129.81	PASS	29	59	0.06	256.36	9.85	266.21	274.54	4.75
60	10.118	7.831	129.20	PASS	30	60	0.06	274.54	10.12	284.66	293.58	4.75

<u>Age</u>	<u>Current accrual %</u>	<u>Prior minimum accrual %</u>	<u>Ratio of current to prior min. %</u>	<u>Pass/fail</u>	<u>Svc.</u>	<u>Age</u>	<u>Pay credits</u>	<u>BOY balance %</u>	<u>Current accrual %</u>	<u>EOY "diffrent!" balance %</u>	<u>EOY "PBO" balance %</u>	<u>Current "PBO" rate %</u>
61	10.904	8.086	134.85	FAIL	31	61	0.065	293.58	10.90	304.48	314.03	4.75
62	11.210	8.348	134.28	FAIL	32	62	0.065	314.03	11.21	325.24	335.44	4.75
63	11.532	8.620	133.78	FAIL	33	63	0.065	335.44	11.53	346.97	357.88	4.75
64	11.868	8.900	133.35	FAIL	34	64	0.065	357.88	11.87	369.74	381.37	4.75
65	12.221	9.189	132.99	PASS	35	65	0.065	381.37	12.22	393.59	405.99	4.75

BOY – Beginning of Year; EOY – End of Year; EE – Employee
 ABO rate – interest credit paid to inactive participants;
 PBO rate – interest credit paid to active employees

Appendix C3

Cash Balance Anti-Backloading Testing Program

(Testing 133¹/₃ % Accrual Rule)

	Input
ABO rate	3.50%
PBO rate 1	4.25%
PBO rate 11	4.25%
EE Age	30
EE Service	0
Initial Balance	0

Transition Years	0
Points	30
Initial Pay Credits	3.00%
Initial total Credits	3.00%
Interest Differential 1	1.25%

Pay Credits		
Age		
Minimum	Maximum	%
0	30	0.03
31	35	0.035
36	50	0.04
41	45	0.045
46	50	0.05
51	55	0.055
56	60	0.06
61	99	0.065

Age	Current Accrual %	Prior Minimum Accrual %	Ratio of Current to Prior Min. %	Pass/Fail	Svc.	Age	Pay Credits	BOY Balance %	Current Accrual %	EOY "diffint'l" Balance %	EOY "PBO" Balance %	Current "PBO" Rate %
30	3.000	3.000	100.00	PASS	0	30	0.03	0.00	3.00	3.00	3.00	4.25
31	3.538	3.090	114.48	PASS	1	31	0.035	3.00	3.538	6.54	6.63	4.25
32	3.583	3.183	112.57	PASS	2	32	0.035	6.63	3.58	10.21	10.41	4.25
33	3.630	3.278	110.74	PASS	3	33	0.035	10.41	3.63	14.04	14.35	4.25
34	3.679	3.377	108.97	PASS	4	34	0.035	14.35	3.68	18.03	18.46	4.25
35	3.731	3.478	107.27	PASS	5	35	0.035	18.46	3.73	22.19	22.75	4.25
36	4.284	3.582	119.60	PASS	6	36	0.04	22.75	4.28	27.03	27.71	4.25
37	4.346	3.690	117.80	PASS	7	37	0.04	27.71	4.35	32.06	32.89	4.25
38	4.411	3.800	116.07	PASS	8	38	0.04	32.89	4.41	37.30	38.29	4.25
39	4.479	3.914	114.42	PASS	9	39	0.04	38.29	4.48	42.77	43.92	4.25
40	4.549	4.032	112.83	PASS	10	40	0.04	43.92	4.55	48.46	49.78	4.25
41	5.122	4.153	123.35	PASS	11	41	0.045	49.78	5.12	54.90	56.40	4.25
42	5.205	4.277	121.69	PASS	12	42	0.045	56.40	5.20	61.60	63.29	4.25
43	5.291	4.406	120.10	PASS	13	43	0.045	63.29	5.29	68.59	70.48	4.25
44	5.381	4.538	118.58	PASS	14	44	0.045	70.48	5.38	75.87	77.98	4.25
45	5.475	4.674	117.13	PASS	15	45	0.045	77.98	5.47	83.46	85.79	4.25
46	6.072	4.814	126.14	PASS	16	46	0.05	85.79	6.07	91.87	94.44	4.25
47	6.181	4.959	124.64	PASS	17	47	0.05	94.44	6.18	100.62	103.45	4.25
48	6.293	5.107	123.22	PASS	18	48	0.05	103.45	6.29	109.75	112.85	4.25
49	6.411	5.261	121.86	PASS	19	49	0.05	112.85	6.41	119.26	122.65	4.25
50	6.533	5.418	120.57	PASS	20	50	0.05	122.65	6.53	129.18	132.86	4.25
51	7.161	5.581	128.31	PASS	21	51	0.055	132.86	7.16	140.02	144.01	4.25
52	7.300	5.748	127.00	PASS	22	52	0.055	144.01	7.30	151.31	155.63	4.25
53	7.445	5.921	125.75	PASS	23	53	0.055	155.63	7.45	163.07	167.74	4.25
54	7.597	6.098	124.57	PASS	24	54	0.055	167.74	7.60	175.34	180.37	4.25
55	7.755	6.281	123.46	PASS	25	55	0.055	180.37	7.75	188.12	193.54	4.25
56	8.419	6.470	130.13	PASS	26	56	0.06	193.54	8.42	201.96	207.76	4.25
57	8.597	6.664	129.01	PASS	27	57	0.06	207.76	8.60	216.36	222.59	4.25
58	8.782	6.864	127.95	PASS	28	58	0.06	222.59	8.78	231.37	238.05	4.25
59	8.976	7.070	126.96	PASS	29	59	0.06	238.05	8.98	247.03	254.17	4.25
60	9.177	7.282	126.03	PASS	30	60	0.06	254.17	9.18	263.35	270.97	4.25

