

THE ABO, THE PBO, AND PENSION INVESTMENT POLICY

Zvi Bodie

ABSTRACT

Corporate management views a defined benefit pension plan as a trust for the employees and manages the fund almost as if it were a defined contribution plan with a guaranteed floor specified by the benefit formula. In order to minimize the cost to the sponsor of providing the minimum benefit guarantee, there is a strong incentive to hedge the accumulated benefit obligation (ABO) by investing in fixed income securities with a matching duration -- that is, to immunize it.

The incentive to immunize the ABO is strongest when the plan is fully funded. If the plan is overfunded, it makes sense to invest in equities and pursue a kind of portfolio insurance strategy known as contingent immunization. If the plan is very underfunded and the sponsor is in financial distress, it may be optimal to exploit the put provided by PBGC insurance through a high-risk investment strategy. Tax, regulatory, and other considerations have in the past created strong incentives to overfund the pension plan. Recent changes in accounting rules and tax law are likely to reinforce the use of fixed income immunization strategies and reduce pension fund investment in equities.

While useful for estimating a firm's future cash flow, the projected benefit method is misleading in the conduct of pension fund investment policy. The PBO is not an appropriate measure of the benefits that the employer has guaranteed and therefore not a target to be hedged by pension fund investment policy. The failure of pension funds to show any significant interest in inflation-protected investment products such as CPI-linked bonds is clear evidence that they do not view their liabilities as indexed for inflation. Investing in equities provides pension funds with higher expected returns, but does not offer an effective hedge against inflation risk.

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Introduction

The consensus emerging from the recent literature on pension fund investment policy seems to be that the plan sponsor ought to hedge the broadly defined projected benefit obligation (PBO) and not just the narrowly defined accumulated benefit obligation (ABO). Black [1989], for example, argues that if benefits under a defined benefit plan are linked to final salary, then it makes sense to hedge against changes in future salary levels. Ambachtsheer [1987] and Arnott and Bernstein [1988] make a similar argument. One corollary of this view is that pension investment policy should call for heavy investment in stocks, as opposed to bonds.

This article offers a different perspective. It argues that the pensions promised under defined benefit plans are best viewed as participating annuities with a guaranteed nominal floor plus a contingent claim on the plan sponsor. This contingent claim reflects an implicit contract between the employer and the plan beneficiaries. It includes elements of inflation protection for continuing employees, but these should not be confused with wage or price indexation either before or after retirement. The PBO is not, therefore, an appropriate target for investment policy. Furthermore, even if the plan were implicitly indexed for inflation, common stocks are not an effective hedge against inflation risk.

I would maintain that corporate management views a defined benefit pension plan as a trust for the employees and manages the fund as if it were a defined contribution plan with a guaranteed floor specified by the benefit formula. In doing so, management must balance the goal of employee welfare maximization against the goal of shareholder wealth maximization. In this context, one management aim would be to minimize the cost of meeting the guaranteed floor benefit. This in turn provides the sponsor with a strong incentive to hedge the accumulated benefit obligation (ABO) by investing in fixed income securities with a matching duration -- that is, to immunize the ABO.

The incentive to immunize the ABO is strongest when the plan is fully funded. If the plan is overfunded, it makes sense to pursue a type of portfolio insurance strategy known as "contingent immunization." If the plan is substantially underfunded, management may find it makes sense to pursue a high-risk investment strategy and exploit the put provided by Pension Benefit Guarantee Corporation (PBGC) insurance.

Tax, regulatory, and other considerations have in the past created strong incentives to overfund a pension plan. Recent changes in accounting rules (FASB Statement No. 87) and tax law (OBRA) are likely to encourage the use of immunization strategies and reduce pension fund investment in equities.

The Nature of Defined Benefit Pension Liabilities

Pension fund investment policies are guided primarily by the desire to hedge liabilities. In order to understand the investment practices of pension funds, therefore, one must understand the nature of their liabilities.

There are two basic types of pension plan -- defined contribution and defined benefit. Under a defined contribution plan, each employee has an account into which the employer and the employee (in a contributory plan) make regular contributions.

Benefit levels depend on the total contributions to and the investment earnings of the account.

