

## Defining and Managing Pension Fund Risk

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### Summary

The way we deal with risk depends on how we define it. This is often a more complicated task than appears. Risk is such a many-headed monster that selecting the right head to strike at can be a big challenge.

Corporate executives have traditionally defined pension fund risk in terms of a trade-off between risk and return on the assets built up against their fund obligations. But assets do not exist in a vacuum, seeking return and avoiding risk for their own sake. When this may seem obvious when expressed in so many words, for U.S. investors it has taken the arrival of the Financial Accounting Standards Board ruling 87 to bring the variability of pension fund liabilities to front and center.

Because a primary goal of accounting procedures is to provide interested parties with consistent and reliable information about the resources the corporation has to meet its liabilities, FASB 87 focuses on the pension fund surplus - the difference between the plan's assets and its liabilities. The result, from an investment policy standpoint, is belated awakening to the simple ideas that the assets must have some systematic relationship to the character of the liabilities they fund. Implications for asset allocation management can be profound.

## Résumé

### Définition et Gestion du Risque de Fonds de Retraite

La façon dont nous traitons le risque dépend de la façon dont nous le définissons. C'est là souvent une tâche plus compliquée qu'il y paraît. Le risque est un tel monstre à plusieurs têtes que choisir la bonne tête sur laquelle frapper peut relever du défi.

Les cadres d'entreprise ont traditionnellement défini le risque de fonds de retraite en fonction de l'échange entre risque et rendement des actifs constitués contre leurs obligations de fonds. Mais les actifs n'existent pas dans un vide, à la recherche du rendement et évitant le risque pour leur propre bien. Bien que cela semble évident lorsqu'exprimé d'une façon aussi explicite, pour les investisseurs américains, il a fallu attendre l'arrivée de l'ordonnance 87 du Conseil des Normes de Comptabilité Financière (FASB 87) pour mettre au premier rang et dans le point de mire la variabilité des engagements du fonds de retraite.

Etant donné qu'un des objectifs primordiaux des procédures comptables est de fournir aux parties intéressées des informations cohérentes et fiables sur les ressources dont dispose l'entreprise pour faire face à ses engagements, FASB 87 se concentre sur l'excédent du fonds de retraite - la différence entre les actifs du plan et ses engagements. Le résultat, d'un point de vue de politique d'investissement, est la réalisation tardive de l'idée simple selon laquelle les actifs doivent avoir une certaine relation systématique avec le caractère des engagements qu'elles financent. Les implications pour la gestion de la répartition des actifs peuvent être profondes.

The major concern of fund sponsors has been the variability of the value of fund assets, which have always been marked to market. With equities traditionally accounting for the largest share of the assets, and with the present value of the liabilities determined by administrative and actuarial decisions, this focus on asset variability made sense.

FASB 87 stipulates that the interest rate employed to calculate the present value of the liabilities is no longer the actuary's province. Market interest rates must now serve that purpose, which means that the present value of bond liabilities will henceforth tend to vary more widely than it has varied in the past.

Now that liabilities, too, will swing with the vagaries of the market, pension fund risk will shift from the variability of the assets alone to the variability of the surplus. The interplay between asset values and liability values becomes a critical variable.

Most corporations, therefore, may be shifting the definition of pension fund risk in response to FASB 87. But they should not yield to the temptation to oversimplify that definition of risk. This would lead to an inappropriate restructuring of the pension fund in terms of the true as opposed to the accounting-defined risks of the pension plan. The oversimplification arises from too much attention to the interest sensitivity of the pension surplus, a result of FASB 87's emphasis on defining the surplus in terms of the interest sensitivity of the fund's liabilities.

These new considerations have a great impact on profitability and financial health. Pension fund assets have grown to a point where they often make up the bulk of a company's total assets. The variability and rate of return of the pension assets affect the bottom line. Under FASB 87, the pension assets' relationship to the liabilities may appear on the published balance sheet as well. So senior management has an obligation to give the pension fund as much attention as any significant operating division. The focus should be analysis of fund decisions in the

context of potential long-term returns measured against the impact on corporate risk.

#### Old and New

As pension funds began to assume importance among corporate assets over the past quarter century, pension portfolio management concentrated on the trade-off between the expected returns on their investments and the market volatility of those returns (that is, the risk). The idea was to maximize the return consistent with some control over the magnitude of year-to-year, and sometimes even quarter-to-quarter, variations in the rate of return. Volatility was of concern for three reasons:

1. Volatility tends to reduce returns over the long run. To put it simply, if you lose 50%, you have to gain 100% to break even.
2. Even if you are convinced that the assets you select can return enough to overcome the drag imposed by variability, by its very nature variability creates uncertainty about what the assets will be worth when liabilities come due.
3. Corporate managements tend to like smooth numbers. Irregularities raise questions that most people are happy to avoid.

The traditional approach, therefore, was either to seek the highest possible return at an acceptable level of volatility or to minimize volatility at any given level of expected return. This view of risk and reward appears in graphic form in *Exhibit I*, which plots the expected asset returns on the vertical axis and variability of asset returns on the horizontal axis. The array runs from cash at the low end to stocks at the high end.

Putting all your eggs in one basket is never optimal. By combining assets to reduce variability, instead of selecting just one, you can obtain more expected return per unit of risk or reduce the risk per unit of expected return. Thus diversification produces the curve that investment parlance calls the "efficient

frontier." The curve shows the best return a fund can achieve through diversification at any level of risk.

The simplicity and convenience of this approach made it very popular. In the 1970s it became, no less, an expression of the culture of the pension fund world. Evaluation of assets based on market levels fits the intuitive idea of what investing pension money is all about. Other important variables - future contributions to the fund, wage growth, and the discount rate used to calculate net present values - were all determined by the actuary and were independent of capital market movements. Their rates were seldom changed.

