FINANCIAL SERVICES REVIEW, 2(2): 131–156
ISSN: 1057-0810

The Risks of Pension Plans

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This paper identifies and describes the risks to which the prospective pensioner is exposed. An understanding of the types of plans and the risks associated with each will assist the individual pensioner with making a proper analysis of the safety of his/her plan and acquaint the pensioner with the role of the Employee Retirement Income Security Act (ERISA) and the Pension Benefit Guaranty Corporation (PBCG) in safeguarding pension assets.

I. INTRODUCTION

When it comes to managing their own investment portfolios most individual investors are concerned with the amount of risk they will incur relative to the expected return. They are aware of the various risks inherent in most investment securities such as purchasing power, liquidity, marketability, portfolio, reinvestment, and default. However, when it comes to their pension plans, many individuals do not allocate an adequate amount of time to understanding the risks inherent in their plans nor do they fully utilize or understand the options that may be offered to them. As a result many employees take their pensions for granted and assume that their pension benefits will be sufficient to meet their expenditures in retirement.

Many of the risks individuals face regarding their pensions arise from financial management decisions made by plan sponsors which directly impact the individual, but over which the individual has little or no control. The major risks to the plan participant include (either directly or indirectly) all of the risks normally associated with investments along with additional risks involving the selection of the type of plan that is offered to the employee, the level of funding for the plan, the investment

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selection and asset allocation, as well as the risks of plan termination plan modification, and regulatory non-compliance. The focus of this article is to review the risks to the individual who participates in the various types of pension plans. We will begin with a review of private defined benefit pension plans and their associated risks and then move to public defined benefit plans. We will then shift our attention to defined contribution plans and conclude with a review of the government's role in guaranteeing pension obligations. The last section will offer our conclusions and suggestions for further research.

II. Private Defined Benefit Pension Plans

All pension plans present the participant or beneficiary with some types of risk taking. The extent and types of risk, however, vary significantly between different plans because of the ability to shift various pension risks between employer and employee. The pension choice normally involves a decision to select either a defined benefit pension plan or a defined contribution pension plan. The defined benefit pension plan covers most individuals covered by pension plans (Ippolito, 1985b, p. 1031) and is referred to as a formula plan because the benefit is customarily based upon some multiple of the employee's earnings and years of employment with the sponsor. The participant in a defined benefit plan is generally more certain about the amount of the promised retirement benefit than in the case of a defined contribution plan because the participant can use the pension formula to estimate his/her promised benefit.

Even though the defined benefit plan appears to offer the participant more certainty as to the expected benefits, there are a number of risks inherent in such plans. The most important risks are the firm specific risks associated with the financial health of the sponsor and the risks associated with the funding status of the plan. The funding status is affected by the investment performance of the plan assets and the actuarial assumptions used in computing plan liabilities. In addition there are risks to the participant arising from plan terminations and regulatory compliance.

Firm Specific Risks

The plan sponsor is liable for the promised pension, but only if it remains a viable concern. A sponsor which experiences financial distress is no longer in a position to make good on its pension promises. This means that the participant in a defined benefit plan is exposed to a great deal of unsystematic risk. Each firm has its own business and financial risks associated with its operations. The ability of the firm to honor its pension obligations is based on its financial condition. The financial strength of the sponsor not only affects its ability to fund its pension obligations, but also puts the employee at risk for his/her job. If the plan sponsor were to experience financial distress resulting in bankruptcy, the loss of the employee's job

coupled with the possible loss of pension benefits presents an extremely high level of risk that is not usually considered by the employee/plan participant.

Funding Risk

One of the biggest risks to participants in defined benefit pension plans is that of the bankruptcy of the plan sponsor coupled with a severely underfunded plan. In order to determine the amount of exposure to funding risk, the plan participant or his/her advisor would begin by reviewing the funding requirements for the plan and then look at the disclosure requirements.

Determining Funding Status

Participants in defined benefit pension plans should be aware of the funding status of their plans. The Employee Retirement Income Security Act of 1974 requires firms to report any underfunded accrued vested[1] liability in excess of plan assets, thus providing plan participants with an indication of the relative safety of their plan. This reporting can be found in the corporation's annual report and 10-K filings as well as on the employer's *Annual Reports of Employee Benefit Plans* (Form 5500). If the Form 5500 is not available, the information can be requested from the Summary Annual Report available from the plan administrator.

In order to provide more uniform and economically relevant information about the funding status of pensions, the Financial Accounting Standards Board (FASB) issued Statement #36 in 1980, which required disclosure of the accrued pension liability and the market value of plan assets as a footnote to the balance sheet. A major limitation to FASB 36 was that it did not consider future salary and benefit increases in determining the present value of pension liabilities. Also it allowed the use of a wide range of interest rates for this calculation.

Further changes in pension reporting were the result of the issuance of FASB Statement #87 in 1985, which required that the underfunded liability appear on the balance sheet. In addition it required a footnote disclosing the pension liability with and without consideration for projected salary increases. FASB 87 also reduced the flexibility of the plan sponsor in choosing discount rates for valuation of plan liabilities.

Funding Policies

Up until the enactment of ERISA, defined benefit plan participants were at risk for virtually the entire amount of the promised retirement income from the plan because there were no regulations mandating corporate funding, nor were there regulations for requiring disclosure of the funding level of the plan. However, as Warshawsky (1989) points out, despite the funding requirements of ERISA, the plan sponsors still retain considerable flexibility in determining the amount of their annual contributions to their pension plans. Whether the pension is overfunded, fully

funded, or underfunded depends not only on the financial health of the sponsor, but also on the sponsor's policy toward funding pension benefits within the maximum/minimum corridor established by the plan's actuary. At this point a review of the theory of funding defined benefit pension plans will illustrate the sources of funding risk to the plan participant.

Sharpe (1976) established that corporate policy on the funding level of a pension may not matter, if the corporation is required to insure the plan's promises. Treynor (1977) observed that lacking insurance company willingness to provide the requisite coverage, the Pension Benefit Guaranty Corporation (PBGC) will become the insurer of benefit promises. The result is that ". . . it still pays the employer to make overgenerous pension promises"(p. 636). This is done without regard for the ability to deliver on these promises.

The theory established by Sharpe (1976) derives from a world with no taxation. The tax motivations for fully funding include (1) the contribution to the plan, up to the maximum allowable contribution, is a tax deductible business expense, thus requiring governmental taxing authorities to bear part of the cost of the pension contribution, (2) the amount in the pension plan grows at a non-taxed rate to the corporation, thus denying taxing authorities revenue on what otherwise would be considered corporate assets, and (3) the current earnings on pension plan assets represent saved future contributions by the corporation. Black (1980) and Tepper (1981) independently establish that corporations should take advantage of the tax laws by fully funding their defined benefit pension plans and investing the pension fund's assets in bonds or other fixed dollar investments. Francis and Reiter (1987) conclude that overfunding of pensions is motivated by tax benefits and the desire to store financial slack, while underfunding is driven by the desire to reduce debt costs through internal borrowing. Malley and Jayson (1986) state that the funding decision is influenced by the sponsors current financial position and investment opportunities.

