Policy Analysis
No. 523 August 24, 2004

Routing

How to Reduce the Cost of Federal Pension Insurance

by Richard A. Ippolito

Executive Summary

The Pension Benefit Guaranty Corporation, the federal agency that insures private-sector defined-benefit pension plans, had a surplus of $9.7 billion at the end of 2000 but a deficit of $11.2 billion at the end of 2003. Pension plan underfunding stands at more than $350 billion, which increases the likelihood that more pension plans will go under and taxpayers will eventually be called upon to provide a bailout.

The reasons for the PBGC's financial difficulties can be found in the structure of defined-benefit pension plans and in the way Congress set up the premium rules when it created the program in 1974. First, because the PBGC stands as the ultimate guarantor of companies' pension liabilities, plan sponsors have an incentive to invest their assets in equities rather than fixed-income securities of the same duration as the liabilities. Second, funding rules allow companies to make gradual contributions to their pension plans in the event of underfunding, which guarantees long-term exposure for the PBGC. Furthermore, when faced with higher contributions, companies have usually appealed to Congress to reduce the underfunding that they need to report, which reduces contribution requirements.

Unfortunately, Congress has failed to adequately address the problems of the PBGC. In temporary legislation passed in April 2004, Congress reduced the required contributions companies must make to their defined-benefit pension plans by an estimated $80 billion over two years by changing the formula used to calculate pension liabilities. Congress also provided additional relief of approximately $1.6 billion to steel and airline companies with heavily underfunded pension plans.

Rather than place the PBGC on sounder financial footing, those measures will likely worsen the agency's financial condition. For that reason—and to reduce the likelihood that taxpayers will have to bail out the PBGC—when Congress revisits this issue in two years' time, it should adopt legislation that contains the following provisions: First, it should enforce the current premium rules so that companies do not avoid paying premiums to the PBGC if their plans are underfunded. Second, it should modify those rules so that premiums are truly risk based. Finally, Congress should allow pension insurance to be offered independent of the PBGC in the private sector or through a self-insurance pool whose members would be jointly responsible for any deficits their plans created.

Richard A. Ippolito (richardippolito@msn.com) is the former chief economist at the Pension Benefit Guaranty Corporation.

CATO INSTITUTE

In 2003 the PBGC reported a deficit of $11.2 billion, a number 75 times higher than the originally anticipated annual premium level.

Introduction

In 1974 Congress established the Pension Benefit Guaranty Corporation as part of the Employee Retirement Income Security Act. The PBGC's task is to insure defined-benefit pension plans that are underfunded at the time of the plan sponsor's bankruptcy (see Appendix for definitions of pension terms). Some analysts have argued that the Studebaker bankruptcy in 1964 was the root of the PBGC insurance program, though its enactment was stalled until the economic downturn of 1973–74.[1]

Because Congress had little idea of how much the insurance would cost, it set a premium equal to $1 per participant. Had that premium been assessed in 2003 (adjusted for inflation), it would have generated about $150 million. Because of various increases along the way, premiums in 2003 actually were almost $1 billion. Yet in 2003 the PBGC reported a deficit of $11.2 billion, a number 75 times higher than the originally anticipated annual premium level. Moreover, under current conditions, the possibility exists for the deficit to get dramatically higher, in which case taxpayers will almost certainly be called upon to bail out the system.

This paper illustrates the nature of the insurance provided, explains the factors that make it expensive, and demonstrates its potential to suffer catastrophic losses. Legislation recently passed by Congress (H.R. 3108) will make matters even worse by offering funding relief largely to single-employer pension plans and additional relief to airlines and steel companies. That need not be the case, as pension insurance can be altered to eliminate most of the variance in financial outcome and to reduce the incentives companies have to engage in moral hazard behavior against the PBGC. That result can be brought about by transforming the federal insurance program into a true self-insurance pool.

This paper focuses on the major program operated by the PBGC, namely, the single-employer program, which is comprised of companies that offer defined-benefit pension plans to their employees.[2] Although the PBGC is involved in an "endgame" in the sense that virtually no new defined-benefit plans have been established in more than 10 years and those plans are clearly losing market share to defined-contribution 401(k) plans, an appreciation of the PBGC's problems is germane for two reasons: First, the defined-benefit plans that remain are disproportionally union plans.[3] Those plans, typically underfunded, are responsible for the lion's share of the underfunding and the PBGC's claims experience. Second, although the PBGC covers only defined-benefit plans, the Enron debacle of 2001, in which many employees had their 401(k) balances erased because they overinvested in company stock, could be the Studebaker of 401(k) plan insurance. In other words, pressure could mount on Congress to establish a PBGC for defined-contribution pension plans. But the defined-benefit experience speaks loudly about the likely costs of pursuing such an insurance program.

The Economics of Defined-Benefit Pensions

In a defined-benefit plan, the employer makes a promise to pay workers a benefit at retirement age. A typical plan might pay an annuity starting at retirement equal to 1.5 percent times years of service times final wage. Thus the indexing of the pension to the final wage makes it important for workers to stay with the company. Let's examine why.

The Cost of Quitting

If a worker quits a company before becoming eligible for retirement, his wage for the purposes of the pension he receives from that company is frozen at whatever level it is at the time of his departure. Although he can earn future pension service credits with another company, his pension with his old company will be proportional to the wage he earned at the time he left, not the wage he would have

earned at retirement had he stayed at that company.

For example, consider a 40-year-old employee with 20 years of service who earns $40,000. Suppose that retirement age is 60 and his pension pays 1.5 percent per year of service times final salary. Over the next 20 years, he expects his salary to increase with inflation plus some real factor. If those amounts together are expected to be 6 percent per year, his expected wage at retirement is $128,285.[4] His expected pension annuity, *based on the 20 years of service accumulated to date*, would be $38,485.[5] The present value of this annuity is his "ongoing" pension benefit.

If, on the other hand, the worker quits now, his final salary is $40,000. Thus his annuity starting at age 60 based on the same 20 years of service is $12,000.[6] The present value of that amount is his "termination" pension benefit. The difference between his ongoing and termination pension benefit is the "pension capital loss" from quitting. The worker in this example has a strong incentive to stay, because if he quits he loses about two-thirds of his pension benefits.

Calculation of the present value of such pension benefits and losses is straightforward. Figure 1 shows ongoing (solid line schedule) and termination (bowed schedule) lifetime benefits as a percentage of current annual wage for workers at every tenure level. The figure assumes that every worker starts work with the company at age 30, plans to retire at age 60, and has a 20-year life expectancy after retirement. It also assumes that the interest rate and wage growth together are 6 percent. The vertical difference between these two schedules shows the pension loss from quitting as a percentage of current wage at various levels of service.

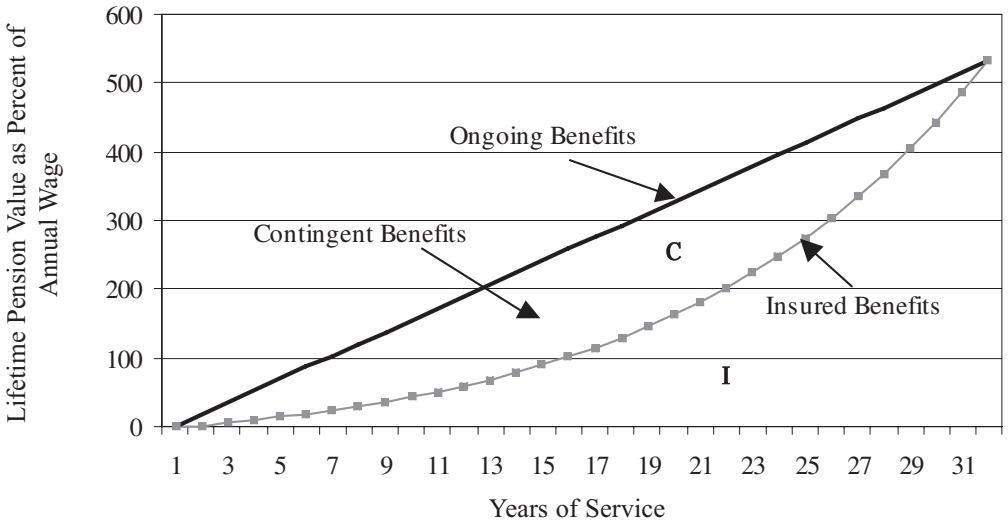
Absolute dollar losses are relatively small at short tenure because workers have not accumulated much service. Those losses become large midcareer as workers accumulate more service but still earn a wage that is substantially lower than their anticipated wage at retirement. As workers approach retirement, the wage converges to the retirement wage, which reduces the size of the capital losses for the worker.