Age	Current Accrual %	Prior Minimum Accrual %	Ratio of Current to Prior Min. %	Pass/Fail	Svc.	Age	Pay Credits	BOY Balance %	Current Accrual %	EOY "diffint'l" Balance %	EOY "PBO" Balance %	Current "PBO" Rate %
61	9.887	7.500	131.82	PASS	31	61	0.065	270.97	9.89	280.86	288.99	4.25
62	10.112	7.725	130.90	PASS	32	62	0.065	288.99	10.11	299.10	307.77	4.25
63	10.347	7.957	130.04	PASS	33	63	0.065	307.77	10.35	318.12	327.35	4.25
64	10.592	8.196	129.24	PASS	34	64	0.065	327.35	10.59	337.94	347.76	4.25
65	10.847	8.442	128.49	PASS	35	65	0.065	347.76	10.85	358.61	369.04	4.25

BOY – Beginning of Year; EOY – End of Year; EE – Employee
 ABO rate – interest credit paid to inactive participants;
 PBO rate – interest credit paid to active employees

Appendix C4

Cash Balance Anti-Backloading Testing Program

(Testing 133¹/₃ % Accrual Rule)

	Input
ABO rate	2.95%
PBO rate 1	4.20%
PBO rate 11	4.20%
EE age	30
EE service	0
Initial balance	0

Transition years	0
Points	30
Initial pay credits	3.00%
Initial total credits	3.00%
Interest differential 1	1.25%

Pay credits		
Age		
Minimum	Maximum	%
0	30	0.03
31	35	0.035
36	50	0.04
41	45	0.045
46	50	0.05
51	55	0.055
56	60	0.06
61	99	0.065