Under a defined benefit plan, by contrast, the pension benefit is determined by a formula that takes into account the employee's history of service and wages or salary. The plan sponsor guarantees this benefit regardless of the investment performance of the pension fund assets.

The pensions offered under a defined benefit plan are best viewed as participating annuities that offer a guaranteed minimum nominal benefit, which is determined by the plan's benefit formula. At the discretion of management, this guaranteed benefit may be enriched from time to time, depending on the financial condition of the plan sponsor, increases in the living costs of retirees, and the performance of the fund's assets.

In the past, many plans have given ad hoc voluntary benefit increases to plan participants.¹ While these increases have been interpreted as evidence of implicit cost-of-living indexation, they are actually very different from a formal COLA (cost-of-living adjustment). They are, rather, an implicit claim of the employees on the plan sponsor.

A Contingent Claim

The implicit pension obligation is a complex contingent claim, in both the economic and legal senses. One way to view this contingent claim is as an employee ownership share in the pension fund surplus. It seems clear that if the sponsoring corporation does not do well financially, employees cannot expect to get anything more than the minimum benefit guaranteed by the benefit formula.

There is mounting evidence that corporations facing severe financial difficulties - low profitability or threat of hostile takeover, for example -- will raid overfunded pension plans leaving just enough assets to provide employees with the legal minimum.² But if corporations are doing well financially, and if retired employees face inflation, corporations tend to help them out with *ad hoc* benefit increases.

There is a crucial difference between benefits that are linked to an employee's own future wages and those that are linked to a general index of wages or prices. Unlike Social Security benefits, whose starting value is indexed to a general index of wages, private pension benefits, even in final-pay- formula plans, are "indexed" only to the extent that (1) the employee continues to work for the same employer, (2) the employee's own wages keep pace with the general index, and (3) the employer continues to maintain the same plan.

Consider, for example, the problem of portability of pension benefits. Workers who change jobs wind up with lower pension benefits at retirement than otherwise identical workers who stay with the same employer, even if the employers have defined benefit plans with the same final-pay benefit formula.

¹See Clark, Allen, and Sumner [1983] for a discussion of these ad hoc increases.

²See, for example, VanDerhei and Harrington [1989], Petersen [1989], and Pontiff, Shleifer, and Weisbach [1989].

The ABO as Economic Reality

Both the Financial Accounting Standards Board (FASB) and the U.S. Congress have adopted as the appropriate measure of a sponsor's pension liability the present value of the guaranteed nominal floor. In FAS 87, the rule-making body of the accounting profession specifies that the measure of corporate pension liabilities to be used on the corporate balance sheet in external reports is the accumulated benefit obligation (ABO)-- that is, the present value of pension benefits owed to employees under the plan's benefit formula, absent any salary projections and at a nominal rate of interest.

In its Omnibus Budget Reconciliation Act (OBRA) of 1987, Congress defined the current liability as the measure of a corporation's pension liability. Furthermore, the limits OBRA sets on the amount of tax-qualified contributions a corporation can make to the pension fund are defined in terms of the current liability. OBRA's definition of the current liability is essentially the same as FAS 87's definition of the ABO.

The ABO is thus a key element in a pension fund's investment policy. It not only affects a corporation's reported balance sheet liabilities, it reflects economic reality.

FAS 87, however, recognizes an additional measure of a defined benefit plan's liability -- the projected benefit obligation (PBO). FAS 87 requires corporations to use the projected method in computing the pension expense reported in their income statement.³ This figure may help analysts to derive an appropriate estimate of expected future labor costs -- a useful measure for analysts attempting to value a firm as a going concern. The PBO is not, however, an appropriate measure of the benefits the employer has guaranteed, hence is not an appropriate target for pension fund investment policy.

I agree with those who think there is usually an implicit long-term contract between employees and employers offering defined benefit plans. I also agree that the pension plan plays a part in this implicit contract, and that the pension liability therefore exceeds the ABO. It does not follow, however, that the PBO is the correct measure of the sponsor's pension liability, or that the fund's investment policy should target it as the amount to be hedged.

The Options Associated with the Pension Liability

There are at least two option-like features inherent in defined benefit pension plans. The first is the corporate guarantee of the ABO. The second is plan beneficiaries' claim to ad hoc benefit increases.