A worker in midcareer has a strong incentive to stay, because if he quits he loses about two-thirds of his pension benefits.

Pension Consequences of Bankruptcy and Termination

Workers as a group have a stake in the financial success of a firm. If a firm encoun-

Figure 1
Ongoing vs. Termination Benefits



ters financial difficulty, it sometimes terminates its pension plan, an outcome that is even more likely in the event of bankruptcy.[7] Upon a termination, the employees are entitled to their pensions, but, for the purposes of calculating their pension benefits, they are locked into the wage they earned on the day of termination. In effect, workers' termination benefits are the same as those described by the bowed schedule in Figure 1.

Presumably, if a firm is successful, the plan will not terminate, and workers will receive the full value of their ongoing pension benefits. If a firm encounters sufficient financial stress, however, it may terminate the plan and pay workers their termination benefits. We can think of the difference between ongoing and termination liabilities as "contingent benefits."

For illustration, suppose that the plan depicted in Figure 1 has one worker at each service level. Upon a termination, workers absorb the losses denoted by area C. Those are called contingent benefits because they are payable only if the firm survives and the plan is not otherwise terminated. If a plan sponsor has sufficient assets in the pension plan to cover termination benefits—that is, the amount denoted by area I—the plan is fully funded and there is no claim against the PBGC. If the bankrupt sponsor has assets that are less than that amount, the PBGC makes up the difference. The PBGC can try to recover those losses in bankruptcy court, but typically the agency recovers less than 10 cents on the dollar. (Although insured benefits are sometimes a bit less than termination benefits, the two concepts are so closely related that we can safely ignore the differences for our purposes.)

The PBGC's exposure is sensitive to nominal interest rates.

Factors That Affect PBGC Losses

Three factors explain the underfunding exposure of the PBGC. First, some union plans, by construct, are persistently underfunded even in the best of economic conditions. Second, the insurance program guarantees nominal (not real) pension benefits, which means that the PBGC's exposure is sensitive to nominal interest rates. And third, although plan sponsors can eliminate the effects of interest rate volatility by holding fixed income securities, they typically do not. Instead, they hold large amounts of equity securities, which ensures dramatic increases in underfunding in economic downturns, precisely when bankruptcy rates are highest. I consider each of those factors in turn.

Persistent Underfunding

Many plans (notably those covered by collective bargaining agreements) are typically underfunded for insured benefits (plan assets are less than the amount depicted by area I). That is because they are "flat-benefit" plans that, instead of promising a pension proportional to salary level and years of service, promise a fixed dollar amount per year of service.[8] Even if the sponsor increases the flat benefit as a result of periodic adjustments to the collective bargaining contract, the funding rules enforced by the Internal Revenue Service do not permit the sponsor to assume that benefits will increase. Each time benefits are increased, "new" underfunding is recognized and paid for gradually over a period of time.

By contrast, in salary-related plans, projected benefits automatically increase with wages, and the funding rules permit sponsors to assume wage growth. Those plans often have sufficient assets to cover the termination benefits denoted by area I in Figure 1, plus some cushion to cover some portion of contingent benefits (part of area C). Firms and union representatives could agree to transform a flat-benefit plan to a salary-related plan and thereby ensure better funding, but they mostly choose not to, which creates a large exposure to the insurer—that is, to the PBGC.

Interest Rate Effects

The value of the insurance (and the amount of PBGC exposure) also depends on

the interest rate. When Congress enacted the PBGC insurance program, it could have specified that the insurance cover a fixed percentage of ongoing benefits (i.e., *real* benefits). Instead, it set insurable benefits to something closely related to termination benefits. That means that in periods during which the interest rate is very high, the present value of the pension is relatively low. On the other hand, if interest rates become very low, the present value of insured benefits is pretty close to that of ongoing benefits.

The reason for that seeming anomaly is easy to understand intuitively. If nominal interest rates are very high, that almost certainly means that anticipated inflation is high. When inflation is high, $100 in benefits received 10 years in the future is not worth much in today's dollars. By contrast, when nominal interest rates are very low, anticipated inflation is also very low. In that case, the real value today of $100 received 10 years hence is something reasonably close to $100.

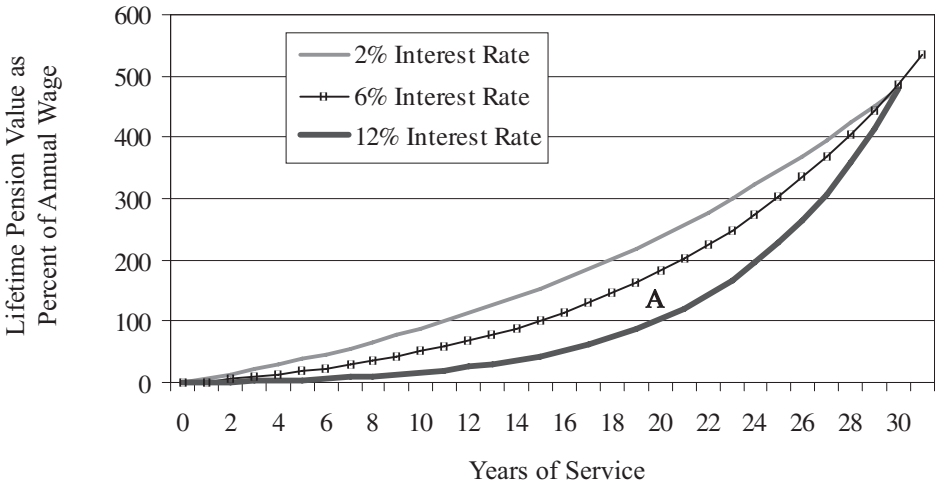
Figure 2 gives a visual representation of the importance of the interest rate in the insurance. The bowed schedule with open square markers depicts the baseline lifetime insured benefits based on a 6 percent interest rate (this schedule is taken directly from Figure 1). The lowest "more bowed" schedule shows termination benefits when the interest rate is 12 percent, and the "less bowed" schedule shows those benefits when the interest rate is 2 percent. The lower the interest rate, the higher the level of insured benefits as a portion of ongoing benefits.

Notice the importance of a reduction in the interest rate from 6 to 2 percent. Suppose that the plan is exactly fully funded for termination benefits at the 6 percent interest rate. When the interest rate falls, covered workers have more valuable insurance, because the insured amount is much closer to ongoing benefits. Area A measures the additional insured benefits. If the plan was underfunding (or exactly fully funded) prior to the change in interest rate, underfunding also increases by the amount denoted by area A.

In the short to medium term, the PBGC absorbs entirely the additional underfunding as added exposure. But the sudden increase in underfunding triggers Internal Revenue Service funding requirements that force plan sponsors to begin making up the additional underfunding. Special "Deficit Reduction Contribution" rules are in place to make funding requirements more urgent in times during which sponsors become seriously

The lower the interest rate, the higher the level of insured benefits as a portion of ongoing benefits.

Figure 2
How Interest Rates Affect Insurable Benefits



underfunded for termination benefits. That helps protect the PBGC but creates dramatic volatility in contribution requirements. As shown below, when funding rules become particularly binding, pension plan sponsors are adept at getting Congress to relax the rules, as they did in the recently passed legislation that allows them to evade the worst impact of the rules and to offload more exposure on the PBGC.

