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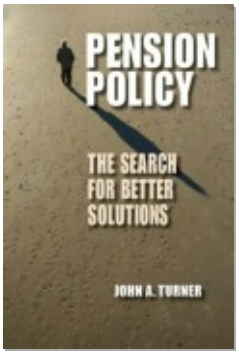

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Managing Pension Risk

Risk is a fundamental aspect of pension systems. Because pension plans promise to pay benefits at a future date, risk is inherent.[1] Some party must bear the economic and demographic risks associated with providing retirement benefits—employers, employees, insurance companies, other financial service providers, or the government. The risks include the financial market risk associated with the investments of the plans, the portability risk experienced by job changers and workers who are laid off, the interest rate risk associated with converting investments into an annuity, the longevity risk associated with the length of life after retirement, and the inflation risk for the accrual of pension benefits and pension benefits in payment.

The rules that determine benefit amounts and contributions determine who bears the risk. An employer's first decision when considering the amount of pension risk to bear, and how much to shift onto workers, is whether to provide a defined benefit plan, a defined contribution plan, or a hybrid plan. The risks plan sponsors bear may affect their willingness to offer pension plans and the types of plans they offer.

In comparing the merits of defined benefit and defined contribution plans, we should bear in mind that the choice isn't mutually exclusive. The positive features of both can be achieved simply by an employer providing both. In 2003, an estimated 14 percent of the U.S. private sector workforce participated in both an employer-provided defined benefit and an employer-provided defined contribution plan (Buessing and Soto 2006). Alternatively, hybrid plans, discussed more in Chapter 7, combine features of both defined benefit and defined contribution plans.

This chapter investigates a broad range of risks facing pension participants and plan sponsors. It considers policy options for dealing with those risks. The chapter first discusses risks arising for workers in both defined benefit and defined contribution plans. It then discusses the two types of plans separately. Finally, it discusses the Pension Benefit Guaranty Corporation, the federal government agency that insures private sector defined benefit plan benefits.

RISK IN PENSION PLANS

Inflation Risk

Inflation can be a risk for workers, as it affects the real value of their benefit accruals in some types of plans. It also affects the portability loss of job changers and workers who are laid off. However, for workers participating in defined benefit plans and for workers who annuitize their defined contribution plans, it is primarily a risk retirees face. Having a fixed annuity increases a person's exposure to inflation risk. Even a low rate of inflation considerably erodes the real value of benefits over the retirement period if benefits are not adjusted for inflation. It is unusual for U.S. defined benefit plans to provide automatic indexation for inflation, though a few do. The plans that do provide this generally provide indexation up to an annual cap, such as 3 percent per year.

Pension policy could require defined benefit plans to provide inflation-indexed benefits to protect retirees against inflation eroding the value of their benefits. While that would provide protection to long-lived retirees, particularly women, it would be expensive. In the UK, pension plans are required to do so. They were formerly required to provide indexation up to 5 percent per year; now that has been reduced to 2.5 percent per year. The reduction was made because of the costs imposed on defined benefit plans by this requirement. If this requirement were placed on pension plans and they were not permitted to adjust the generosity of the initial benefits they provided, it would considerably increase their pension costs, which in a voluntary pension system could lead to erosion in the willingness of employers to provide defined benefit plans. In the United Kingdom, it is estimated that imposing mandatory inflation indexation plus mandatory survivors' benefits raised the liabilities of final-salary defined benefit plans by 40 percent (House of Lords 2003).

A major difference between social security programs and employer-provided pensions is the protection they provide against inflation. While the social security systems in most high-income countries provide inflation protection, pension systems generally do not provide inflation-indexed benefits. They do not do so because few countries

have well-developed markets for inflation-indexed securities that could be used to provide the financial backing for inflation-indexed annuities. When inflation protection is provided on a cost-neutral basis, initial benefits are lower than they would be without such protection, while benefits received at older ages are higher because of the indexing of benefits. Chile is unusual in that it has a well-developed market for price-indexed bonds, allowing pensioners to receive benefits from price-indexed annuities.

Inflation indexing of annuities is particularly valuable for people with long life expectancy. For this reason, inflation indexing is particularly valuable for women.

Replacement Rate Risk

Replacement rate risk is the risk that workers will have a lower income replacement rate provided by their pension than expected. The income replacement rate can be measured in different ways, but in broad concept it is the percent of preretirement earnings that are replaced by retirement income. Replacement rate risk is influenced both by financial market risk, which affects the level of benefits in defined contribution plans, and by risk in the worker's preretirement earnings, which is a factor for both defined contribution and defined benefit plans.