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffmt'l" balance %	EOY "PBO" balance %	Current "PBO" rate %
30	3.000	3.000	100.00	PASS	0	30	0.03	0.00	3.00	3.00	3.00	4.20
31	3.538	3.089	114.54	PASS	1	31	0.035	3.00	3.538	6.54	6.63	4.20
32	3.583	3.180	112.68	PASS	2	32	0.035	6.63	3.58	10.21	10.40	4.20
33	3.630	3.273	110.90	PASS	3	33	0.035	10.40	3.63	14.03	14.34	4.20
34	3.679	3.370	109.18	PASS	4	34	0.035	14.34	3.68	18.02	18.44	4.20
35	3.731	3.469	107.53	PASS	5	35	0.035	18.44	3.73	22.17	22.72	4.20
36	4.284	3.572	119.94	PASS	6	36	0.04	22.72	4.28	27.00	27.67	4.20
37	4.346	3.677	118.19	PASS	7	37	0.04	27.67	4.35	32.02	32.83	4.20
38	4.410	3.786	116.51	PASS	8	38	0.04	32.83	4.41	37.25	38.21	4.20
39	4.478	3.897	114.89	PASS	9	39	0.04	38.21	4.48	42.69	43.82	4.20
40	4.548	4.012	113.35	PASS	10	40	0.04	43.82	4.55	48.37	49.66	4.20
41	5.121	4.131	123.97	PASS	11	41	0.045	49.66	5.12	54.78	56.24	4.20
42	5.203	4.252	122.35	PASS	12	42	0.045	56.24	5.20	61.45	63.11	4.20
43	5.289	4.378	120.81	PASS	13	43	0.045	63.11	5.29	68.40	70.26	4.20
44	5.378	4.507	119.33	PASS	14	44	0.045	70.26	5.38	75.64	77.71	4.20
45	5.471	4.640	117.92	PASS	15	45	0.045	77.71	5.47	83.18	85.47	4.20
46	6.068	4.777	127.04	PASS	16	46	0.05	85.47	6.07	91.54	94.06	4.20
47	6.176	4.918	125.58	PASS	17	47	0.05	94.06	6.18	100.24	103.01	4.20
48	6.288	5.063	124.19	PASS	18	48	0.05	103.01	6.29	109.30	112.34	4.20
49	6.404	5.212	122.87	PASS	19	49	0.05	112.34	6.40	118.74	122.06	4.20
50	6.526	5.366	121.61	PASS	20	50	0.05	122.06	6.53	128.58	132.18	4.20
51	7.152	5.524	129.47	PASS	21	51	0.055	132.18	7.15	139.34	143.24	4.20
52	7.290	5.687	128.19	PASS	22	52	0.055	143.24	7.29	150.53	154.75	4.20
53	7.434	5.855	126.97	PASS	23	53	0.055	154.75	7.43	162.19	166.75	4.20
54	7.584	6.028	125.82	PASS	24	54	0.055	166.75	7.58	174.34	179.25	4.20
55	7.741	6.206	124.74	PASS	25	55	0.055	179.25	7.74	187.00	192.28	4.20
56	8.404	6.389	131.54	PASS	26	56	0.06	192.28	8.40	200.69	206.36	4.20
57	8.579	6.577	130.45	PASS	27	57	0.06	206.36	8.58	214.94	221.03	4.20
58	8.763	6.771	129.42	PASS	28	58	0.06	221.03	8.76	229.79	236.31	4.20
59	8.954	6.971	128.45	PASS	29	59	0.06	236.31	8.95	245.26	252.23	4.20
60	9.153	7.176	127.54	PASS	30	60	0.06	252.23	9.15	261.39	268.83	4.20

<u>Age</u>	<u>Current accrual %</u>	<u>Prior minimum accrual %</u>	<u>Ratio of current to prior min. %</u>	<u>Pass/fail</u>	<u>Svc.</u>	<u>Age</u>	<u>Pay credits</u>	<u>BOY balance %</u>	<u>Current accrual %</u>	<u>EOY "diffrent'l" balance %</u>	<u>EOY "PBO" balance %</u>	<u>Current "PBO" rate %</u>
61	9.860	7.388	133.46	FAIL	31	61	0.065	268.83	9.86	278.69	286.62	4.20
62	10.083	7.606	132.56	PASS	32	62	0.065	286.62	10.08	296.70	305.16	4.20
63	10.314	7.831	131.72	PASS	33	63	0.065	305.16	10.31	315.47	324.47	4.20
64	10.556	8.062	130.94	PASS	34	64	0.065	324.47	10.56	335.03	344.60	4.20
65	10.808	8.299	130.22	PASS	35	65	0.065	344.60	10.81	355.41	365.57	4.20

BOY – Beginning of Year; EOY – End of Year; EE – Employee
 ABO rate – interest credit paid to inactive participants;
 PBO rate – interest credit paid to active employees

Appendix C5

Cash Balance Anti-Backloading Testing Program

(Testing 133^{1/3} % Accrual Rule)

	Input
ABO rate	3.00%
PBO rate 1	4.25%
PBO rate 11	4.25%
EE age	20
EE service	0
Initial balance	0

Transition years	0
Points	30
Initial pay credits	5.00%
Initial total credits	5.00%
Interest differential 1	2.00%

Pay credits		
Age		
Minimum	Maximum	%
0	30	0.05
31	35	0.05
36	50	0.05
41	45	0.05
46	50	0.05
51	55	0.05
56	60	0.05
61	99	0.05