Asset Composition and the Value of PBGC Insurance

Finally, the value of pension insurance also depends on the composition of the pension plan's portfolio. At any given funding ratio, a portfolio comprised of stocks presents more risks to the PBGC than a portfolio of Treasury bonds.

A plan sponsor can protect itself against interest rate fluctuations by fully funding its pension fund with bonds of the same duration as its liabilities.

A plan sponsor can protect itself against interest rate fluctuations by fully funding its pension fund with bonds of the same duration as its liabilities. Duration is a term of art that measures the percentage change in the value of a debt security as a result of a one percentage point change in the interest rate. If a firm's pension liability has a duration of 10, then that liability increases by 10 percent in response to a reduction in the interest rate of one percentage point.

Consider a simple example. The interest rate is 5 percent. A plan promises to pay an annuity equal to $100 per annum in perpetuity, starting immediately. Akin to the notion of termination benefits, I assume that the $100 per annum obligation is fixed in nominal terms. The present value of a $100 annuity paid out each year in perpetuity is equal to the annuity amount, $100, divided by the interest rate, in this case 5 percent. If the plan sponsor purchases a $2,000 bond with no maturity date and a coupon rate of 5 percent, then the bond delivers $100 in interest payments per annum forever, which is just enough to pay the $100 pension promised per annum forever. If the interest rate falls to 4 percent, then the present value of the annuity is $2,500 (= $100/.04). In this case, the value of the liability changes by $500, or 25 percent of its value, as a result of a 1 percent reduction in the interest rate. This liability has a duration of 25.

The present value of the promised pension is higher at the lower interest rate. If the pension sponsor tried to sell the obligation to pay the annuity to an insurance company, the sponsor would have to hand over, not $2,000, but $2,500. That is because when the insurance company tries to buy a bond to fund $100 per year forever, it must buy a $2,500 perpetual bond, which at 4 percent interest yields $100 per year. That is why the market value of the liability increases from $2,000 to $2,500 upon the fall in interest rates.

If the sponsor in my hypothetical example also held a perpetuity on its asset side, then the increase in the liability value of the perpetuity is exactly matched by the capital gain on its assets. Obviously, if the interest rate falls to 4 percent, the firm can sell its 5 percent coupon rate bond at a significant premium. How much would the bond sell for?

The answer is $2,500. At this market price, the coupon rate (5 percent) times the face value of the bond ($2,000) equals $100, which is 4 percent of the $2,500 purchase price. So if the pension plan is fully funded to start with (which I assume to be the case), then it is insulated or "immunized" against interest rate risk because it has "matched" its assets to its liabilities. Because the sponsor holds a bond with the same duration as its liabilities, the increase (decrease) in the pension liability is exactly matched by the capital gain (or loss) in the bond value no matter what happens to interest rates.

In reality, there is no such thing as a perpetual annuity, nor can one purchase a perpetual bond. But the same principles of matching are unaffected (though they are made more complicated) for obligations that are more realistic.

How Stocks Create Potential Exposures

Typically, firms hold some bonds of durations matched to liabilities, but rarely do those bonds make up 100 percent of the portfolio. A more typical portfolio has 40

percent bonds and 60 percent stocks. Stock values tend to increase if the interest rate falls, but the correlation is quite weak. The normal volatility in stock returns swamps the small correlation that exists between pension liabilities and stock values.

If a plan holds a majority of its assets in the form of stocks, it is "mismatched," in the sense that it is vulnerable to interest rate risk. All else being the same, a reduction in market interest rates creates additional underfunding. The present value of promised nominal benefits increases, but the assets that back those liabilities do not necessarily do so. Firms hope that the average return on stock they hold will over time exceed bond returns, in which case they can get away with contributing less to their pension funds. On average, that reasoning is correct. But it adds considerable exposure to the PBGC.

To understand the role of stocks in the pension plan, one needs to remember that the probability of bankruptcy depends on the overall performance of the economy. Some firms enter bankruptcy during high-growth periods in the economy, but bankruptcies are far more likely during or following economic downturns.

The correlation of bankruptcy risks with poor performance of the economy as a whole generates important downside exposure for the PBGC. Consider a pension plan that holds all stock in its portfolio. In bad times, the portfolio value falls, which increases the overall amount of underfunding and the risks of bankruptcy. A pension plan that is fully funded for insured benefits with stocks is riskier than a fully funded plan with a portfolio that comprises duration-matched bonds. Consequently, it should pay the pension insurer—in this case, the PBGC—higher premiums for the additional potential exposure it creates.

For example, if a plan is fully funded with stock, a 40 percent decline in the value of that stock leaves the plan only 60 percent funded. The new underfunding triggers higher contribution requirements, but those contributions are spread over a period of time, so that the underfunding is prone to linger, particularly if, in the case of flat-benefit union plans, collective bargaining requires the sponsor to raise benefits during this period.

Although it is tempting to think that the PBGC benefits if stock returns are high, in reality, it does not. The reason is that bankruptcy risks are low when markets perform well and, if a bankruptcy occurs when a pension plan is overfunded, the PBGC does not receive a "negative" claim. The PBGC exposure is completely one-sided vis-à-vis stock performance. The sponsor wins when equity returns are high, and the PBGC stands to lose when they are low.

A plan presents essentially zero exposure to the PBGC if it is fully funded and if it holds a portfolio of high-grade corporate bonds (or Treasuries) of the same duration as its pension liabilities. Not only is the plan immunized against interest rate risk, it is insulated from stock market risks and default risks. For simplicity, assume that if the economy is "up" there is no bankruptcy risk. If the economy is "down" then the probability of bankruptcy for the typical sponsor is p. Also, assume that if the economy is "down" the equity return is minus r. Assume that any bonds in the portfolio are duration matched against liabilities. In this highly stylized illustration, the expected loss from insuring a plan for a period of time is

$$EL = pL^* \left[(1 - f) - \alpha rf\right] \geq 0 \qquad (1)$$

where α is the share of stocks in the pension portfolio, f is the starting funding ratio, and L^* are termination liabilities.

This expression tells us that the economic price of pension insurance is a product of three factors: the probability of bankruptcy, p; termination liabilities, L^*; and the funding ratio upon termination in a downturn (the term inside the square brackets). The first term inside brackets, $1 - f$, is the portion of liabilities that is underfunded at the beginning of the period. The second term, αrf, captures the subsequent effect of equity performance on exposure. A plan that is 100 percent funded at the start of the period and holds only (duration-matched) bonds presents no exposure.

The correlation of bankruptcy risks with poor performance of the economy as a whole generates important downside exposure for the PBGC.

In periods during which economic performance is poor, the PBGC runs the risk that many bankruptcies can occur within a short period.

Market Risk and Pension Insurance

Under normal conditions, ignoring the administrative costs of operating the insurance, the economic premium for any insurance coverage is expected to equal expected losses, such as those depicted in the expression above. In the case of pension insurance, however, the market price is higher. Why? The answer lies in the correlation of claims with downturns in the economy.

The backers of the insurance require a higher return to invest in the insurance for the same reason that stockholders require a higher expected return than bondholders. If all stocks moved randomly and independently of each other, then holding a diversified portfolio of individual stocks would yield an average return that had a minuscule variance. In that case, stock investors would expect a return commensurate with the return on a bond. In reality, a diversified portfolio of stocks has a very large variance because returns are correlated across stocks. That is the so-called market risk, or beta risk, which cannot be diversified away.[9]

Put somewhat differently, holders of high-quality bonds accept a lower return than stockholders because they experience less volatility in their portfolio value.[10] Stocks whose returns evince a higher amplitude than market returns (high-beta stocks) have a higher expected return than stocks whose returns have a lower amplitude than market returns (low-beta stocks). No one wants to lose a substantial portion of his portfolio in down times, and thus stockholders must earn a higher premium relative to bondholders to obtain equilibrium in the financial markets.