Litigation Risk

The United States is a litigious society. Increasingly, plan sponsors face litigation risk. Plan sponsors in both defined benefit and defined contribution plans face the risk that they will be sued. In 401(k) plans, a number of lawsuits have been related to the fees that plans charge participants. Participants have also brought lawsuits regarding the investment options provided to participants and the participants' investments in employer securities in companies that eventually have gone bankrupt.

Litigation risk is tied to the fiduciary liability that employers incur based on the pension decisions they make. Litigation risk may be particularly large in the United States, given the litigious nature of U.S. society. A 2007 proposal of the ERISA Industry Committee (ERIC 2007) has signaled that employers are willing to give up control of the

investment decisions in defined benefit plans if they can also shield themselves from fiduciary risk relating to investment decisions.

RISK IN 401(k) PLANS

Workers with 401(k) plans face an array of risks, and those plans do little to protect workers from risks. Workers face capital market risks on their investments. When they do not annuitize, workers face risks as to their ability to monitor their consumption during retirement so as to not spend too quickly, and they face risks as to their own life expectancy. If they have the good fortune of living longer than they expected, they need to have annuitized income or to have saved adequate assets to cover their living expenses for the longer period. The opposite risk is that they will be overly conservative in avoiding this risk and spend less than they could. However, empirical studies indicate that few people fall in the latter category (Butrica and Mermin 2006).

Investment Risk

Workers bear investment or rate-of-return risk from their 401(k) investments in financial markets. This risk is particularly great for workers who are near retirement because they have relatively little time to wait for the stock market to recover following a downturn. This risk can be reduced at the expense of reducing expected rates of return by investing in low-risk assets such as government bonds or by purchasing an insurance company product. When workers with defined contribution plans seek to minimize this risk by investing overly conservatively, they increase their replacement rate risk that they will not have adequate assets in retirement.

If workers were to maintain a constant portfolio mix over their working lives, the risk of a large loss would increase as retirement approached because the workers' account balances would be larger. Workers can offset this risk by gradually moving into bonds, but because of inertia, it appears that many workers do not make that change. For this reason, life-cycle mutual funds have been developed that automatically make

that adjustment. With life-cycle funds, the fund is diversified with a mix of stocks and bonds that shifts toward bonds as the worker approaches his planned retirement date.

The financial market meltdown of 2008 has highlighted the financial market risk borne by older workers. Perhaps the best way of dealing with this type of risk prospectively is to invest in life-cycle funds, where the fund's portfolio switches increasingly into bonds as the worker's retirement date approaches. As with any good idea having to do with 401(k) plan investment management, recognizing the poor job that many participants do of managing their accounts, this approach could be voluntary, it could be the default, or it could be mandatory.

Investment risk is borne by the plan sponsor in defined benefit plans. The risk may be partially shifted to workers in some plans when the extent of price indexing of retirement benefits is affected by the investment rate of return received by the plan.

Because of the long time horizon of pension plans, with their long-dated liabilities, it can be argued that investment risk is different for them than for some other types of investments. For example, if a plan were to purchase long-dated bonds that it planned to hold to maturity, the fluctuations in the value of those bonds would be irrelevant to the plan. A mark to market approach, which would force a contemporaneous recognition of the fluctuation in their value, would impose a false element of volatility.

Investment risk is borne in different ways by participants in hybrid plans. In cash balance plans, the participants may bear some investment risk to the extent that the crediting rate varies with the rate of return in capital markets. In the collective defined contribution plans in the Netherlands, employers contribute a fixed amount, and all investment and demographic risk is borne by workers collectively. However, because benefits are based on a benefit formula, the risk is not borne through changes in benefits but through changes in the contributions made by workers. Thus, workers nearing retirement and retirees receiving benefits bear relatively little risk. This pattern of risk-bearing is superior to that in 401(k) plans, where workers nearing retirement and retirees are most affected by investment risk.

Individual Management Risk

Individual management risk arises from individual errors in managing pension investments. Evidence has accumulated that many individuals systematically make errors in managing pension investments, and that these errors affect their retirement income. Life-cycle funds have been developed to help individuals manage the investments of their 401(k) plans. Individual management risk is discussed more thoroughly in Chapter 8.

Individual management risk does not arise in traditional defined benefit plans, which generally are managed by financial professionals. However, financial professionals also may make investment management mistakes, whether by following what other professionals are doing ("herding"), by trading too aggressively, or by engaging in short-term strategies. The risk associated with bad financial management is borne by the plan sponsor of defined benefit plans.

Agency Risk

Defined contribution pension participants are subject to risks arising from the improper or self-serving financial management of the agents they entrust to handle their investments. Agency risk arises because the pension participant's investments are handled by agents rather than directly by the participant. These agents include mutual fund managers and the corporations in which the investments are made. The risk is limited to a small extent by workers' being able to choose their investments. An example of agency risk is when the CEO of a company in which the worker has invested receives a high salary while mismanaging the company. This risk is borne by the plan sponsor in defined benefit plans but by the individual worker in defined contribution plans.