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffrent'l" balance %	EOY "PBO" balance %	Current "PBO" rate %
20	5.000	5.000	100.00	PASS	0	20	0.05	0.00	5.00	5.00	5.00	4.25
21	5.100	5.100	100.00	PASS	1	21	0.05	5.00	5.10	10.10	10.21	4.25
22	5.204	5.204	100.00	PASS	2	22	0.05	10.21	5.20	15.42	15.65	4.25
23	5.313	5.313	100.00	PASS	3	23	0.05	15.65	5.31	20.96	21.31	4.25
24	5.426	5.426	100.00	PASS	4	24	0.05	21.31	5.43	26.74	27.22	4.25
25	5.544	5.544	100.00	PASS	5	25	0.05	27.22	5.54	32.76	33.37	4.25
26	5.667	5.667	100.00	PASS	6	26	0.05	33.37	5.67	39.04	39.79	4.25
27	5.796	5.795	100.01	PASS	7	27	0.05	39.79	5.80	45.59	46.48	4.25
28	5.930	5.925	100.07	PASS	8	28	0.05	46.48	5.93	52.41	53.46	4.25
29	6.069	6.059	100.17	PASS	9	29	0.05	53.46	6.07	59.53	60.73	4.25
30	6.215	6.195	100.32	PASS	10	30	0.05	60.73	6.21	66.95	68.31	4.25
**	**	**	**	**	**	**	**	**	**	**	**	**
**	**	**	**	**	**	**	**	**	**	**	**	**
**	**	**	**	**	**	**	**	**	**	**	**	**
44	9.036	8.459	106.82	PASS	24	44	0.05	201.81	9.04	210.84	215.38	4.25
45	9.308	8.650	107.61	PASS	25	45	0.05	215.38	9.31	224.69	229.54	4.25
46	9.591	8.844	108.44	PASS	26	46	0.05	229.54	9.59	239.13	244.29	4.25
47	9.886	9.043	109.32	PASS	27	47	0.05	244.29	9.89	254.18	259.67	4.25
48	10.193	9.247	110.24	PASS	28	48	0.05	259.67	10.19	269.87	275.71	4.25
49	10.514	9.455	111.21	PASS	29	49	0.05	275.71	10.51	286.22	292.43	4.25
50	10.849	9.667	112.22	PASS	30	50	0.05	292.43	10.85	303.28	309.86	4.25
51	11.197	9.885	113.27	PASS	31	51	0.05	309.86	11.20	321.05	328.02	4.25
52	11.560	10.107	114.38	PASS	32	52	0.05	328.02	11.56	339.59	346.97	4.25
53	11.939	10.335	115.53	PASS	33	53	0.05	346.97	11.94	358.91	366.71	4.25
54	12.334	10.567	116.72	PASS	34	54	0.05	366.71	12.33	379.05	387.30	4.25
55	12.746	10.805	117.96	PASS	35	55	0.05	387.30	12.75	400.04	408.76	4.25
56	13.175	11.048	119.25	PASS	36	56	0.05	408.76	13.18	421.93	431.13	4.25
57	13.623	11.297	120.59	PASS	37	57	0.05	431.13	13.62	444.75	454.45	4.25
58	14.089	11.551	121.97	PASS	38	58	0.05	454.45	14.09	468.54	478.77	4.25
59	14.575	11.811	123.41	PASS	39	59	0.05	478.77	14.58	493.34	504.11	4.25
60	15.082	12.077	124.89	PASS	40	60	0.05	504.11	15.08	519.20	530.54	4.25

Age	Current accrual %	Prior minimum accrual %	Ratio of current to prior min. %	Pass/fail	Svc.	Age	Pay credits	BOY balance %	Current accrual %	EOY "diffint'l" balance %	EOY "PBO" balance %	Current "PBO" rate %
61	15.611	12.348	126.42	PASS	41	61	0.05	530.54	15.61	546.15	558.09	4.25
62	16.162	12.626	128.00	PASS	42	62	0.05	558.09	16.16	574.25	586.81	4.25
63	16.736	12.910	129.63	PASS	43	63	0.05	586.81	16.74	603.54	616.74	4.25
64	17.335	13.201	131.32	PASS	44	64	0.05	616.74	17.33	634.08	647.96	4.25
65	17.959	13.498	133.05	PASS	45	65	0.05	647.96	17.96	665.92	680.49	4.25