The same principle applies to insurance markets. When insurable events are mostly unrelated (for example, auto accident claims), average claims experience is characterized by a trivial variance, so long as the insurer covers many areas of exposure. Even if exposure is correlated, say with flood damage along the Mississippi River, the insurer can offer flood damage insurance in many different areas of the country and indeed the world and, thus, diversify away those risks across a large number of insureds (if it is unusually wet in one spot, it must be abnormally dry somewhere else).

Pension insurance claims are not only susceptible to bunching but are also (negatively) correlated with market returns. The backers of the insurance are asked to pay out large claims precisely at times during which their portfolios are falling. Investors require a premium to underwrite that kind of risk compared to other risks that are uncorrelated with market returns. Because the idea is directly related to the portfolio risks, pension insurance is said to carry beta risk.

There are two components of beta risk in pension insurance: One arises because pension funding is a function of stock performance in all plans that hold stock investments. The second arises because the probability of bankruptcy itself increases in down markets. Even if a plan holds only bonds but is underfunded, the probability that this underfunding leads to a PBGC claim is higher in down markets than up markets, and thus the insurer's loss exposure is negatively correlated with stock market returns.

The beta risk itself gives rise to the possibility of catastrophic events. In periods during which economic performance is poor, the PBGC runs the risk that many bankruptcies can occur within a short period, each characterized by abnormally low funding levels. Even under normal economic conditions, the insurer is vulnerable to a few large claims arriving by chance, or to the downturn of an entire industry. Catastrophic exposure is characterized by the possibility of severe "tail" events—that is, events with a small probability of occurring but with very large claims when they occur. The cost of this kind of coverage is hard to estimate because catastrophic events, by definition, are rare, which restricts the usefulness of historical data for projecting claims.

Illustration of the Catastrophic Event

Claims experience over the brief history of the PBGC illustrates both the catastrophic and beta risk inherent in federal pension

insurance. Figure 3 shows PBGC claims through 2003.[11] The bar columns show nominal claims (measured along the left vertical axis). The line distribution shows the two-year rolling-average equity return on the S&P 500 Index (right vertical axis).

Since 1970 there have been only two periods during which equity returns were so poor and persistent as to generate a negative two-year return. The first was 1974, which captures the stock market reduction of 1973–74 (the average return during those two years was minus 20 percent per annum). The underfunding created by this event and the corresponding increase in bankruptcy rates were important stimuli for the enactment of the federal pension insurance program on Labor Day 1974.[12]

The legislation that created the PBGC was not retroactive. It offered pension insurance against claims arising in the future. Fortunately, the post-1974 period was characterized by a dramatic reversal in equity performance. Indeed, stock returns generally were quite favorable for the insurance program throughout the 1980s and 1990s, creating the impression that perhaps the insurance was not especially costly. Though premium rates were increased occasionally, total premiums rarely exceeded $1 billion per annum, and as of year-end 2000 the PBGC enjoyed a $9.7 billion surplus position. It had not yet experienced the conditions that give rise to the catastrophic nature of the insurance, notably, a substantial downturn in the economy.

Figure 4 shows the distribution of insured pension liabilities by plan funding ratio as of the start of 2001, just prior to the stock market downturn. The figure gives little cause for alarm. Total underfunding amounted to only $31.2 billion. The figure adequately demonstrates the pitfall of gauging exposure by relying on a snapshot of funding ratios without also taking into account the potential impact of negative stock returns on pension assets. For example, U.S. Airways, which became a claim against the PBGC in 2003, was 104 percent funded in 2000 but only 50 percent funded two years later.[13]

From the time the snapshot in figure 4 was taken, equity returns fell by almost 40 percent through the end of 2002, virtually reproduc-

U.S. Airways, which became a claim against the PBGC in 2003, was 104 percent funded in 2000 but only 50 percent funded two years later.

Figure 3
PBGC Claims vs. Stock Market Returns

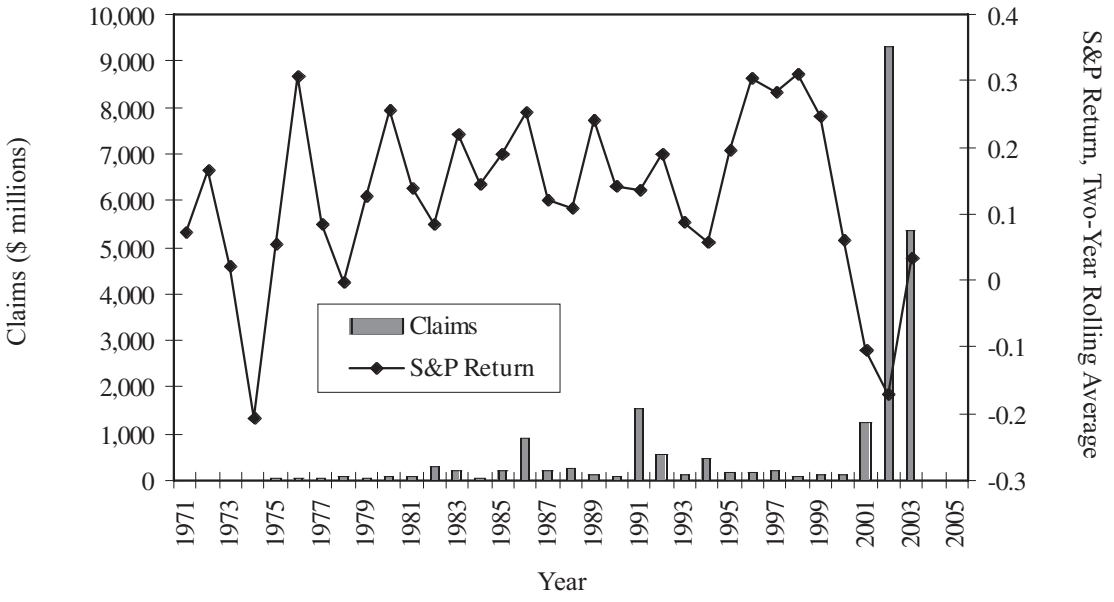
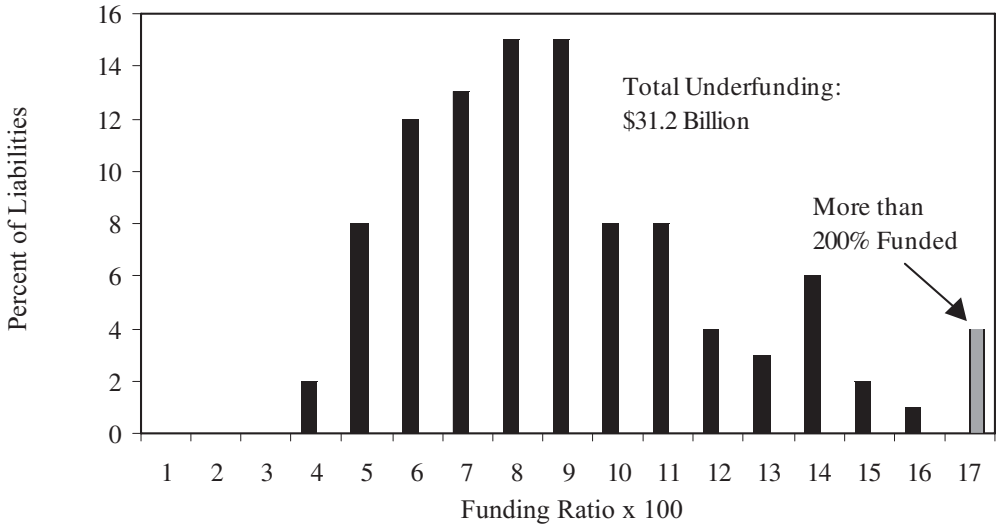