Longevity Risk

Longevity risk for workers has two components. First, longevity risk arises because of changing mortality rates up to the point of retirement. This aspect of longevity risk affects the annuity value if the individual decides to annuitize the account balance, or it affects the amount the individual can withdraw through phased withdrawals if he

chooses not to annuitize. Second, individuals who do not annuitize their account balances face the risk of living longer than expected and not having sufficient funds. Both aspects of longevity risk are borne by the plan sponsor in defined benefit plans but are borne by the worker in defined contribution plans.

Risks Associated with Annuities

While annuities provide insurance against outliving one's income, they also pose risks to the purchaser. Annuity providers have developed options that deal with many of the risks workers face in an attempt to make annuities a more appealing financial and insurance product for pension participants.

Prepurchase market risk. Workers face financial market risk concerning the value of an annuity. The value of the assets in their account may be relatively low because of a downturn in financial markets shortly before the date at which they plan to retire and purchase an annuity. This risk to some extent can be dealt with by phased or delayed purchase of annuities.

Mortality risk. Retirees who annuitize face the risk of dying unexpectedly early, in which case they would have been better off not annuitizing their account. This risk can be dealt with by purchasing an annuity that guarantees a death benefit to the purchaser's beneficiary or that guarantees payment for a minimum number of years whether the purchaser is alive or not. Another way for workers to deal with this risk is simply to annuitize a smaller part of the account balance.

Default. A further risk is that the annuity provider will default. Insurance companies provide annuities. These companies face the risk of bankruptcy if, for example, they misprice their products or if people live substantially longer than the insurance company expected. This risk is addressed to some degree through state guarantee funds and can be further mitigated through reinsurance. Reinsurance is an agreement whereby an insurance company transfers risk of loss under insurance policies it writes by means of a separate contract with another insurance company.

The Chilean government guarantees the annuities of retirees in its mandatory pension system. The government provides this guarantee without charge to the participants or the insurance companies. The guarantee is for 75 percent of the annuity, subject to a maximum amount. To prevent the need for this insurance being used, the Chilean government sets stringent regulations on insurance companies. Thus far, for the 25 years the Chilean system has operated, no claims have been made against the insurance (James, Martinez, and Iglesias 2006). Issues related to annuities are discussed further in Chapter 10.

Interest rate risk at purchase. When a worker purchases an annuity, the worker's account balance is converted to an annuity based on an interest rate, which varies with the long-term interest rates available in capital markets. When interest rates are relatively high, the annual value of the benefits provided by an annuity are higher than when interest rates are low. Thus workers face the risk that interest rates will be relatively low when they convert their account balance to an annuity.

Variations in interest rates used to convert account balances to annuities can have a large effect on the level of annual pension benefits received. For a 65-year-old U.S. male, a 4 percent interest rate generates annual payments of $686 per $10,000 annuitized. This amount rises to $830 at 6 percent and $982 at 8 percent (Ameriks 2002). Higher interest rates produce higher annual payments because the interest income produced by the account balance invested at those interest rates will be greater. The higher payments do not necessarily imply higher lifetime benefits because higher interest rates tend to be associated with higher inflation rates. This interest rate risk can be largely eliminated by investing individual accounts in the period leading up to annuitization in long-term bonds.

Interest rate risk may be offset to some extent by offsetting changes in asset prices. That occurs if interest rates are low, producing a low annuitized benefit for a given account balance when stock prices are relatively high.

Under a guaranteed annuity conversion option, a pension plan guarantees to convert a worker's account balance to a life annuity at a fixed interest rate. Alternatively, the interest rate can be guaranteed to be no lower than a fixed minimum. If the annuity rates provided under the

guarantee are more beneficial to the participant than the prevailing rates in the market, the plan, employer, or some other entity must make up the difference in the purchase price of the annuity.

Fixed rate guarantees are vulnerable to prolonged falls in interest rates (Turner and Rajnes 2006). Alternative approaches can be used to limit the interest rate risk associated with annuity conversions. One approach is to allow workers to partially annuitize in steps, spread over time. This approach reduces the interest rate risk associated with completely annuitizing at a single point in time. Another approach is to allow workers to initially take phased withdrawals and later take an annuity, thus giving workers greater flexibility in picking the date at which they annuitize.

Sweden provides an interest rate guarantee for annuity conversions. The government, as the provider of annuities in the Swedish mandatory Notional Defined Contribution system, limits interest rate risk for workers by providing the guarantee. The interest rate used to determine the annuity varies based on market interest rates but is guaranteed to be no lower than 3 percent (Engström and Westerberg 2003).

