

Periodic Cost of Employee Benefits

Jeremy Gold, FSA, PhD

**Presented at The Great Controversy: Current Pension Actuarial Practice in Light of Financial
Economics Symposium
Sponsored by the Society of Actuaries**

Vancouver

June 2003

Copyright 2004 by the Society of Actuaries.

All rights reserved by the Society of Actuaries. Permission is granted to make brief excerpts for a published review. Permission is also granted to make limited numbers of copies of items in this monograph for personal, internal, classroom or other instructional use, on condition that the foregoing copyright notice is used so as to give reasonable notice of the Society's copyright. This consent for free limited copying without prior consent of the Society does not extend to making copies for general distribution, for advertising or promotional purposes, for inclusion in new collective works or for resale.

(note: The quotations appearing in this monograph are exact, except where capitalization and punctuation were changed in keeping with modern style and grammar guidelines.)

Abstract

This paper uses economic principles to evaluate methods that may be used to assign the cost of employee benefits to accounting periods. The periodic cost may be derived from the end-of-period liabilities that are recognized; the likely liability candidates, using U.S. nomenclature, are the vested benefit obligation (VBO), the accumulated benefit obligation (ABO) and the projected benefit obligation (PBO).

We look at *exit costing* (a version of VBO-based recognition, but independent of U.S. accounting standards), which is based on the explicit terms of the benefit contract. Exit costing may be contrasted with projected methods that anticipate future pay increases, vesting and eligibilities. Because projected methods recognize liabilities for benefits before the employee has unconditional ownership, we call them *advance-recognition* methods. Because the recognized cost of benefits must be included in competitive total compensation, advance-recognition methods expose employees to the risk that they will not receive all that they have earned. Employees can lose these benefits in several ways; when they lose because the employer reneges, they become infuriated.

Our analysis follows two parallel tracks. The first challenges us to justify certain benefit designs that may be identified by the large accounting conflicts they engender. The second asks us to recognize that these same accounting conflicts may lead to public misunderstandings followed by the making of arbitrary results-oriented rules. A crucial thesis of this paper is that actuaries may head this off by doing our best science and that doing so constitutes our best defense against the multitudes of bad rules that may be handed down by the rule-makers.

1. Introduction

In this paper, we explore the problem of allocating the cost of employee benefits over an employee's periods of service. We are concerned only with economics and financial reporting and do not address funding. We develop *exit costing* as a neutral measure when benefits are fully vested. We observe that *advance recognition* (a common property of projected benefit methods) may encourage employers to behave opportunistically and that *delayed recognition* (for example, the amortization of fully vested benefits over future periods) provides poor incentives to employees.

Our attempt to apply exit costing universally leads to two issues that we pursue in some depth. The first challenges us to justify certain benefit designs that may be identified by the large accounting conflicts they engender. The second asks us to

recognize that these same accounting conflicts may lead to public misunderstandings and societal reaction:

- **Justifying benefit design.** Projected benefit methods have been defended in the economics and accounting literature as being reflective of implicit contracts that extend beyond the explicit terms of plan documents. We review these arguments and conclude that there is no effective contract to support the recognition of future pay increases in today's liabilities. Arguments that implicit contracts exist for future vesting and eligibility are not so easily dismissed and may support accrued benefit recognition that exceeds exit cost. It has been argued that potentially forfeitable benefits provide incentives for employees to remain with the firm and to be more productive. After compensating employees for the additional risk that they bear under these arrangements, the employer may still realize a net gain from increased productivity. But this process has practical limits. Long cliff vesting, such as that found in many postretirement medical programs, may induce so much risk that net productivity gains do not exist. A large difference between accrued and vested liabilities is an indicator for potentially fragile benefit designs.
- **Societal reaction.** We look at the reaction of society to the situation where employers appear to renege¹ on implicit contracts that they have made. We review historical examples of such situations—as well as the legislative, regulatory and court responses that follow. We observe that advance recognition is dangerous to employees, to employers and to the accountants and actuaries who advise them. We conclude that advance recognition should be avoided except where the terms of the implicit contract are economically rational and sufficiently transparent and credible to minimize moral hazard.

Many benefit formulas relate to individual years of service in a way that makes the cost allocation clear. Examples are term life insurance, health insurance for active employees and defined contribution (DC) plans. Other benefits may accrue over an employee's career in a way that makes the cost attribution less certain. Difficulties can arise with vesting provisions in pension and retiree medical plans and with pay-related defined benefit (DB) plans. When do benefits that are subject to vesting and eligibility rules accrue, over the full crediting period or only when they vest? Do final-pay benefits accrue on the basis of current pay or expected final pay? What about benefits that may be revoked at the company's discretion, such as retiree medical coverage or ancillary pension benefits that are not protected by statute?

¹ Economists use the word *renege* nonjudgmentally.

The cost allocation method should provide reliable information to support economically rational decisions by managers, employees, investors and regulators. Standard U.S. accounting and actuarial methods for allocating benefit costs over employees' careers are designed to provide smooth patterns rather than faithful representations of the underlying contracts.

We begin with a review of principles of employment economics in Section 2. (Readers whose main interest is actuarial and accounting may choose to bypass this section, referring back to its principles as they are referenced in subsequent sections.) In Section 3 we develop a stylized competitive employment market in which employers and employees are free to negotiate new terms of employment for each period, unconstrained by contracts (implicit or explicit), legal or reputational costs of employment termination, or other impediments.² This market allows us to illustrate principles that may be adapted to apply even as contracts and impediments are introduced. This approach leads us to formulate an *exit-cost* model and to show that departures from it create moral hazard. Analysis of this model implies that employee benefit cost attributions should *exclude* future salary projections and benefits that have not yet vested. Current benefit accounting (e.g., FAS 87, FAS 106) incorporates an *advance-recognition* (projected benefit) model that includes future pay increases and nonvested benefits.

Advance recognition—absent certain contractual conditions—invites bad behavior by employers. Section 4 introduces multiperiod contracting and shows that advance recognition may be justified by enforceable contracts; actuarial estimates of discretionary future salary increases do not meet this test. The economics of multiperiod contracts leads us to review the literature (Section 5) that links benefit plans, implicit employment contracts and incentives. Section 6 looks at historical problems that have roots in the advance-recognition model.

Section 7 addresses the conflict between exit cost (VBO-based) and accrued cost (ABO-based) when benefits are subject to deferred vesting and possible revocation. Used in moderation, such provisions may act as incentives under implicit contracts, but many common designs that incorporate sharp vesting and eligibility cliffs and revocable benefits should be examined skeptically and justified economically.

The bad behavior that advance recognition invites offends society. Regulators, legislators and courts respond in ways that may infuriate employers and employees and threaten the future of otherwise desirable employee benefit schemes (Section 8). Section 9 summarizes the paper and concludes.

² Such a market is often called a “spot market for labor” in the economics literature.

2. Some Principles of Employment Economics

We seek an economic basis to inform financial reporting for firms that sponsor employee benefit plans. We do so in the context of employment economics and contractual relationships.

2.1 Contract Basics

Contracts constitute an important branch of economic analysis. We are interested in contracts related to employment and the recognition of the liabilities to which they give rise.

Contracts are agreements entered into by willing parties, each for his own perceived benefit. The contract is created by such agreements accompanied by an exchange of elements of value (consideration), such as money or promises. Although some contracts begin and end immediately (e.g., a cash purchase of a newspaper), we are interested here in contracts that may extend over long periods. Because circumstances change subsequent to the original meeting of the minds,³ contracts must have force even after one party would rather no longer be bound. Thus, contracts must be part of a system that can coerce compliance from a reluctant party. To deter noncompliance, courts must, in relatively rare cases, intervene and apply legal sanctions. Far more often, other forces, such as the reputations of the parties or their continued interdependence, serve as the enforcement mechanism.

Contracts may be explicit or implicit or combinations of both. Economics teaches us that it is not efficient to write a contract when the costs to do so exceed the advantages. In many cases, where the complexity of the agreement or the contingencies that may arise thereunder make a written reduction impossible, some or all of the contract may consist of mutual and tacit understandings. When a home is sold, it is efficient to write a contract because the amount of value being transferred is large, the sale occurs at a single point in time, there are only a few pertinent issues, the importance of compliance is high and both parties want the enforcement potential of the courts to stand behind the transaction. In contrast, when a firm hires a young manager or salaried professional, an explicit contract is not efficient because the employment relationship will encompass changing responsibilities and compensation, evolving relationship-specific investments by each party, and an unpredictable date of severance.

³ In many cases, for example, one party performs first, effectively becoming a creditor of the other.

Economists expect contracts to be rational (the welfare of each party is improved) and efficient (no “better” contract exists).⁴ Although a contract that injures either or both parties would not be rational, a seemingly irrational contract may nonetheless be efficient when seen in its full context. Consider a fair gambling contract on the outcome of a coin toss. On its face, it is not financially rational for two risk-averse parties to enter into such a contract. Nonetheless, we can construct circumstances under which the wager will occur. This observation will play a deeper role as we try to understand why a benefit that is conditional on vesting may or may not be economically rational.

Contracts may incorporate options (financial or real) that may be absolute or conditional. Examples from the employment world may include the right to terminate a pension plan at any time for any reason, the right to fire an employee for inadequate performance or the right to choose a lump sum rather than an annuity. The holder of the right (the “long” position) will usually have had to concede some compensation to the “short” party in the contract negotiation.

2.2 Financial Accounting for Contracts

Principle 1: The objective of financial accounting is to report value-relevant information to interested parties. Information that would reduce (increase) the price that a buyer would be willing to pay for a share of the firm signifies a value-relevant liability (asset).

Principle 2: Accounting recognition follows de facto contracts whether implicit, explicit or combined. This is a direct application of Principle 1. Financial accounting reports the value of firm assets and the value of contractual claims against those assets in a fashion that will be credible to suppliers of capital and labor. Although this may seem to be self-evident, we will see that much of the debate about the proper accounting for employee benefits turns on the nature of the contracts and upon the actions and intents of the parties.