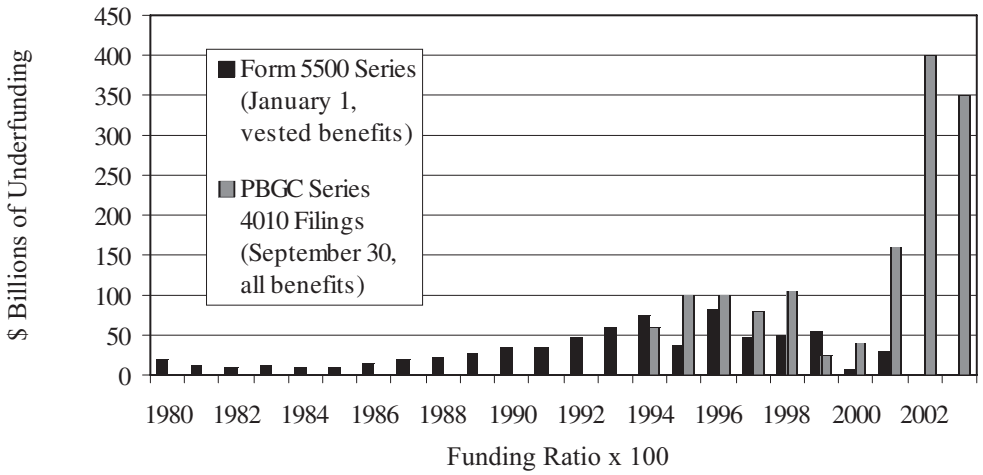
Figure 4
Funding Ratios as of 12/31/2000



Source: 2001 Form 5500 Annual Reports (Schedule B).

ing the stock market crash of 1973–74. Figure 5 demonstrates the effect of this downturn on plan underfunding. The figure shows two series of underfunding, one based on IRS Form 5500 Annual Report data and the other (since 1996) based on submissions to the

Figure 5
Pension Underfunding, 1980–2003



Note: The Form 5500 series provide funding ratios as of January 1 of the year and count vested liabilities only. Data are taken from Schedule B attachments. The PBGC series pertain to September 30 of the year and include all accrued liabilities. The PBGC obtains its data from firms that by law must divulge underfunding beyond $50 million (so-called 4010 filings). Both series are adjusted to a common mortality table and both adjust to a common PBGC rate (though the interest rates for the same year can differ because the series are calculated at two different times of the year).

PBGC made by plans with more than $50 million in underfunding.[14] Although the series evince some differences, it is apparent that pension plan underfunding increased starting in 2001 and reached about $400 billion by the fall of 2002.

Unlike its initial experience, in which the PBGC escaped with relatively few claims following the economic downturn in the early 1970s, the agency has not escaped the consequences of the stock market downturn that started in 2001. This time it has absorbed the full brunt of the bankruptcies and underfunding that accompanied the downside event (see Figure 3). Over a short time, the PBGC has accumulated $15.9 billion in claims, more than twice as much as the $6.1 billion it assumed over the entire period 1980–99 ($9.5 billion in 2003 dollars). In real terms, per annum claims during the last three years have been more than 15 times the per annum claims over all prior years.

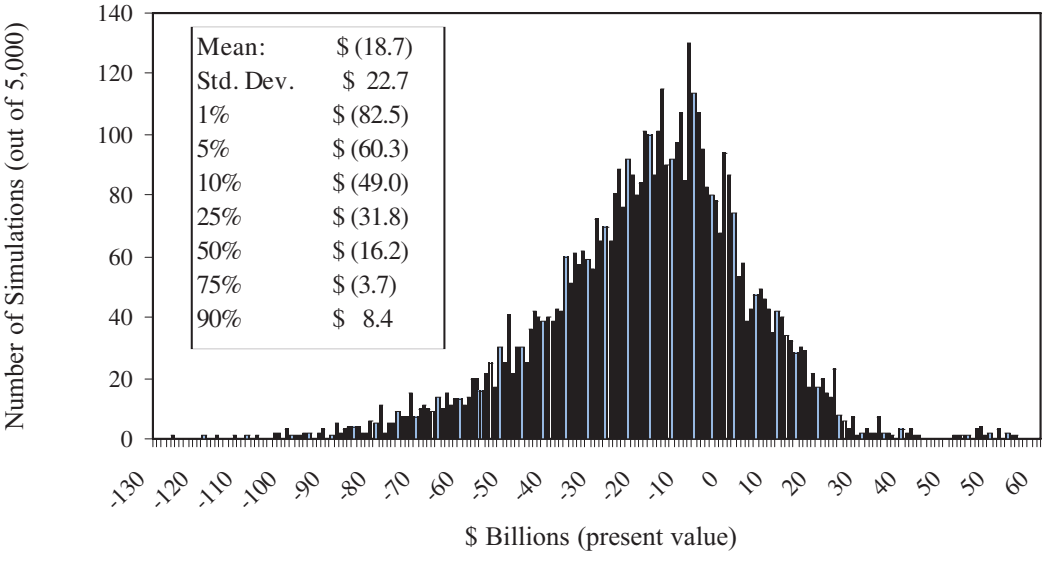
The downside event erased the heretofore mentioned $9.7 billion surplus and replaced it with a deficit of $11.2 billion as of the end of 2003, a reversal of positions of about $21 billion over the span of three years. More claims may yet materialize from this period. As of the end of 2003, underfunding stood at $350 billion, and $83 billion of that amount was in plans sponsored by firms whose bonds were rated as "junk."[15]

The PBGC's Financial Future

The future position of the PBGC depends in large part on economic conditions that unfold. Like most other catastrophic insurers, the PBGC uses a stochastic simulation model to capture the distribution of potential net financial outcomes. Essentially, when insurers lack reliable data from large numbers of observations, the insurers use information about what is known to affect losses to simulate future conditions. For example, insurance companies that cover hurricane damage use weather models to simulate thousands of possible spring hurricane seasons to determine the distribution of possible claims outcomes. The PBGC uses a com-

Future premiums are likely insufficient to even hold the PBGC deficit at current levels over 10 years.

Figure 6
Distribution of the PBGC's Financial Position in 2013 (starting position 2004)



Source: *2003 PBGC Annual Report.*

plex model that accommodates stochastic movement in stock returns, interest rates, employment changes, bankruptcy rates, and other factors to create various scenarios that could affect the agency. Typically, it bases its projections on 5,000 simulations.[16]

Figure 6 shows the distribution of projected possible outcomes in 2013 as reported in the *2003 PBGC Annual Report*.[17] The expected net position is an $18.7 billion deficit in present value terms. In other words, future premiums are likely insufficient to even hold the deficit at current levels over 10 years. The projected deficit (expressed in present value terms) is about 18 times higher than annual premiums.

The expected deficit, of course, is merely the average of all the positions that are possible 10 years hence. There is about a one-in-five chance that the PBGC will have sufficiently favorable experience to accumulate a surplus position in 10 years. There is a 10 percent chance that the deficit will be at least $49 billion, a 5 percent probability that the deficit will be at least $60.3 billion, and a 1 percent probability that it will be at least $82.5 billion.

If sponsors decline to fully fund their pensions and choose to hold stock instead of duration-matched bonds, they expose themselves to the possibility of triggering stringent funding rules upon encountering poor stock market performance.

Recent Legislation

Recent temporary legislation has worked to further weaken the PBGC's financial position by lowering sponsors' required contributions that are intended to reduce the underfunding shown in Figure 5. The Internal Revenue Service minimum contribution rules provide the PBGC's most significant defense against financial ruin. Dramatic underfunding (defined as less than 80 percent funding ratio) triggers the Deficit Reduction Contribution, which is especially helpful in reversing serious levels of exposure.