RISK IN DEFINED BENEFIT PLANS

For many workers, particularly those with long careers working for a single employer, defined benefit plans provide retirement benefits with substantially less risk than 401(k) plans. Defined benefit plans, however, can be risky for workers who change jobs or are laid off, particularly at older ages. They also pose greater risks for workers than do defined contribution plans in the case of the bankruptcy of the sponsoring employer or plan termination for any reason. Because the earnings used to calculate defined benefit plan benefits are not indexed in the United States (but are in the United Kingdom), these events can cause a substantial loss of benefits, compared to what would have been accrued for those years of work if the person had continued working at the job until normal retirement age. Portability risk to participants due to changing jobs or layoffs is discussed in Chapter 4.

Risk That Benefits Will Be Cut

U.S. pension law prevents a cut in accrued vested benefits. However, employers can modify their pension plans to reduce future accruals of benefits. Thus, a person who was hired with the expectation that the pension plan at hire would be the one providing benefits at retirement may have his expectations disappointed. The benefits he expected to receive can be cut.

In bankruptcy, workers may experience a cut in benefits because of limitations on the benefits that the PBGC insures. In addition, workers generally will experience a cut in the benefits that they expected to receive, when those expectations were based on a long career and the continued existence of the plan.

Risk Sharing in Career Average Defined Benefit Plans

Career average defined benefit plans provide a form of risk sharing between the plan sponsor and workers that does not occur in final average pay plans. Career average plans base benefits on the nominal average of wages over a career. Because of inflation, the nominal average of wages does not keep pace with the current standard of living. Thus, these plans periodically have benefit enhancements. However, risk sharing occurs in that the benefit enhancements typically depend on how well the plan is doing concerning its investments and its experience with increased worker life expectancy.

Risks to Plan Sponsors in Defined Benefit Plans

Investment risk. In the early 2000s, several changes occurred that may have made defined benefit plans appear to employers to be riskier than they previously had thought. These changes may have contributed to a declining support for defined benefit plans among employers. In what some commentators called a perfect storm, both the stock market and interest rates declined. The decline in the stock market lowered the value of assets, while the decline in interest rates raised the value of liabilities. In addition, the increase in worker life expectancy at older ages may have been greater than anticipated by plan sponsors.

These changes, however, also affected defined contribution plans. The decline in the stock market would make defined benefit plans relatively less desirable to employers, but it would also make defined contribution plans relatively less desirable to employees. Unexpectedly long life expectancy would similarly make defined benefit plans less desirable to employers but more desirable to employees, with the reverse pattern holding true for defined contribution plans. A reduction in interest rates increases the cost of annuitizing in both defined benefit plans and defined contribution plans.

Investment mismatch risk. Plan sponsors bear the risk that their assets and liabilities are mismatched, so that their liabilities may grow faster than their assets. Their assets and liabilities may react differently to changes in interest rates.

The effects of uncertainty in improvements in life expectancy. Uncertainty as to future changes in life expectancy may affect employers' pension decisions. For example, the increasing obesity in the population may cause life expectancy to increase less than projected, while a revolution in medical science may cause the improvements to be greater than projected. Experts disagree as to the likely future increases in life expectancy. The Social Security actuaries have projected an increase of 6 years between 2000 and 2080 for life expectancy at birth; but the 2003 Technical Panel on Assumptions and Methods (2003), which examined the basis for that projection, recommended projecting an even greater increase in life expectancy—about 7.5 years. Most of this increase will occur at older ages because mortality is already low at younger ages.

Pension plan sponsors may have poorly anticipated improvements in life expectancy. Many defined benefit plans were established during the 1940s and 1950s, a time when life expectancy at older ages had increased relatively little during the preceding decades of the twentieth century. Life expectancy at age 65 rose from 11.7 years in 1900 to 21.2 years in 2000, an 81 percent increase. However, 75 percent of this increase occurred after 1950, and thus may not have been anticipated by the sponsors of defined benefit plans at the time that many plans were started. The improvements in life expectancy at older ages generally

accelerated over the century, thanks especially to an unprecedented reduction in mortality from cardiovascular disease beginning in the late 1960s (Technical Panel on Assumptions and Methods 2003).

Markets can pool idiosyncratic longevity risk, which is the risk that a particular individual will live longer than expected. However, pension providers also take on systematic longevity risk, which is the risk that an entire cohort will live longer than expected.

Longevity bonds are a financial instrument that would protect defined benefit plan sponsors from the risk that an entire cohort lives longer on average than expected. Longevity bonds have a payout that is structured so that the larger the percentage of a particular age cohort that survives during the postretirement years, the larger the payout. These bonds have been offered, but a market has not been developed for them.