2.3 Risks and Incentives in Employment Contracts

In this paper, we consider the impact of three distinct types of employment-related risks faced by employees: (a) *statistical* (or demographic) *risk*, where individual employee experiences vary around actuarial expectations in regard to tenure, compensation, mortality etc., (b) *firm-specific risk*, where employees are exposed to the fortunes of the firm and (c) *moral hazard*, where employees are vulnerable to exploitation if management fails to adhere faithfully to implicit contracts.

⁴ A “better” contract increases at least one party’s welfare at no cost to any other party.

Contracts that impose risk on employees stimulate two countervailing forces: risk-averse employees demand higher expected total compensation under riskier contracts, but these same employees may well be positively motivated by risk and become more productive.

Firm-specific risk aligns employee compensation and firm results. This may be accomplished through bonus programs, stock options and grants, and promises without collateral (e.g., unfunded or underfunded benefit programs that make the employee a de facto firm creditor).

Statistical risk, such as a probability of future vesting instead of immediate vesting, can serve to retain and motivate employees. Employees facing potential forfeiture if they terminate will (a) require greater pay from competitors seeking to hire them away and (b) be disinclined to shirk for fear of being fired.

The amount of compensation demanded per unit of risk increases as a function of the amount of risk employees are asked to bear. An employee who demands a \$1 risk premium for one unit of risk will demand more than a \$2 premium for two units. The productivity incentive effect declines as risk is increased. If the first unit of imposed risk adds \$10 to output, the second unit will add less than another \$10.

Principle 3: Increasing employment contract risk may be efficient, but only up to a limit. At some point, the increasing marginal compensation must exceed the decreasing marginal productivity, and any further imposition of risk must be counterproductive.

Principle 4: Exposing employees to moral hazard is generally inefficient. An employer who wants to retain valuable options against employee interests cannot generally pay employees enough. This is tantamount to asking employees to insure the employer against its own bad acts. Most actuaries will deem this risk “uninsurable.” A more practicable variation on this theme may be constructed with conditions; that is, the option to renege on promised benefits will only be exercised when “condition A” occurs. If condition A is defined, for example, in terms of the employer’s financial distress, we may characterize the employee position as “short a customized put on the employer’s equity.” Such a short position is equivalent to a variable long position in the employer equity. Thus, we have a special case of firm-specific risk.

2.4 Competition

The plain-vanilla economic model of the firm exists in a competitive equilibrium framework. Firms employ capital and labor, each of which is provided within a context of perfect information, competition and mobility. The plain-vanilla version gives rise to spot markets for capital and labor, the existence of which implies that:

- The risk-adjusted expected return on capital is the same in every firm. Lower (higher) returns cause a departure (influx) of capital until this principle is met.
- Each employee will be offered the same total compensation in each period by numerous firms. Lower (higher) total compensation causes a departure (influx) of labor until this principle is met.

Principle 5: Total compensation is independent of the value of benefits earned under the de facto contract. Any increase in benefits must be offset dollar-for-dollar by a decrease in direct pay. If a firm chose to commit more (or less) to benefits without adjusting direct pay, the resulting increase (decrease) in total compensation would drive away its suppliers of capital (labor).

In the sections that follow, we will “dirty up” this plain-vanilla model, adding sprinkles to account for the more complex real-life features of explicit and implicit contracts of employment. We begin by using the plain-vanilla model to develop the exit-cost model.

3. The Exit-Cost Model

In this section we formalize the accounting model for the spot labor market—where there are no implicit contracts and employment agreements are freshly made in each accounting period. We demonstrate that failure to adhere to this exit-cost model can injure employees and employers.

Consider a highly simplified model of an economy in competitive equilibrium with full labor mobility:

- Each employee is able to choose each year among several companies, each of which offers the same total compensation. Job changes carry no legal repercussions, reputational costs or economic losses to companies or employees.
- Total compensation (TC_t) is competitively determined for each employee at the beginning of each year and is due at the end of the year (t). Notation is summarized in Appendix A.
- Benefit programs vary from employer to employer but offer no tax advantages. Employees have no individual benefit preferences and value an employer-provided benefit dollar equally with a dollar of direct compensation. At least one company, which we will call Company A, has no benefits and pays each employee’s total compensation as direct pay.

- Direct pay (W_t) is defined for each employee as the cash compensation paid. In accordance with Principle 5, direct pay is the remainder after we recognize the end-of-year value of that employee's benefits for the year. We will refer to the value of the non-cash benefit (VC_t) as "withheld wages" (from the company's viewpoint) or "foregone wages" (from the employees' viewpoint). Thus, the direct pay due at the end of the year is: $W_t = TC_t - VC_t$.
- Regulation is nonexistent.

We define the "exit benefit" (V_t) as the benefit to which the employee would be entitled if he left service at year end. It reflects years of service and pay to date; it excludes nonvested benefits, benefits for which eligibility has not yet been satisfied, and salary scale effects. We define the end-of-year value of V_t as $L_t(V_t)$, or as L_t when the meaning is clear. We designate the increase during the year of the employee's termination benefit as ΔV_t . Under these conditions, the correct benefit cost would be the end-of-year value, $L_t(\Delta V_t)$, which we have already denoted by VC_t . We refer to the use of L_t on the balance sheet and VC_t in the income statement as the "exit-cost" attribution method. In much of what follows we treat all the variables in a deterministic fashion. Appendix B briefly outlines a stochastic generalization.

We count only the termination benefit because any higher or lower cost attribution exposes either the company or the employee to future loss:

- **Advance recognition:** Suppose the company charges more than the exit cost and the employee goes along. The employee would be foregoing wages not for an immediate entitlement, but in the expectation that the company will, in a future year, credit termination benefits without simultaneously withholding wages. But the company could take the low road, frustrating the employee's expectations either by a prospective change in the plan or by charging fully for the termination benefits when they actually vest.
- **Delayed recognition:** Alternatively, suppose the company charges less than the full exit cost. Companies often increase vested benefits (e.g., career average updates, past service benefit improvements, negotiated increases in flat dollar plan etc.) in the belief that today's employees will render future service in return (Byrne et al. 1983).⁵ This belief may be reflected in the amortization of the

⁵ See, especially, Byrne's remark defending the practice of spreading the cost of immediate increases in accrued promises over substantial future periods (i.e., delayed recognition):

"There is no basis for the view that an employer adopts a pension plan primarily as a reward for services rendered prior to the adoption of the plan ... Pension funds represent reward for future service and productivity.

instantaneous rise in vested liabilities over forward periods. When the company tries to recoup its undercharge, the employee simply quits while ahead and joins Company A.

3.1 Base Case—Defined Contribution Plan

We use a DC plan to illustrate advance recognition:

- Company A pays a certain employee \$50,000 in direct pay with no benefits.
- Company B pays \$48,000 of wages plus \$2,000 immediately vested in a DC plan.
- Company C, a start-up, puts in a DC plan that credits and immediately vests \$1,000 for an employee with less than five years of service and \$3,000 for one with five years or more.

Under exit costing, which is the existing practice for vested DC plans, Company C would recognize \$1,000 of benefit cost and pay \$49,000 of wages. Once the employee has qualified for the stepped-up contribution, Company C would recognize a DC cost of \$3,000 and pay wages of \$47,000. Instead, the company decides to recognize a uniform cost of \$2,000, based on a projection of its average contribution over the employee's career; accordingly, it offers \$48,000 of wages. It reports total compensation expense of \$50,000. This accounting departs from current rules, but is there any substantive problem with it?

An employee who expects to stay with the same company for his entire career decides that this basis will be favorable and joins Company C. For five years the employee collects total compensation of \$49,000, \$48,000 as wages and \$1,000 as defined contributions. In the fifth year, Company C is acquired by Company D. At first, the employee worries that the plan will be changed. He is reassured to learn that Company D, which has the same DC plan as Company C, will maintain the plan.

Then the employee learns that Company D uses exit costing (the standard accounting method in this case). His direct wages will be calculated as \$50,000 minus the defined contribution.

Over the past five years, the employee has received the same wages but \$5,000 less in defined contributions than his Company B counterparts. He had expected to

“The same conclusion can be reached for amendments to a pension plan. That a plan may use pre-adoption service or pay ... does not detract from the conclusion that the plan is an exchange for future service” (Byrne et al. 1983, p. 985).

We return to this subject in Section 7.43.

recoup this shortfall by continuing to receive the same wages as Company B employees but getting \$1,000 *more* in annual defined contributions. Now he realizes that his \$5,000 sacrifice was fruitless. Going forward, he will receive the same total compensation as they, although differently allocated between wages and defined contributions. In no real sense did Company C have any liability to meet his expectations of receiving above-market compensation after five years of service; the “liability” has vanished *without a change in the benefit plan*.

This illustrates why the standard accrual accounting in this case, *in which it coincides with exit costing*, is correct. Company C’s spreading method creates a phantom liability and can produce incorrect and abusive compensation decisions.

3.2 Salary Scale—Another Case of Advance Recognition

We next show that the standard accrual accounting for defined benefit (DB) plans is as flawed as the smoothed DC example above, *exactly because it does not follow exit costing*. A case that closely parallels the earlier example can be built using the PBO defined by Financial Accounting Standard (FAS) 87 (FASB 1985) as applied to a simplified final-pay DB plan.

Unlike the ABO and the VBO,⁶ the PBO assumes future pay increases. Consider a plan with immediate vesting that provides a lump sum benefit equal to 2 percent of final year’s total compensation⁷ multiplied by years of service. We look at a newly hired employee who might be expected to work for 30 years. Her initial total compensation is \$50,000 and is expected to compound at 4.9% annually to \$200,000 in her 30th year.

The benefit payable after 30 years can be computed as 2 percent of \$200,000 (\$4,000) times 30, or \$120,000. Because the VBO and PBO calculations each discount for the time value of money and for termination probabilities in the same way, we ignore these discounts⁸ and focus on the different ways in which they assign benefit accruals to reporting periods. The standard accounting model assigns a service benefit (ΔP_t) of \$4,000 to each period. The VBO approach, following the exit-costing theme, computes the first year benefit (V_1) as 2 percent of \$50,000, or \$1,000. The two-year vested benefit (V_2) is \$2,098⁹ and, thus, the second year accrual (ΔV_2) equals \$1,098. In the 30th year, when ΔP_{30} is again \$4,000, ΔV_{30} is \$9,415. Each method assigns a total of \$120,000 over 30 years.

