The Economics of Pension Insurance

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1989
Published for the
Pension Research Council
Wharton School
University of Pennsylvania
by
IRWIN
Homewood, IL 60430
Boston, MA 02116

Project editor: Paula M. Buschman
Production manager: Bette Ittersagen
Compositor: TCSystems, Inc.
Typeface: 10/12 Melior
Printer: R. R. Donnelley & Sons Company

Library of Congress Cataloging-in-Publication Data

Ippolito, Richard A.
The economics of pension insurance / Richard A. Ippolito.
p. cm.
Bibliography: p.
Includes index.
ISBN 0-256-07474-7
1. Pension Benefit Guaranty Corporation 2. Insurance, Pension trust guaranty—United States. I. Title
HD7105.45.U6I615 1989
368.4—dc19 88-39853
CIP

Printed in the United States of America

1 2 3 4 5 6 7 8 9 0 DO 6 5 4 3 2 1 0 9

CHAPTER 10

Proposal for an Economic Insurance System

Chapters 6 through 8 discussed reforms attained for the federal pension insurance system and ideas proposed for future reform. Chapter 9 discussed some of these ideas in the context of economic efficiency. In this chapter, many of the ideas discussed or implied in these and other parts of the book are brought together to describe an economically rational pension insurance program.

This is a good place to reconsider the ideas of Dan McGill mentioned in Chapter 1. Prior to the enactment of ERISA, he developed a set of principles to guide the development of a national pension system. His policy would have been operated by the federal government but would have differed from ERISA legislation in the following ways. The insurable event would be firm failure, not "distress" or reorganization; guaranteed benefits would exclude (*a*) benefit increases within five years of termination and (*b*) all shutdown benefits; and funding rules would be changed to (*a*) require standardized assumptions and (*b*) reduce amortization periods on past service credit from 30 to 20 years.

If these provisions had been included in ERISA, the Pension Benefit Guaranty Corporation would have accumulated significantly lower claims over its history. And except for the past service amortization period, which was partly addressed (for underfunded plans only) in the Pension Protection Act of 1987, all of his ideas would still have had a significant impact on the solvency of the program if they had been enacted in 1987.

In my view, if Congress will not permit market pricing and will continue to require mandatory participation, the single most important reform that could be instituted in the existing program is to restrict the amount of the basic insured benefit and age of first receipt. I would

guarantee a maximum benefit equal to the plan benefit or the average of all pension benefits (as a percent of wage and service), whichever is lower, payable no earlier than age 62. This concept mimics principles of the unemployment compensation insurance program, which restricts benefits to something proportional to average wages and sets a limit on the period of collection. This would substantially reduce the distortions created by the current system and various attempts to fix it.

Rather than weave reform ideas around the existing program, however, my intention in this chapter is to build an entirely new program, one that incorporates McGill's notions and others discussed above. The system I describe could be operated either by the PBGC or by private insurance companies. I will describe the system, however, as if it will be operated by the private sector, subject to government regulation. My preference for the private-sector solution is grounded on the presumption that it will be more efficient owing to the competition of ideas and varieties of policies that otherwise would less likely be developed in a system operated by a single, nonprofit insurance company.

By its nature, the discussion in this chapter is suggestive and leaves many questions unanswered. It also leaves many options unexplored: it assumes one set of congressional constraints and develops one hypothetical carrier's policy to satisfy those constraints. Discussion of a full pension system with all of its attendant regulatory and private-sector options would itself fill a rather lengthy book.

UNDERLYING CHARACTERISTICS OF PROPOSAL

Congressional Constraints

In developing this proposal, I assume the solution has boundaries owing to various congressional constraints. Setting out such constraints is a somewhat arbitrary exercise. The ones I chose to assume simply represent my interpretation of limits likely to be imposed by Congress on any type of reformed pension insurance system. The specifics would probably vary depending on who draws up the list. But the themes in most lists, I suspect, would reflect (1) some paternalistic element—workers must be protected against loss of basic pension benefits at older ages and (2) some transfer element—insurance prices must be constrained to reflect some cross-subsidies from low- to high-risk firms.