Bulow (1992) notes that large underfunded liabilities are much more common in union defined benefit pension plans. Ippolito (1985a) finds that this practice turns workers into bondholders of the firm, a behavior which further binds the worker to the sponsor.

Friedman (1983) believes that firms time their pension contributions to smooth earnings. However, some firms take advantage of the pension funding laws to minimize their investment in their pension plans so as to maximize their reported earnings and/or use of cash generated from operations that would have been channeled into the pension plan. This is due to the fact that the smaller amount that goes into the pension plan, the lower the charge against earnings for that period and the lower the cash drain. Therefore, this provides an incentive to minimize the pension contribution when earnings are low or cash is short. For example, Lockhart (1992) points out that TWA never asked for a waiver of funding, never missed a payment and always made at least the *minimum* necessary contribution, yet at year end 1991 it was $900 million underfunded.

This method of underfunding essentially makes the firm a low-cost borrower from the other plan sponsors covered by the PBGC, since the PBGC requests premium increases on all sponsors when it faces a cash flow crisis. According to the PBGC's executive director, James Lockhart, approximately half the current premium ". . . represents a subsidy from the well-funded to the underfunded plans, creating a direct incentive to underfunding."[2]

The variation in the amount of a firm's contribution to its pension plan can be explained by a number of reasons. If the contribution made in any period differs from that which is required on an actuarial basis, the plan will become something other than fully funded. However, even if the firm has consistently made the actuarially correct contribution, the plan could be underfunded due to the investment performance of assets in the plan. Variation in the value of plan assets gives rise to funding risk and the types of assets in the plan give rise to this variation. We will now look at how investment risk affects funding status.

Investment Risks

The investment performance of plan asset managers is dependent upon asset allocation, security selection, and market performance. Prior to the passage of ERISA, one could assume that the pension liability was analogous to risky debt. Using the approach of Copeland and Weston (1988) and assuming that the pension is uninsured and that this is an all equity firm, the end of period payoff to the pension beneficiary is shown in Figure 1.

The dollars of end of year payoff are on the vertical axis while the market value of the firm (V) and the market value of pension assets (A) are on the horizontal axis.

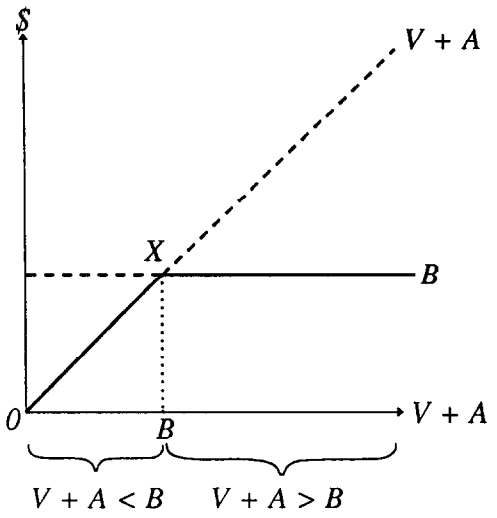

Figure 1. End-of-period pension fund payoffs.

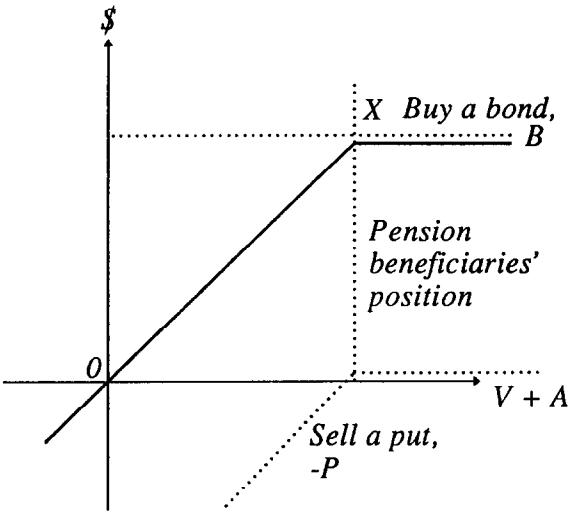

Figure 2. The pension beneficiaries is equivalent to risky debt (long in a riskless bond and short in a put option).

The plan participant will receive the promised benefit (B) only as long as the market value of the total assets, V + A, is greater than or equal to the promised benefit, B. The line OXB in Figure 1 represents the payoff to the pension beneficiary.

Concentrating on the pension beneficiaries' position, this can be modeled as the equivalent of owning a risk-free bond having an end-of-period value which is equal to B and selling a put option (P) on the assets of the firm. As can be seen from Figure 2, the pension beneficiaries' position is the sum of the payoffs on the risk-free bond and selling the put option which is the equivalent of holding risky debt. This is the same payoff as shown in Figure 1.

If pension insurance were considered, the payoff to the beneficiary would be as shown in Figure 3 where GB is the PBGC guaranteed benefit and PB is the promised benefit. The horizontal axis is the funding ratio (FR) and the vertical axis is the dollars of payment. As can be seen the pension beneficiary would receive the PB as long as the plan is fully funded or better (FR $\geq$ 1.0). When the FR < 1.0 the actual benefit would be less than the PB to the point where the guaranteed benefit begins. The payoff to the pension beneficiary resembles a collar with the cap as the PB and the floor the GB. This is equivalent to the purchase of a risk free bond, sale of a put, and purchase of another put with a lower exercise price.

Assuming that shareholders wealth is a call option on the assets of the firm, the level of investment risk or types of assets selected by pension managers can be explained. In the event that the firm is under financial distress and its pension plan is underfunded, the sponsor could change the asset mix of the pension in order to maximize the value of the call option. Since the PBGC establishes a floor for the participants and the PBGC claim on the equity of the corporation in bankruptcy is

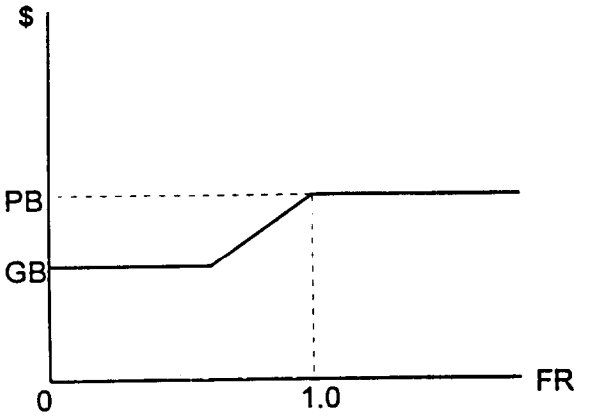

Figure 3. Payoff with PBGC guarantee.

generally worthless, the optimal strategy from the point of view of the shareholders of a financially distressed company, according to Copeland and Weston (1988), would be to put all of the pension assets into very risky stocks. If the stocks performed well, the company could have an overfunded pension, if not the PBGC and the plan participants absorb the losses. However, if the firm were not in financial distress, they summarize that the all bond pension portfolio is preferable to shareholders.