BOY – Beginning of Year; EOY – End of Year; EE – Employee
 ABO rate – interest credit paid to inactive participants;
 PBO rate – interest credit paid to active employees

Appendix D

Benefit Accruals for New Hires Under Sample Plans

5% Pay credits
 0.065 Interest credit
 0.04 Salary scale

Sample cash balance plan - benefit accruals for new hires

	25	40	55
Age at hire	25	40	55
Initial pay	30,000.00	30,000.00	30,000.00
Initial cash balance	0.00	0.00	0.00
Pay credit, year 1	1,500.00	1,500.00	1,500.00
Interest credit, year 1	0.00	0.00	0.00
Cash balance, end of year 1	1,500.00	1,500.00	1,500.00
Pay credit, year 2	1,560.00	1,560.00	1,560.00
Interest credit, year 2	97.50	97.50	97.50
Cash balance, end of year 2	3,157.50	3,157.50	3,157.50
Pay credit, year 3	1,622.40	1,622.40	1,622.40
Interest credit, year 3	205.24	205.24	205.24
Cash balance, end of year 3	4,985.14	4,985.14	4,985.14
Pay credit, year 4	1,687.30	1,687.30	1,687.30
Interest credit, year 4	324.03	324.03	324.03
Cash balance, end of year 4	6,996.47	6,996.47	6,996.47
Pay credit, year 5	1,754.79	1,754.79	1,754.79
Interest credit, year 5	454.77	454.77	454.77
Cash balance, end of year 5	9,206.03	9,206.03	9,206.03
Age at termination	30	45	60
Cash balance with interest to age 65	83,427.39	32,438.78	12,613.06
Age 65 annuity factor	10.2467	10.2467	10.2467
Annuity at 65	678.49	263.81	102.58

Sample traditional final-average -pay plan benefit accruals for new hires

	25	40	55
Age at hire	25	40	55
Year 1 pay	30,000.00	30,000.00	30,000.00
Year 2 pay	31,200.00	31,200.00	31,200.00
Year 3 pay	32,448.00	32,448.00	32,448.00
Year 4 pay	33,745.92	33,745.92	33,745.92
Year 5 pay	35,095.76	35,095.76	35,095.76
Average	32,497.94	32,497.94	32,497.94
FAE monthly benefit*	135.41	135.41	135.41
Age at termination	30	45	60
Deferred to 65 factor	1.0160	2.6455	7.1739
Lump sum at termination	1,650.93	4,298.74	11,656.99

*final-average-pay monthly benefit =
 1% * average monthly pay * years of service*

References

- American Benefits Council. 2000. "‘Wear-Away’ Prohibitions Should Not Include Early Retirement Subsidies," Issue Brief: Retirement Security and Savings Act of 2000 (H.R.1102), American Benefits Council Group Paper, October.
- Conference of Consulting Actuaries. 1999. "Gray Book." Buffalo Grove, IL.
- Eaton v. Onan Corp.* (2000) S.D. Ind., No. IP 97-814-C H/G.
- Hoeffner, S. J. 2000. "Cash Balance Plans: Helping Employers Meet Today's Staffing Needs," *Benefits Quarterly*, 17(1): 33-37.
- H.R. Conference Report No. 1012, 99th Congress, 2nd Session 375, 1986
U.S.C.C.A.N. 3868
- Lowman, T. B. 2000. "Actuarial Aspects of Cash Balance Plans." Online at http://www.soa.org/research/actuarial_aspects.pdf.
- Shea, R. C., M. J. Francese, and R. S. Newman. 2000. "Age Discrimination in Cash Balance Plans: Another View," *Virginia Tax Review* 19(4): 763-80.