When an employer provides annuities through a defined benefit plan, the employer takes on idiosyncratic and systematic longevity risk. That risk can be reduced in larger plans by the diversification across plan participants. By the same token, the risk is larger in small plans than in large plans because small plans have a smaller pool of retirees across which they can diversify the risk.

Systematic longevity risk is expensive for a plan sponsor to bear because it is positively correlated across workers. However, it is relatively inexpensive, compared to idiosyncratic risk, for individual workers to bear because for each worker the increase in life expectancy is relatively small, and the worker benefits from that increase through the associated longer life. It is efficient for plan sponsors, rather than individual workers, to bear the idiosyncratic risk because plan sponsors of large plans can diversify it away. It may be efficient for workers to bear the systematic risk because they are also the beneficiaries of the longer life expectancy.

Systematic risk can be transferred to workers by raising the plan's normal retirement age in connection with improvements in life expectancy. An increase in the normal retirement age means that benefits are reduced at all calendar ages younger than the new normal retirement age, including at the plan's earliest retirement age. The reduction in benefits is designed to maintain a constant lifetime expected value of benefits in the face of increased life expectancy. U.S. plans are not per-

mitted to have a normal retirement age higher than age 65, an aspect of pension law that has not been adjusted to reflect increasing longevity.

The increase in the plan's normal retirement age can be done in several ways. Similar to the increase for Social Security benefits, the increase can be determined in advance according to a fixed schedule. This approach eliminates any risk as to the timing and amount of the changes. Alternatively, the increase can be linked to increases in life expectancy. That approach would entail some risk as to the timing and amount of reductions in annual benefits, but would assure that for the pension population as a whole the expected lifetime value of benefits would be maintained. The increase could occur for all workers, or it could be limited to new hires.

Pension participants as a group have longer life expectancies than the general population because they are healthy enough to work. Also, they have higher average income than the population average, which is associated with longer life expectancy. The life expectancy of pension participants may change at a different rate from that of the general population, which should be taken into account in indexing increases in a plan's normal retirement age.

Regulatory risk. Regulatory risk is the risk that pension commitments will be made more expensive for plan sponsors because of regulatory changes. For example, a change that required all plans to provide cost-of-living adjustments for retirees, or that required plans to index benefits during the preretirement period for workers the plan sponsors lay off, would raise plan costs.

Pension Insurance for Defined Benefit Plans: The PBGC

In a dynamic economy, new companies are being created at the same time that older companies are shutting down.[2] The bankruptcy of firms, though distressing for owners and employees, is part of the normal functioning of a competitive, efficient economy. If government wants to further that competitive economy, it will avoid subsidizing firms in declining industries.

The bankruptcy of firms generally hurts pension participants in defined benefit plans. In an employer-provided defined benefit system,

workers may lose their retirement benefits if their employer declares bankruptcy at a time when its defined benefit pension is underfunded. When employers are under financial stress, contributing to a pension plan may take a low priority. In the absence of regulations preventing employers from forgoing contributions, typically such an employer seeks to place the minimum amount into the pension plan, leading to underfunding.

The PBGC protects the pensions of U.S. workers in private defined benefit plans. The PBGC's operations are financed by insurance premiums set by Congress and paid by sponsors of defined benefit plans; they are also financed by investment income, assets from underfunded pension plans the PBGC has taken over, and recoveries from companies formerly responsible for the plans. The PBGC maintains separate insurance programs for single-employer defined benefit plans and for multiemployer defined benefit plans because of the difference in risk of termination between the two types of plans. The PBGC charges a premium that is based in part on the number of participants in the plan and in part on the extent of underfunding. However, the premium is not risk-related in that it is not larger for sponsors that are more likely to go bankrupt. Thus, weak companies having plans with a significant degree of underfunding are not charged the full premium that would be charged using insurance principles.

Table 6.1 indicates that the net assets of the PBGC single-employer trust fund declined by an astounding $33 billion between 2000 and 2004. This experience demonstrates that the PBGC is somewhat like a casualty insurance company that insures catastrophic events. The financial status of the pension benefit insurer can change dramatically in a short period of time.

Causes of the deficits. These deficits reflect in part the effects of a three-year downturn in the stock market, starting in 2000, plus the decline in interest rates over the period. At the beginning of 2000, the PBGC had a surplus of $9.7 billion rather than a deficit.

Claims on the PBGC's insurance are sensitive to changes in interest rates and stock returns, overall economic conditions, the development of underfunding in some large plans, the economic performance of particular industries, and the bankruptcy of a few large companies.