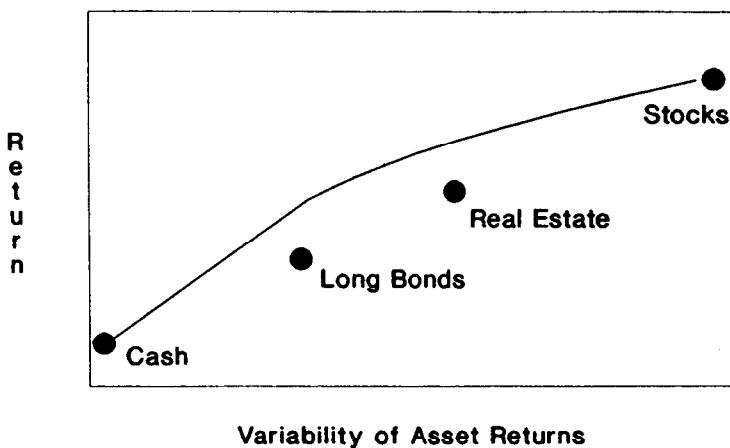
According to this view, pension plans with a low risk tolerance will locate themselves on the left-hand portion of the frontier, emphasizing long-term bonds and cash; and those willing to bear more risk in the search for higher returns will locate themselves toward the right, concentrating more on riskier assets like stocks and real estate. Where most portfolios position themselves, the slope of the efficient frontier is rather flat (see *Exhibit II*). This feature of the frontier would lead to a conclusion that most funds are very tolerant of risk because a curve with only a slight upward slope means that these funds will accept much more risk for a modest increment in expected return.

This notion of risk tolerance in search of small gains is unrealistic for three reasons:

- # Corporate pension fund sponsors, serious about their fiduciary responsibilities, tend to be prudent, careful investors, with risk tolerances ranging from conservative to only moderately aggressive. Few will accept as much risk as this diagram suggests.
- # This notion is silent on the subject of liabilities. That is, it only draws the shape of the frontier; it tells management nothing about where the pension plan should be positioned on the frontier. Organizations with mature work forces or with volatile lines of business would hardly

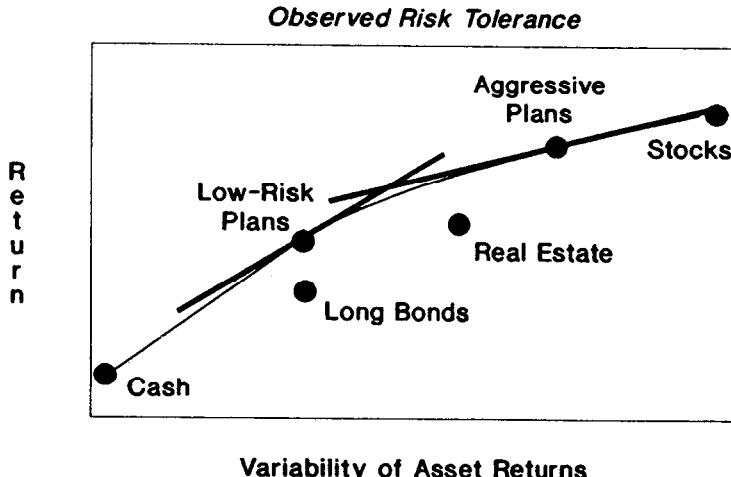
**EXHIBIT I**  
**Risk and Reward**  
**The Traditional Perspective**

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**EXHIBIT II**  
**Risk and Reward**  
**The Traditional Perspective**

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want to be on the same point of the frontier or at the same level of risk tolerance as organizations with young work forces or with stable earnings power.

- # It limits the definition of risk to variability of expected returns on assets, paying no attention to the variability patterns of the liabilities the assets are to fund. Pension liabilities are highly sensitive to many factors, including changes in interest rates.

#### Enter FASB 87

By fixing on the surplus of the pension fund - the difference between the assets and the present value of the liabilities - the new accounting ruling introduces an extra level of complexity. The value of the assets is easy enough to measure, but the liabilities are something else again. The ruling mandates the use of the market interest rates on long-term bonds to calculate the net present value of those liabilities. Formerly this discount rate was fixed and in the domain of the actuary (who still projects asset growth and wage growth).

The rationale for market-determined discount rates is simple enough. Actuarial valuations tend to lag reality. Moreover, like many other features of corporate bookkeeping, they aim at smooth changes. The capital markets are anything but smooth, but their view of the appropriate discount rate is immediate and inescapable. In addition, the markets are undoubtedly more accurate than the view, no matter how judicious, of a single individual or organization aiming to be conservative, avoiding frequent changes, and shunning disruptive numbers.

The consequence of this redefinition of risk is profound. If the objective is to maximize the excess of assets over liabilities while seeking to minimize the variability of that excess, the fund sponsor has to ask which assets best match the variability pattern of the liabilities. Since FASB 87 treats the liabilities as fixed obligations, discounted at a market interest rate, this is equivalent to asking, "Which assets act

most like long-term bonds?" The answer is obvious. As we shall see shortly, the answer is perhaps too obvious.

Immediately under FASB 87, long-term bonds become the lowest risk asset, replacing cash in that enviable spot. We redraw or risk-expected return trade-off chart accordingly (*Exhibit III*). The expected rates of return remain the same, but the riskiness of the assets has changed. In the context of the FASB 87 definition of surplus valuation, the chart tells us that any asset with variable income or whose principal value does not move closely with the bond market will be a risky asset. At the extreme, cash becomes an anathema, with its low expected return and high variability of income. Its vaunted stability of principal does us no good in hedging liabilities whose principal value can vary widely over time.

The clear implication of this shift in viewpoint is that bonds represent the risk-minimizing choice for pension funds, and at an attractive long-term rate of return. Other assets can still make sense, but at a sharp increase in risk.