Figure 1
Present Value of Lump Sum at Termination for “Joe Employee”

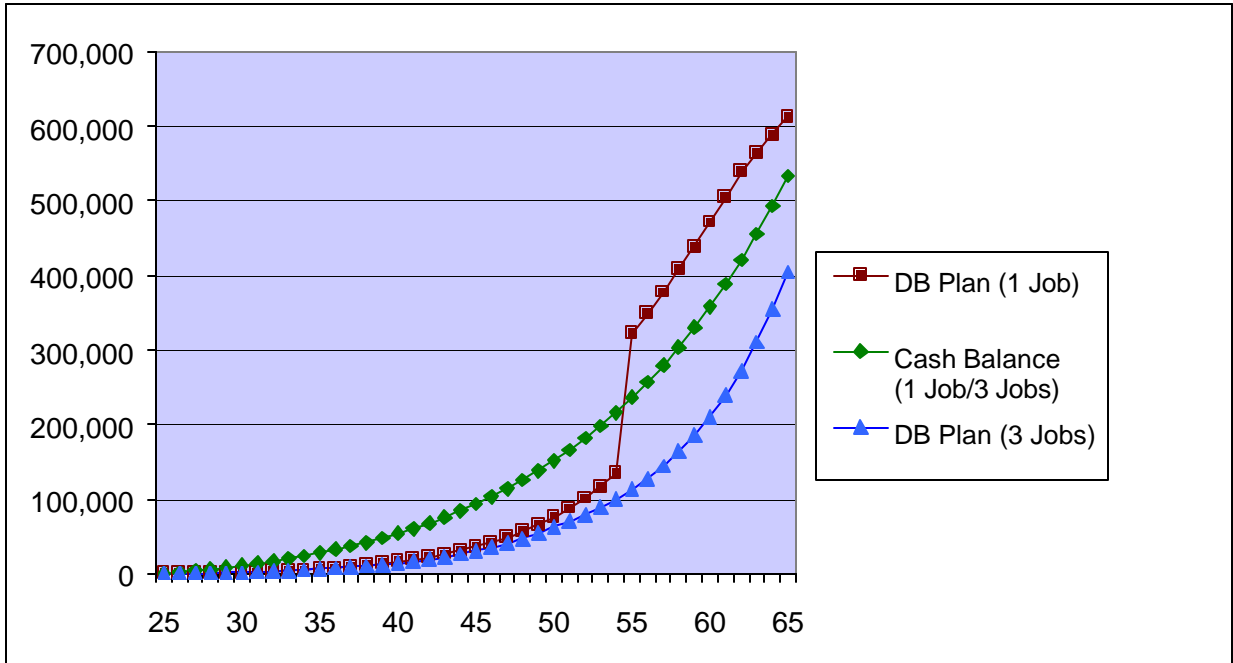


Figure 2

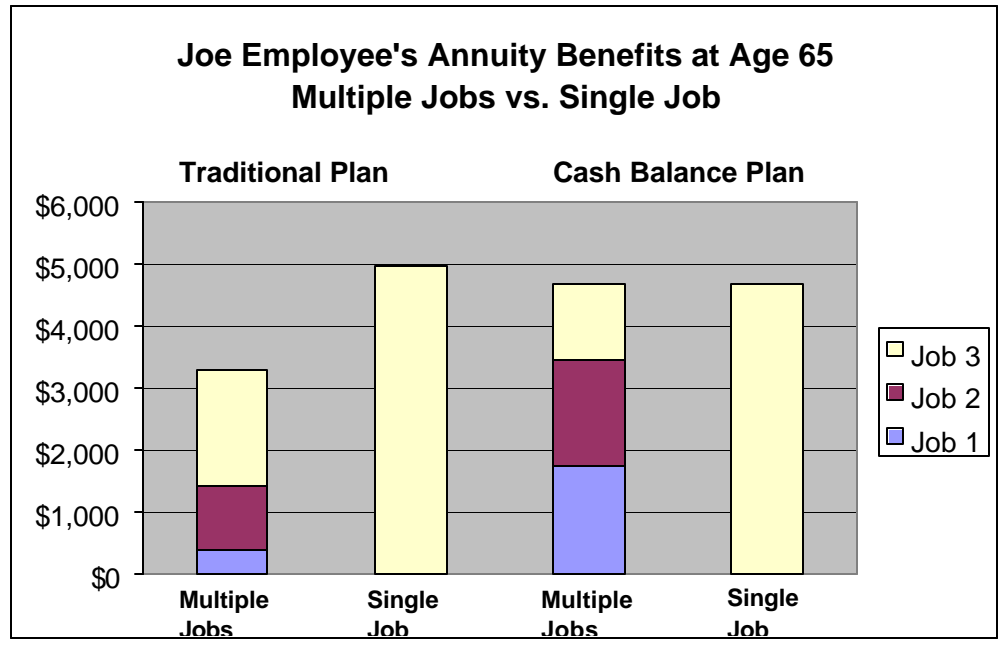


Figure 3

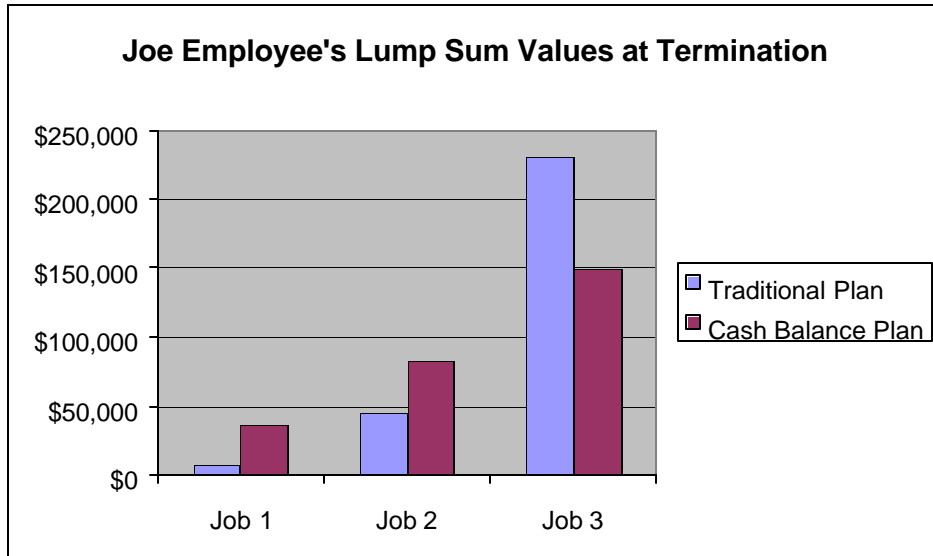


Figure 4

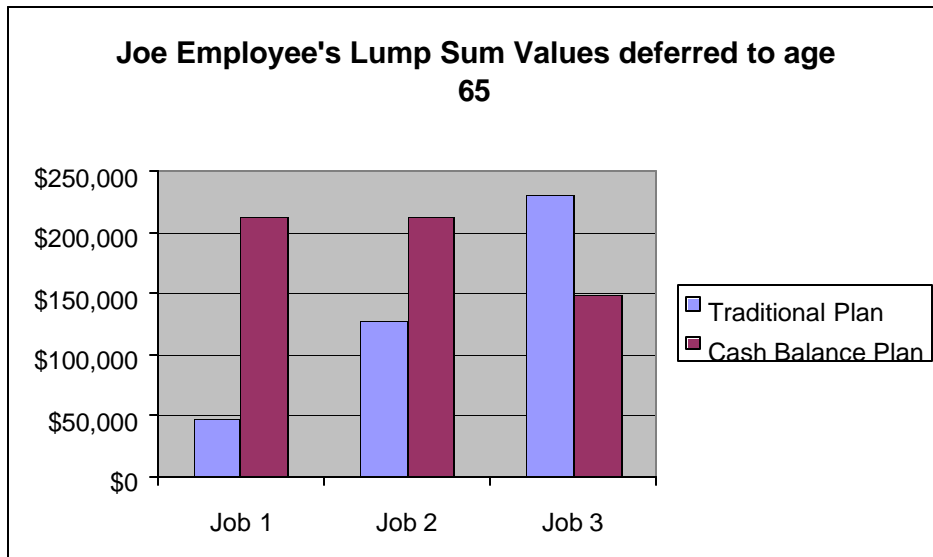


Table 1
Joe Employee—Multiple Job vs. Single Job Comparison

	Job 1	Job 2	Job 3	Total 1, 2 & 3	Single job
Age from hire – termination	25 - 35	35 – 50	50 - 65	25 - 65	25 - 65
FAP plan					
Years of service	10	15	15	40	40
Annuity at 65	\$384.40	\$1,038.39	\$1,870.04	\$3,292.82	\$4,986.77
Lump sum at 65	\$47,265	\$127,679	\$229,939	\$404,884	\$613,171
Present value of deferred annuity at termination	\$6,438	\$45,626	\$229,939.1 0	N/A	\$613,171
Cash balance plan					
Years of service	10	15	15	40	40
Lump sum at 65	\$212,841	\$213,643	\$149,600	\$576,085	\$576,085
Annuity at 65	\$1,730.98	\$1,737.51	\$1,216.66	\$4,685.15	\$4,685.15
Cash balance at termination	\$36,497	\$83,070	\$149,600	N/A	\$576,085