Table 6.1 PBGC Single-Employer Trust Fund Financial Status, 2000–2007

Year	Overfunding (deficit)
2000	$9.7 billion
2001	$7.7 billion
2002	($3.6 billion)
2003	($11.2 billion)
2004	($23.3 billion)
2005	($22.8 billion)
2006	($18.1 billion)
2007	($13.1 billion)

SOURCE: Annual Reports of the PBGC.

Defined benefit pensions face long-term challenges due to the earlier retirements and increasing life expectancies of their participants. In 2003, an average male worker would expect to spend 18.1 years in retirement, compared to 11.5 years in 1950 (PBGC 2003). The additional seven years of retirement must be funded.

Since pension plans with unfunded benefits are more likely to be sponsored by weak companies, the variable premium the PBGC charges is a step toward a risk-related premium that a commercial insurer would assess. The next step would be to increase the 0.9 percent to reflect the probability of the employer becoming bankrupt.[3] However, that gets difficult, for the following five reasons: 1) the correct premium could be huge for employers that are about to go bankrupt; 2) not all companies are rated; 3) ratings can be incorrect (e.g., Enron), so the PBGC might need to audit employers; 4) the large premium could be enough to bankrupt a weak employer; and 5) the premiums would go to the PBGC, whereas the best place for the money would be to put it into the plan.

Since it could be difficult to get payment of this large risk-related premium from a bankrupt employer, the PBGC could put a cap on it. Another idea is to restrict benefits. For example, when a weak employer is funded at less than 60 percent, U.S. pension law restricts the employer from improving benefits. These rules could go further in four ways: by 1) setting a higher threshold than 60 percent; 2) restricting improvements targeted at employers with a below-investment-grade credit rating;

3) further restricting benefits, such as by freezing all accruals[4] and disallowing lump sums and early retirement subsidies; and 4) avoiding the guarantee of poison pill provisions or shutdown benefits unless they were funded. It should be noted that advocates for workers oppose the 60 percent rule, arguing that workers should not be penalized for the poor funding, which is the responsibility of employers. These benefit restrictions have been discussed in response to plan funding ratios plummeting because of payments of subsidized lump sums to people who get all their money out before plan termination by lump sum. Because of the way that the PBGC guarantees benefits,[5] the participants remaining in these plans will get less from the PBGC.

Principles for Evaluating the PBGC

This section discusses basic principles for evaluating the PBGC. A fundamental issue in establishing a pension insurer is the extent to which it should act as a profit-making insurer would, providing market-based insurance, versus the extent to which it should provide social insurance, where social goals are met through the transfer of resources across firms.

Adequate pension funding. The PBGC would not be needed if government regulation could assure that pension plans were always adequately funded. However, with the volatility of equity and bond markets and the desire of employers to gradually pay for new or larger benefits, it is difficult to require that pension plans always be adequately funded.

Because pension contributions are tax deductible under the corporate income tax and the earnings on contributions are generally not taxed, profitable tax-paying firms have an incentive to prefund pension plans. For firms in financial distress that are not paying taxes, the incentive is the opposite: these firms try to minimize contributions.

When a firm promises a defined benefit pension to its workers, economic theory posits that those workers accept a lower amount in wages, depending on the risk associated with the promise of benefits and the value that workers place on future compensation versus current compensation. As a matter of public policy, many people believe that the

trade-off of lower wages for future pension benefits should not be a gamble that depends on the fortunes of the employer.

Requiring adequate funding for pension plans, rather than placing too much burden on using risk-based premiums, limits the premium costs for employers. Ensuring adequate funding through funding regulations is the best way to keep down the level of the required levy and to assure employers that the cost of the levy will not become burdensome.

Funding issues can be divided into two groups: those that occur during periods of economic strength and those that occur during periods of economic weakness. During periods of economic strength, funding rules need to assure that an adequate cushion of extra assets is built up in pension funds to cover the difficult economic periods. The funding during periods of strength is important, since funding during those times is less burdensome on firms because they tend to have adequate resources in those times.

During periods of economic weakness, the PBGC is more at risk of claims. Adequate safeguards in funding rules can be used to avoid underfunding. Funding rules need to assure that employers are required to contribute to underfunded plans.

Because of concerns about lost tax revenue due to pension funding, the amount of overfunding allowed in pension plans during periods of strong capital markets generally is restricted. During periods of strong financial markets, plans need to develop an adequate cushion of overfunding.