Treynor (1977) also addresses the issue of asset management of defined benefit plans relative to the role of the PBGC as guarantor. He concludes that due to the existence of the PBGC . . . "it still pays the employer to put heavy pressure on the manager of his pension funds to manage them aggressively" (p. 636). Bodie (1992) states that the PBGC insurance creates an incentive for an underfunded pension plan to invest in risky assets due to the existence of a put option which increases in value with increases in the risk of the underlying portfolio. Black (1980) and Tepper (1981) as mentioned previously suggest fully funding and investing in bonds and other fixed income securities.

Contrasting the views of Treynor and Bodie (1992) to that of Black and Tepper suggests a difference in pension asset management. Treynor's and Bodie's conclusions support aggressive management, implying equities, while Black and Tepper endorse the use of bonds. To integrate these views, Bodie, et al. (1987) examined the proposition that pension assets and liabilities are parts of an extended balance sheet and that pension funding policy is integral to corporate financial policies. This approach would integrate the tax induced behavior of Black and Tepper with the insurance role of the PBGC, as perceived by Treynor and Bodie, and test the pension asset strategy. They find that the proportion of plan assets in fixed income securities is inversely related to funded status of the plan (plan assets to liabilities ratio) and sponsor's bond rating which are two measures of corporate risk taking. This would

support the contention of Bodie, et al. that the pension is an extension of the corporation.

Alderson (1990) examined the influence of the changes in pension regulation introduced by the Omnibus Budget Reconciliation Act of 1987 (OBRA) on the pension policies of defined benefit plan sponsors. He concluded that the tighter restrictions on the discretionary capabilities to terminate underfunded plans has transferred a greater share of the financial risks from the government to shareholders and ultimately to the plan participant. He concludes that this has increased the need for a lower risk policy in regard to investment selection and management of pension assets.

As one would expect, the asset mix and, therefore, the investment performance of pension funds is of particular importance to the funding status of pension plans. Over the 1987 to 1990 period, according to Miller (1991), distributions from pension plans exceeded contributions with the net outflow in 1990 amounting to $13 billion. In order to compensate for this negative flow, the sponsor must make either greater contributions in the future (increase funding) or achieve greater investment performance (perhaps by incurring greater risks or by employing superior investment managers).

Prudence in Investment Management

The pension trustees, or plan administrators, while employed by the plan sponsor, have a fiduciary responsibility for the plan. As fiduciaries, they are required to perform their duties for the sole benefit of plan participants and their beneficiaries; with the skill, care, prudence, and diligence under the circumstances prevailing that a prudent man[3] acting in like capacity and familiar with such matters would use, by diversifying the investments of the plan to minimize losses in accordance with the documents and instruments governing the plan.[4] In many cases this would involve the retention of the services of a professional investment manager. However, hiring professional investment managers does not assure the plan sponsor or the participant of either good investment performance or a source of recovery for poor investment performance. For example, Weyerhaeuser failed to win a judgment against one of its investment managers for poor performance in spite of the investment manager earning only $34.9 million on $2.52 billion under management over a three year period approximately, 0.5% per year, clearly indicating that the sponsor (and ultimately the employee) is the one at risk.[5]

Whether a firm takes an aggressive or conservative investment approach with its pension assets would appear to be influenced by both the current funding status of the plan and the financial condition of the sponsor. The current funding status of the plan is determined by the actuarial assumptions used to calculate the pension liability.

Actuarial (Valuation) Risks

The employer hires the Enrolled Actuary (EA) to perform an annual valuation report and to complete a Schedule B for corporate tax reporting. The EA is an

independent professional bound by rules of the profession and by the IRS. As a result of this annual valuation, the EA recommends an amount for the employer to contribute to the plan. This recommended contribution is within a band of actuarially acceptable minimum and maximum contributions. The requirements for the minimum contribution are established by ERISA and determined as follows:

1. All normal costs attributable to benefit claims deriving from employee services in a given year must be paid that year;
2. Any experience losses (caused by a decline in the value of the securities in the fund, by unexpected changes in employee turnover, or by changes in actuarial assumptions about the discount rate) must be amortized over a period not to exceed 15 years; and
3. Supplemental liabilities resulting from increased benefits or underfunded past service costs must be amortized over a period not to exceed 30 years (40 years for companies with pre-ERISA supplemental liabilities).[6]

The maximum allowable contribution is determined by the Internal Revenue Service regulations. The limit is the actuarially determined normal cost of the plan plus any amount which is necessary to amortize over ten years any experience and supplemental losses.

Despite the fact that ERISA and the IRS have established the permissible range of annual contributions to defined benefit plans, sponsors still retain considerable flexibility in determining the amount of the contribution to make to their pension plans within the parameters set by regulation. However, the assumptions which the EA has to make in order to complete the annual valuation are the basis of this flexibility. Among the assumptions that affect the valuation and, therefore, the funding status of a plan are the interest rate used for discounting, the rate of wage inflation, and the rate of price inflation, participant mortality and morbidity. Any changes in the actuarial assumptions and methods are included in the valuation report and Schedule B. The EA must be prepared to justify any changes based on either plan experience or long term market expectations.

Actuarial changes would not only affect the present value of the pension fund liability, but also the shareholder's expectations about the riskiness and level of future cash flows of the firm. Following the approach of Weston and Copeland (1988), the value of shareholders wealth (S) is shown in (1) as the market value of the firm (V) minus the market value of its pension fund liabilities (PFL) and other debt (B).

$$S = V - PFL - B \tag{1}$$

The market value of the pension fund liabilities is determined by the market value of pension plan assets (PA), the present value of expected contributions adjusted for tax benefits (PC), and the present value of expected pension fund benefits from past and future service (PB). This is shown in (2).

$$PFL = PB - PA - PC \quad (2)$$

Of concern to us here is the difference between the book value of the pension fund deficit and the market value. The main cause of any difference is the discount rate used. The appropriate discount rate used for pension valuation has changed as a result of ERISA. Prior to ERISA the expected benefits (PB) would have been discounted at the firm's cost of junior, or subordinated, debt because the pension benefit obligation was not considered to be a senior claim on the assets of the sponsoring corporation. With the passage of ERISA the pension obligation became a senior obligation falling right behind tax liabilities in the order of distribution of assets. The result is that the present value of expected benefits is discounted at a lower discount rate, thereby increasing the value of the pension benefits. This change resulted in a wealth transfer to pension beneficiaries from shareholders as the relative increase in PB from (2) would increase PFL. This would in turn, everything else being equal, result in a decrease in S from (1).

Whether a plan is currently underfunded or overfunded depends on the present value of the future pension obligation relative to the present value of the pension plan assets. If a firm chooses a high assumed discount rate, the present value of the future obligation becomes less and requires lower contributions to the plan. (It should be noted that, if the cash available to the corporation from lower pension contributions is expensed, the effect on shareholder wealth is the same and changing the actuarial assumptions to change current contributions is futile at best.) Current accounting practice, however, indicates that the discount rate applied must reflect the market determined rates available for investment. Consequently, when interest rates are declining, present values of future pension obligations increase. This could turn an overfunded pension plan into an underfunded one, or exacerbate an underfunded situation.