⁶ Recall that the VBO, as opposed to the ABO, ignores nonvested benefits and benefits for which eligibility rules have not yet been satisfied. In the example at hand, the VBO equals the ABO.

⁷ Final-pay plans are invariably based on some measure of direct pay. The use of total compensation in our example simplifies the illustration without significant distortion.

⁸ This is equivalent to zero percent discount rate and service survival probability of unity.

⁹ Two percent of \$52,448 times two years. The entire tabulation appears in Appendix C.

The effect of the standard accounting is, in parallel with the earlier smoothed-DC example, to substitute an average accrual that exceeds the actual accrual in the early years. In this example, the cross-over point occurs after 17 years, at which time the projected P_{17} is \$68,000 while the vested V_{17} is only \$36,528. Following our earlier example, the employee who has worked for one year will receive a \$46,000 paycheck under standard accounting despite having earned a vested benefit of only \$1,000. Under exit-cost accounting that paycheck is \$49,000. As earlier, advance-recognition accounting invites exploitation. If the employer chooses to exploit the situation after 17 years, the employee loses \$31,472, almost half of the amount of foregone wages.

3.3 Nonvested and Revocable Benefits

A similar problem arises under current accounting for nonvested benefits. Suppose the company withholds wages to pay for nonvested benefits (of any kind); the employee accepts this withholding in the expectation of future vesting. When the vesting year arrives, even if the company cannot legally change the vesting provision, it can frustrate the employee's expectation by changing the ground rules and charging the employee's direct pay for the full value of the newly vested pension. The employee would have no recourse. Whether she stays or leaves, she has received no value for the previous years of pension charges against her pay.

This reasoning applies to all benefits that increase in value as the employee ages: for normal or ancillary benefits that vest at later ages, for the impact of future pay increases on prior service, for other postretirement employee benefits (OPEBs), such as retiree medical plans that vest at an early retirement date, or for benefits that can be revoked by the company. Only exit costing creates a compensation environment that minimizes opportunities for gaming the system.

4. Multiperiod Contracting

In this section we show that when a multiperiod contract exists, the year-by-year precision of the exit-cost model may be relaxed without introducing moral hazard. Reduction of total compensation early in employees' careers is in fact standard in certain businesses where the possibility of future rewards is part of a conditional implicit contract. Law firms and investment banking firms may underpay associates by offering the prospect of eventual partnership rewards for the most successful. The pay pattern is built into the industry structure, and firms intending to stay in business cannot cheat on the eventual rewards.

This example illustrates that a contract may allow the exit-cost attribution method to be postponed during the contract period. It does not free us from the need to

strike an economically motivated deal at contract inception nor does it free us from the need to true up at contract expiry. Our new partners must now be paid commensurately with competitive partnership standards and our new nonpartners must receive future compensation competitive with their now well-defined status.

This illustration suggests conditions that could permit a company to attribute costs and withhold wages on a basis other than exit costing. Such conditions would reflect restricted labor mobility, because of constraints on the company or the employees. These constraints can take the form of company-employee contracts, explicit or implicit; enforced on the company by the high costs of recruiting, training and potential reputational injury and lawsuits; enforced on the employee by high transactions costs associated with job search, job change and the abandonment of employer-specific skills.

We review these contractual concepts algebraically, beginning with a reminder that total compensation must be competitive across firms and a revisit to the precise exit model:

Liability (*VBO*) at the end of year t : L_t

Year t benefit cost: VC_t

Year t direct pay: $W_t = TC_t - VC_t$

When a T -year contract exists, the employer and the employee can agree to recognize an accumulated obligation, R_t , in addition to the vested benefit obligation, L_t . Use of R_t as a *contract reserve* (and ΔR_t as the periodic addition to or subtraction from the contract reserve) allows the direct pay to be overcharged in some years and undercharged in other years, as long as the accumulated value is zero at the end of the contract:

Liability at the end of year t : $L_t + R_t$

Year t direct pay: $W_t = TC_t - VC_t - \Delta R_t$

End of contract: $R_T = 0,$

where $\Delta R_t = R_t - (1+i)R_{t-1}$ and i represents a fair employer-employee rate of interest.

4.1 VBO vs. PBO

FAS 87 assumes a multiperiod contract in the definition of the PBO that, for pay-related plans, credits a percentage of future earnings in each year's pension accrual. Setting $R_t = PBO_t - L_t$ to reflect the FASB-hypothesized contract in excess of the plan document contract:

$$\text{Liability at the end of year } t: \quad L_t + R_t = PBO_t$$

$$\text{Year } t \text{ direct pay:} \quad W_t = TC_t - VC_t - \Delta R_t = TC_t - SC_t$$

$$\text{End of contract:} \quad VBO_T = PBO_T \Rightarrow R_T = 0,$$

where $VC_t + \Delta R_t = L_t - (1+i)L_{t-1} + R_t - (1+i)R_{t-1} = PBO_t - (1+i)PBO_{t-1} = SC_t$ is the FAS 87 service cost.

L_t represents the exit liability (more specifically it equals the VBO_t in FAS 87) under the explicit contract defined by the plan. Thus, R_t represents the advance recognition inherent in the implicit contract that FAS 87 deems recognizable. It is appropriate, therefore, to refer to this use of R_t as the FAS 87 *implicit contract reserve*.

Is this multiyear implicit contract sufficient to justify the FAS 87 accounting treatment rather than the exit-cost method of Section 3? Note that we have had to assume a promise to pay competitive total compensation over the life of the contract. Further, although this contract does not contemplate exit, if we wished to let employees go without penalizing them, we would have to pay them the implicit contract reserve when they leave. Similarly, the contract does not anticipate plan termination or amendment but, if we wished to let the plan be amended or terminated at the will of the employer, we would have to agree to settle up based on the PBO at that time.

Note that moral hazard is avoided whenever the accounting matches the contract; current explicit contracts (plan documents) are VBO-like and imply exit costing; an enforceable PBO contract would be consistent with FAS 87.

5. Economic Models of Implicit Pension Contracts

Actuaries and accountants are not the only quantitative professionals who have struggled to assign value to financial promises that are wrapped in complicated relationships where not everything is reduced to written contracts. Economists have engaged themselves in these activities as well and have developed several conflicting models. It appears that, while we all may model what we see, we cannot be sure that we

have grasped the financial essence of the unwritten promise and its intended effects. To some degree, economists have fussed more than others about the rationality of implicit contracts. The following literature review is intended as a primer for those unfamiliar with economic models of implicit pension contracts.

5.1 Lazear Style Implicit Contracts (LSICs)

Lazear (1979) identifies implicit multiperiod employment contracts that add value for employers and employees. Lazear (1983) asserts that DB pension plans may be viewed as the implementation mechanism for LSICs. According to Lazear, early in their careers, certain employees are paid less than their competitive total compensation. These employees, who tacitly agree to participate in LSICs, commit to a long-term relationship that withholds a portion of their earned total compensation, trains them to enhance their future productivity, motivates them to perform under the risk of losing the value withheld, and ultimately rewards them with career total pay that incorporates all of their enhanced productivity. Usually such employees may be characterized as salaried nonbargaining employees covered by pay-related DB pension plans.

The portion of early-career compensation that is withheld is deemed to act as a “training bond” that allows employers to invest in the employee relationship or as a “performance bond” that discourages employee shirking.¹⁰ Return of the withheld compensation late in the career (in the form of vested early retirement subsidies and postemployment benefits) acts as a severance incentive.

Employees who participate in LSICs must believe that, even after considering various risks—including possible renegeing by the firm—they will be adequately rewarded. This belief has been bolstered by the observation that the firm has not renegeed on prior generations of employees. Firms that see the value in LSICs need to protect their access to today’s young work force by honoring the implied promises previously made to their employees with long-tenure today.

Can Lazear style implicit contracts justify accounting that recognizes pension liabilities in excess of those explicitly laid out in plan documents? How real are the promises and how precisely can they be measured?

¹⁰ The performance of such employees can neither be perfectly specified (as in an explicit contract) nor costlessly monitored; thus, incentives that motivate employees are incorporated into an efficient (but second best) contract. Although the same considerations might argue for implicit contracts for senior executives, it appears that the cost-benefit ratio related to the specification of executive contracts is generally more favorable than it is for salaried professionals and middle managers.

5.2 Implicit Contracts and DB Pension Plans

Kotlikoff and Wise (1985) examined the empirical evidence to see whether labor markets follow a spot or a multiperiod contractual model. They focused on cliff vesting and cliff eligibility for subsidized early retirement benefits. Under the spot market approach, the presumed smoothness of total compensation must be offset by sharply discontinuous vesting values particularly at, and shortly after, age 55; that is, observable direct pay should not proceed smoothly upward in that age range. Kotlikoff and Wise do not find such discontinuity in direct pay and deduce that implicit contracts prevail over the spot market model.

Bodie (1985) in his comment in re Kotlikoff and Wise (1985) questions how much can be deduced about implicit contracts by looking at direct pay patterns without having substantially more information about other forces at work.

Bulow and Landsman (1985) note that the direct pay patterns of individual employees may not reflect the impact of discontinuous benefit entitlements. Because benefit decisions and salary determinations are often made disjointly within an employer's hierarchy, we often observe employees who earn the same direct pay but take nonequal advantage of offered benefits. Nonetheless, because the employer must still determine its total compensation competitively, cohort direct pay plus cohort vested benefit costs must equal cohort total compensation, even if the rule applies imperfectly for individuals.

Bulow (1982) asks the critical question, "[h]ow should the firm accrue its pension liability to the worker over time, to keep accounting profits consistent with economic profits?" (p. 438) if an implicit career-long contract exists. Bulow argues that the total compensation should be recognized in each period, regardless of how it is apportioned between direct pay and pension benefits. If the employer recognizes the PBO, the employee's direct pay equals total compensation (TC) less the service cost (SC). Even though the employee's direct pay plus the value of his incremental vested benefits (VC) does not equal the total compensation earned, the employee does not care because the employer is fully obligated for the PBO under the long-term contract. This relationship is outlined algebraically in Section 4.