The corporate guarantee of the ABO is, in effect, a put option on the investments of the pension fund with an exercise price equal to the present value of the ABO. To see this, imagine that the plan is terminated. Formally, the payoff structure at the date of termination is: $\text{Max}(0, \text{ABO} - I)$.

To clarify, consider Table 1, which shows the market value balance sheets of a corporate sponsor and its pension fund. These balance sheets differ from conventional

³For a more complete explanation of FAS87 see Bodie [1989].

accounting ones in that we have explicitly included the corporate sponsor's guarantee of the ABO (G) as both an asset of the pension fund and a liability of the corporation.

Table 1. Sample Corporation Balance Sheets at Market Value

a. Corporate Balance Sheet

Assets		Liabilities and Owners' Equity	
Conventional Assets	A	Conventional Debt	D
Corporate share of pension fund net worth	ϕS	Corporate guarantee of ABO	G
		Shareholders Equity	E

b. Pension Fund Balance Sheet

Assets		Liabilities and Owners' Equity	
Investments	I	Accumulated benefits ABO	
Corporate guarantee of ABO	G	Net Worth	S

The pension fund net worth (S) is the difference between its total assets (investments plus corporate pension guarantee, I+ G) and the ABO. The corporation owns a proportion, ϕ , of the pension fund net worth; the remainder (1- ϕ) belongs to the employees. This is because as guarantor of the accumulated pension benefits, the sponsoring corporation is liable for pension asset shortfalls but does not have a clear right to the entire surplus in case of pension overfunding. Recent court rulings in cases of terminations of overfunded plans have left unclear how much of the surplus belongs to the plan sponsor, but it is less than 100%.⁴

The shareholders' equity in the corporation (E) is the difference between total corporate assets (conventional plus the corporation's share of the pension fund surplus, A + ϕS) and corporate debt (conventional plus the guarantee of the ABO, D + G).

Now consider the second option-like feature associated with the pension liability. The ABO is the present value of the minimum benefit that the employees are legally entitled to. Corporate plan sponsors, however, generally see themselves bound to offer more than this minimum, provided that the corporation does well financially.

A simple way to model this implicit pension obligation is as a call option on the sponsoring corporation's equity. It is like a warrant or similar "equity kicker." As such it can be evaluated using the Black-Scholes [1973] methodology.⁵ We might think of it

⁴Early papers on pension finance by Sharpe [1976] and Treynor [1977] assumed that the pension trust was essentially an asset of the sponsoring corporation. Bulow and Scholes [1983], however, argue convincingly that the corporation's shareholders and the plan beneficiaries actually share ownership.

⁵Brennan and Schwartz [1979] have employed this methodology in evaluating equity-linked life insurance policies. Pension liabilities are very similar, although the equity index would be the

as part of the employees' share of the pension fund net worth, $(1-\phi)S$.

The main investment implication of this simplified view is that in order to hedge the implicit pension obligation, the sponsor should invest in the corporation's own stock. Equivalently, it could simply leave the obligation unfunded.

Of course, in reality the implicit pension obligation is more complicated than a simple call option. The amount eventually paid to employees will depend not only on the price of the sponsoring corporation's stock, but also on the cost of living and on the funding status of the pension fund. These additional complications, however, do not point in the direction of a policy of investing in the stocks of other firms.

Immunization

In effect, the pension fund is a subsidiary of the sponsoring corporation. The sponsor guarantees the debt of its pension fund subsidiary. If the sponsor's shareholders own less than 100% of the pension fund net worth, then any increase in the riskiness of the pension assets reduces the market value of their shares in the sponsoring corporation.

This point is easiest to understand using the theory of option pricing. If the volatility of the underlying security's price increases, then the put and the corresponding call option will both increase in value by the same amount.⁶ In the case of a defined benefit pension fund, if the value of both the corporate pension guarantee (a corporate liability) and the pension fund net worth (only partially a corporate asset) increase by the same amount, the value of corporate equity must go down.⁷

One way to minimize the cost of the benefit guarantee to the corporation's shareholders is to immunize the pension liability through an investment strategy of duration matching.⁸ Pension fund pursuit of duration matching strategies has created a demand for fixed-income instruments with a guaranteed duration. Many of the innovations of the past 10 years such as zero coupon bonds, CMOs, GICs, and interest rate futures contracts, can be viewed, at least in part, as the market response to this demand. These products all offer ways to eliminate duration uncertainty from traditional bonds and mortgages.