The ability to alter the discount rate used to calculate pension liabilities and, therefore, to affect the funding status of the pension plan is a risk to plan participants which is tempered somewhat by regulation and the professional standards of the actuary. Lower rates make the present values of future pension payments larger (thus justifying larger current period contributions). As such, Bodie et al. (1987) report that firms that are more profitable avail themselves of the tax advantages of funding pension plans by encouraging their plan actuaries to assume lower discount rates in determining the pension liability. This behavior is attributable partly to corporations building financial slack (Bodie et al. (1987); Francis and Reiter (1987); and Stone, 1987). Correspondingly, firms with low profitability would encourage the use of greater discount rates in determining pension obligations and thereby reduce the firm's cash outflow by reducing the size of the required pension payment. A low profit position would, accordingly, place the firm in a low tax position and, therefore, in a position to benefit only negligibly from the favorable tax treatment of the periodic pension expense. Feldstein and Morck (1983) have established that firms with the greatest pension obligations relative to smaller levels of pension assets assume the largest rates of return to be earned on those assets; therefore, those plans

which present the greatest risk to plan participants from being underfunded are also subject to the sponsor's risk taking from assuming too large a rate of return.

A study by Schwimmer illustrates the effects of changing the discount rate on the funding status of various plans. By lowering the discount rate from 8% in 1990 to 7.75% in 1991 Bell Atlantic's underfunded projected benefit[7] liability increased by $385 million (32 percent), to a new total of $1.598 billion. Vosti (1991a) found that a reduction of the discount rate from 9.65% in 1990 to 8.5% in 1991 increased Chrysler Corporation's underfunded projected benefit obligation by $770 million to $4.39 billion (an increase of 21 percent). Vosti (1991b) further states that by decreasing the rate from 10% in 1990 to 9.3% at the end of 1991, General Motors' (GM) underfunded liability increased to $8.6 billion. However, according to the PBGC's calculations the underfunded liability for GM was $11.8 billion at the end of 1991.

In interest rate related research, Barrett and Pfenenger (1989) suggest that pension liabilities should be discounted at the risk free rate of return. D'Arcy and Chen (1988) find that the stock market returns of firms' reducing assumed discount rates outperform the market and firms raising discount rates under perform the market. They attribute this performance difference to the fact that since lower rates represent a more conservative (higher) value of the pension liability, the investment managers must become more aggressive in order to earn higher returns which would increase the value of the funds assets.

Warshawsky (1989) further examines the issue of how corporations remain within ERISA guidelines and yet maintain different funding levels for their plans. He concludes that although investment performance can account for some of the difference, for the most part the choice of actuarial cost methods[8] and assumptions explains the variation in funding ratios. Regardless of the actuarial method used, Willinger (1992) proposes the use of a contingent claims model to reduce the possible variation in the reporting of the pension liability associated with the actuarial model. Financial Accounting Standards Board (FASB) Statement No. 87 states that the assumed discount rate shall reflect the rates at which the pension benefits could be effectively settled. The discount rate fitting this description include a variety of choices which would provide for the possibility of manipulating current and historical pension obligations. He suggests that using the contingent claims model would limit the ability of the sponsor (in conjunction with the plan's actuary) to manipulate the pension liability as previously discussed in this section.

Assumptions are important because they are the basis of all funding and liability calculations. Each year the plan endures demographic changes such as turnover, early retirement, aging of the covered population, and hiring of new employees, as well as changes tied to assumptions such as asset appreciation. Large fluctuations in demographics or assets can create volatility in the normal cost and the unfunded liability projections from one year to the next. So the actual experience of the plan can impact the normal cost of funding and the stability of the plan.

As has been discussed, the selection of actuarial assumptions and methods affects the funding status of the defined benefit plan. Since these assumptions are made by plan actuaries, the participant is at risk for any errors in these assumptions that would result in an underfunded position for firms experiencing financial distress. While the effects of actuarial assumptions on funding status are important there are other factors which affect the risk of defined benefit plans. Among these are the risk of plan termination and non-compliance.

Plan Termination Risk

Overfunding a pension plan does not necessarily reduce all of the risks faced by participants in defined benefit plans. Many corporations in an attempt to reduce future funding costs or to recapture excess pension assets have terminated their defined benefit plans. The issue of plan termination is of interest to plan participants for two reasons, both of which connote pension risk. First, as Mittelstaedt and Reiger (1993) observe, when terminating defined benefit plans firms must satisfy vested and previously non-vested liabilities ". . . using salaries in effect at the legal date of termination."(p. 3) The ramification is that salary progression ceases and the future retiree will receive benefits calculated upon the salary level in place at the termination date and not at retirement.

The second plan termination risk is really a type of investment risk and results from the firm purchasing annuities to satisfy the legal obligation to the participant. Once the annuity is purchased this form of benefit promise falls outside of the realm of the PBGC and is not guaranteed by them. In addition the plan sponsor does not have any liability for the purchase of annuities from an insurance company that subsequently fails according to PBGC Opinion Letter No. 91-4.

TABLE 1.
Defined Benefit Pension Plan Terminations

	Number of Terminations by Type of Termination (1)						
Year	*A*	*B*	*C*	*D*	*Total*	*Number of Participants*	*Dollar Amount of Reversions (2)*
1986	43	72	84	50	249	261,769	$4,284.3
1987	28	70	106	72	276	235,826	1,954.9
1988	29	33	127	73	262	272,107	2,206.2
1989	13	23	97	39	172	161,220	843.5
1990	6	17	38	12	73	55,537	304.2
Total	119	215	452	246	1032	986,459	$9,593.1

Notes: (1) PBGC Classifies Successor Plan to a Termination as
A = Spinoff
B = Defined Benefit Plan (Complete Termination)
C = Defined Contribution Plan (Complete Termination)
D = No New Plan (Complete Termination)
(2) in millions

Source: "SEPPAA Completed Reversion Cases," PBGC, February 7, 1991.

If the plan is terminated and the participant receives a paid up annuity, the safety of the pension is solely a function of the ability of the insurance company to fulfill its obligations. Zall (1992) explains the magnitude of this risk by showing that 170 life insurance companies failed from 1975 to 1990 with forty percent failing in 1989 and 1990. (It should be noted that only four major insurers have failed.) Zall goes on to mention that more than 300 defined benefit plans have been terminated which purchased annuities from insurers with questionable financial condition. As a result of these terminations, there is a growing exposure of plan participants to life insurance company failure.