In the context of the claims history shown in Figure 3, the additional funding required in "bad times" is the primary way in which plan sponsors accept some of the beta risk inherent in the insurance. That is, if sponsors decline to fully fund their pensions and choose to hold stock instead of duration-matched bonds, they expose themselves to the possibility of triggering stringent funding rules upon encountering poor stock market performance. In a study I did with Steven Boyce, we showed that the contribution rules reduced the overall cost of pension insurance by about half, partly by reducing underfunding and partly by shifting some of the beta risk away from the PBGC and toward premium payers themselves.[18]

Although the deficit reduction rules have been in play since 1986, they have not been especially relevant because favorable stock market returns have reduced the frequency of underfunding, especially dramatic underfunding. As shown in Figure 3, the first true test of those rules came with the stock market decline of 2001–02. The decline coincided with reductions in interest rates, which themselves increase underfunding. When faced with the requirement to absorb their part of the beta problem by increasing contributions, sponsors appealed to Congress to reduce contribution requirements. In temporary legislation that lapsed on January 1, 2004, Congress reduced the funding rules by taking the normal interest rates used for this purpose—those of long-term Treasury bonds—and allowing sponsors to use rates equal to 120 percent of those rates for the years 2002 and 2003. While that measure may have reduced underfunding for the purposes of making contributions, it did not affect plans' underfunding as measured by the market.

That temporary legislation is one reason why U.S. Airways, though its funding ratio fell to 50 percent at the time that its plan became a claim against the PBGC, legally made no contributions for the four years prior to the claim date. The PBGC took a claim of $2.2 billion.[19] Similarly, Bethlehem Steel was 45 percent funded when it was taken as a claim in 2003, and yet the last calculation of underfunding for purposes of making contributions put the company at 84 percent.

In April 2004 Congress passed new temporary relief legislation (H.R. 3108). Instead of

permitting 120 percent of long-term Treasury bond rates, H.R. 3108 allows sponsors to use corporate bond rates, which are about 100 basis points higher than long-term Treasuries. Corporate rates are higher because corporate bonds have varying chances of default. Those rates are inappropriate for PBGC purposes because the PBGC would not default on its insured promises. It is widely believed that Congress will bail out the PBGC regardless of the deficit it accumulates. That guarantee means that the promised flow of annuities should be discounted by long-term Treasury rates.

Put somewhat differently, the only way an insurance company can guarantee to pay an annuity flow is to hold duration-matched risk-free bonds. Use of corporate bonds for this purpose could create the possibility of default on some part of the payments because of default risks inherent in corporate bonds.

In addition, riders to H.R. 3108 exempt plan sponsors in the steel and airline industries from most of the deficit reduction contributions that are still required from those sponsors even after the application of the higher interest rates. The estimated relief those two industries will receive from the riders is approximately $1.6 billion. Because most recent PBGC claims come from those industries, the blanket waivers impose large additional exposure on the PBGC.

How Can the Problem Be Fixed?

As long as sponsors of underfunded pension plans are not held responsible for the exposure they impose on the PBGC, ultimately either the premium level must increase, in which case some of the cost will be shifted to well-funded pensions in the short run, or, if exposures create claims that reach catastrophic levels, taxpayers will be called upon to provide a bailout through the PBGC.

Shortfalls of Premium Rules

In principle, the PBGC is supposed to collect a variable rate premium equal to $9 for each $1,000 of underfunding. But plan sponsors can avoid premiums if their actuaries claim that the plan is at the so-called full funding limit, which arises if plans contributed more than the minimum required in past years. It is not relevant if the plan continues to be underfunded. Moreover, recent legislation increased the interest rate used to calculate these premiums as well.

The ineffectiveness of the premium rules as currently enforced is starkly seen if we multiply the $9 rate against market underfunding. For example, in 2002 the PBGC calculated that, based on market values, underfunding stood at $400 billion. If it had collected 0.9 of 1 percent of that amount as prescribed by law, the PBGC would have collected $3.6 billion in variable rate revenues in 2002. In reality, total premiums equaled $787 million, of which $586 million came from a fixed assessment of $19 per plan participant. That means that the PBGC collected only about $200 million from the variable rate premium, or about $0.50 per $1,000 of underfunding, or about 5.5 percent of the advertised $9 charge.

Market Pricing through a Self-Insurance Pool

Suppose that the government terminated its role in the PBGC and required all pensions to belong to a self-insurance pool. To obtain a clean start, suppose that the federal government handed over sufficient monies to eliminate the projected mean expected $18.7 billion deficit (Figure 6). This includes $7.5 billion more than the PBGC's current $11.2 billion deficit because current conditions are most likely consistent with claims that outstrip revenues over the next 10 years. The governing board of the pool would set policy and premiums (board members in a pool arrangement would presumably be elected by pension plans, where votes are proportional to pension participants in each plan).

Sponsors in the pool are held jointly liable for any deficit that develops. That ensures that all sponsors will aggressively work to align premiums with exposure and to ensure

As long as sponsors of underfunded pension plans are not held responsible for the exposure they impose on the PBGC, ultimately either the premium level must increase or taxpayers will be called upon to provide a bailout through the PBGC.

On average, risk-based premiums move countercyclically with economic conditions.

a solvent system. As a way of ensuring the elimination of cross-subsidies, pensions should be permitted to find coverage in the private sector after some period of time. Sponsors of underfunded plans will then have an interest in reducing their reliance on payments from well-funded plans so as to keep them as a source of some help in solving the underfunding problem.

Predictably, the board would reset the variable rate premium each year (or more frequently) to reflect current economic conditions. In effect, it would set premiums each period proportional to the average probability of bankruptcy in period t, p_t, in expression (1) above. I reproduce the formula with a subscript i to denote the expected loss from the ith plan and t to denote year:

$$EL_{it} = p_t L_{it} * [(1 - f_{it}) - \alpha_{it} r_t f_{it}] \geq 0 \qquad (2)$$

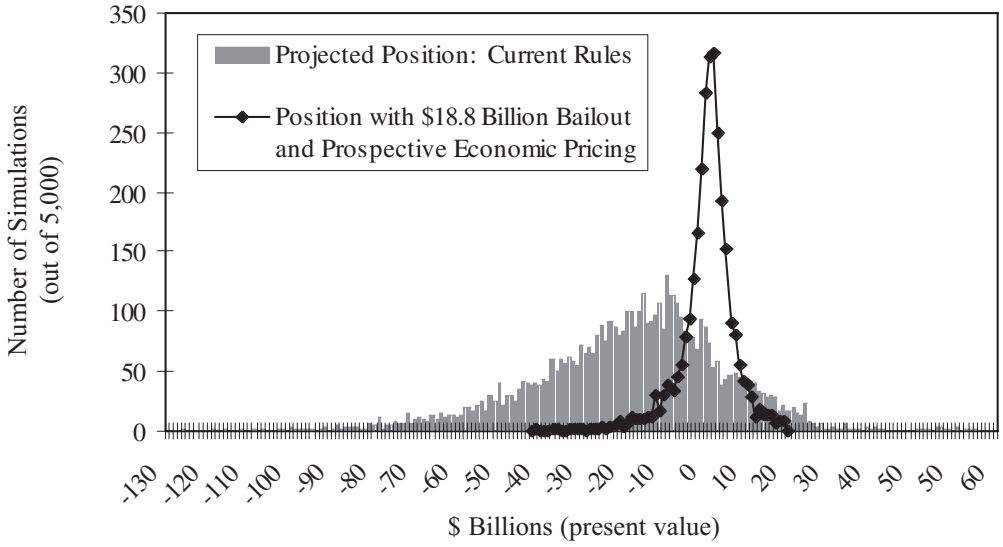
Recall that this formula assumes that the downside stock return is minus r, whereas in reality it could take on many values. Although the expression is oversimplified, it is adequate for understanding how a market premium is applied in principle.

Note that the bankruptcy risk of the particular sponsor does not enter the expression (there is no i in the subscript to p). That is because the insurance is term renewable. Just as a person's life insurance premium does not increase when he is diagnosed with cancer (in a term renewable policy), neither does the premium increase for a firm that becomes financially unstable. But just as a cancer victim is not permitted to purchase more life insurance after diagnosis, neither should a sponsor be allowed to increase benefits upon reaching a critical probability of bankruptcy. The overall premium rate, however, can increase or decrease as the overall risk of bankruptcy across all insureds increases or decreases.