Overfunding and Contingent Immunization

If the corporation's management wants to maximize or at least maintain the value of shareholder wealth, why should they choose to fund the pension plan, and why

sponsor's own shares in this case.

⁶See, for example, Bodie, Kane, and Marcus [1989], page 564.

⁷The only exception to this rule is the special case considered by Sharpe [1976] and Treynor [1977] where the shareholders own 100% of the pension fund surplus. In that case shareholders' equity is unaffected by the pension fund asset mix.

⁸See Leibowitz [1986].

should they invest in anything but securities that exactly hedge the ABO liability? There are at least four reasons why firms fund their defined benefit pension plans.

First, there are minimum standards imposed by law. The purpose of these standards is to insure the promised pension benefits against the risk of default by the corporate sponsor and to protect the government (and therefore the taxpayer) from abuse of the insurance provided by the government. Recent changes in the law have made the insurance premium charged by the PBGC a function of the degree of underfunding and eliminated the possibility of voluntary termination of an underfunded pension plan.⁹

Second, there are big tax incentives for plan sponsors to fund their DB plans. Black [1980] and Tepper [1981] have shown that the tax advantage stems from the ability of the sponsor to earn the pretax interest rate on pension investments. To maximize the value of this tax shelter, it is necessary to invest entirely in assets offering the highest pretax interest rate. Because dividends from investment in common and preferred stock are taxed at a much lower rate than interest on bonds, corporate pension funds therefore should invest entirely in taxable bonds and other fixed-income investments. Recent changes in the tax laws have reduced the ability of pension plans to overfund, but sponsors still are allowed to make additional tax-qualified contributions as long as pension assets are less than 150% of the current liability.¹⁰

Third, funding its pension plan provides the sponsoring corporation with financial "slack" that can be used in case of possible financial difficulties the firm may face in the future.¹¹ Because the law still allows plan sponsors facing financial distress to draw upon excess pension assets by reduced funding or, in the extreme case, voluntary plan termination, the pension fund effectively serves as a tax-sheltered corporate contingency fund.

Finally, PBGC insurance covers only a portion of the promised benefits for the highly compensated plan participants. Funding provides a cushion of safety for this group, which includes top corporate management.¹²

If the pension fund is overfunded, then a 100% fixed-income portfolio is no longer required to minimize the cost of the corporate pension guarantee. Management can invest surplus pension assets in equities, provided it reduces the proportion so invested when the market value of pension assets comes close to the value of the ABO.

Such an investment strategy is a type of portfolio insurance known as contingent immunization.

⁹See Utgoff [1988].

¹⁰The relevant law is the Omnibus Budget Reconciliation Act (OBRA) of 1987.

¹¹See Bodie et al. [1985] for a more complete discussion of the financial slack motive for funding a pension plan.

¹²See Light and Perold [1987] for a more complete discussion of this point.

Why Invest in Equities?

If the only goal guiding corporate pension policy were shareholder wealth maximization, it is hard to understand why the pension fund would invest in equities at all. A policy of 100% bond investment would both maximize the tax advantage of funding the pension plan and minimize the cost of guaranteeing the defined benefits.

Yet we know that in general pension funds invest from 40 to 60% of their portfolios in equity securities. There are at least three possible explanations.

The first is that corporate management views the pension plan as a trust for the employees and manages fund assets as if it were a defined contribution plan. It believes that a successful policy of investment in equities might allow it to pay extra benefits to employees and is therefore worth taking the risk.

The second possible explanation is that management believes that through superior market timing and security selection it is possible to create value in excess of management fees and expenses. This is usually stated as reducing pension costs through superior investment performance. Many executives in nonfinancial corporations are used to creating value in excess of cost in their businesses. They assume that it can also be done in the area of portfolio management. Of course, if that is true then one must ask why they do not do it on corporate account rather than in the pension fund. That way they could have their tax shelter "cake" and eat it too.

The third possible explanation is that management has a mistaken view of the suitability of equity securities as a hedge. Some plan sponsors and money managers think that investing in equities provides a hedge against inflation.