The sources of protection to plan participants associated with a failed insurance company are a recently enacted rule by the PBGC in June, 1992 requiring firms to give participants 45 days notice prior to any distribution of assets of the names of the insurers which are being considered for providing annuities to replace the pension benefits and state guarantee associations. The PBGC rule arose from the failure of Executive Life, which had provided annuities to many corporations that had terminated defined benefit plans.[9]

Corporations also have been terminating defined benefit pension plans to recapture the value of excess contributions to the plan. This coincides with Stone's (1987) observation that firms build financial slack in their pension plans and then terminate them to access this slack. One of the problems in this termination process is that rarely do firms replace the terminated defined benefit pension plan with another defined benefit plan. As Table 1 indicates, over the period 1986 to 1990, 1032 defined benefit pension plans were terminated and only 215 (20.8%) were replaced with another defined benefit plan. Of the remaining terminations, 246 (23.8%) were not replaced at all and 452 (43.8%) were replaced with defined contribution plans. The recapture by corporations of over $9.5 billion is sufficient motivation for this action, but over 986,000 employees were affected in the process. Mittelstaedt and Reiger (1993) find that firms terminating defined benefit pension plans and replacing them with defined contribution pension plans show excess positive stock returns, thereby documenting a wealth transfer from pension plan participants to stockholders. The trend away from offering defined benefit plans as reported in Table 1 was also noted by Lockhart (1990), that in the 1980s the percentage of employees covered by defined benefit plans declined from 80 percent to under 70 percent.

Compliance Risk

Another risk that participants face is that the plan is found to be in violation of anti-discrimination laws. Such non-compliance occurs when the Internal Revenue Service (IRS) deems that a particular pension plan does not equitably treat all participants or potential participants. If an existing plan fails discrimination testing, the contributions to the pension plan or the earnings from the plan are immediately taxable income to the participants. The amount of the contribution or the earnings that are taxable depends upon a complex formula of vesting.

Compliance with changes in pension regulations involving integration of pension benefits with Social Security can have an effect on the funding status of a defined benefit plan. Currently almost 60% of participants in defined benefit pension plans have their yearly retirement benefit integrated with Social Security (See Maher and Ketz, 1991). However, in response to the Tax Reform Act of 1986 which addressed the discriminatory nature of integration with Social Security in regards to lower paid employees, the IRS implemented new rules in 1991 to limit the adverse effects. For those plans that continue to use the Social Security offset there will continue to be the problem of estimating the Social Security portion of the participants benefit so as to arrive at the sponsors contribution to the plan which could result in either overfunding or underfunding. In addition this adds a new dimension to the risks to the participant and the sponsor based on possible changes in eligibility requirements for Social Security.

There are additional risks for those employees participating in a defined benefit plan sponsored by a relatively small employer because of the nature of the employer and the regulation imposed on it. The small employer has more firm specific risk, and is subject to more restrictions (called top heavy rules) on benefit variations among employees. These extra restrictions increase the risks of non-compliance of the plan.

Additional Plan Risks

The defined benefit pension plan participant faces risk on three additional fronts: changes in taxation of pensions, use of the sponsor's own securities to fund the plan, and revisions to the plan document. In regards to the first risk, there is concern that with a new President and a Congress intent on reducing the deficit, there may be additional limitations placed on the level of tax deductible contributions to defined benefit pension plans. Any change in deductible funding rate would probably result in a reduction in contributions for at least the short term as companies reassessed their costs of contributing to such plans. In the long run, such changes could have the effect of reducing the attractiveness of such plans and accelerating the conversion of defined benefit plans into defined contribution plans or eliminating retirement plans altogether.

A second area involves the use of the corporation's own securities to fund the plan contributions which is a permissible practice under ERISA. However, it exposes the participant to an additional level of risk. In the event the sponsor bankrupts, not only would the employee lose his/her job, the pension plan would contain the now worthless securities of the sponsor, jeopardizing the employee's pension benefits. Even if the sponsor does not bankrupt, there is a lack of personal diversification on the part of the employee whose current and future fortunes are tied to the sponsor.

The contribution of a firm's securities to its pension plan is typical when cash flow problems arise. According to Vosti (1992b) General Motors (GM), responding to cash flow needs, in 1992 planned to contribute $500 million of its own common

stock to reduce its pension liability. GM had not made a pension plan contribution since 1987 due to credits it had built up. However, its 1987 contribution was $1.04 billion of its own new preferred stock. While there is no risk to participants if the firm remains financially healthy, Chernoff (1992) notes that the PBGC did inherit $26 million of worthless preference stock from Wheeling-Pittsburgh Steel when the PBGC took over that plan.

Another aspect of risks of defined benefit plans not previously covered is that of an amendment to the plan. Although it is through this mechanism that retiree benefits are frequently raised, the plan participant should be aware of the risk that the adjustment might result in a reduction of future benefits. Albert and Schelberg (1992) illustrate this risk by referring to Kreutzer versus the A.O. Smith Corporation. In this case the company had amended the severance benefit formula printed in the supervisor's manual, but failed to notify the supervisors. Seven supervisors requested benefits according to the original formula and were denied. In subsequent litigation the court ruled that the firm had not acted in bad faith and had not tried to conceal the changed benefit formula. Consequently, the supervisors were not entitled to benefits other than those provided under the newer formula. The plan participant is clearly required to stay abreast of any changes the sponsor makes.

III. Public Defined Benefit Pension Plans

While ERISA provides some security for corporate sponsored defined benefit plans, it does not cover public employee plans. This means that in addition to having all of the risks associated with a private defined benefit plan, public plans are not subject to Federally mandated minimum funding requirements or vesting schedules. The following sections will cover the differences in risk between public and private defined benefit plans.

Funding Risk

As a result of the lack of regulation concerning the level of funding of public defined benefit plans, their funding ratios can vary more widely than those of private plans. According to Clark (1991b) many public defined benefit plans are operated on a pay-as-you-go basis and are severely underfunded. For example, the Massachusetts system is less than 20 percent funded. Other states are required by state law to be fully funded. This necessity to fully fund creates political problems for municipalities during economically challenging periods.

Actuarial Risks

Clark (1991) also points out that public funds have been creative in an attempt to alter their funding status during the 1990–1992 economic slowdown. Many plans

have adjusted the assumed rate of return to be earned on plan assets for purposes of reducing the present value of future obligations. While corporations were lowering their discount rates to more nearly reflect current market rates of return, many public employee funds have been increasing their rates to diminish obligations. As an example of the effects of this type of activity Clark (1991) mentions that the Metropolitan Transit Authority of New York City (MTA) was faced with an operating shortfall and did not want to increase fares. The MTA changed its rate of return assumption on plan assets from 8.25% to 9%, thereby reducing its pension contribution by $40 million. New York is not alone, however. Among the twelve public funds increasing discount rates, Louisiana increased its 1991 rate to 8.3% from 7.5% to save $24 million and California proposed to increase its 1991 rate to 9.5% from 8.5% to save $300 million.