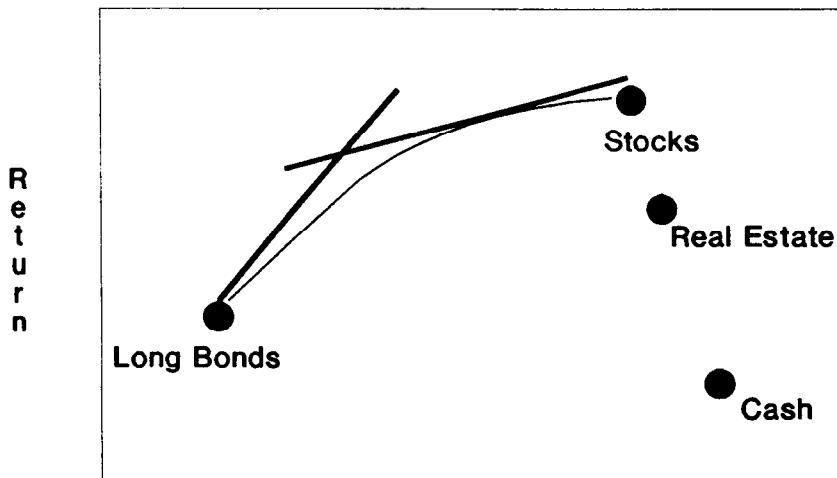
The simplicity of the analysis presented here is actually so attractive that it leads to the temptation to announce the solution of the pension fund investment problem. This is precisely the wrong conclusion to reach. FASB 87 makes it easy to take a simplistic view of pension risk. There are compelling reasons to favor other assets besides long-term bonds for many funds, though not for all.

The appropriate framework for management depends on how it defines pension fund risk. If risk is related solely to the variability in the discount rate used to calculate net present values, then bonds are the asset of choice. Any alternative must be justified only on the basis of a substantial return enhancement. When we widen the definition of risk, on the other hand, assets with variable rather than fixed-income streams can become the low-risk assets.

EXHIBIT III

'True' Risk and Reward

Risk Tolerance (New View)



Variability of Fund Surplus  
(assets minus present value of liabilities)

The critical question then becomes how to determine whether discount rate variability should be the dominant consideration in the definition of pension fund risk.

### Parsing Liabilities

The attraction of bonds is greatest where the interest sensitivity of the liabilities is highest. Or, to put it a little differently, the attraction of bonds is greatest where the dollar amount of the liabilities, like the dollar amount of the principal, is fixed. Under those circumstances, the only factor influencing the present value - and the ultimate obligation - of the liabilities is the relevant rate of interest.

The obligation to cover pensions of people who have already retired (the "retired lives," to use the popular terminology) meets this criterion precisely. This is an amount that the actuaries can estimate very accurately. Unless the corporation assumes an obligation to protect its retirees from inflation, the retired lives liability is as close to a fixed and determined sum as can be found in the universe of pension liabilities.

This is why the dedicated bond portfolio has attracted such a large following in recent years. Here was an opportunity to create an exact match between assets and liabilities. The synchronization of asset and liability present values was a pleasant by-product, but the main attraction was the elimination of risk made possibly by the use of immunization and other forms of cash-matching techniques to make a perfect fit.

"Elimination of risk" does not refer to variability as such but to the risk of having insufficient assets to meet the obligations as they come due. This is, indeed, the only rational definition of risk; everything else is a variation on that theme. When interest rates were high in the late 1970s and early 1980s, the dedication of income-matched bond portfolios to meet the obligations for retired lives (or even terminated plans) enabled corporate

management to free up pension assets for other purposes.

As it happens, the definition of total pension liabilities under FASB 87 is remarkably similar to this retired lives liability. FASB 87 defines the total pension liability as the amount to be paid to retirees and current employees assuming immediate termination of the pension plan. This is essentially the same as defining the size of an annuity to be purchased for these employees at retirement, with the size of the annuity to be determined on the basis of today's wages and today's "years of service."

This definition, as with the liability for retired lives alone, creates a fixed nominal total pension liability. The present value of the total liability, called the accumulated benefit obligation, or ABO, is deducted from the value of the pension assets to determine the pension surplus that must be reported each year under the terms of FASB 87.

Though a big improvement over the simplistic actuarial discount rate structures of the past, this model is also unrealistic once we look beyond the accumulated benefit obligation. Indeed, to some extent it is unrealistic even within the confines of that obligation as defined under FASB 87. Three problems intervene:

1. The duration of the bond portfolio may be shorter than the duration of the liabilities. That is, the flow of coupon payments and ultimately the return of principal may arrive sooner than the time needed to fully pay off the ABO liabilities, which may stretch far into the future. If the portfolio managers cannot reinvest that incoming cash at the same or a higher rate of interest than the rate paid on the original investment, the bond portfolio will fail to cover these obligations as they come due. This is known as reinvestment risk.

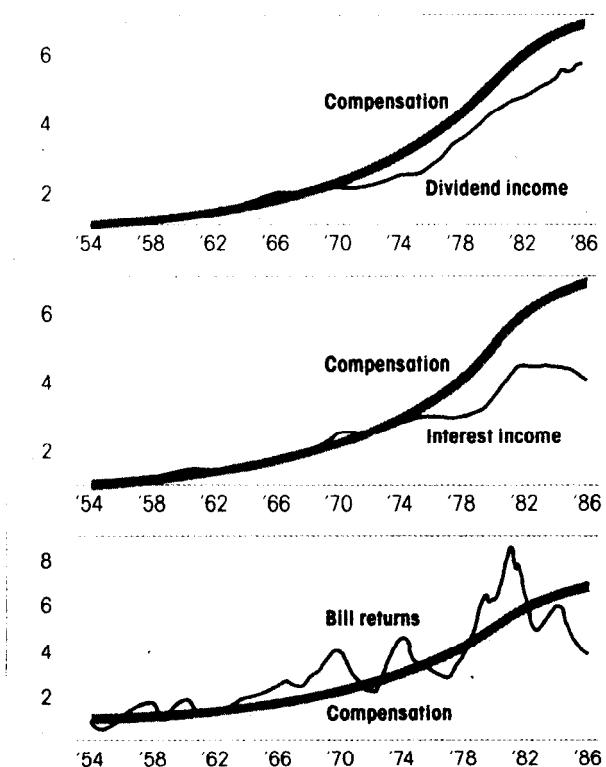
2. Many corporations give their retirees at least partial protection against inflationary inroads into their purchasing power. A pension fund invested totally in long-term bonds will clearly not address this implicit component of the liability.
3. What is most important, the assumption of immediate pension plan termination is unrealistic. The ABO ignores any growth in wages and assets between the present date and retirement, and reflects only current years of service rather than years of service at retirement. In further distortion of reality, the ABO assumes that no new workers will join the organization from today till the current work force retires. FASB 87 implicitly assumes that the future contributions will address all these extra obligations.