Noting the analogy between pensions and life insurance that drives projected benefit actuarial methods, Bulow reinforces this observation. He states that the whole life policyholder does not object to paying more than the term cost in early years because the insurer is obligated to offer coverage below the term cost in later years. The burden is on those who advocate projected benefit accounting for pensions to show that

there exists an implicit contract of sufficient force to assure the employee that he will be made whole.

Finally, Bulow (1982) argues that, even if LSICs exist, there is no reason to assume that “the value of the firm’s implicit contract liability is systematically related to the difference between the present values of its pension liabilities, as calculated under the projected benefit and accrued benefit methods” (p. 440). In other words, the pattern of the implicit obligation created by the use of the PBO rather than the VBO would have to be justified. “The point here is that an extraordinary set of implicit contracts is necessary, but not sufficient, for projected benefit methods to be appropriate ... ” (p. 440).

We can see a substantial divide between Bulow (1982) and Lazear (1983) that is not well-resolved by empirical work nor by further debate in the years that followed. The FASB adopted a projected measure for statements of profit and loss and an asymmetric accrued measure for the balance sheet in FAS 87 effective for fiscal years beginning after Dec. 15, 1986. The debate among economists subsided after the flurry of work in the 1980’s while practitioners proceeded to implement the FAS 87 methodology.

More recently we have seen dissatisfaction with financial reporting under FAS 87, a continuation of a trend to a more mobile work force (i.e., more of a spot than a career-long contract market for labor) and many conversions of traditional pay-related DB plans to cash balance plans. These factors have contributed to the present revival (and extension) of the 1980’s debate.

Balan (2003) argues that workplace changes since the early 1980’s have led employers to reduce their interest in implementing LSICs with their entering employees. No longer constrained by the impact on the new entrants, employers have been freed from the need to make good on their existing obligations to their long-tenure employees. Balan’s work is tentative but indicative of a declining role for LSICs.

6. Historical Examples

The explicit DB contract under ERISA is VBO-like. PBO-based recognition—which reflects an implicit contract reserve—must be justified by the existence of implicit contracts. As postulated by Lazear, such implicit contracts rely on reputational costs to deter employers who might be tempted to exploit advance-recognition accounting. Such exploitation can diminish employee morale, increase turnover and cause recruiting difficulties. In rare cases, companies that act more aggressively may be met by job actions and lawsuits.

These costs are likely to inhibit all companies in good times and most companies even in less favorable times. From time to time, however, companies will find that reneging gains exceed reputational costs and will act accordingly. It is at just such times that employees will find that they have surrendered real compensation for “a pocketful of mumbles, such are promises.” We look at three cases where employers have exercised their explicit rights, disappointing employees whose expectations were implicitly formed.

6.1 Cash Balance Conversions

During the 1990’s, sponsors of traditional pay-related DB plans faced aging tenured populations, a need to attract young mobile workers, rising liabilities under their traditional back-loaded DB plans and competition from younger firms around the world. While some of these employers terminated their DB plans and started—or strengthened—their DC plans, many were trapped by potential excise taxes and elected to convert to cash balance plans. Both DC replacements and cash balance conversions honor the explicit ABO liabilities but disavow some or all of the excess of the PBO over the ABO.

Consistent with Balan (2003), employers who convert to cash balance plans appear to have concluded that the work force they must bring to today’s competition is less amenable to LSICs and not very interested in how long-tenure employees are treated. Naturally, the long-tenure employees are often furious and ready to exert themselves fully to recover the final-pay benefits and early retirement subsidies they feel they have earned. Most prominent among the companies that have faced the backlash from their older employees is IBM, whose cash balance conversion in 1999 led to loud protests, much bad press and Congressional scrutiny. Having already grandfathered those employees within five years of earliest retirement eligibility, IBM responded to this political and public relations furor by agreeing to grandfather employees aged 40 and over who had at least 10 years of service.

6.2 Cutbacks and Rescission of Postemployment Medical Benefits

Because postemployment medical benefits are not pay related, the accumulated postretirement benefit obligation (APBO) under FAS 106 (FASB 1990) parallels both the ABO and the PBO under FAS 87. The APBO accumulates uniformly from the employee’s date of hire until his first eligibility date (e.g., at age 55). Throughout that period, the exit benefit is certainly zero—and may remain so forever because the firm maintains the right to revoke it.

Most employers have been cautious about medical benefit promises and have reserved the right to amend or terminate such plans unilaterally for nonunion employees. Prior to the application of FAS 106 in 1993, these plans were often accounted for on a pay-as-you-go basis.¹¹ The adoption of FAS 106, rising medical costs and some of the same factors driving DB plan terminations and cash balance conversions (aging populations, mobile young workers, worldwide competition) have led employers to cut back postretirement medical plans. Companies that have been most burdened have had the greatest incentive to cut back or rescind. According to the Employee Benefit Research Institute (2001):

“As a result of FAS 106, some employers placed caps on what they were willing to spend on retiree health benefits. Some added age and service requirements, while others moved to some type of “defined contribution” health benefit. Some completely dropped retiree health benefits for future retirees, while others dropped benefits for current retirees, although this has happened less frequently than the other changes”.

Such cutbacks reduce the APBO and may generate income for plan sponsors. Even though the accrual of the APBO has been charged against employee pay in accordance with implicit contract theory, there is usually no legal limit on the degree of cutback. Reputational concerns are likely to have mitigated the extent of cutbacks. Singh (2001) says:

“ ... critics have renewed charges that some companies are using FAS 106—the standard that since 1993 has governed accounting for postretirement health-care benefits—as part of a strategy to reduce retiree medical coverage, then reflect the lower reserve amounts in operating earnings” (p. 1).

6.3 Layoffs of Employees Approaching Eligibility for Shutdown Benefits

In 1977, the Continental Can Company and the United Steelworkers negotiated supplemental pension benefits that would be paid to eligible employees in the event of plant shutdown or long-term layoff.¹² The eligibility requirements were expressed in terms of age and service, for example, age plus service of at least 65 and 20 years of service.¹³

¹¹ Because revocable benefits never vest, pay-as-you-go is exit costing.

¹² Shutdown benefits are analyzed in Section 7.44.

¹³ At some plants, age plus service had to total 70 or 75.

Several lawsuits (for example, *Gavalik v. Continental Can Co.*, 812 F.2d 834, 851-853 (3d Cir. 1987)) alleged that the company subsequently initiated and maintained a computer-based system to identify employees who were approaching eligibility. Many targeted employees were then laid off and the computer system acted as a line of defense to prevent their recall. These lawsuits were consolidated in the Newark Federal District Court (*McLendon v. Continental Can Co.*, 908 F.2d 1171 (3d Cir. 1990)), which ruled in May 1989 that the layoff program violated Section 510 of ERISA. In January 1991, under orders from the court, the parties agreed to a \$415 million settlement in favor of the employees.

7. Justifying Benefit Design—ABO:VBO Discrepancies Point to Fragile Designs

So far we have demonstrated that employees whose pay is charged for projected benefits are vulnerable because the “liabilities” can disappear. We have shown that the employer can offer smaller pay increases to employees with longer service in a final-pay plan and that the employee cannot use competitive offers to recoup the contract reserve. It is not so easy, however, for an employer to take advantage of vesting and eligibility provisions where the employee can recover the reserve simply by staying on the job. We can address the pay issue simply by abandoning the PBO measure in favor of the VBO or the ABO. But is it perfectly clear which of the latter two is always most appropriate?

The difference between the ABO and the VBO exists because not all benefits accrued by an employee may be taken on exit. The discussion leading to Principle 3 makes it clear that such designs are meant to put employee compensation at risk in ways that increase net productivity. Principle 3, however, cautions us that such incentives have limits. When accrued liabilities are much larger than vested liabilities, we should ask whether the risk built into the benefit design will cost more than it returns.

In this Section, I critically examine benefit designs where the ABO is substantially greater than the VBO. These designs may or may not be justified economically. We identify a need to inform shareholders about implicit benefit obligations. This shareholder need for information conflicts with the protection employees need against being charged for promises that they cannot take with them. Certain designs are shown to be fragile and I sketch out more robust replacements.

7.1 Explicit and Implicit Benefit Plans

Benefit plan documents expressly deny tenure, for example, “This *Summary Plan Description* does not constitute a contract of employment.” Nonvested accrued liabilities come from implicit contracts and the need to inform shareholders about all value-affecting obligations whether or not explicit. Strict VBO reporting protects employees. Does it properly inform shareholders? Under VBO reporting, it appears that the promise to vest a valuable benefit soon is indistinguishable from no promise at all. Is this a faithful representation of firm value?

In a strict sense, yes, because employees have not been charged for the promise and because they will be fully charged when the promise vests. Can this be applied in practice? If VBO reporting is used to account for a postemployment medical plan with cliff vesting, the paycheck for a newly vested employee must be debited for the entire lump-sum benefit value, an untenable amount. Without some form of multiperiod contracting, VBO reporting and cliff vesting cannot be reconciled. Employees at some point in their careers—say, 10 years prior to the cliff vesting point—must understand that the employer will vest a substantial fraction of their cohort. Rather than pay for this valuable benefit in the vesting year, these employees tacitly agree to allow the employer, in exchange for the benefit, to pay them less than their market competitive salaries for the period of years that extends until, and perhaps even after, vesting. Thus, an implicit pay-smoothing contract exists. If strict VBO reporting were used in this instance, shareholders would be unaware that liabilities loom for soon-to-be-vested benefits.

This example shows that financial reports must include the value of obligations under a multiperiod contract, albeit conditional and statistical (i.e., only employees who actually remain in service will earn any part of the benefit). Consistent with Section 5, competitive total compensation must be reported in each period and money withheld under an implicit multiperiod contract must be reserved. This presumes, of course, that the employer will honor the implicit contract.