For the sake of describing an operational system, I assume these constraints take the following specific forms (summarized in Table 10–1): (1) the insurance program is mandatory; (2) the insurance must at least cover a basic benefit equal to the lower of the plan benefit or the average of all pension benefits (as a percent of wage and service),

TABLE 10–1 Assumed Congressional Constraints

Category	*Provision*
Coverage	Mandatory
Maximum premium	$200 per participant per year ($1985)
Type of policy	Renewable term
Maximum coinsurance	40 percent for active workers at termination; 20 percent for retirees
Minimum benefit guarantee	Lower of plan benefit or average of all pension annuities (adjusted for age and service), payable at age 62

payable in an unreduced form no earlier than age 62; (3) pension insurance policies, like most life insurance policies, must be term renewable; (4) the coinsurance charge against workers can be no greater than 40 percent for vested active workers and 20 percent for retirees older than age 62 (except as affected by the minimum benefits limit (see item 2 above)); and (5) the premium is limited to $200 per participant per year (in 1985 dollars) for minimum insured benefits (see item 2).

The role of the *regulatory agency* is to enforce these constraints.

Role for the Industry Group

The proposal outlined here is designed to operate in a competitive insurance market. Subject to the congressional constraints enumerated above, each insurer would be free to design its own policies and to set rates based on its own assessment of risks and exposure. The PBGC would provide its historical data on all insureds and claims to help insurers set prices.

I assume an *industry group* will provide various functions. It will operate an assigned risk pool for so-called uninsureds (pension plans that cannot find insurance for basic benefits for less than $200 per participant per year). The pool rules will be designed by the regulator. In addition, the industry group will provide reinsurance to protect against individual insurance company bankruptcies and will enforce a surcharge-rebate scheme to handle catastrophic claims events.

It is expected that each insurance company will protect itself from exposure to claims disproportionate to all insurance companies. They will do this by diversifying coverage across a wide variety of firms and industries. It is also presumed that all insurance companies will reinsure portions of their major clients with other carriers to protect themselves against insolvency from taking one usually large claim. Because the industry group essentially acts as a guarantor in the case of a carrier insolvency, presumably it will require these precautions in any event.

A problem arises, however, if the entire industry experiences "catastrophic" events. This means claims over time may not exhibit a small variation but instead may evince a "bunching" in some time periods. For example, in serious recessions, funding ratios may fall and the rate of firm failure may increase; or, an entire industry may fail over a short time period. In these cases, the insurance companies as a group may not have accumulated sufficient premiums to cover claims, and insureds will have incentives to find insurance through new insurance companies unencumbered by unusual past losses.

To maintain a stable system, the insurance group will impose surcharges on all insureds to fund an industry reserve, which would be available to insurance companies according to some predetermined formula when overall insurance industry claims experience increases by some specified amount beyond expectations. The surcharge can be increased or lowered (or rebates given), depending on experience and the size of the surplus pool.

Insureds wishing to exit the defined benefit system will be responsible for paying their share of any surcharge in effect at the time of the departure and for some period of time (perhaps five years) after departure (perhaps guaranteed by a bond on exit). In addition, all insurance carriers, including new entrants writing pension insurance, will be required to charge the same proportional surcharge to their clients. These rules prevent free-riding by insureds who try to flee the system (that is, switch to either defined contribution plans or to a new-entrant carrier) during or after some catastrophic loss period, once it is apparent that they are not the ones to use the insurance during the period.[1]

It is presumed that Congress mandates the equivalent of a *term-renewable policy*, which is common in life insurance policies. This kind of policy prevents insurance carriers from increasing the premium when it becomes apparent that a client is "sick" or "dying." That is, it prevents insurance carriers from reassessing probabilities of default for particular insureds after the initial determination. Changing risks, however, may be taken into account in decisions to permit firms to attain lower funding levels or to obtain protection for higher real benefits. In addition, risk assessments may be altered if the client voluntarily changes its risk classification, say, by changing its line of business through merger or acquisition (this is akin to increasing life insurance premiums if a client starts smoking midstream in the contract).