Add the PBO

Contrary to the limitations prescribed by FASB 87, corporate executives obviously realize that their pension liability goes well beyond the ABO. Active employees (or "active lives" in the popular nomenclature) will earn higher wages in the future - perhaps at a faster or slower rate than the actuarial assumption - and these employees will have pensions based on their final pay. Assets also may grow at more or less than the rate assumed by the actuary. The fund sponsor must add estimates of these uncertain but crucial magnitudes to the ABO to derive the true total pension liability, which is known as the projected benefit obligation, or PBO.

Many factors shape the size of the PBO. The dominant factors in wage growth are inflation, productivity change, and the fortunes of the company. Over the long run, wages tend to keep pace with changes in the cost of living, however unevenly. Workers and stockholders share much of the benefit of productivity improvement, and customers get an extra portion in the form of lower, or less rapidly increasing, prices. Even with high inflation and high productivity growth, an unprofitable company cannot keep compensation in pace with these forces; a very profitable company,

## How Hourly Compensation Fared Against Dividend and Interest Income and Treasury Bills, 1954-1986



Notes: Compensation is nominal compensation, nonfarm business sector; 1977 = 100.  
Dividend income is trailing four-quarter dividends on S&P "500."

Interest income is calculated interest on a corporate bond portfolio. The calculations assume that new money contributed each year equaled 10% of the total asset value at the end of the preceding year, including interest earned in that year. This is a rough approximation of reality. If we had treated the bond simulation like the others, without any adjustment for fresh inflows of cash, the interest income number would never have budged above 1. This is what would have happened with a bond purchased in 1954 and with no subsequent purchases at the higher interest rates that came later.

Treasury bill returns are year-over-year returns on 90-day bills. 1954:1 = 1 for both series.

however, may treat its employees even better than inflation and productivity alone would warrant.

Looking at the liabilities from this viewpoint, a 100% long-term bond portfolio may not after all be the risk-minimizing asset for hedging against the possibility of ending up with insufficient funds to meet the pension obligations. The fund managers now must seek assets, some with fixed-income returns but many with variable-income returns, whose variability closely approximates the variability of inflation and productivity change - and their effect on the liabilities of the pension fund. The managers should also seek assets that diversify the fund's inherent risks so that the company can pay its pensioners even if it falls on ill fortune before or during their retirement.

Exhibit IV shows the income flows of stocks, bonds, and cash over the past 30-odd years in relations to wage rates (nominal hourly compensation in the nonfarm business sector). The dividend income line assumes that the fund bought the Standard & poor's 500-stock composite index at the beginning of 1954 and held it through the end of 1986. Dividends failed to keep pace with the growth in hourly compensation, mostly because of a steady shortfall from 1967 through 1976. In the virulently inflationary years since then, however, dividends have just about tracked the rise in hourly wage rates.

The chart makes the mismatch between changes in bond income and wages after 1975 painfully clear. Here we dropped the assumption of just one initial investment in 1954 and assumed that new money came into the fund each year and was invested in bonds at the prevailing rate of interest. The larger the inflow of new corporate contributions compared with the pool of monies already invested in the pension fund, the more closely the interest income will keep up with inflation. Even so, bonds are clearly a miserable hedge against the inflation and productivity changes that drive wage increases.

A pension fund with a higher cash flow than we have assumed or a younger fund that was started, say, in the early 1970s (instead of in the early 1950s) would have shown better results. Note, however, that our equity graph assumed no additional influx of money after the launching of the fund in 1954. But dividends still furnished an excellent hedge against wage growth.

The Treasury bill line in Exhibit IV also assumes just one investment in 1954, which was rolled over into new bills every quarter. Here the variability of the income stream is the most visible feature. Nevertheless, the total flow of income from this hypothetical portfolio was the highest of the three, comfortably above the cumulative total of the nominal compensation curve.

Note that T-bills represent a much better fit for the incremental PBO than for the ABO. Even though cash equivalents do not fluctuate in value with the net present value of the liabilities, they do immunize well against inflation. If cash is held for retirement benefits, with income reinvested it will likely grow with inflation and hence with the magnitude of retirement benefits. If the corpus of that investment is then distributed to pay retirement benefits, rather than the income generated by the Treasury bills used to service benefits, then the bills actually represent a good fit with the incremental PBO. This fit is good, however, only from the vantage point of risk. For the long term, the reward of cash equivalents remains low. So for the incremental PBO, cash remains an unattractive asset.

Although we mean these simulations to be only suggestive, their suggestions are significant. The emphasis of FASB 87 on covariance with bond interest becomes a dangerous oversimplification when the company considers the expected incremental liabilities of the projected benefit obligation. Protection against the risk that pension fund earnings will fail to cover the PBO requires a combination of assets - like equities - whose income flow is somehow related both to the severe pressures of inflation and to productivity change.

### Hedging Risk

Treasury bills, common stock, and other variable-return assets may do a better job than bonds in hedging the long-term risks inherent in wage growth assumptions, but they have two important disadvantages. First, their income flows are too variable to fund the retired lives and too risky to fund the ABO. Second, they are only partly interest sensitive; sometimes they correlate negatively with changes in long-term interest rates. This means that they add unwanted variability to the pension fund surplus as defined under FASB 87. A central component of that surplus is the net present value of the liabilities, which are highly sensitive to interest rates.

Senior management's task in hedging pension fund risk, therefore, is to act according to the advantages and disadvantages of each type of asset. This involves employing fixed-income assets to fund fixed-dollar obligations, where the estimate of the liability is precise, and employing variable-income assets to fund variable-dollar obligations, where the estimate of the liability is imprecise.

The best way to look at this problem is to make separate estimates of the ABO and the PBO, then examine the size of the spread between the two, the incremental PBO. The more mature the plan, or the more mature the work force, the smaller that spread is likely to be. In other words, the pension liability to a mature work force can be estimated with more certainty than to a young work force. The ABO often exceeds 90% of the PBO, leading to a well-defined nominal liability.

Mature plans, therefore, will favor long-term bonds, at the expense of stocks or cash equivalents, because they offer certainty of return to cover the certainty of the liability. Moreover, long-term bonds will give the pension fund surplus maximum stability under the FASB 87 assumption that the corporation will go out of business tomorrow. Conversely, young or fast-growing companies with still small ABOs will want to hold a more aggressive asset mix having a stronger relationship to future wage growth. In such cases, equities will probably dominate.