In periods after poor economic performance, rates increase to reflect high expected rates of bankruptcy. The insureds themselves absorb market volatility instead of offloading it to a third party (namely, the taxpayer). In short, they absorb the beta risk. The opposite happens when market returns are high. Thus, on average, risk-based premiums move countercyclically with economic conditions.

That policy dramatically increases volatility of aggregate premiums but commensu-

Figure 7
Simulated Distribution of the PBGC's Financial Position in 2013



Source: Boyce and Ippolito.

rately reduces the volatility of the pool's potential economic conditions. The only variation in outcome is attributable to idiosyncratic risk. In periods of below-average claims, a fund builds up. In periods of above-average claims, the fund is drawn down (and temporary premium surcharges are assessed if necessary).

Steve Boyce and I simulated how insurance works under that policy.[20] Figure 7 shows that the pool arrangement would affect the insurer's projected net financial position. Notably, we eliminated the fixed charge in the PBGC pricing structure and replaced it with a variable rate premium assessed against market value underfunding. (We did not reflect charges as a function of portfolio composition.)

The bar distribution in the figure depicts the projected PBGC financial position 10 years out under current conditions (taken directly from Figure 6). The line distribution captures the outcomes when the insurance is operated as a self-insurance pool and the pool resets the variable rate against marked-to-market underfunding each period to accommodate current market conditions. The reduction in volatility brought about by aggregate economic pricing is dramatic. The outcomes under this policy have no beta risk and evince a distribution that is more compatible with a private-sector solution to the insurance problem. All that remains is a relatively small amount of idiosyncratic risk.

Reduction in Moral Hazard

If the board merely enforced a premium as described in (2), sponsors would have an immediate incentive to fund their plans. They could then reduce their premiums to zero if they fully funded their plans with duration-matched bonds. If they partially funded those plans with stocks, they could dramatically reduce their premiums if they held assets that exceeded liabilities so as to create a cushion against reductions in stock value.[21] Plans that wanted to expose the pool to lots of risk would be required to pay commensurately higher premiums. Indeed, with a well-functioning variable rate premium as described in (2), there is no need for a complex set of funding rules. Sponsors have an economic incentive to fund their plans.

Once taxpayers were removed as ultimate guarantors of the insurance, the plans themselves (and most notably the better funded plans) would have an incentive to align premiums with exposure, and plan sponsors would have to face up to the problems that their own underfunding creates.

Conclusion

Pension underfunding is entirely controllable by companies that sponsor pensions. Under current conditions, there is almost no charge for imposing exposure on the PBGC. Most of the premium revenue is a fixed charge per participant without regard to underfunding. Although the agency advertises a $9 charge per $1,000 of underfunding, in effect, through various loopholes, it actually collects only about $0.50 per $1,000. Implicitly, the taxpayer backs the insurance agency and almost certainly will be called upon to bail out the agency if it encounters catastrophic loss levels.

If mandatory pension insurance were offered in the private sector, or through a mandatory self-insurance pool whose members were jointly liable for deficits, then premiums would reflect exposure. Sponsors would learn to economize on the amount of underfunding they carry.

A large part of the problem would disappear even if the insurance were operated as it is now, with one change. Eliminate the loopholes that permit sponsors of underfunded plans to evade the variable rate premium and require sponsors to calculate market value underfunding. That change would dramatically increase revenues to the PBGC, reducing the need for a bailout and greatly reducing the level of underfunding.

Although it is hard to point to a single instance in which a federally subsidized insurance program was successfully privatized or

If mandatory pension insurance were offered in the private sector, or through a mandatory self-insurance pool whose members were jointly liable for deficits, then premiums would reflect exposure.

reformed in such a way as to eliminate cross-subsidies and federal bailout guarantees, there is a potential avenue by which the PBGC experience can seriously inform public policy on pensions. Defined-benefit plans, which are the responsibility of the PBGC, account for only about one in four covered workers in the private sector. The largest area of new pension growth is 401(k) plans. Those pensions, however, have their own potential for risks. In some cases, workers in those plans invest heavily in company stock of the firm that employs them. In the event of that company's bankruptcy, as in the case of Enron Corporation, covered workers can lose their entire pension balances. Perhaps it is prudent to think about diversification requirements for those plans before the PBGC has a new subsidiary covering nondiversified 401(k) plans.

Appendix: Definition of Pension Terms

Defined-Benefit Plan: A pension that pays an annuity at retirement age proportional to service in the company and usually proportional to final salary.

Defined-Contribution Plan: A pension into which the firm deposits some percentage of pay in workers' individual accounts; sort of a tax-preferred savings account.

401(k) Plan: A special kind of defined-contribution plan in which employees can choose to save. The firm often matches employee contributions according to some predetermined formula.

Termination Benefits: The present value of workers' accrued pension annuity earned on the basis of current service if the pension terminates immediately.

Ongoing Benefits: The present value of workers' accrued pension annuity earned on the basis of current service on the assumption that the firm will continue the pension plan.

Contingent Benefits: The difference between ongoing and termination benefits. Also known as the pension capital loss from quitting.

Underfunding: The amount of termination benefits in excess of assets in the pension trust fund.

Funding Ratio: Pension assets to termination benefits.

Duration: The percent change in the value of a bond as a result of a one percentage point change in the interest rate. A bond of duration 10 loses 10 percent of its value if the market interest rate increases by 1 percent.

Immunized Portfolio: A term used to describe a portfolio of bonds that has the same duration as pension liabilities. A fully funded immunized portfolio does not develop overfunding or underfunding if the interest rate changes.

Beta Risk: The term used to describe undiversifiable risk that is linked to the overall stock market return.

Idiosyncratic Risk: Random risk that can be diversified away.

Notes

1. James Wooten, "The Most Glorious Story of Failure in the Business: The Studebaker-Packard Corporation and the Origins of ERISA," *Buffalo Law Review* 49 (2001): 683.

2. The PBGC also operates a smaller program, which covers union workers in multiemployer plans such as the Central States Teamsters' plan. This program is also in deficit, but it is not sensitive to individual company bankruptcy risk, and so it warrants a different kind of analysis, which is not pursued here. It is vulnerable to industry risk, for example, replacement of union workers with nonunion workers at construction sites or the export of textile jobs to other countries.

3. About 50 percent of workers still covered by traditional defined-benefit plans are in plans that are collectively bargained.

4. The future value of $40,000 growing at 6 percent annually for 20 years is equal to $FV = \$40{,}000 * (1 + 0.06)^{20} = \$128{,}285$.

5. $0.015 * 20 * \$128{,}285 = \$38{,}485$.

6. $0.015 * 20 * \$40{,}000 = \$12{,}000$.

7. Terminations almost always occur in Chapter 7 (dissolution) and often accompany Chapter 11 bankruptcies as well, especially if the plan is under-

funded. If underfunding exists and the bankruptcy judge deems termination necessary to the successful reorganization of the company, the PBGC must take the plan as a claim.

8. Not all collectively bargained plans are flat-benefit plans, but virtually all flat-benefit plans are collectively bargained.

9. The nomenclature "beta risk" comes from the Nobel Prize–winning paper that introduced the idea of market risk. See William Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance* 19 (September 1964): 425–42.

10. There is of course inflation risk in bonds, but one can imagine holding I-bonds issued by the U.S. Treasury, which pay a real interest rate plus inflation. Those bonds have no inflation risks, so one expects a low return on them.

11. Historical PBGC data are found in the *Pension Insurance Data Book*, which is issued annually by the PBGC.

12. See Richard A. Ippolito, "A Study of the Regulatory Effect of the Employee Retirement Income Security Act," *Journal of Law and Economics* 31 (April 1988): 85–125. See also Wooten.

13. Air Line Pilots Association, "A Media Primer on Pensions and the Airline Industry," http://www.alpa.org.

14. The 5500 data are as of the first of the year and measure vested liabilities only. The PBGC series pertains to measures as of September 30 of the year; includes all liabilities, including unvested benefits; and is almost four years more current than 5500 data.