New pension plans would be assigned a premium based on their

[1]In principle, each firm could write separate long-term contracts with their clients. This solution is more costly because clients must protect themselves from the insurer raising prices to increase profits or offset poor underwriting judgment.

financial and other risk characteristics at the time of entry. The insurance company, however, is permitted to increase prices across the board to reflect its overall claims experience.

Assigned Risk Pool

The insurance policy proposal presented here revolves around the establishment of a maximum premium, for basic benefits insurance equal to $200 per participant per year, indexed to wages; the VanDerhei study suggested that if free market prices were applied to the existing insurance contract in 1985, roughly 7 percent of the participant population would have paid a price in excess of $200 (see Chapter 6). Pension plans paying a premium less than the maximum face no special funding rules and no constraints on benefit payments (except those related to a coinsurance feature of the policy and those not reflected in liability calculations, such as shutdown benefits). Firms wishing to buy insurance at a cost greater than $200 per participant per year are free to do so.

Otherwise, plans constrained by the maximum premium are put into the *assigned risk pool*. Plans in the pool face special funding rules and constraints on benefit levels.

These constraints are discussed in greater detail below. The insureds in the assigned risk pool are allocated to all participating insurance companies, presumably in proportion to the amount of voluntary pension insurance they write. This method ensures that subsidies will be financed equitably by all those outside the pool.

ILLUSTRATIVE POLICY BY A PRIVATE INSURER

In this section, I will discuss a hypothetical insurance policy offered by a competing insurance carrier. The policy will satisfy the constraints imposed by my hypothetical Congress (see Table 10–1) and will reflect various principles described in previous chapters. The elements of the insurance policy are listed in Table 10–2 and will be discussed in turn.

The policy I describe does not insure a terminated benefit. As discussed in Chapter 2, the problem with a termination-type guarantee is that the coinsurance factor varies greatly with participants' ages and the interest rate. Workers do not know which portion of their real promised pension is protected. In addition, it is difficult for the carrier to satisfy the coinsurance limits imposed by my hypothetical Congress with this type of guarantee. The coinsurance limits may be satisfied at, say, an 8 percent interest rate but be violated if the rate increases to 10 percent.

In the policy described here, *guaranteed pensions for active participants are indexed to the lesser of prices or Treasury bill rates*

TABLE 10–2 Features of an Illustrative Economic Insurance Policy

Category	*Characteristic*
1. Pension promise	Indexed* from date of plan termination until death for active participants. For retirees, indexation is retroactive to age of retirement.
2. Portion of real pension insured	50 percent (equivalent to a roughly 30 percent coinsurance factor compared to ongoing benefits)
3. Insurance firm portfolio	100 percent Treasury bills.
4. Premium formula	$q\,[(1 - c)L^* - A(1 - g)] + yM$ plus expense and subsidy amounts q = Probability of termination L^* = Liabilities reflecting indexed insured benefits g = Percent permissible pre-claim defunding c = Coinsurance portion of L^* M = Exposure attributable to portfolio risk y = Cost of holding hedging instruments.
5. Risk assessment	A risk premium is assessed on the basis of the risk characteristics of the portfolio. These risk measures may include the beta value and long-bond share characterizing the portfolio. Assuming this exposure can be hedged, the price is captured by the term yM above.
6. Liability calculation	Must use fixed assumptions: All benefits (including flat benefits) must be calculated in a termination sense, using a discount rate not to exceed the lower of 1 percent or the average of the real T-bill rates over the most recent 20 years. Assume all retirements occur at highest-cost ages (usually ages first eligible).† Turnover and mortality assumptions reflect industry averages.‡
7. Increases in real benefits	Not covered on past service (maintenance of real benefits is anticipated in premium calculation—see category 6)
8. Shutdown benefits	Not permitted; but plan may provide for annuities to be indexed to prices from the date of plant shutdown until the normal retirement age§
9. Lump-sum options	Not permitted, except for de minimus amounts
10. Defunding	Permitted with permission of insurance firm. Otherwise, covered up to g percent erosion of plan's funding ratio (indexed to all plans' funding ratios). Beyond this, the plan's benefits are frozen in real terms, benefit payments are reduced to insured levels, and portfolio is converted to 100 percent Treasury bills.