7.2 Fragile Benefit Designs

But what are the terms of the implicit contract? When, if ever, may the employer curtail promised benefits (or otherwise appropriate the contract reserves)? When the firm is in financial distress? When managers are in danger of failing to meet their own goals? The contract, because it does not vest the benefit as it is recognized, creates a valuable employer option. Section 2.3 makes it clear that employees will demand higher pay because they are placed at risk. But when is this transaction fair and when is it exploitive? At a minimum, a fair contract must be perceived identically and accurately

by the parties. The employees cannot be led to believe that the employer will renege only under “Condition A,” later to learn—to their misfortune and misery—that the employer reneges under “Condition B.”

Either details of the contract must be made explicit or employees must have reason to trust that the employer will be fair. Such a degree of trust applies only in situations where the value of the employer’s option is *de minimis* or where the employer is constrained and very likely to remain so. When the benefit option is valuable and the period over which advance recognition occurs is long, trust cannot provide sufficient motivation for the employee’s acquiescence.

Benefit designs with substantial conditionality (long cliff vesting, revocable benefits, shutdown benefits) may endanger employees (using advance recognition) or misinform shareholders (using exit cost). This suggests that there may not be genuine agreement on terms. The explicit contract often clearly retains rights for the employer while the implicit contract limits the exercise of these rights.

If the implicit agreements are genuine, it should be possible to explain to employees and shareholders alike why the contracts take the form that they do and how the existence of such contracts is beneficial to the parties. Because these contracts create risk and raise expected labor costs, proponents should be able to identify expected productivity gains and their source. Arguments in re training, performance and severance, along the lines of Lazear, do just that.

Principle 3, however, limits the productivity gains that may be expected. It is reasonable to argue that five-year cliff vesting in DB and DC plans can protect training investments. It is less reasonable to argue that promising nonvested postemployment medical benefits to 25-year-old employees adds more in retention incentives than it costs in risk, reputation and dissatisfaction.

In situations where, over extended periods, the exit promise is nonexistent and the looming liability should be reported to shareholders, we must look critically at the benefit design. Implicit contracts are inherently fragile; the degree may be measured by the magnitude of the ABO:VBO disparity. Designs that reduce the disparity are likely to be more robust and more efficient.

7.3 More Robust Benefit Designs

Let us consider several redesigns of postemployment medical benefits that reduce the ABO:VBO disparity, reduce contract risks and the associated costs, and may still provide efficient incentives:

- Individual accounts for postemployment medical benefits may be implemented on a defined contribution or cash balance basis. Retention incentives may be fostered through modest class-year vesting. At a specified age, where retention is no longer an employer goal, full vesting is granted.
- DB postemployment medical may be accrued (and vested) ratably over some portion of the employee's career; for example, 10% of the ultimate medical coverage may be earned in each of the 10 years preceding early retirement eligibility. Such accrual (with de facto pay debiting) may begin when the employee is old enough to value such benefits. As above, incentives may be built in.
- As discussed in Section 4, projected accounting creates implicit reserves owed to employees whose pay has been debited in excess of their exit benefits. Plans could be designed where that reserve is partially vested, along the lines of the PBO settle-up discussed in Section 4.1.

The ABO:VBO conflict may be seen as a marker or symptom of fragile benefit design. When the marker is noted, economic justification for the design should be sought. The search for justification may validate the design as robust, challenge it as fragile or result in valuable redesign.

7.4 Other Fragile Designs

The very long cliff vesting typically associated with postemployment medical benefits makes it something of a poster-child for dubious design. We next review some other cases where the mix of explicit and implicit provisions may be marked fragile because neither the VBO nor the ABO tell the whole story.

7.4.1 Subsidized Early Retirement With Cliff Eligibility

How shall we analyze the implicit contracts surrounding eligibility for subsidized early retirement? The traditional actuarial anticipation of entitlement that leads to a positive contract reserve (R_t) in the years approaching eligibility "bonds" the employee to remain until eligible. At the moment of eligibility, the increased vested benefit value will be large and may extinguish the contract reserve; that is, the bond is released. Under the traditionally smooth cost methods, it is likely that subsequent ΔR_t 's are slightly positive. The combined effect is to hold the employee in the years approaching eligibility for subsidized early retirement benefits and to encourage an early exit thereafter (note how the positive pre-eligibility contract reserve encourages

employees to remain in anticipation of its release, while positive posteligibility ΔR_t 's encourage retirement).

To the extent that traditional final-pay plan designs (without subsidized early retirement) created too much incentive for employees to linger past their peak years of productivity, the early retirement subsidy may be seen as a “bribe” to encourage departure. The invention of the “open window plan” circa 1980 represents a more efficient form of bribe that has made the early retirement subsidy obsolete. Some of the movement towards cash balance plans that began in 1985 has been attributed to their lack of embedded early retirement subsidies.¹⁴

As in the case of cliff vesting, it is likely that benefit design and traditional cost methods have incited the behavior of employers and employees in the years approaching early retirement eligibility. The invention of window and cash balance plans indicates that more efficient and transparent tools may be used to accomplish similar purposes. If cash balance plans eliminate subsidies, the issue is moot—there is no cliff. When window plans are used to create an explicit cliff, exit costing recognizes the cost of the bribe immediately, improving transparency and timing relative to the current treatment.¹⁵

For the traditional plan, the use of exit costing would lead to higher direct pay prior to eligibility and would fully charge for the benefit subsidy in the year that it occurs. This would make the personal and pension wealth accumulation of the employee smoother, in a fashion somewhat along the lines of that achieved by cash balance plans. Because the traditional pension incentives apply to age cohorts, they are blunt instruments when used to discourage employment as worker productivity declines. With exit costing and/or the removal of early retirement subsidies, employers may find it necessary to evaluate productivity more precisely for each aging employee. Window plans may still be used to motivate groups.

¹⁴ “The study found that when companies reduced costs in the conversion it was largely due to the prospective elimination of subsidies for early retirement, which typically augment benefits at around age 55. The effect on normal retirement benefits was much more muted” (see Watson Wyatt 2003). “Some companies may feel that these subsidies have become cumbersome, expensive or unfair. **Where that is the case, the introduction of a cash balance plan may present an opportunity to eliminate or rethink these subsidies**” (see Kwasha Lipton 1985, p. 6, original emphasis).

¹⁵ Some might argue that the spreading of window costs over future periods to match anticipated cost savings from the elimination of unproductive workers is good accounting. It is more likely true that the losses that arise from continuing to employ these workers (under a contract theory that makes employers reluctant to terminate them) has already been incurred because the “contract” assures that the losses will soon be realized. The window plan write-off recognizes that cost immediately. If any spreading were really appropriate, it would be backward not forward.

7.4.2 Revocable Benefit Promises

Another difficulty with cost attribution for retiree medical benefits is their revocability. Companies almost always retain the right to modify or terminate these plans. We observe that under exit costing, eliminating coverage for employees who have not reached their dates of first eligibility has no direct financial impact on either the employees or the company, simply because there is no VBO and no charge against employee compensation. Under FAS 106, however, the service cost that has accumulated to the APBO has been charged, and employer revocation appropriates employee wealth.

Terminating benefits for retired or active employees who have become eligible breaches an implied contract, with potential legal exposure, employee relations problems and reputational cost. Petertil (2003) tells us the cost of terminable benefits cannot be measured by methods that ignore the likelihood of benefit reduction or elimination. Clearly the company's right to reduce or terminate such benefits is a valuable option. Valuable options remain unexercised indefinitely only if their consequences for the optionholder exceed the gains from exercise.

Exit costing for revocable benefits protects employees because it does not recognize benefits until they are paid (pay-as-you-go was the common approach prior to FAS 106). Of course it does not inform shareholders that any obligation exists until it is paid, at which point it is too late to charge against the pay of the now-retired recipient. How should shareholders understand payment of a benefit that was neither promised nor charged against the employee's wages? One possibility is that the payment constitutes a gratuity. A purely gratuitous payment by a company violates its fiduciary responsibility to shareholders.

Suppose instead that the payment is designed to develop good will among present employees. Perhaps that satisfies shareholders if they are getting equal or greater value from existing employees. But is the company charging the current employees or getting better service from them? If so, is it because today's employees expect that they will get future benefits even though no irrevocable promise is made? Shall we charge current employees for benefits paid to the retirees and then also charge them because they have been lured into believing that future benefits await them?

Whether a gratuity or a goodwill builder or a lure, revocable promises seem to be fraught with opportunities for misunderstanding, mispricing and abuse. But it still may be possible for us to interpret the revocable contract as genuine, but conditional. Perhaps it is just such a contract that allows some companies to continue to pay revocable benefits today while others choose to renege.

Perhaps the true contract is a conditional promise to pay as long as all is well: as long as medical costs do not soar, as long as the company prospers, as long as the company values its goodwill with current employees more highly than it values the marginal dollar needed to meet other needs. If such promises exist, it is possible to design an appropriate accrual system. Option theory offers us some techniques to value a promise to pay up to \$X of benefits as long as the company stock is priced at \$Y or higher.¹⁶ This suggests that rational, explicit and transparent contracts might be made along these lines. It does not, however, imply that this is a very good idea.

7.4.3 Past Service Benefits

In Section 3 we identified so-called past service benefits as an example of a delayed-recognition scheme that invited opportunistic behavior by employees. We also cited Byrne's (1983) observation that such benefits are always awarded in exchange for future service despite their "past service" appellation.

Past service benefits are often created at the inception of a DB plan, when career-average and flat-dollar plan benefits are updated and, less frequently, in response to plan amendments due to plan mergers, statutory and regulatory changes, etc. Under current accounting and funding rules, even though new liabilities are often created in an instant, recognition is delayed over extended future periods.

A weakness of this approach has already been noted: shareholder liabilities are increased immediately while compensation reductions extend over time.¹⁷ Unless many employees leave en masse¹⁸, however, this seems to be little cause for concern and not much of a demonstration that this is an untenable approach to benefit design.

But here is where exit costing can illuminate an alternative design that is demonstrably more favorable to shareholders. The apparent disadvantage of exit costing when past service benefits are created is that it creates an abrupt loss to shareholders. Using delayed-recognition (amortization of the past service liability over future years) recognizes that future compensation will be reduced for employees who remain, in a fashion consistent with Byrne's analysis of the exchange of past service benefits for future employee-generated value.