Plan Alterations

In addition to changing actuarial assumptions, public defined contribution plans have shifted the burden of funding to employees. In a study by Vosti (1992c), Arizona, for example, in 1989 reduced its cash outflow by dropping its contribution rate to 2 percent of salary from the previous 4.7% level. Minnesota reduced its contribution rate from 4.5% to 4.3%. These reductions in contributions, if not offset by increases in employee contributions, are attained at the potential expense of the state taxpayers, who will have to make up shortfalls through increased taxes in future years. To limit this future confrontation with taxpayers, states are looking at alternatives. One such alternative is adoption of defined contribution plans for new employees. Colorado and Oklahoma each approved defined contribution plans for municipalities and universities in their states.

Trends in Public Defined Benefit Plans

Wentz, et al. (1991) point out that there were three trends which became evident in the 1980s which would have an adverse impact on public defined benefit pension plans. These trends were the ending of the economic expansion of the 1980s; the advent of lower interest rates; and the expansion in the number of state and local government employees. Due to these events the funding for pension plans in many states has been adversely affected. However, this underfunding is not necessarily apparent to the public (even though disclosure is required under Government Accounting Standards Board (GASB) Statement No. 5). This is due to the fact that many of the states increased their assumed rate of return on pension assets thereby minimizing the underfunding of the plans. Public pension plans may soon be following the lead of private corporations in shifting more of the burden of providing retirement benefits to the employee by terminating their defined benefit plans and adopting defined contribution plans.

IV. Defined Contribution Plans

Defined contribution plans would generally include 401(k) and profit-sharing plans for private employees, 457 plans for employees of state and local government, and 403(b) plans for non-profit groups such as teachers and hospital employees. In this type of plan the sponsor and/or the employee make deposits into the plan on a regular basis. At retirement, the plan participants will have a given pool of funds to draw upon for their retirement needs.

Funding Risk

Defined contribution plans promise no fixed benefit as the ultimate retirement benefit is determined by the rate of return earned on funds contributed to his/her account and the amount contributed. By definition defined contribution plans are always fully funded and, therefore, there is no funding risk as in the case of defined benefit plans. In essence, the sponsor has shifted all of the risks to the employee. However, there is the possibility that the sponsor would not put the required contribution into the pension, but that would be obvious to the participant upon receipt of his/her pension statement which records all contributions and earnings performance.

Investment Risks

The participants in defined contribution plans are captive to the rates of return earned by the investment options in the plan. In addition the participant in many cases is responsible for making asset allocation/investment decisions for his/her contributions through the selection from among a number of investment options. Once the initial decisions are made as to the location of contributions, the participant is still directly involved in the investment decision making process through the ability to transfer from one investment to another within the plan. This responsibility for asset allocation or rebalancing the portfolio is generally far beyond the capabilities of most employees and usually results in the continuation of the initial investment selection.

With the increase in defined contribution plans and the greater responsibility placed on the employee to plan for his/her retirement, obviously comes greater risks along with the opportunity for greater returns. Unfortunately, in cases where this involves the selection of investment options, it would appear that employees are not investing their money wisely. According to Schultz (1992a) three-fourths of employees with self-directed defined contribution plans have no investment in stocks. There appears to be a tendency toward being too conservative in the investment of these funds. This investment strategy is not one that offers much hope of protecting the purchasing power of the pension.

In order to protect the employees from themselves, the plan trustees have a fiduciary responsibility to uphold. If they do not, they may be liable for damages incurred by the participants. But what of the case where the employee makes the

selection of the investment vehicle(s) for his/her contribution? Are the trustees still held responsible for bad investment decisions on the part of participants? The section on fiduciary responsibilities addresses this issue.

Liquidity Risks

Another risk that occurs in some defined contribution plans comes about due to provisions in the plan document allowing for loans to plan participants. If the participant has this capability and exercises this option the plan is obligated to provide the funds. If this were to occur at a time of rising interest rates or falling stock prices, the plan may have to liquidate securities at unfavorable prices and could incur losses on the pension portfolio. As a result of this risk, the plan would have to hold larger amounts in liquid assets which would normally result in lower investment returns. As an option, the plan trustees may have the ability to borrow to meet this liquidity need in order to avoid selling securities at an unfavorable price. However, the plan would still incur the cost of borrowing.

Fiduciary Responsibilities

In an attempt to define the responsibilities of the plan fiduciaries in the case where the participant has the ability to choose among a number of investment options, the Department of Labor has issued regulations under ERISA Section 404(c) which limits the liability of plan fiduciaries who satisfy the requirements of this section.

According to Buck Consultants (1992) the key provisions for compliance with Section 404(c) are that the participant has the ability to exercise meaningful control over the assets in the account. In order to meet the requirements of having meaningful control the participant must have the opportunity to:

1. Choose from a broad range of investment alternatives.
2. Give investment direction with respect to each investment alternative available under the plan with a frequency which is appropriate in light of its market volatility.
3. Diversify investments within and among investment alternatives.
4. Receive sufficient information to make informed decisions.

A plan is considered to offer a broad range of investment alternatives only if it allows the participant to diversify investments in order to minimize the potential risk of large losses; materially affect the potential return on assets under the participants control; and choose from at least three investment alternatives each significantly different in its risk and return characteristics. If Section 404(c) regulations are followed, then the plan fiduciary is exempted from certain liability for investment losses incurred by the plan participant. For plans that qualify under Section 404(c) the risk of loss in the defined contribution plan rests solely on the participant.

Risks of Guaranteed Investment Contracts (GICs)

With the growth of defined contribution pension plans came the problem of selection of investment options within the plans. Many trustees choose to offer GICs offered by insurance companies. According to the General Accounting Office 28 percent of defined contribution plan assets are currently invested in GICs.[10]

Due to the failure of Executive Life and other insurers there has been increasing scrutiny of the safety of investments in pension plans. While the term Guaranteed Investment Contract sounds good, the guarantee is only as good as the insurance company which is backing the GIC. Although it is true that to date no retiree has lost benefits due to an insurance company failure, one has to be concerned about the safety of GICs. According to a study by Todd and Wallace (1992) currently only 17 states explicitly guarantee GICs with two other states under court order to do so. In 14 states neither the guaranty fund nor the courts say whether GICs are guaranteed. Puerto Rico and 17 of the states have laws which explicitly deny coverage to GICs. However, even if there are explicit state guarantees, the pension beneficiary should be aware of another set of risks involving the funding status of the guaranty fund and the maximum guarantees provided.

V. The Role of the Government in Reducing Pension Risk

ERISA

In its desire to provide a safety net for at least a portion of the employees retirement benefits Congress passed the Employee Retirement Income Security Act (ERISA) in 1974 which set mandatory funding requirements for defined benefit pension plans, established minimum vesting requirements, created the Enrolled Actuary (EA) designation, and required that the EA provide an independent valuation and tax report of the pension. Among the reasons for the passage of ERISA were actions by employers, who offered defined benefit plans, such as firing employees right before they would have become vested in their pension benefits. This practice placed the employee at risk for his/her pension right up to the vesting date which was usually the normal retirement date.

Some of this uncertainty was eliminated with passage of the ERISA and the Tax Reform Act of 1986 which requires all pension plans subject to ERISA to vest their employees according to one of the following schedules:

1. Cliff Vesting: Employees are fully vested after five years of service.
2. Graded Vesting: Employees are vested 20% after 3 years of service and then increasing at the rate of 20% per year to become fully vested after seven years of service.