Concern may be raised about excess pension funding making a firm an attractive target for a corporate takeover. That issue was dealt with in the United States by a steep tax on asset reversions when a corporation terminates an overfunded plan and reverts assets to the corporation (or to a corporation that has taken over the original corporation). The reversion tax is 50 percent, on top of a federal corporate income tax of 35 percent. With state income taxes, the total tax can exceed 90 percent of the reversion. If the employer uses surplus assets to improve benefits or start a replacement plan, the excise tax is lowered to 20 percent. Even with this lower excise tax, the total tax would exceed 50 percent. Thus, U.S. employers rarely terminate pensions to get a reversion. The funds are more valuable in the plan. However, the reversion tax may reduce funding levels. In good years, when an employer could contribute more

to a pension plan, they don't, because if the pension assets do well they may exceed the value of all future benefits, and the employer won't be able to access them without paying the steep excise tax. Thus, the employer may never get the advantages of the good returns.

The funding situation in pension plans, however, can change dramatically over a short time period, due to falling equity values and rising liabilities. In addition, if an employer goes bankrupt it needs to replace its pension promises with annuities, which generally are determined using bond rates of return. These annuities are more expensive than the present value of the pension promises, using expected long-term rates of return.

A major source of funding problems has been flat benefit plans. Periodically unions renegotiate the pension benefit formula, which leaves these plans perpetually underfunded. This problem could be dealt with by prohibiting increases in benefit generosity in plans that are underfunded and prohibiting increases in benefit generosity that cause underfunding beyond set limits.

Moral hazard. Moral hazard arises because people may take less care to avoid an undesirable outcome if they are covered by insurance and thus compensated if that event occurs. This problem is considerably more significant for pension benefit insurance than for life insurance or fire insurance because with moral hazard, financially weak firms have an incentive to take actions that increase the liabilities of the PBGC.

Another factor making moral hazard particularly a problem for government-provided pension benefit insurance is that weak firms, through the political process, may seek to influence the pension benefit insurance legislation to subsidize them. This is particularly likely to happen when an industry is struggling, such as the airline industry is, and when various firms are able to work together to mobilize political support.

For financially stable firms, pension benefit insurance may suffer less from adverse incentives due to moral hazard, because these firms have countervailing motivations. A firm that expects to continue to be in existence will want to maintain its reputation as a trustworthy employer and as a responsible institution in society.

These countervailing motivations do not limit the incentives of moral hazard for financially stressed firms with little in the way of future prospects. Because of the likelihood of their eventual bankruptcy, those firms may attempt to increase their claim on the PBGC so that their limited resources can be used for providing compensation for their senior management. Also, a firm in financial trouble may engage in measures to preserve the firm that would be described as desperate. It is presumably more likely to engage in financial activities that a financially sound firm would not do, including skipping required pension contributions to pay wages, or increasing future pension benefits instead of current wages.

The existence of the PBGC diminishes the influence of concern for reputation as a restraining force on the problem of moral hazard for weak firms. This occurs because firms that are concerned about the welfare of their employees, and for that reason would take steps to fund their pension benefits, now can rely on the PBGC to provide those benefits. For example, immediately after PBGC was created in 1974, unless a large employer was in very bad financial condition, it generally did not enter bankruptcy (and all the difficulties that entailed) just to get help with its pension plan. However, that has changed. Employers realized that bankruptcy could help them in other areas (such as allowing them to break labor agreements). A few large employers used Chapter 11 bankruptcy rules (reorganization, not liquidation) in the 1980s to eliminate debts and reorganize, relying on the PBGC to pay their pension debts (with their competitor's premiums). These companies set a precedent, and an increasing number of large employers are using Chapter 11 bankruptcy rules for just these purposes. For this reason, Congress amended U.S. pension laws to make it more difficult in Chapter 11 reorganization for the employer to dump the pension plan on the PBGC. The bankruptcy judge must find that the company cannot continue unless the pension plan is terminated.

Without pension benefit insurance, employees have a strong financial interest in the extent to which their pension plans are funded. They express these concerns explicitly in labor negotiations and implicitly in the labor markets, where workers choose among various employers with competing offers (CBO 1993). Even with this incentive, however, workers may be able to do little to influence the funding of an under-

funded pension plan. Nonetheless, pension benefit insurance means that employees have weaker incentives to assure that their pension plans are adequately funded.

Policy to Deal with Moral Hazard

Monitoring. Monitoring the status of firms at risk can allow the PBGC to take steps to limit its exposure. Monitoring can occur through mandatory advance reporting of activities of firms, such as change in corporate ownership, or it can occur through indicators, such as a decline in bond rating. When the PBGC learns that a strong company is selling a subsidiary to a weak buyer, it may require that the pension plan be well funded, or that the strong seller back its funding requirements for five years.