15. The numbers in this paragraph are found in Pension Benefit Guaranty Corporation (2004), *2003 PBGC Annual Report*.

16. The model is described in detail in Steven Boyce and Richard Ippolito, "The Cost of Pension Insurance," *Journal of Risk and Insurance* 69, no. 2 (2002): 121–70.

17. See Pension Benefit Guaranty Corporation.

18. See Boyce and Ippolito.

19. See Pension Benefit Guaranty Corporation.

20. See Boyce and Ippolito.

21. To overfund for termination benefits, flat-benefit plans may have to switch to a salary-related formula, or Congress would need to modify the tax code to permit flat-benefit plans to anticipate periodic increases.

OTHER STUDIES IN THE POLICY ANALYSIS SERIES

522. **Budget Reforms to Solve New York City's High-Tax Crisis** by Raymond J. Keating (August 17, 2004)

521. **Drug Reimportation: The Free Market Solution** by Roger Pilon (August 4, 2004)

520. **Understanding Privacy—And the Real Threats to It** by Jim Harper (August 4, 2004)

519. **Nuclear Deterrence, Preventive War, and Counterproliferation** by Jeffrey Record (July 8, 2004)

518. **A Lesson in Waste: Where Does All the Federal Education Money Go?** by Neal McCluskey (July 7, 2004)

517. **Deficits, Interest Rates, and Taxes: Myths and Realities** by Alan Reynolds (June 29, 2004)

516. **European Union Defense Policy: An American Perspective** by Leslie S. Lebl (June 24, 2004)

515. **Downsizing the Federal Government** by Chris Edwards (June 2, 2004)

514. **Can Tort Reform and Federalism Coexist?** by Michael I. Krauss and Robert A. Levy (April 14, 2004)

513. **South Africa's War against Malaria: Lessons for the Developing World** by Richard Tren and Roger Bate (March 25, 2004)

512. **The Syria Accountability Act: Taking the Wrong Road to Damascus** by Claude Salhani (March 18, 2004)

511. **Education and Indoctrination in the Muslim World: Is There a Problem? What Can We Do about It?** by Andrew Coulson (March 11, 2004)

510. **Restoring the U.S. House of Representatives: A Skeptical Look at Current Proposals** by Ronald Keith Gaddie (February 17, 2004)

509. **Mrs. Clinton Has Entered the Race: The 2004 Democratic Presidential Candidates' Proposals to Reform Health Insurance** by Michael F. Cannon (February 5, 2004)

508. **Compulsory Licensing vs. the Three "Golden Oldies": Property Rights, Contracts, and Markets** by Robert P. Merges (January 15, 2004)

507. **"Net Neutrality": Digital Discrimination or Regulatory Gamesmanship in Cyberspace?** by Adam D. Thierer (January 12, 2004)

506. **Cleaning Up New York States's Budget Mess** by Raymond J. Keating (January 7, 2004)

505. **Can Iraq Be Democratic?** by Patrick Basham (January 5, 2004)

504. **The High Costs of Federal Energy Efficiency Standards for Residential Appliances** by Ronald J. Sutherland (December 23, 2003)

503. **Deployed in the U.S.A.: The Creeping Militarization of the Home Front** by Gene Healy (December 17, 2003)

502. **Iraq: The Wrong War** by Charles V. Peña (December 15, 2003)

501. **Back Door to Prohibition: The New War on Social Drinking** by Radley Balko (December 5, 2003)

500. **The Failures of Taxpayer Financing of Presidential Campaigns** by John Samples (November 25, 2003)

499. **Mini-Nukes and Preemptive Policy: A Dangerous Combination** by Charles V. Peña (November 19, 2003)

498. **Public and Private Rule Making in Securities Markets** by Paul G. Mahoney (November 13, 2003)

497. **The Quality of Corporate Financial Statements and Their Auditors before and after Enron** by George J. Benston (November 6, 2003)

496. **Bush's National Security Strategy Is a Misnomer** by Charles V. Peña (October 30, 2003)

495. **The Struggle for School Choice Policy after *Zelman*: Regulations vs. the Free Marke**t by H. Lillian Omand (October 29, 2003)

494. **The Internet Tax Solution: Tax Competition, Not Tax Collusion** by Adam D. Thierer and Veronique de Rugy (October 23, 2003)

493. **Keeping the Poor Poor: The Dark Side of the Living Wage** by Carl F. Horowitz (October 21, 2003)

492. **Our History of Educational Freedom: What It Should Mean for Families Today** by Marie Gryphon and Emily A. Meyer (October 8, 2003)

491. **Threats to Financial Privacy and Tax Competition** by Richard W. Rahn and Veronique de Rugy (October 2, 2003)

490. **Defining Democracy Down: Explaining the Campaign to Repeal Term Limits** by Patrick Basham (September 24, 2003)

489. **EU Enlargement: Costs, Benefits, and Strategies for Central and Eastern European Countries** by Marian L. Tupy (September 18, 2003)

488. **War between the Generations: Federal Spending on the Elderly Set to Explode** by Chris Edwards and Tad DeHaven (September 16, 2003)

487. **The Balanced Budget Veto: A New Mechanism to Limit Federal Spending**

by Anthony W. Hawks (September 4, 2003)

486. **What Does a Voucher Buy? A Closer Look at the Cost of Private Schools** by David F. Salisbury (August 28, 2003)

485. **Mending the U.S.–European Rift over the Middle East** by Leon T. Hadar August 20, 2003)

484. **Replacing the Scandal-Plagued Corporate Income Tax with a Cash-Flow Tax** by Chris Edwards (August 14, 2003)

483. **Casualties of War: Transatlantic Relations and the Future of NATO in the Wake of the Second Gulf War** by Christopher Layne (August 13, 2003)

482. **Property Rights: The Key to Economic Development** by Gerald P. O'Driscoll Jr. and Lee Hoskins (August 7, 2003)

481. **The Constitutional Case against "Free" Airtime** by Laurence H. Winer (August 6, 2003)

480. **Why Subsidize the Soapbox? The McCain Free Airtime Proposal and the Future of Broadcasting** by John Samples and Adam D. Thierer (August 6, 2003)

479. **The Uses and Abuses of Structured Finance** by Barbara T. Kavanagh (July 29, 2003)

478. **All the Players at the Table: A Multilateral Solution to the North Korean Nuclear Crisis** by Doug Bandow (June 26, 2003)

477. **After Victory: Toward a New Military Posture in the Persian Gulf** by Christopher Preble (June 10, 2003)

476. **A Grand Façade: How the Grand Jury Was Captured by Government** by W. Thomas Dillard, Stephen R. Johnson, and Timothy Lynch (May 13, 2003)

475. **Demonizing Drugmakers: The Political Assault on the Pharmaceutical Industry** by Doug Bandow (May 8, 2003)

474. **Bring the Troops Home: Ending the Obsolete Korean Commitment** by Doug Bandow (May 7, 2003)

473. **Welfare Reform: Less Than Meets the Eye** by Michael Tanner (April 1, 2003)

472. **Extremist, Nuclear Pakistan: An Emerging Threat?** by Subodh Atal (March 5, 2003)

471. **Should Congress Repeal Securities Class Action Reform?** by Adam C. Pritchard (February 27, 2003)

Published by the Cato Institute, Policy Analysis is a regular series evaluating government policies and offering proposals for reform. Nothing in Policy Analysis should be construed as necessarily reflecting the views of the Cato Institute or as an attempt to aid or hinder the passage of any bill before Congress. Contact the Cato Institute for reprint permission.

Additional copies of Policy Analysis are $6.00 each ($3.00 each for five or more). To order, or for a complete listing of available studies, write the Cato Institute, 1000 Massachusetts Ave., N.W., Washington, D.C. 20001 or call toll free 1-800-767-1241 (8:30 a.m.-4:30 p.m. eastern time). Fax (202) 842-3490 • www.cato.org

CATO INSTITUTE