This preference for equities is likely to be the case for reasons beyond the ability of dividends to keep pace with inflation and to reflect productivity improvements as well. Pension plans that cover young workers will start paying out big sums only in the far distant future. A match with the horizon of the liabilities reduces reinvestment risk. Equities can represent a good duration fit because the principal is never repaid and because the cash return is expected to grow with the passage of time.

So far, so good. Life is not quite that simple, however. Yet unconsidered is the conflict between the short run and the long run in pension planning as well as the difference between variability in rates of return - essentially asset price variability - and variability in flows of income on each asset. Return variability and the short-run/long-run conflicts are connected.

In the short run, stability in the pension fund surplus is important because of its impact on current profitability and the balance sheet. The framers of FASB 87 knew what they were about in forcing clarification of the influence of the pension fund on earnings and financial well-being. Over the long haul, on the other hand, the stability of the surplus is not nearly as important as its size: the corporation wants something left over to make up for reduced contributions during the periods of earning weakness. In essence, the pension plan acts as a tax-deferred savings plan (an "IRA" for the corporation, right down to the penalty for early withdrawal).

The assets most likely to ensure a surplus over the projected benefit obligation in the long run are the riskiest in the short run because they add variability to the pension fund surplus. Stocks, for example, have the clear lead for matching the attributes of the longest term liabilities, but their short term returns are highly variable and correlate only weakly with interest rates. At the other end of the spectrum, cash equivalents tend to have low yields that often correlate negatively with returns on bonds.

A positioning of investment vehicles according to the short-term view appears in *Exhibit V*. The expected rates of return are the same as in the original array in *Exhibit I*, but the positions of the investments according to risk are far different. The risks depend mainly on the sensitivity of asset returns to interest rates, because interest rates determine the net present values of the liabilities (that is, the surplus) in the short run.

*Exhibit VI* shows what happens when we introduce the incremental PBO into the deliberations and take a longer view. The variable-income assets now become less risky and the fixed-income assets become riskier. In plain English, this means that the variable-income assets increase management's confidence in their ability to fund the PBO, while bonds would not be the almost risk-free assets that they are for the ABO.

The shift in viewpoint is critical. Now we direct our attention to the ultimate size of liabilities, not just to their sensitivity to interest rates that determine only their actuarial net present values. In other words, minimizing the long-run variability of the pension fund surplus depends on the business's ability to fund the PBO rather than merely minimize the short-run variability of the ABO surplus.

Finally, *Exhibits VII* and *VIII* demonstrate the differing choices available to mature and early-growth funds. The mature fund (*VII*) would take dangerously larger risks for each increment of return if it moved very far from a bond portfolio. The fixed nature of the obligations makes anything other than fixed-income assets very dangerous. The slope of the risk/return relationship is steep on the left side in the low-risk tolerance zone where this fund belongs.

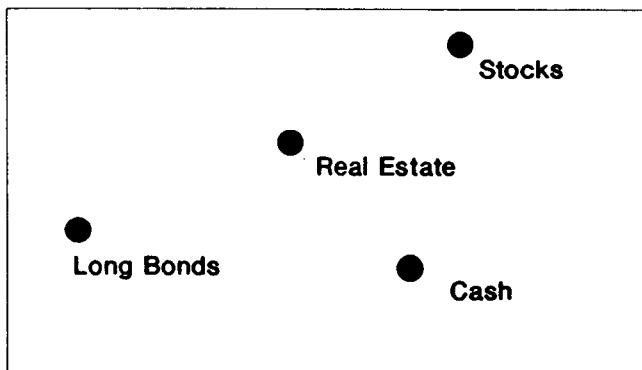
In *Exhibit VIII*, the riskiness of variable-income assets declines as we lengthen the time horizon appropriate to a younger fund, while the riskiness of bonds increases. This fund has a greater appetite for riskier securities as they are conventionally classified. It will locate itself further to the right on the efficient frontier where the slope is flatter, as befits a fund with a higher risk tolerance. Indeed,

EXHIBIT V

Risk and Reward  
The ABO

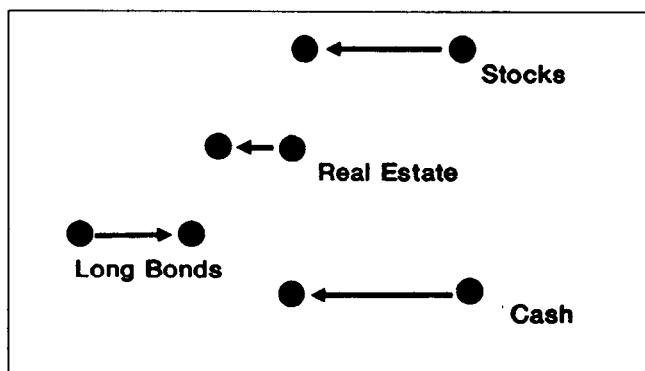
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Return



Variability of Fund Surplus  
(assets minus present value of liabilities)

Return

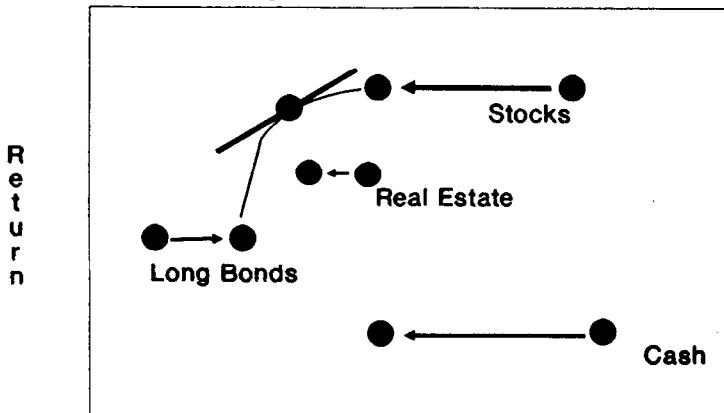


Variability of Fund Surplus  
(assets minus present value of liabilities)