Now consider an alternative design that effects the "Byrne exchange" and, using exit costing, produces the desired cost spreading. Instead of increasing the vested

¹⁶ Petertil (2003) characterizes these conditional promises as employee "equity interests." Here they are characterized as equity options.

¹⁷ A negative implicit contract reserve is created and amortized.

¹⁸ This situation may be created quite deliberately under a window plan.

benefit immediately while delaying the cost recognition, simply phase in the benefit improvement over the desired period. Thus, the accounting accruals are smoothed because the benefit accrual is smoothed. Employees who remain in service receive the same ultimate benefits as under the existing approach. Employees who leave receive less. The future costs have really been matched to the future productive service of today's employees. The employee incentives have been more sharply defined and the employer is able to retain greater control and flexibility with respect to future employment levels and compensation.

7.4.4 Plant Shutdown Benefits

Plant shutdown benefits are extra pension payments made to old long-service employees when a plant is shut down. These were negotiated between unions seeking job security for their members and rust-belt employers who could not agree to keep unprofitable plants running to the detriment of their shareholders. In theory, such benefits align the interests of employees and shareholders; older employees earn "sweat equity" in the plant in which they work and are rewarded when shareholder interests dictate that plant operations shall cease.

Once negotiated, these benefits become part of the business calculations made by employers. The decision whether or not to shutdown and when to do so is influenced by the existence of shutdown benefits and by their eligibility provisions¹⁹. Plan actuaries frequently choose not to include shutdown benefits in the course of ongoing funding valuations because the shutdown event is binary—it occurs or not, and funding for a probability of shutdown will always provide too much funding right up to the moment of shutdown, when it is then shown to have provided too little.

Although shutdown benefits may have some economic justification and contractual force, they present very real problems to actuaries and accountants attempting to provide useful information to shareholders. These benefit designs incorporate some of the same mechanisms (long cliff eligibility, employer volition, equity characteristics) that challenge the viability of revocable postretirement medical plans.

¹⁹ Because the benefits were designed to protect old long-service employees, the eligibility cliffs occur only with substantial age and service.

8. Societal Reaction: Bad Contracts/Accounting Invite Legislation, Regulation and Lawsuits

Society reacts when bad outcomes befall innocent people. In this section we look at the ways in which political institutions act to redress perceived injustices. Legislators legislate, regulators regulate and courts decide. Each of these actions affects employers and employees in ways that cannot be predicted accurately. Unintended consequences are almost certain.

Because the legislators, regulators and judges (collectively, rule-makers) are motivated to repair damage, they are inherently results-oriented. It is almost never their self-perceived function to do science. A crucial thesis of this paper is that actuaries may head off bad outcomes by doing our best science and that doing so constitutes our best defense against the multitudes of bad rules that may be handed down by the rule-makers.

Several times in this Section 8 we will allude to the Manning and Segal (2002) presentation entitled "Stop the Insanity". It describes the unintended consequences that have arisen in the DB pension funding area in the post-ERISA era. No U.S. pension actuary would argue that the multiple overlapping rules made in this era represent the best that actuarial science has to offer.²⁰

8.1 Here Comes the Judge

When an employer reneges on what employees understand to be benefit promises, particularly where pay debits have preceded vesting, the parties may meet in court. Once in court, at most one party can win and sometimes both lose.

In the Continental Can case, the Newark Federal District Court found substantial evidence that the company had acted in bad faith and had deliberately misled the employees. Continental had run afoul of ERISA Section 510. Although Section 510 permits a company to make economically motivated business decisions with respect to such issues as layoffs and plant closings, it may not take actions that are motivated by the emerging value of pension benefits. Continental attorney and former U.S. Attorney General Nicholas deB. Katzenbach said, "I don't know anything about Continental. ... Maybe they do all kinds of bad things. I don't know. ... But you cannot run a company if you can't take these [pension] costs into account" (Beck 1991, p. 66).

One of the lessons of the Continental Can case is that calculated exploitation of contractual opportunities may be offensive and can be redressed. In particular,

²⁰ Also see Gold (2003) for a brief follow-up to the Manning and Segal (2003) presentation.

reasonably formed expectations of the aggrieved parties are likely to be respected. When contract particulars and the commonsense understanding of the parties are sharply at odds, courts may feel compelled to rewrite the contract.

Although courts are a common venue for testing society's attitude towards contractual exploitation, regulators and legislators often take action too. This is particularly true when the perceived exploitation is widely repeated. The cash balance brouhaha which led to congressional hearings in and after 1999 is a case in point. Cash balance plan conversions credit employees with an opening balance that is usually computed to be equal to the accrued benefit value. Mid-career employees who expected to ride up the sharply accelerating accrued benefit curve until it caught up with the PBO were disappointed. Although they would express the issue very differently, they wanted to know what had happened to the implicit contract reserve: $R_t = PBO_t - ABO_t$.

Companies were applying the terms of the explicit contract. Many companies believed that they were being more generous. By grandfathering mid-to-late-career employees, they were meeting the expectations of the implicit contract. Even those that did not grandfather such employees were able to argue that any plan going forward offered more than they were explicitly required to offer. The right to terminate the DB plan at any time had been retained by virtually every company with respect to nonbargaining employees.

Employee advocates argued vigorously in favor of the implied projected benefit contract. Karen Ferguson, executive director of the Pension Rights Center, testified:

“What is particularly shocking about this practice²¹ is that these benefits were fully funded and the employers fully intended to pay them—until they were advised by their consultants that they could take advantage of a technical maneuver that could save them millions of dollars in benefit payments, while also boosting their companies' bottom lines” (Ferguson 2001, p. 4).

Without judging the intentions of the employers ourselves, we observe that Ferguson's argument is made more plausible by projected funding and expensing methods. Where she uses the phrase “fully funded” in support of her argument²² regarding employer intent, she might have said “that these benefits have been fully paid for.” To the extent that the PBO (and comparable ERISA measures of liability) anticipates future salaries, subsidies and eligibilities, this argument might be persuasive regardless of market vagaries.

²¹ “... reducing the *expected* pension benefits of older employees” (emphasis added).

²² A convenient argument, given that the S&P 500 Index ended the year 2000 at 1320.28.

“We also think there is a way that the *reasonable benefit expectations* of the employees can be reconciled with employers’ interests in having the flexibility to make prospective changes in their plans” (Ferguson 2001, p. 5, emphasis added).

In a competitive economy with voluntary private pension plans, is it reasonable to hold companies responsible for employees’ expectations with respect to future pay raises? Certainly we do not “vest” their future compensation increases or potential service. Nor do we account for such future compensation and service, but we do account for their impact on future pension and medical benefits. Actuarial methods and assumptions include expectations of future pay increases, future service, future eligibility and, as noted elsewhere (Bader and Gold 2003), future equity risk premiums. Should we be surprised that employee advocates imply that actuarial expectations bolster employee expectations?

In December 2002, after lengthy study of the controversial practice of converting DB plans to cash balance plans, the IRS proposed regulations affirming that employers could convert as long as the successor cash balance plan protected the value of accrued benefits—valued at reasonable interest rates.

This is noteworthy because the IRS proposal amounted to a determination that—despite the outrage of employees who felt they had been mistreated (see Section 6.1)—the terms of the explicit DB contract prevailed and there was no obligation to provide anything more than the benefit accrued to date. Although this tends to reinforce arguments in favor of exit costing, it should also serve as a warning: Courts, legislators and regulators will not always reject implicit contract theories.²³ Actuaries and accountants should be cautious about financial recognition of contracts that clients do not recognize as legally binding.

The dissonance between PBO accounting and VBO contracting may be settled by exit-cost accounting or by lawsuits, legislation and regulation that will intermittently enforce PBO-like contracts.

8.2 Results-Oriented “Fixes”

Legislatures, regulators and courts have used a results-oriented approach to “fix” perceived weaknesses in the U.S. pension system over the past 30 years. Let us look at the contrast between our free-market folklore and our regulator reality, followed by the

²³ The IRS proposed rule has been promulgated during an administration generally deemed to be corporate-friendly.

“ERISA Game” and two ham-handed fixes thereunder, concluding with a grandfathering lesson we have learned.

8.2.1 Free-Market Folklore, Regulatory Reality

Although the free-market ethos highly values the freedom for parties to enter into contracts of their own design, the American sense of fair play is offended by contracts that invite exploitation, even if such exploitation is occasional and incidental. The post-war employee benefit history of the United States, reflecting the tension between free markets and fair play, includes strictly voluntary employee benefit plans that are strictly regulated.

As long as promises made become promises kept, the free-market and fair-play forces are both satisfied. When promises are broken, however, we find that there can be substantial debate about what went wrong and how to fix it. Shall we (society, through government) strengthen the enforcement of promises? How shall we deal with ambiguous promises? Should we intervene in the promise-making as well as in the promise-keeping? What incentives are created? How much pertinent information is available to each of the contracting parties at inception and subsequently?

Because these simple questions do not have simple answers in a complex society, society provides a complex regulatory environment teeming with societal agents and quasi-agents, including: courts; legislatures; official regulators such as the Department of Labor, the IRS and the SEC; quasi-official regulators such as the FASB, the Actuarial Standards Board and the Actuarial Board for Counseling and Discipline; and professionals in public practice including CPAs and EAs.

8.2.2 The ERISA Game

Bader and Gold (2003) say ERISA froze the developing pension actuarial science and began an iterative game between sponsors and consulting actuaries on the one hand and rule-makers on the other. This is an unfortunate history for all parties because actuarial science had accomplished much prior to ERISA and was still flexible and creative. The ERISA Game stifled the advancement of pension science; all sides appeared to need results more than greater insight.

Actuaries are scientifically trained businesspeople and, thus, capable of both deep understanding and the pursuit of favorable results—but not always simultaneously. We describe ourselves as problem-solvers, and this fits our ability to do science and our ability to get results—but the ERISA Game made us choose, and our client’s needs made us choose, and the political nature of the regulatory establishment

made us choose. It appears that duty to our clients led us to choose results as the first priority and science as the second. To rationalize the ERISA Game and “stop the insanity” (Manning and Segal 2002), we must return to the strength of our root science, enriched by developments in financial economics over the last 30 years.