Table 2
Joe Employee's Cash Balance Account

Age	Beginning of year balance	Pay credit	Interest credit	End of year balance	One-year accrual	Ratio of current to lowest accrual*
25	-	1,750.00	-	1,750.00	1,750.00	100.00%
26	1,750.00	1,820.00	113.75	3,683.75	1,933.75	106.25
27	3,683.75	1,892.80	239.44	5,815.99	2,132.24	112.65
28	5,815.99	1,968.50	378.04	8,162.53	2,346.54	119.20
29	8,162.53	2,047.25	530.56	10,740.34	2,577.81	125.92
30	10,740.34	2,129.15	698.12	13,567.61	2,827.27	132.79
31	13,567.61	2,214.30	881.89	16,663.80	3,096.19	139.83
32	16,663.80	2,302.85	1,083.15	20,049.80	3,386.00	147.03
33	20,049.80	2,394.95	1,303.24	23,747.99	3,698.19	154.41
34	23,747.99	2,490.75	1,543.62	27,782.36	4,034.37	161.97
35	27,782.36	2,590.40	1,805.85	32,178.61	4,396.25	169.71
36	32,178.61	2,694.00	2,091.61	36,964.22	4,785.61	177.64
65	533,036.66	8,401.20	34,647.38	576,085.24	43,048.58	512.37

* Adjusted for salary increases

Note: Annual accrual equals current pay credit plus current interest credit.

Table 3**Annual Accrual Equals Current Pay Credit Plus Interest Credit to Age 65**

Age	Pay credit	Interest credit to age 65	One-year accrual
29	2,047.25	16,505.45	18,552.70
34	2,490.75	13,983.98	16,474.73
Age 34 accrual / Age 29 accrual = 89%.			

Table 4**Age-Graded Pay Credits: Annual Accrual Equals Current Pay Credit Plus Interest Credit to Age 65:**

Age	Pay credit	Interest credit to age 65	One-year accrual
30	1,500.00	6,380.02	7,880.02
62	3,250.00	333.13	3,583.13
Age 62 accrual / Age 30 accrual = 45.5%.			

Table 5**Comparison of Benefits for New Hires at a Range of Ages**

Age at hire	25	40	55
Age at termination	30	45	60
Annual pay in year of hire	\$ 30,000	\$ 30,000	\$ 30,000
Sample cash balance plan cash balance at termination	\$ 9,206	\$ 9,206	\$ 9,206
Cash balance projected to 65	\$ 83,427	\$ 32,438	\$ 12,613
Monthly annuity at age 65	\$ 678	\$ 263	\$ 102
Sample traditional final-average-pay plan monthly annuity at age 65	\$ 135.41	\$ 135.41	\$ 135.41
PV of lump sum at termination	\$ 1,651	\$ 4,299	\$ 11,657

Table 6**Current Liability with Decrement at Age 45 and 6.5% Interest Credit**

	Present value 1	Present value 2	Present value 3	Present value 4
Cash balance	\$100,000	\$100,000	\$100,000	\$100,000
Interest crediting rate	6.50%	6.50%	6.50%	N/A
Annuity conversion rate	7.00%	6.00%	6.50%	N/A
Annuity conversion factor	9.8733	10.6463	10.2467	N/A
Discount rate	6.00%	7.00%	6.50%	N/A
Deferred annuity factor	3.0199	2.3211	2.6455	N/A
Present value	\$107,778	\$76,823	\$90,974	\$100,000

Note: Present value 1 is calculated using 6.0% discount for current liability and a 7.0% annuity conversion factor as follows: $(\$100,000 \times (1.065^{20}) / 9.87325) \times 3.01995 = \$107,778$

Table 7**Current Liability with Decrement at Age 45 and 4% Interest Credit**

	Present value 5	Present value 6	Present value 7	Present value 8
Cash balance	100,000	100,000	100,000	100,000
Interest crediting rate	4.50%	4.50%	4.50%	N/A
Annuity conversion rate	7.00%	6.00%	6.50%	N/A
Annuity conversion factor	9.8733	10.6463	10.2467	N/A
Discount rate	6.00%	7.00%	6.50%	N/A
Deferred annuity factor	3.0199	2.3211	2.6455	N/A
Present value	73,767	52,581	66,266	100,000