While it is certainly true that stocks provide a higher expected return than bonds or cash, there is considerable evidence that equities do not provide a hedge against inflation in the conventional sense of offering a return that is highly positively correlated with inflation. Indeed, the correlation between common stock returns and inflation appears to be small and with the wrong sign.¹³ Therefore, even if one views corporate DB pension liabilities as inflation-indexed, it does not follow that corporate sponsors can use equities to hedge.

Underfunding, PBGC Insurance, and Pension Investment Policy

Even without PBGC insurance, an underfunded pension plan has less of an incentive to immunize than a fully-funded plan. This is because the sensitivity of the value of the corporate pension guarantee to the volatility of the fund's investment portfolio is greatest when the ABO equals the value of the pension assets. BGC insurance creates an additional incentive for an underfunded pension fund to invest in risky assets. Briefly, the PBGC's insurance of pension benefits in effect gives the sponsoring firm a put option. The value of this PBGC put increases with the risk of the underlying asset.

Before OBRA, even healthy firms with underfunded pension plans had some

¹³See Bodie [1976].

incentive to exploit this PBGC put by voluntarily terminating an underfunded plan.¹⁴ OBRA has eliminated this possibility. Firms in financial distress, however, still have an incentive to invest pension fund money in the riskiest assets, just as troubled thrift institutions insured by the Federal Savings and Loan Insurance Corporation (FSLIC) have had similar motivation with respect to their loan portfolios.

Pension Fund Investment Policy in Practice

Recent trends in pension asset allocation are broadly consistent with the notion that they want to hedge the ABO. Some pension funds pursue immunization and contingent immunization strategies openly, often using stock index futures. Others accomplish a similar result through stop-loss orders and similar trading techniques in the stocks themselves.

The widespread practice of writing covered call options can be interpreted as evidence that pension funds want to convert some of their investment in corporate equities into debt. By writing a call option on an appropriate stock market index, a pension fund can effectively transform a portfolio of stocks into a portfolio of corporate bonds maturing at the expiration date of the option.

Berkowitz and Logue [1986] found that the average risk-adjusted performance of ERISA plans from 1968 to 1983 was lower than returns experienced by other diversified portfolios in U.S. financial markets. This could be interpreted as evidence that pension funds pursue contingent immunization strategies. The difference in return is in effect an insurance premium for avoiding downside risk. Berkowitz and Logue also found that there was more reallocation among stocks, bonds, and cash equivalents in DB pension plans than in the control group. This too can be interpreted as evidence of the dynamic hedging involved in implementing the most popular portfolio insurance strategies.

The failure of pension funds to show any significant interest in inflation-protected investment products such as the CPI-linked bonds and CD's issued by Franklin Savings Association and other financial intermediaries is additional evidence that they do not view their liabilities as indexed for inflation.¹⁵ In the U.K., pension plans that offer automatic inflation indexation of benefits (COLA's), take positions in index-linked Treasury bonds to hedge these liabilities. If pension plans in the U.S. viewed their liabilities as indexed for inflation, they too would have a demand for inflation-linked securities offering a risk-free real rate of return. We would observe immunization strategies being implemented using securities denominated in real rather than nominal terms.

Future Trends

Recent changes in accounting rules (FASB Statement 87) and tax law are likely

¹⁴See Harrison and Sharpe [1983].

¹⁵For a description of CPI-linked investment instruments see Bodie [1988].

to reinforce immunization strategies. FAS 87 gives corporate officers concerned with the adverse impact of an unfunded ABO on the corporate balance sheet a greater incentive than before to hedge against interest rate risk.

Two of the provisions of the Omnibus Budget Reconciliation Act of 1987 are relevant. The first is the strengthening of the claim of the PBGC on corporate assets for underfunded pension plans. This eliminates some of the incentive for such corporations to take risks with the assets in the pension plan and thereby increases the proportion invested in fixed income securities.

The second relevant provision of OBRA is the imposition of strict funding limits on pension plans. If pension plans gradually become less overfunded, the cost of providing benefit guarantees will become more sensitive to the proportion invested in equities. Plan sponsors will therefore have an incentive to invest more in fixed-income securities.

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