For now, we look at two examples where the results orientation of the rule-makers played off of actuaries’ needs for results and led to two ERISA disasters: (1) the definition of *current liability* [Internal Revenue Code Section 412(l)] and (2) the Metzenbaum reversion excise tax [IRC Section 4980].

8.2.2.1 Current Liability

When Congress enacted ERISA, it adopted actuarial funding techniques designed to budget employer contributions and adapted these in order to create its own minimum funding requirements. Because minimum funding is society’s way of defining the collateral necessary to back up benefit promises, the science to apply is that outlined by Bodie and Merton (1992) rather than the budget technology of Trowbridge (1952). When, after nearly a decade of ERISA minimum funding, an Allis Chalmers plan terminated with seven-digit assets and nine-digit liabilities, it highlighted the lack of science in minimum funding rules. The PBGC, which bore the brunt of such failures, lobbied successfully for funding rules based on plan assets and the *current liability*²⁴.

Results-oriented legislators understood that IRC Section 412(l) would increase employee security—Congress was not especially interested in the associated actuarial mechanics. Results-oriented consulting actuaries knew that their clients did not want funding standards that would produce volatile contributions, nor were the clients inclined to give up expected equity returns and reduce volatility via asset/liability matching. The resulting measure of the current liability is a miserable compromise all but devoid of scientific basis. IRC Section 412(l) contributes to Manning-Segal “insanity.”

8.2.2.2 Metzenbaum Reversion Excise Tax

ERISA protects the accrued benefits defined by the explicit pension contract (plan). Funding and accounting rules recognize the projected benefits of the implicit contract. The results of this “split-personality” are tested frequently by employers, their consultants, the courts, the regulators and the Congress. In the 1980’s, after projected benefit funding combined with the beginning of a great bull market to produce assets often far in excess of the accrued benefit liability, many employers chose to terminate their plans in order to capture the surplus assets. Some of these transactions occurred in

²⁴ Defined by IRC Section 412(l).

connection with corporate takeovers and restructurings that often included employee layoffs.

Senator Howard Metzenbaum and his constituents in the highly unionized state of Ohio were infuriated. The result was IRC Section 4980,²⁵ which combined with the continued bull market to “trap” surplus assets in many plans. This, in turn, contributed to the 1990’s test of accrued versus projected liabilities, for example, cash balance plan conversions, infuriating still more plan participants. IRC Section 4980 contributes to the Manning-Segal “insanity.”

8.3 Grandfather Lessons

Consider how one full cycle of the ERISA Game is played. An employer, party to an implicit contract that it finds onerous, concludes that the reneging gains are high enough and the reputational costs are low enough for it to capture a net gain.²⁶ It reneges, thereby infuriating its employees and, in turn, rule-makers. Rule-makers, in response to public expressions of dissatisfaction, act to prohibit future occurrences of this kind. But rule-makers are constrained by ex post facto considerations that limit the extent to which the original action can be overturned; thus, corrective rule-making usually applies only prospectively. Therefore, the originator, and in all likelihood some early copycats, enjoy the benefits of reneging on unfavorable implicit contracts while those who might have hesitated or deferred have missed their opportunity.

- Lesson one: If it appears that violating an implicit contract will produce a net gain, act early. Carpe diem.
- Lesson two: Each implicit deferred compensation contract—in conjunction with advance-recognition accounting—should have to justify itself in light of the costs inflicted upon society from time to time. Lessened reliance on implicit contracts in the employment arena is likely to be a public good.

9. Conclusion

This paper started out to answer the question, “What method should be used to compute the periodic cost of employee benefit programs that accumulate value over long periods of employee service?” In particular, should the method anticipate future

²⁵ Ten percent excise tax on asset reversions, IRC Section 4980, added by Pub. L. 99-514, title XI, Sec. 1132(a), for reversions after Dec. 31, 1985. Increased to 15 percent by Pub. L. 100-647, title VI, Sec. 6069(a), for reversions after Dec. 31, 1988. Increased to 20 percent by Pub. L. 101-508, title, XII, Sec. 12001, which further provided a rate of 50 percent unless the employer used at least 20 percent of the otherwise revertible assets to fund immediate benefit increases or at least 25 percent to fund a qualified replacement plan, for reversions after Sept. 30, 1990.

²⁶ Balan (2003) describes this in the context of a firm that no longer needs to recruit young employees into LSICs.

pay raises and benefit eligibilities under plans/contracts that do not guaranty future employment, future compensation and plan continuance? Broadly characterizing recognition methods that *do* anticipate as projected benefit cost methods (e.g., FAS 87) and those methods that *do not* as exit-cost methods, we conclude that exit-cost methods are more accurate, more transparent and less fraught with opportunities for manipulation.

In the course of researching the attribution issue, I discovered that the dissonance between explicit accrued benefit rights on the one hand, and implicit projected benefit contracts embedded in accounting and funding rules on the other, defines much of the battleground upon which society fights its pension and OPEB wars. Along the way, I concluded that certain plan designs, which I have characterized as “fragile,” were apt to be economically inefficient. These designs were particularly prone to create misunderstandings between employers and employees, thus serving to widen society’s battleground.

Some of the societal discord—and much of the actuarial angst associated with it—might be alleviated by a better pension actuarial model, one more rooted in the science of financial economics than in the day-to-day results-oriented efforts of pension actuaries to meet client objectives while navigating regulatory minefields.

As prior literature has shown, projected methods applied to pay-related plans overcharge the pay of younger shorter-service employees in exchange for sometimes dubious promises of future overpayment. I argue that advance recognition of future benefit entitlements in excess of those actually promised is dangerous. Absent coercive mechanisms, implicit contracts have insufficient force to justify financial recognition. Nonetheless, real-life complications require financial reports to inform shareholders of obligations that might reflect less-than-perfectly formed contracts.

Yet we should be aware, as financial reporters and as benefit designers, that implicit contracts and financial reports based on them may add deadweight costs. We can aim at a more efficient system by making explicit as much of the employment relationship as is practicable and by avoiding the creation of valuable options that only go unexercised because they are held in check by fragile mechanisms. When these mechanisms fail, the breach will often be filled by courts, legislators and regulators.

DB pension plans define an explicit accrual pattern whose financial value is precisely measured by exit costing. Every other recognition method deviates from this pattern, relying economically on an implicit contract to explain the difference ($R_t \neq 0$). All of the projected cost methods imply positive implicit contracts ($R_t > 0$) that raise

employee expectations. Enforcing these dubious contracts adds system-wide cost in several ways:

- The cost of regulation and the threat thereof, including the patchwork of regulation that derives from imperfections in prior regulatory layers. When creative consulting actuaries exploit these imperfections in order to help their clients win the ERISA Game, regulators respond with a new layer of “insanity.”
- Capital costs associated with opaque financial reporting. When lenders and shareholders fear pension plan surprises, corporations must offer higher rates of return to acquire external capital.
- Additional capital costs arise when investors suspect that managers may be building up slush funds inside well-funded plans.
- Because employees cannot be sure that their expectations will always be met, in a competitive economy, their compensation must include a renegeing-risk premium. Companies that wish to avoid this premium may choose not to sponsor DB plans.
- Whether or not their compensation has included such a premium, employees who feel victimized when renegeed upon will sue. Win or lose, this is costly.
- Because the implicit contract raises employee expectations, management must anticipate negative reaction whenever they contemplate plan cutbacks. Thus, the apparently flexible implicit contract becomes an impediment to real flexibility in the future.

In contrast, exit costing substantially immunizes employees so they do not bear the brunt of plan design changes. This clarifies the employment contract, reducing dependency on ambiguous implicit contracts, reduces the threat and cost of regulation, provides transparency to investors and allows management greater flexibility to design plans that best serve the *future* interests of all constituents.

If we wish to stop the regulatory insanity, employers must make explicit and rational pension contracts with their employees. Exit costing follows a rational entitlement contract, diminishes employee expectations and reduces the judgmental actuarial “art” that many of us have enjoyed practicing. It represents something of a return to the “science” in pension actuarial science. It encourages us to direct our creative talents to the development of explicit benefit contracts incorporating transparent incentives.

Acknowledgments

I thank the following for helpful comments and extensive discussions: Lawrence N. Bader, Julia L. Coronado, Nick Hudson, David R. Kass, James F. Moore, Robert C. North, Adam Reese, Cliff Speed.

References

- Bader, Lawrence N., and Jeremy Gold. 2003. "Reinventing pension actuarial science," *Pension Forum* 15(1): 1-13.
- Balan, David J. 2003. Have Lazear-style implicit contracts disappeared? Working paper, Federal Trade Commission, January.
- Beck, Susan. 1991. "Hero," *The American Lawyer* 13(3): 58-67.
- Bodie, Zvi 1985. "Comment" on Labor compensation and the structure of private pension plans: Evidence for contractual vs. spot labor markets, by Laurence J. Kotlikoff and David A. Wise. In *Pensions, labor and individual choice*, ed. D.A. Wise, 85-7. Chicago: Univ. of Chicago Press.
- Bodie, Zvi, and Robert C. Merton. 1992. On the management of financial guarantees, *Financial Management* (Winter).
- Bulow, Jeremy I. 1982. "What are corporate pension liabilities?" *Quarterly Journal of Economics*, 97: 435-52.
- Bulow, Jeremy, and Wayne Landsman. 1985. The relationship between wages and benefits. In *Pensions, labor and individual choice*, ed. D. A. Wise, 379-97. Chicago: Univ. of Chicago Press.
- Byrne, Robert S. Jr., Jeremy Gold, and Mitchell Sirota. 1983. Current developments in pensions: U.S., *Record of Society of Actuaries* 9 (3): 979-98.
- Employee Benefit Research Institute. 2001. EBRI issue brief no. 236, August. <http://www.ebri.org/ibex/ib236.htm>.
- Ferguson, Karen W. 2001. Statement of the pension rights center on the comprehensive retirement security and pension reform act of 2001, H.R. 10. Testimony before the Subcommittee on Employer-Employee Relations, Committee on Education and the Workforce, U.S. House of Representatives, April 5.
- Financial Accounting Standards Board (FASB). 1985. Statement of financial accounting standard no. 87: Employers' accounting for pensions. December.