EXHIBIT VII

## Risk and Reward

### The Early Growth Plan (PBO>>ABO)

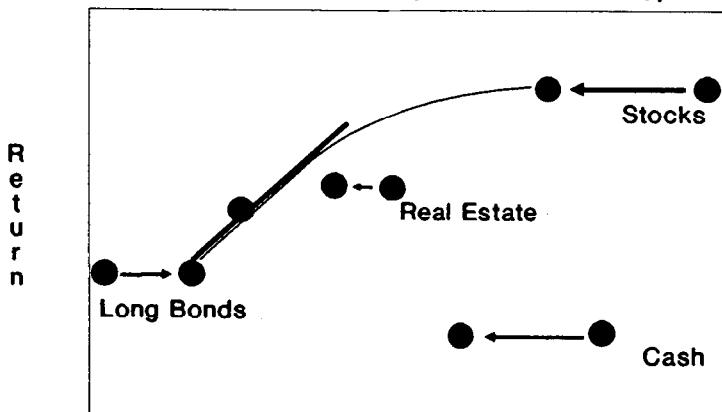


Variability of Fund Surplus  
(assets minus present value of liabilities)

EXHIBIT VIII

## 'True' Risk and Reward

### The Mature Plan (ABO Dominates)



Variability of Fund Surplus  
(assets minus present value of liabilities)

even with the same risk tolerance (measured by the slope of the risk tolerance line) as the mature plan, the younger plan would use more stocks and real estate investments in order to match the greater sensitivity of the liabilities to inflation or productivity growth.

### Focus on the Future

The most popular approach to pension risk analysis concentrates only on the riskiness of the assets themselves and ignores their correlations with the riskiness of liabilities. Fortunately, the Financial Accounting Standards Board has forced pension sponsors to weigh the liabilities as well as the assets in weighing their strategies.

Many companies, however, putting too much emphasis on the strictures of FASB 87, are looking to long-term bonds to save the day. Long bonds are appropriate for stabilizing the surplus in the short run where the net present value of the liabilities is the crucial consideration. Bonds are also appropriate where the liability estimation is highly certain, as in the case of retired lives or a pension fund for a mature work force.

But there is danger in viewing all pension funds in these terms. Sometimes sponsors are tempted to go in that direction just because of the simplicity of relating the variability of the assets to the variability of the present values. Sometimes this temptation arises from a slavish devotion to the short run, where the desire for smoothness and consistency can easily override consideration of the variability that is inescapable in getting high long-run returns.

In reality, the size of pensions the corporation pays in future years will have little to do with today's level of long-term interest rates. The company that wants to build a downstream surplus in its pension fund had better consider future as well as immediate risks.

But that warning applies to all risk management. You do not buy life insurance on a building or fire insurance on a senior executive. You do not take out a 30-year term life policy on a 55-year-old executive or a 6-month maintenance agreement on a brand-new mainframe computer. Insurance policies are matched to the nature and time horizon of the risks. The pension fund should be considered likewise in all its complexity.

#### MANAGING THE POLICY MIX

It is interesting to note that assets are often managed with little regard for the liabilities and with active decisions effected on an emotional foundation, rather than any kind of rigorous discipline. The asset allocation decision cannot be avoided. If we choose not to make an asset allocation decision, the markets will do it for us. Only two rational positions exist in regard to asset allocation. Either market efficiency is assumed to preclude profitable shifts in asset mix, or else active shifts are assumed to add value. Only a handful of investors behave in accordance with either view! How many investors allow their asset mix to float with market impulses? This is a strategy which assures heavy exposure at market highs and low exposure at market lows. How many investors were selling bonds in 1980, 1981 and 1982, during a period of peak yields? How many were bailing out of stocks in late 1974 or immediately after the 1987 crash? Such trades are hopeless attempts to escape from losses already realized. A drifting mix and ad hoc rearview mirror shifts in asset mix are not consistent with either view of market efficiency.

For those who favor the view that markets are efficient, a simple process of rebalancing can reverse the damage done by a drifting mix. A simple mechanistic rebalancing strategy solves two problems at once. First, it means that the effort invested in choosing the appropriate long-term normal policy mix (see Exhibit IX) has not gone to waste. It does so by assuring that the normal mix is maintained in a rational manner. Second, it tends to enhance risk-adjusted performance. To be sure, it does not add value in every year, or even every market cycle. But,

EXHIBIT IX: What Is Our "Policy" Asset Mix?

- I. How much exposure to illiquid or non-traditional assets is appropriate?
  - A. Real estate.
  - B. Venture capital.
  - C. Non-U.S. stocks, bonds, real estate.
  - D. Specialty categories:
    1. Limited partnerships.
    2. Energy partnerships.
    3. Timber leases.
  
- II. How sensitive are we to funding ratio considerations?
  - A. Avoiding the "four ills". Newly underfunded plans face:
    1. A new liability on the balance sheet.
    2. An earnings reduction due to a rise in pension expense.
    3. A cash flow cost due to sharply accelerated pension contributions.
    4. A cash flow cost due to increased PBGC insurance premiums.
  - B. If well funded, how do we stay there?
    1. Reduce the volatility of funding ratios?
    2. Accept funding ratio volatility in the quest for high returns, thereby sustaining the funding ratios through strong returns.
    3. What is the risk tolerance of my "customer" (likely the pension committee of the board)? Will my customer permit a long investment horizon or not?
  
- III. What mixture of stocks, bonds and illiquid assets offers the best long-term rewards, without exceeding our tolerance for risk?

over the long run, it appears to add measurably to performance.

Systematic rebalancing merits consideration for many reasons:

- # Simple rebalancing strategies do not require that the investor believe in "market timing".
- # While an investment committee may tend to frown on active asset allocation strategies, it is far easier to persuade a committee to engage in simple rebalancing. This can be an effective way to steer an organization away from the ad hoc market timing which has plagued institutional performance for many years.
- # A simple rebalancing strategy is easy to implement and need not disrupt the existing managers.
- # A rebalancing strategy will return control of the most important investment decision to the pension officer.
- # A historical evaluation of returns indicates that a rebalancing strategy adds modest value. After compounding, this modest added value can translate into significant incremental assets.