TABLE 10–2 (*concluded*)

Category	*Characteristic*
11. Insurable event	Chapter 7 of the U.S. Bankruptcy Code; abandonment of the plan outside the insurable event is protected by a pledge of security in the amount of 20 percent of insurable benefits.
12. Plan administrator	The insurance company.

*Indexed to lower of the inflation rate or the T-bill return.

†Rule is relaxed if established plans can demonstrate a statistical distribution that justifies a different assumption.

‡Can be stylized to plan only if actuarial assumptions are based on statistical evidence for the plan.

§If these shutdown benefits are permitted, the plan may not incorporate anticipated layoffs in its turnover assumption.

from the date of termination until death, reduced by a fixed coinsurance factor. For retirees, indexation is retroactive to the age of retirement, reduced by a fixed coinsurance factor: the retiree receives either the insurance benefit or his current benefit, whichever is lower.[2]

The guarantee formula does not presume benefits are also explicitly indexed in the pension plan. Pension benefit formulas, however, are relevant to enforce a reasonable coinsurance policy, particularly their explicit and implicit indexing provisions. For purposes of my example, I assume the plans my carrier insures pay benefits that are implicitly or explicitly tied to wages at, or around, retirement age, and some ad hoc policy will accommodate inflation after retirement. If, for example, the pension plan never paid postretirement inflation adjustments, a different guarantee would have to be written to prevent negative coinsurance from characterizing the insurance contract described below.

The coinsurance factor chosen must be sufficiently large to discourage moral hazard *and* to offset full indexing of the insured benefits after retirement, not usually available in the private sector. For example, Allen, Clark, and Sumner (1986a) showed that while private pension benefits were routinely increased during retirement on an ad hoc basis, benefits during retirement eroded in real terms by a few percentage points per year during the 1970s. For example, if the erosion rate is 3

[2]The added condition on retirees reduces the possibility that insured benefits exceed current benefits: negative coinsurance factors could create moral hazard problems. The insured benefit might exceed current benefits in the policy my hypothetical insurance carrier offers if a pension plan had not made postretirement cost-of-living adjustments for several years and if inflation were significant. The condition does not eliminate the potential for negative coinsurance for some retirees, as will be demonstrated in an example below.

percent per year, then roughly one third of real benefits will be eroded over 15 years.

The policy I describe has roughly a 30 percent coinsurance factor for active workers; that is, the insured benefit has a value roughly 70 percent as high as benefits that would be collected if the plan did not terminate. It turns out that this is roughly equivalent to applying a 50 percent coinsurance factor to a completely indexed pension. The PBGC coinsurance factor generally has ranged between 25 percent and 35 percent, depending on the prevailing interest rate. That is, termination liabilities have amounted to roughly two thirds to three fourths of ongoing liabilities.[3]

Real insured benefit. The insurance policy written by my hypothetical carrier is summarized as follows. In the event of a pension termination, all workers' accruals to date are insured *in real terms* and reduced by one half. Existing retirees will have their real benefits recalculated as of the date of their retirement, reduced by 50 percent. The retiree will receive this benefit or his current benefit, whichever is lower, indexed until death.