Coinsurance. Coinsurance, in which employees are not fully insured against pension benefit losses, is one way to preserve incentives for employees to pressure their firms for better pension funding. With top executives, coinsurance may have some influence on their decisions because they would lose pension benefits if the plan terminated with insufficient funding. This idea has not been as successful in the United States as originally hoped, however, because employees, except those at the very top, have little effect on an employer's funding of the pension plan, especially if the firm is weak. In addition, the employees at the very top may be insulated from this concern by having their separate (and much larger) contractual pension benefits vest when the company is in difficulty. Congress is considering ways to prohibit this vesting and tie the interests of the top employees to the prospects of the company's pension plan.

Coinsurance can also occur with other creditors of firms in financial distress. The PBGC is a creditor of the bankrupt defined benefit plan sponsor. The more money the PBGC receives from the bankrupt firm, the less the other creditors receive. Consequently, other unsecured creditors are also coinsurers of pension insurance. They would want the pension plan funded better (and wages not increased as much). Through the decisions to provide loans (and loan covenants that can call in the loan) they may be able to affect the plan sponsor's behavior.

Policy concerning top executives. In some U.S. firms making claims on the PBGC, high executives have retired shortly before the firm filed a claim, taking their entire pension benefits as a lump sum or in accelerated payments. This strategy has enabled them to receive their full pension benefit amount, rather than the reduced amount they would receive if they had taken an annuity, which would have been subject to the maximum insurable benefit. It also in some cases has considerably reduced the assets in the plan and decreased the plan's funding ratio. This type of practice has since been prevented by not allowing lump sum benefit payments when a pension is underfunded below a certain level.

Top executives in failing firms may have an incentive to pay themselves high compensation rather than funding their pension plans. This incentive may be a reason for the PBGC to monitor executive compensation in firms with low funding ratios and even to limit maximum compensation in that situation.

Protections Against Political Risk

The political forces affecting the PBGC may result in it being structured in a way that leads to it having insufficient financing. Political risk has two major aspects. First, financially weak firms will exert pressure so that they will be subsidized by financially strong firms through the PBGC. Second, the government, in order to reduce the loss of tax revenue occurring due to the tax deductibility of pension contributions, will set too low a ceiling on the allowable level of pension overfunding.

Special interest group politics work against the financial soundness of pension benefit insurance. The companies most likely to make a claim on the pension benefit insurer tend to be in the same industry, which facilitates their efforts to influence the government in ways opposed to the interests of other taxpayers.

Economic downturns are a difficult time in which to require greater pension funding. In the past, bills have been introduced in the U.S. Congress that would permit underfunded plans to reduce their contributions because of hard economic times. Thus, political pressure could worsen the PBGC's financial situation, unless it helps some companies stay afloat long enough to maintain their plan and fund it better in the long

run. Unfortunately, the PBGC has experience with companies that got funding breaks only to eventually come back later and dump their plan on the PBGC, but this time with larger underfunding.

CONCLUSION

Life expectancy risk can be divided into the idiosyncratic risk that a particular individual will live longer than expected and the cohort risk that an entire cohort on average will live longer than expected. Annuity providers are able to deal with idiosyncratic risk by pooling it across large numbers of people, effectively diversifying it away. However, no pooling mechanism exists for dealing with cohort risk. Longevity bonds would provide a hedge, but a market for them has not developed. Longevity bonds have a higher payout when the percentage of a cohort that is surviving is higher. Life expectancy indexing of benefits is one way of dealing with this risk. The idiosyncratic risk is borne by the annuity provider, who can diversify it away. The cohort risk is borne by workers, who are the beneficiaries of the improved life expectancy.

The PBGC insures pension benefits but itself is subject to risks arising from political pressures. The financial problems of the PBGC have not been resolved, even though it has been in existence for some 35 years.

Inflation risk remains a problem in the U.S. pension system. Few workers have benefits that are protected against inflation. While annuities protect workers against outliving their resources and are particularly valuable for women because of their longer life expectancies, the real value of annuity benefits can be greatly eroded in old age for long-lived retirees. An issue in dealing with this problem is that the trade-off of reduced benefits at retirement in exchange for higher benefits a decade or two later does not seem to be appealing to most retirees.

Notes

1. The reader is reminded that the term "pension plans" refers in this book to both defined benefit and defined contribution plans, and that 401(k) plans, because of their dominance, are generally discussed when discussing defined contribution plans.
2. This section draws heavily on Gebhardtsbauer and Turner (2004).
3. In addition, the risk premium could reflect two things—1) the risk levels of the pension plan's assets and 2) whether the plan is too large for the employer to afford—by comparing the plan's cost and liabilities to items on an employer's balance sheet and the balance sheet's earnings or cash flow. However, not only would this be complex, but it could entail the PBGC involving itself in the employer's business in an unprecedented way.
4. Not just disallowing benefit improvements, which really only hurts hourly plans that don't base benefits on final pay averages.
5. The PBGC may pay larger benefits in plans that are better funded.