Each of these attributes of rebalancing is important and merits a detailed examination. Suppose we are skeptical about "market timing." Then, if a particular asset mix has been judged to best meet the long-term needs of the organization, a strategy which permits a drifting asset mix (or permits ad hoc shifts in mix) simply makes no sense. A skeptical view on market timing would rule out active shifts in the asset mix, based on a tactical asset allocation discipline. However, it would also rule out shifts in asset mix based on market drift or based on the whims of a pension committee. In short, a belief in the efficiency of markets would suggest a systematic strategy of rebalancing the asset mix to the target policy mix, in response to any substantive market movement.

## What Do We Do About the "Temptation to Tinker?"

One of the biggest challenges in managing institutional assets is the pressure to shift the asset mix in a reactive fashion after market movement. Such pressure inevitably is in the same direction as the recent market move. If a market has slumped, there is often pressure to slash our exposure. If a market has soared, there is a temptation to boost our exposure and to chase that market. These shifts in asset mix are often misguided efforts to prevent damage which has already occurred. One of the easiest ways to convince a committee not to engage in these ad hoc asset allocation shifts is to ask that committee to adopt a long-term policy asset mix and stick with it through systematic rebalancing. In other words, rebalancing can be an easy way to convince a pension committee not to disrupt a carefully crafted long-term policy for asset mix.

Can value be added by ad hoc changes in asset mix? Of course they can, but history suggests that most ad hoc approaches do not add value. In 1986, Brinson, Hood and Beebower looked at the 10-year results of 91 of the largest U.S. pension funds.<sup>2</sup> The results in Exhibit X demonstrate how the typical pension sponsor forfeited 66 basis points per annum through sloppy ad hoc shifts in asset mix. This is a huge difference; after 10 years, a \$1 billion portfolio, growing at 10% per annum, would be worth \$160 million more without these ad hoc shifts! Historically, shifts in asset mix tended to be based on this kind of ad hoc decision process. In Brinson's study, the sponsor benefitting the most added just 25 basis points from timing, while the most unfortunate forfeited 268 basis points per annum over the span of a decade.

Although a disciplined framework for rebalancing has results which, like any other facet of investing, cannot be foreseen, clients who embrace it for the long run appear to prevail in the end. Investment committees tend to unite in order to avoid the unfamiliar and the uncomfortable. Persuading them to subscribe to a simple systematic process of rebalancing indicates that they will employ an extended portfolio management structure, thus offering the chance to

**Exhibit X**  
**Annualized 10-year Returns of 91 Large U.S. Pension Plans, 1974-1983**

<u>Portfolio Total Returns</u>	<u>Average Return</u>	<u>Minimum Return</u>	<u>Maximum Return</u>	<u>Standard Deviation</u>
Policy Mix	10.11%	9.47%	10.57%	0.22%
Policy Mix & Timing	9.44	7.25	10.34	0.52
Policy Mix & Selection	9.75	7.17	13.31	1.33
Actual Portfolio	9.01	5.85	13.40	1.43

**Differential  
Active Returns**

Timing Only	(0.66)%	(2.68)%	0.25%	0.49%
Security Selection	(0.36)	(2.90)	3.60	1.36
Other	(0.07)	(1.17)	2.57	0.45
Total Active Return	(1.10)	(4.17)*	3.69*	1.45*

\* Column not additive.

Source: Gary Brinson, Randall Hood, and Gilbert Beebower, "Determinants of Portfolio Returns," Financial Analysts Journal (July/August, 1986).

adhere to the long-term investment policy consistently.

Let's assume that you want to maintain a policy mix of 60% stocks and 40% bonds. With the use of derivative securities (futures and options), trading costs will be minimal. It is likely that aggregate trading costs will be less than 10 basis points each way. No other trading vehicle can be traded so efficiently and economically. Indeed, it is impractical to consider ongoing active rebalancing without the use of derivative securities.

Over the 20 years 1969-1988, simple rebalancing produced an average annual return of 9.25%, 16 basis points over the results for a drifting mix. Volatility has increased somewhat. By rebalancing into the more variable-return assets in a declining market, the drifting mix stands to gain more than the portfolio.

Systematic rebalancing appears to enhance performance. But its most valuable attribute is likely the added control it gives over the asset mix of a portfolio. It will not add value in every year or even work in every market cycle. But it does appear to work over time. Interestingly, this incremental return is earned with a turnover of less than 1% per month. Maintaining a policy mix on a consistent basis is supremely boring. Yet it makes sense. A belief in market timing is not necessary, it remains constant with the view that markets are efficient, and most important, can help to persuade the decision makers to stick with the policy during unfavorable periods. Once they are committed to the idea, it is realistic to expect they will remain. Remember that the average pension fund in the Brinson study forfeited 66 basis points, not 16 basis points, due to untimely ad hoc decisions to stray from a long term policy.

### Too Much Cash!

A second element of policy mix that deserves attention is the large cash reserves maintained in most institutional portfolios. Idle cash reserves do not bear any resemblance to the liabilities served by the pension portfolio. In this context, cash can actually be a very high risk investment. For example, substantial drops in interest rates reduce income on cash earnings, and we miss the bond and stock rallies that typify such markets. Similarly, if real wages rise, the returns on cash simply will not keep pace with real wage boosts that come from an increase in productivity.

Yet, while the risk implications of cash are subtle, the return implications are not. Historically, the rate of return on cash equivalents has been less than that for stocks and bonds by roughly 6% and 1% per annum, respectively. To illustrate, cash equivalents will forfeit about 400 basis points annually on an average pension fund portfolio with a 60/40 stock/bond mix. For long term investors (and pension funds should most assuredly be long term investors), idle cash reserves produce low returns at a terrible cost in risk.

According to Federal Reserve data, some 11-15% of U.S. corporate pension holdings over the past decade have been cash equivalents. This means that many pension funds may have forfeited as much as 60 basis points per annum just due to the cost of excessive idle cash reserves. Over the past decade, if U.S. pension funds were fully invested, then their aggregate value would be more than \$100 billion greater than they are today. Endowment funds, similarly, continue to sustain large cash reserves, while still attending to commitments they hope will be lasting.