To protect the insurance carrier from indexing more than its portfolio can deliver, indexing is done at the inflation rate or the Treasury bill rate, whichever is lower. Because T-bill rates generally exceed the inflation rate over the long run (see Table 18 in Appendix A), this policy produces an expected cushion to the carrier, which in a competitive market, will be reflected neither in the price of the insurance nor in a rebate scheme set by the carrier.

To see how the insurance works, consider a 55-year-old worker at termination. In this example, I suppose that his annuity according to the benefit formula in the pension plan is .5 percent, times wages of $10,000, times 15 years of service, or $750 per year. The plan provides for a single retirement age (60), and death always occurs at age 80. The real three-month Treasury bill rate is zero (the T-bill rate equals the inflation rate).

This worker's insured benefit equals his $750 annuity reduced by one half, or $375; this amount is indexed from termination date (age 55) to death (age 80). Because the real T-bill rate is zero in this example, this yields a pension value in real terms at retirement age equal to $7,500 ($375 in real terms collected from age 60 to age 80). Because his first year annuity is indexed from the date of termination, and since the real interest rate is zero by assumption, the real value of the insured benefit at age 55 is also $7,500.

This amount (generally financed partly by assets in a terminated plan and partly by the insurance firm) will be invested entirely in

[3]These numbers can be derived by dividing funding ratios in Table 3–8 by those shown in Table 3–7.

TABLE 10–3 Coinsurance in an Illustrative Indexed Insurance Policy

Age (1)	*Ongoing Liabilities (2)*	*Termination Liabilities (3)*	*Coinsurance† (4)*	*50 Percent Real Liabilities (5)*	*Coinsurance‡ (6)*
45	$ 3,441	$ 750	78.1%	$ 2,500	27.3%
50	6,883	2,250	67.3	5,000	27.3
55	10,324	5,025	51.3	7,500	27.3
60 (retire)	13,766	10,000	27.3	10,000	27.3
65	9,161	7,145	22.0	7,500	18.1
70	5,522	4,610	16.5	5,000	9.4
75	2,483	2,258	9.0	2,500	−.6
Total—active	$34,414	$18,025	47.6%	$25,000	27.3%
Total—retired	$17,166	$14,013	18.3%	$15,000	12.6%

Assumptions: Start age is 40; retirement occurs at age 60; and death occurs at age 80. Interest rate, inflation rate, and wage growth rate are 8 percent. Ongoing plans make ad hoc adjustments to retirees equal to one half the inflation rate.

†Numbers in this column equal column 2 minus column 3 all divided by column 2.

‡Numbers in this column equal column 2 minus column 5 all divided by column 2.

Treasury bills. By investing all assets in T-bills and restricting inflation adjustments to the lesser of the T-bill rate or the inflation rate, the insurance firm will avoid the risk posed by mismatching its assets and liabilities (see Chapter 2).

This example is developed further in Table 10–3. It is assumed that the interest rate, the inflation rate, and expected wage growth all equal 8 percent per annum. It is assumed that this pension plan is typical in the sense that if it continues, it is expected to make ad hoc adjustments to retiree benefits equal on average to one half the inflation rate. In this case, the present value of the ongoing benefit for a 55-year-old worker is $10,324. That is, the worker's $750 annuity is expected to be indexed to wages until retirement and then is subject to 4 percent erosion each year thereafter (ad hoc benefit increases are 4 percent, but the interest rate and inflation rate are 8 percent). The present value of a 20-year annuity discounted at 4 percent to age 60 is $10,324. Because wage growth equals the interest rate, the net discount rate to age 55 is zero (see Chapter 2); thus, the present value of the ongoing benefit at age 55 is also $10,324.

Coinsurance for workers. On termination, the current PBGC insurance system freezes nominal benefits until death. Thus, all benefits are discounted at 8 percent. The value of a $750 annuity starting at age 60, discounted at 8 percent and discounted back to age 55 at 8 percent, is $5,025. The PBGC coinsurance factor for this worker is 51.3 percent.