Even though there are mandated vesting schedules, this does not mean that all employees are covered by the pension. The employee must meet certain criteria before he/she is eligible to participate in the plan. IRS rules allow the plan to exclude new employees under the age of 25, with less than one year of service, or with less than 5 years until normal retirement age defined in the plan. Plans may require that each participant work a certain number of hours during the plan year, such as 1000 or 2000 hours, in order to be eligible. This may exclude many part time employees from the plan. Provisions for handling breaks in service are also included in plan specifications. Therefore, an employee is at risk of losing covered status for the year, due for example, to a change in the number of hours worked or to an uncovered break in service.

Pension Benefit Guaranty Corporation

ERISA also created the Pension Benefit Guaranty Corporation (PBGC). The PBGC is a government sponsored insurance plan designed along the lines of the Federal Deposit Insurance Corporation and operated under the U.S. Department of Labor. It obtains its funds by assessing plan sponsors an annual premium per covered employee. The current premium assessed by the PBGC for single employer plans is the sum of a flat premium of $19 per employee plus a variable premium of $9 per $1,000 of underfunded vested liability (subject to a cap of $53 per participant). Funding status is determined as the ratio of pension plan assets to accrued benefits, both those vested and those earned but not vested.

The PBGC acts as an insurer as long as the firm remains financially viable and maintains minimum contributions to its pension plan. The actual behavior of the PBGC is more like deposit insurance. As more firms' underfunded plans are taken over by the PBGC, it must raise premiums, which started at only $1 per employee when ERISA was first passed. According to Lockhart (1992) the PBGC's premium receipts are currently sufficient to pay the benefits received by retirees of the 1650 plans the PBGC currently administers. However, if there were an increase in the number of plans taken over by the PBGC combined with an increasing number of retirees, its cash flow would become negative in a very short period of time.

The existence of the PBGC does not eliminate all of the default risk of the plan participants. In order to protect itself, the PBGC has authority to terminate a defined benefit plan in the event the sponsor is deemed to be financially unsound, thereby limiting the accumulation of further benefit liability. In such a termination the pensioner should be aware that the PBGC does not insure or guarantee all benefits in a covered plan. It covers basic benefits only. Therefore upon termination of a plan, the PBGC takes over administration of the plan and makes pension payments in accordance with the terminated plan's agreement. However, these payments are limited to a maximum guaranteed monthly benefit which is adjusted annually with inflation.[11] For plans which provide employees with cost of living adjustment (COLA) clauses and with insurance benefits, there is even more risk of loss due to the lack of PBGC coverage of these benefits.

Current Risks to the PBGC

The pension funding problems associated with the bankruptcy of LTV and other plan sponsors are illustrative of potential liability of the PBGC for coverage of underfunded pension plans which it insures. According to Lockhart (1991) of the total underfunding of $40 billion in defined benefit plans, $13 billion is associated with financially troubled firms which present a serious risk to the PBGC. This represents an increase of 75% over the previous period. Estimates for 1992 are that the level of underfunded liabilities will be approximately $43 billion according to estimates by the Office of Management and Budget found in Abken (1992). The 50 top companies with the largest underfunded pension liabilities as of the end of 1991 are shown in Exhibit 1.

As you can see from Exhibit 1 the underfunded liability of these fifty companies exceeded $29.4 billion and the average funding ratio was 71%. If just the guaranteed benefits were considered, the amount of underfunding was "only" $24.2 billion.[12]

The Future of The PBGC

According to Abken (1992) the problems with pension guarantees may seem like a repeat of the recently experienced deposit insurance difficulties. However, the problems with the PBGC are not new as the net-worth deficits have persisted since its creation. In fact many of the top 50 underfunded companies in Exhibit 1 have been on the list for decades. The major issue is whether or not we have learned from the deposit insurance problems and can apply what we have learned to the pension insurance problem before it becomes a taxpayer's nightmare.

There are a few particular issues currently facing the PBGC which will affect the riskiness of the guarantee provided to covered pensions. One of these issues is the contribution of non-cash assets (except for employer stock and diversified real estate holdings) unless a specific exemption is approved. Chernoff(1992b) points out that under ERISA the reason that a firm cannot contribute non-cash assets is the concern of the PBGC that it would eventually be saddled over-valued assets which have limited marketability. However, as one might expect plan sponsors want more flexibility in the selection of assets for contribution to the pension plan. As a result litigation has been filed to challenge the PBGC's restrictions and the U.S. Supreme Court has agreed to consider the case. If the Supreme Court relaxes these restrictions, then the plan participants may incur greater risk due to the potential for the plan to become overloaded with assets with limited marketability or inflated values.

A broader question concerning the future of the PBGC is its own funding status. The PBGC currently operates on a cash basis, essentially a pay-as-you-go process. This method fails to consider the long term impact of PBGC obligations over time. As an example, Lockhart (1992) noted that when Pan Am's plans were terminated, the loss to the PBGC was over $600 million while the loss reported as part of the federal budget was only $10 million. Chernoff (1992a) estimated that the