- . 1990. Statement of financial accounting standard no. 106: employers' accounting for other post-retirement benefits. December.
- Gold, Jeremy. 2003. "How to stop the insanity," *Pension Section News*, 52: 6-7.
- Kotlikoff, Laurence J., and David A. Wise. 1985. Labor compensation and the structure of private pension plans: evidence for contractual vs. spot labor markets. In *Pensions, labor and individual choice*, ed. D. A. Wise, 55–87. Chicago: Univ. of Chicago Press.
- Kwasha Lipton. 1985. "Exciting new retirement concept: The cash balance pension plan," *Kwasha Lipton Newsletter* 18(1), June.
- Lazear, Edward P. 1979. "Why is there mandatory retirement?" *Journal of Political Economy* 87: 1261–84.
- . 1983. Pensions as severance pay. In *Financial aspects of the U. S. pension system*, ed. Zvi Bodie and John B. Shoven. Chicago: Univ. of Chicago Press.
- Manning, Tonya B., and Donald J. Segal. 2002. Stop the insanity. Presentation given at the Enrolled Actuaries Meeting.
- Petertil, Jeffrey P. 2003. Measuring terminable postretirement obligations. Current Pension Actuarial Practice in Light of Financial Economics Symposium, Society of Actuaries, June.
- Singh, Laurie Kaplan. 2001. "Profiting from health-care cuts?" *CFO Magazine* (Feb. 1). <http://www.cfo.com/article/1,5309,2045%7C%7CA%7C7%7C7,00.html>.
- Trowbridge, C.L. 1952. "Fundamentals of pension funding," *Transactions of the Society of Actuaries* (4): 17–43.
- Watson Wyatt. 2003. Most conversions to cash balance pensions are cost-neutral – and 80 percent of employees actually fare better. Press release, April 7. <http://www.watsonwyatt.com/us/news/press.asp?ID=11294>

Appendix A

Notation Table

Notation	Definition
t	Career year.
$L_t()$	Liability valuation function, discounts, annuitizes and decrements as necessary.
A_t	Accrued benefit, end of year t .
ABO_t	$= L_t(A_t)$
AC_t	$= L_t(\Delta A_t)$, accrued-benefit-based service cost (traditional unit credit normal cost).
P_t	Projected benefit, end of year t .
PBO_t	$= L_t(P_t)$
SC_t	$= L_t(\Delta P_t)$, FAS 87 Service Cost (projected unit credit normal cost).
V_t	Vested benefit, end of year t .
VBO_t	$= L_t(V_t)$
VC_t	$= L_t(\Delta V_t)$, Exit Cost (service cost under exit-cost model)
TC_t	Total compensation, end of year t .
W_t	Direct compensation, end of year t .
	$W_t = TC_t - XC_t$, where XC_t is recognized cost. $W_t = TC_t - VC_t$ under exit-cost method.
R_t	An "implicit contract" reserve. Employer owes employee, $R_t > 0$, or vice versa, $R_t < 0$.
ΔR_t	One year change in implicit reserve. Special case, FAS 87 vs. Exit Cost: $\Delta R_t = SC_t - VC_t$
W_t'	Special case, used in Appendix C. $W_t' = TC_t - SC_t = W_t + VC_t - SC_t = W_t - \Delta R_t$
TC_t'	Special case, effective total compensation: $TC_t' = W_t' + VC_t = TC_t - \Delta R_t$
x	Employee age at hire.
${}_{T-t} \ddot{a}_{x+t}$	\$1 deferred annuity, employee age $x+t$, commences at age $x+T$

Appendix B

In Section 3 we define total compensation, benefit cost, direct pay, termination benefit and its value deterministically. Because we define the direct pay and the benefit to be earned at the beginning of the year while we account for them at the end of the year, we are able, in the deterministic model, to say that total compensation has been determined at the beginning of the year, that is, $TC_t = W_t + VC_t$.

In the more realistic case we cannot, without perfect hedging, be sure what value VC_t will have and we may not know W_t with certainty either. Thus, we redefine our variables stochastically and express the beginning of year employment bargain as:

$$T\tilde{C}_t = \tilde{W}_t + V\tilde{C}_t$$

Where the employer and employee have agreed to formulae that define \tilde{W}_t and $V\tilde{C}_t$ and, thus, $T\tilde{C}_t$ at the beginning of the year. $T\tilde{C}_t$, after risk adjustment, is competitively determined. $V\tilde{C}_t = L_t(\Delta\tilde{V})_t$ where $\Delta\tilde{V}_t = \tilde{V}_t - V_{t-1}$. Often we will be able to resolve \tilde{W}_t and $\Delta\tilde{V}_t$ to certainties at the beginning of the year but market forces, affecting $L_t(\cdot)_t$, are likely to leave $V\tilde{C}_t$ uncertain until year end.

Another uncertain item at the beginning of year t is the end-of-year- t value of the previous year's termination benefit, $\tilde{L}_t(V_{t-1})$. The beginning of year value $L_{t-1}(V_{t-1})$ is known and appears on the balance sheet at the start of t .

At the end of the year, accounting proceeds as follows:

- W_t is determined and recognized as a compensation expense.
- $L_t(\Delta V_t) = VC_t$ is determined and recognized as a compensation expense.
- $L_t(V_t)$ is determined and shown on the balance sheet.
- $L_t(V_t) - L_{t-1}(V_{t-1}) - VC_t$ is recognized as a financing cost (profit if negative).

Although we have not traced their development, assets are also shown on the balance sheet and, after adjustment for cash flow, the change in value is recognized as a financing item.

Appendix C

Simplified DB Plan (Section 2)

A defined lump sum payable on exit (V_t) is equal to 2 percent of final year's notional total compensation (what Company A pays, TC_t) for each year of service. Direct pay (W_t) is determined by subtracting recognized exit benefit cost, VC_t . When SC_t is recognized (per FAS 87), alternate direct pay (W_t') is determined accordingly, and vested total compensation (TC_t') is computed by adding back VC_t . The equivalences $\Delta V_t = VC_t$ and $\Delta P_t = SC_t$ are special cases due to assumed zero percent discount, service survival certainty and the lump-sum benefit definition.

t	TC_t	W_t	V_t	$\Delta V_t = VC_t$	P_t	$\Delta P_t = SC_t$	W_t'	TC_t'	R_t	ΔR_t	V_t/TC_t	VC_t/TC_t
1	\$50.000	\$49.000	\$1.000	\$1.000	\$4.000	\$4.000	\$46.000	\$47.000	\$3.000	\$3.000	2%	2.00%
2	52.448	51.350	2.098	1.098	8.000	4.000	48.448	49.546	5.902	2.902	4	2.09
3	55.016	53.813	3.301	1.203	12.000	4.000	51.016	52.219	8.699	2.797	6	2.19
4	57.710	56.394	4.617	1.316	16.000	4.000	53.710	55.026	11.383	2.684	8	2.28
5	60.536	59.099	6.054	1.437	20.000	4.000	56.536	57.973	13.946	2.563	10	2.37
6	63.500	61.934	7.620	1.566	24.000	4.000	59.500	61.066	16.380	2.434	12	2.47
7	66.609	64.904	9.325	1.705	28.000	4.000	62.609	64.314	18.675	2.295	14	2.56
8	69.871	68.017	11.179	1.854	32.000	4.000	65.871	67.725	20.821	2.146	16	2.65
9	73.292	71.279	13.193	2.013	36.000	4.000	69.292	71.305	22.807	1.987	18	2.75
10	76.881	74.697	15.376	2.184	40.000	4.000	72.881	75.064	24.624	1.816	20	2.84
11	80.645	78.279	17.742	2.366	44.000	4.000	76.645	79.011	26.258	1.634	22	2.93
12	84.594	82.033	20.302	2.561	48.000	4.000	80.594	83.154	27.698	1.439	24	3.03
13	88.736	85.967	23.071	2.769	52.000	4.000	84.736	87.504	28.929	1.231	26	3.12
14	93.081	90.089	26.063	2.991	56.000	4.000	89.081	92.072	29.937	1.009	28	3.21
15	97.638	94.409	29.291	3.229	60.000	4.000	93.638	96.867	30.709	771	30	3.31
16	102.419	98.936	32.774	3.483	64.000	4.000	98.419	101.902	31.226	517	32	3.40
17	107.434	103.680	36.528	3.753	68.000	4.000	103.434	107.187	31.472	247	34	3.49
18	112.694	108.652	40.570	4.042	72.000	4.000	108.694	112.737	31.430	-42	36	3.59
19	118.212	113.862	44.921	4.351	76.000	4.000	114.212	118.563	31.079	-351	38	3.68
20	124.000	119.321	49.600	4.680	80.000	4.000	120.000	124.680	30.400	-680	40	3.77
21	130.072	125.042	54.630	5.030	84.000	4.000	126.072	131.102	29.370	-1.030	42	3.87
22	136.441	131.037	60.034	5.404	88.000	4.000	132.441	137.845	27.966	-1.404	44	3.96
23	143.122	137.320	65.836	5.802	92.000	4.000	139.122	144.924	26.164	-1.802	46	4.05
24	150.129	143.903	72.062	6.226	96.000	4.000	146.129	152.356	23.938	-2.226	48	4.15
25	157.480	150.802	78.740	6.678	100.000	4.000	153.480	160.158	21.260	-2.678	50	4.24
26	165.191	158.032	85.899	7.159	104.000	4.000	161.191	168.351	18.101	-3.159	52	4.33
27	173.280	165.608	93.571	7.672	108.000	4.000	169.280	176.951	14.429	-3.672	54	4.43
28	181.764	173.547	101.788	8.217	112.000	4.000	177.764	185.981	10.212	-4.217	56	4.52

29	190.664	181.867	110.585	8.797	116.000	4.000	186.664	195.462	5.415	-4.797	58	4.61
30	200.000	190.585	120.000	9.415	120.000	4.000	196.000	205.415	0	-5.415	60	4.71
⊙	3.263.459	3.143.459		120.000		120.000	3.143.459	3.263.459		0		

Figure 1
Vested Versus Projected