Most pension officers are not even aware of the magnitude of the problem. Few admit to cash reserves above 10%, yet Federal Reserve data suggests that the average is higher than this. The problem is simple. Cash crops up in the portfolio in many spots. Equity managers maintain idle cash reserves, as do bond managers. Cash is contributed to the portfolio and

lingers pending allocation to investment managers. The pension fund maintains a modest deliberate cash reserve in order to serve near-term pension benefits. It is the combination that represents such a huge number (and such a huge drain on investment results).

Yet, these idle cash reserves are necessary. Active stock and bond managers need cash to pounce on opportunities in the marketplace. Cash is needed to serve near-term benefits. While the cash is needed in the portfolio, it doesn't have to look like cash. Futures and options can be used to synthetically create exposure to stocks or bonds, so that a portfolio can always be fully invested.

If we believe that the markets are efficient, then we cannot justify idle cash reserves; only a fully invested portfolio can be justified. Therefore, unless we choose to adopt a tactical framework for asset allocation, and unless that tactical framework suggests the use of cash in the face of vulnerable markets, then we have a responsibility to put idle cash reserves to work. Remarkably, this is more the exception than the norm, and at a terrible cost to the institutional investing community.

*Exhibit XI* compares the rewards of disciplined rebalancing against the returns for a portfolio with a drifting asset mix and with 1% of the portfolio in idle cash reserves. As we already observed, cash reserves in the average pension portfolio are larger than this. In this example, a pension sponsor, with excess idle cash and with a drifting asset mix (not even suffering from the costly ad hoc shifts which so typify pension management), realizes returns some 33 basis points per year less than those provided by disciplined rebalancing. History suggests that the average sponsor actually does moderately worse than this.

Rebalancing and full investment of all idle cash reserves provides results which, over the long run, are measurably better than those achieved by the average pension sponsor. But, this is at the cost of somewhat more volatility. In 1974, rebalancing had us putting more and more money into a plunging equity market; worse yet, idle cash reserves performed far better than

## EXHIBIT XI

## Value Added by Rebalancing vs. a Drifting Mix

Results for Jan 1969 to Dec 1988	Drifting Mix <u>Return</u>	Rebalancing <u>Return</u>	<u>Value Added</u>
Average Return	9.09	9.25	0.16
Max Return	31.82	31.98	1.86
75th Percentile	20.12	20.59	0.52
Median	12.93	12.74	0.18
25th Percentile	1.78	2.98	0.01
Min. Return	-14.59	-15.30	-2.17
Standard Dev.	12.80	12.96	0.86
Trans. Average	0.84 % turnover/month		

## SUMMARY OF ANNUAL RETURNS

<u>Year</u>	Drifting Mix <u>Return</u>	Rebalancing <u>Return</u>	<u>Value Added</u>
1969	-6.86	-6.68	0.18
1970	7.24	7.36	0.12
1971	13.25	13.52	0.27
1972	13.40	13.41	0.01
1973	-13.17	-12.67	0.51
1974	-14.59	-15.30	-0.71
1975	22.23	24.10	1.86
1976	20.34	20.59	0.25
1977	-4.94	-4.92	0.02
1978	3.07	3.30	0.23
1979	10.01	9.57	-0.44
1980	17.91	15.74	-2.17
1981	-4.67	-4.53	0.14
1982	29.04	30.63	1.59
1983	13.83	12.81	-1.02
1984	9.12	9.77	0.65
1985	31.82	31.98	0.15
1986	20.12	20.64	0.52
1987	1.78	2.98	1.2
1988	12.93	12.74	-0.19

either stocks or bonds. So the combination of rebalancing and synthetic investment of idle cash reserves hurt to the tune of 318 basis points. In 1975, the opposite occurred. Investment of idle cash reserves boosts returns wonderfully in a rising market. Rebalancing also had the portfolio move progressively out of stocks, which performed badly late in the year. The combination boosted returns by 392 basis points. In short, these disciplines make sense in the long run. They make sense because they provide an easy framework for enforcing a "buy low, sell high" asset mix into the overall portfolio process.

#### CONCLUSION

One of the most dangerous, and regrettably common, misconceptions about asset allocation is that the asset mix decision is a single decision. Indeed, it is not. The appropriate asset mix for today is dependent not only on market opportunities today, but also on our strategies for the long-term.

The first critical step is the assessment of the appropriate policy for asset mix. What mix of stocks, bonds, cash, international assets and illiquid assets such as real estate or venture capital represents the best balance between the desire for return and the desire for containment of risk?

One often neglected reality is that a dollar made in the pension fund is worth at least a dollar of operating earnings. Arguably, it may be worth more because of the tax sheltered nature of the accumulation of assets. All too often, corporations act as if this is not so. The pension officer's role is a staff function, frequently with little promotion opportunity. The irony is all too clear. Pension funds often have assets approaching or even exceeding corporate net worth. As a result, a 100 basis point improvement in the return on plan assets can be worth as much as a 100 basis point improvement in corporate return on equity.

There is no element of the investment decision process that has a greater impact on long-term aggregate plan results than the policy asset mix decision. This decision must be made with all of the

skill and wisdom that we can draw upon. History suggests that active asset allocation may offer opportunities to add measurably to portfolio returns. To do so, the active shifts in mix must be handled in a contrarian fashion.

For each element of the asset mix decision, there is no single "right" answer. Some investors should bear the risk of an aggressive asset mix policy. Others may jeopardize the competitive position of the corporation by doing so. Some organizations, particularly those with a willingness to focus on the long-term, may be in a position to seek enhanced returns through active management of the asset mix. Others may have a board of directors which is sufficiently risk averse that costly portfolio insurance strategies are necessary. The intent of this paper has not been to provide answers, but to provide a roadmap which may be useful for the pension sponsor to find their own answers.

1. This paper is drawn in large measure from the "Right Way to Manage Pension Fund Risk," by Robert D. Arnott and Peter L. Bernstein, Harvard Business Review, January/February 1989, and the "Managing the Asset Mix," by Robert D. Arnott, from Pension Fund Investment Management, edited by Frank J. Fabozzi.
2. Gary Brinson, Randall Hood, and Gilbert Beebower, "Determinants of Portfolio Returns," Financial Analysts Journal (July/August, 1986).