EXHIBIT 1.
Top 50 Companies with the Largest Unfunded Pension Liability

Company Name	*Assets*	*Total Benefit Liability*	*Unfunded Benefit Liability (Funding Ratio)*	*Guaranteed Benefit Liabiltiy*	*Unfunded Guaranteed Benefit Liability (Funding Ratio)*
Ravenswood Alurninum Corp.	$ 10	$ 90	$ 80 (11%)	$ 85	$ 75 (12%)
LTV Corp.	425	3,415	2,990 (12)	3,244	2,819 (13)
Morrell(John) & Co.	51	124	73 (41)	118	67 (43)
Uniroyal Goodrich Tire Co.	391	945	554 (41)	898	507 (44)
Keystone Consolidated Ind.	85	205	120 (42)	195	109 (44)
New Valley Corp.	331	712	381 (46)	677	346 (49)
Loews Corp.	129	277	147 (47)	263	133 (49)
Sharon Steel Corp.	122	243	121 (50)	231	109 (53)
Laclede Steel	70	132	63 (53)	126	57 (55)
Carter Hawley Hale	81	151	70 (54)	143	63 (56)
Chrysler Corp.	4,855	8,874	4,019 (55)	8,430	3,575 (58)
American National Can	516	929	413 (56)	883	367 (58)
Borg-Warner	121	217	96 (56)	206	85 (59)
Bridgestone-Firestone	305	546	241 (56)	519	213 (59)
Rockwell International	437	797	360 (55)	741	304 (59)
Anchor Glass Co.	159	281	122 (57)	267	108 (60)
National Intergroup	434	758	325 (57)	721	287 (60)
Trans World Airlines	592	986	394 (60)	936	344 (63)
Occidental Petroleum Corp.	115	187	72 (62)	177	62 (65)
ACF Industries	124	199	75 (62)	189	65 (66)
Budd Co.	333	520	188 (64)	494	162 (67)
Cyclops Industries Inc.	275	424	149 (65)	403	128 (68)
Tenneco Inc.	191	294	103 (65)	279	88 (68)
Bethlehem Steel Corp.	3,492	5,347	1,854 (65)	5,079	1,587 (69)
White Consolidated Industries	230	345	116 (67)	328	98 (70)
Foxboro Co.	129	189	60 (68)	180	51 (72)
Crown Cork & Seal Co. Inc.	528	723	195 (73)	687	159 (77)
Varity	243	332	89 (73)	315	73 (77)
AlleghenyLudium	313	426	113 (73)	405	92 (77)
Goodrich (B.F.)	490	661	171 (74)	628	138 (78)
Navistar International	2,050	2,759	709 (74)	2,621	571 (78)
James River Corp.	214	281	68 (76)	267	53 (80)
Maxxam Inc.	617	810	193 (76)	769	152 (80)
General Motors Corp.	38,903	50,730	11,827 (77)	48,194	9,291 (81)
Clark Equipment	234	305	71 (77)	290	55 (81)
Northwest Airlines	357	460	102 (78)	437	79 (82)
AST Holding	199	257	58 (77)	244	45 (82)
Reynolds Metals	542	691	149 (78)	657	115 (83)
Occre & Co.	1,185	1,613	428 (73)	1,417	232 (84)
Rohr Inc.	326	406	81 (80)	386	60 (84)
Honeywell Inc.	367	456	90 (80)	433	67 (85)
SX Corp.	815	1,008	193 (81)	958	143 (85)
RJR Nabisco Holdings Corp.	727	897	169 (81)	852	125 (85)
Goodyear Tire & Rubber Co.	1,146	1,402	256 (82)	1,332	186 (86)
Burlington Northern	43 4	523	93 (82)	497	66 (87)
Pacificorp	478	578	100 (83)	549	71 (87)
National Steel Corp.	482	572	90 (84)	543	62 (89)
Westinghouse Electric	4,275	4,999	724 (86)	4,749	474 (90)
Armco Steel L.P.	672	867	195 (78)	737	66 (91)
Kimberly-Clark Corp.	780	853	73 (91)	838	58 (93)
TOTALS (in millions)	$70,375	$99,795	$29,420 (71%)	$94,615	$24,239 (74%)

PBGC's present value of future liabilities is $43 billion although its most recently reported annual loss was only $2.5 billion for 1991.

Finally, there is the question of the PBGC's status in bankruptcy court. Clearly, the LTV case indicates corporations cannot arbitrarily claim the inability to fund existing plans, put them to the PBGC, and then initiate new plans. The bankruptcy status of the PBGC, is as a dual class citizen. The PBGC has a priority claim for the guaranteed benefits. For those plan participants due more benefits than the PBGC guaranteed maximum, legislation in 1987 allows the PBGC to share recovered assets with workers for non-guaranteed benefits. However, Zall (1992) notes that historically the PBGC only recovers through bankruptcy courts 10 to 15% of assets claimed. Lockhart (1992) points out that approximately 86% of the PBGC's claims are in the general unsecured creditor status.

VI. Summary and Conclusions

Employees who are participants in retirement plans offered by their employers are subject to a number risks. The type and degree of risk varies depending on the type of retirement plan—defined benefit or defined contribution. In the private defined benefit plan the participant is subject to the risk that the sponsor of an underfunded plan bankrupts or the plan is terminated by the PBGC. The plan could be underfunded because of inadequate contributions due to inaccurate actuarial assumptions or because of poor investment performance. In any event the participant may not receive all the pension to which he/she was entitled. A fully funded plan can also be terminated by the sponsor and benefits to the participant distributed in the form of a paid up annuity. In this case the PBGC is no longer involved and the participant is at risk in the event of the failure of the insurance company which wrote the annuity.

Private defined benefit plans basically have all of the risks of private plans perhaps with the exception that the risk of bankruptcy of the sponsor may be less. The major risk that the participant faces is that of the shifting of the burden of the pension obligation to the employee or the termination of the defined benefit plan in favor of a defined contribution plan.

Defined contribution plans present the participant with almost all of the same risks as those faced by an individual investor. The exception is in the selection of assets to include in the plan, which are limited by the plan trustees or in some cases by ERISA.

ERISA and the PBGC provide limited safeguards to plan participants by guaranteeing a basic benefit up to a maximum adjusted for inflation and setting fiduciary standards for plan sponsors and trustees and charging penalty rates on premiums for underfunded plans. In addition for defined contribution plans ERISA encourages plan sponsors to provide flexibility in self-directed plans through Section 404(c) by limiting liability to the plan sponsors and trustees.

A number of issues concerning pension funds deserve further attention of researchers. First of all, since one of the greatest risks to participants of corporate

defined benefit plans comes from the inability of the sponsor to make contributions due to financial distress, research should be focused on how the individual can hedge this risk using options and futures contracts.

A second area of research involves the determination of the optimal number and type of asset classes to be offered in self-directed defined benefit pension plans. The requirements of ERISA Section 404(c) only state that the number of options must be at least three and that each alternative must also be diversified and has *materially* different risk and return characteristics. The question remains as to what is materially different.

Finally, there would appear to be a need to develop guidelines for the selection of insurance companies which provide annuities to plans which are terminated. Under the current PBGC regulations, there is no further involvement on its part once the plan is terminated and the annuities are purchased. In addition under current law the plan sponsor is not liable in the event the insurance suffers financial difficulties in the future which would jeopardize the participants pension benefits. Therefore, establishing criteria for the selection of the insurance company would be a desirable research project.

NOTES

1. Accrued vested benefits are those benefits which the participant has earned by satisfying a minimum employment period criterion, and which have become an obligation of the firm, regardless of whether or not the plan participant remains with the firm beyond that time period.
2. These comments by Mr. Lockhart are found in "Grey Peril," *The Economist*, May 11, 1991, p. 78.
3. The prudent man rule is being replaced by the prudent investor rule as a result of work by the American Law Institute which resulted in a restatement of the common law of trust investments.
4. ERISA Section 404(a)(1)(A–D).
5. For a discussion of the Weyerhauser suit see "Verdict Inconclusive in Manager Lawsuit," *Pensions & Investments*, March 30, 1992, p. 4.
6. Copeland and Weston (1988, p. 642).
7. Projected benefit obligation exceeds the accumulated benefit obligation because it factors in periodic assumed increases in salary, thereby raising the pension liability above the accumulated benefit obligation, which does not include a provision for salary increases.
8. For a discussion of actuarial costs methods see Winklevoss (1977).
9. For a further discussion of this requirement see "Annuity Notice to be Required," *Employment Benefit Plan Review*, December 1991, pp. 52–53.
10. "Retirement Plans," *Employee Benefit Review*, June 1992, p. 68.
11. The 1992 guaranteed maximum benefit is $2,353.27.
12. The source of this information is "NEWS," Pension Benefit Guaranty Corporation, November 19, 1992.

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