The indexed policy written by my hypothetical carrier (subject to a 50 percent coinsurance factor) has a value of $7,500 (see above) and thus imposes a coinsurance factor equal to 27.3 percent. In fact, recomputing pension values for all active participants, the coinsurance factor is a fixed 27.3 percent (column 6 in Table 10–3), well within the 40 percent boundary set by my hypothetical Congress. The average PBGC coinsurance for active workers in this example would be 47.6 percent (see column 4 in Table 10–3).

Coinsurance for retirees. Coinsurance factors fall significantly for retirees under either the PBGC or the real insurance scheme. In the case of PBGC insurance, the "extra" 4 percent discounting applies to fewer years for retirees; thus, a 70-year-old retiree has a coinsurance factor equal to 16.5 percent.

In the real insurance scheme, the 70-year-old retiree's benefit is recalculated in real terms at his retirement age. If this retiree had 20 years of service when he retired at age 60 (the same service I suppose all retirees had), and assuming that real wages have not changed since retirement, his age-60 benefit in real terms would be $1,000.[4] Reducing this by 50 percent, leaves a $500 annuity indexed to prices. The present value of this annuity to the age-70 retiree is equal to $5,000 ($500 in real terms collected for 10 more years of service), which is more than 90 percent of the value of his ongoing amount. The ongoing annuity is worth $670 in real terms (it had eroded 4 percent per year for 10 years) but will erode over his remaining 10 years at the rate of 4 percent compared to the indexed pension. In present-value terms, a $500 indexed annuity for 10 years is worth $5,000 in real terms. A $670 partially indexed annuity is worth $5,522.

It is noted parenthetically that the age-75 retiree receives more insured benefits in my indexed scheme than he would have if the plan had not terminated. This occurs even though his first posttermination-year annuity is less than current benefits.[5]

Other policies. The indexed insurance policy illustrated in Table 10–3 could be altered in numerous ways. For example, the coinsurance factor could be increased, or retirees' annuities could be frozen in nominal terms akin to current PBGC policy. My choice is somewhat arbitrary and serves to illustrate the basic coinsurance features of an indexed insurance policy. Further, by indexing all benefits, including

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[4]That is, the plan pays .5 percent per year times a $10,000 wage (real terms), times 20 years of service.

[5]The insured annuity in this case is $500. His current benefit in real terms is $548 ($1,000 at retirement at age 60, eroded by 4 percent inflation each year from age 60 to age 75). But because the $500 insured annuity is indexed and his current annuity is only 50 percent indexed, the present value of the insured benefit exceeds the value of his current benefit.

retirees' benefits, the optimal portfolio strategy is simple (100 percent T-bills). If retirees' benefits are frozen in nominal terms, the 20 percent coinsurance limit set by my hypothetical Congress for retirees (see Table 10–1) could be violated under some interest rates, and the portfolio must be composed of T-bills to match active liabilities and of long-term bonds to match retiree liabilities.

In addition to numerous potential variants to the above policy, my hypothetical insurance carrier also will offer a *basic benefits plan*, consistent with the minimum insurance required by Congress. The plan pays a full benefit at age 62 equal to the weighted average of all plans' full benefits available at age 62 (as a percent of wages and service); payments prior to age 62 use a formula approved by the insurance carrier that reflects full actuarial adjustments.

All of the same rules enumerated above apply to the basic plan. In particular, the basic plan is indexed and subject to 50 percent coinsurance. When liabilities—and thus exposure—are calculated, they will conform to the generally lower liabilities calculated under the basic plan.

The basic plan option is available only to insureds whose plan benefits are more generous than the basic plan (generosity is measured in terms of the age of eligibility and size of benefits at a given age and service). Otherwise, the insured benefit may be more valuable than the ongoing benefit.

DEFAULT RISK

Setting the appropriate premium requires estimation of several parameters: namely, the probability of default, underfunding exposure (including pre-claim defunding), insureds' portfolio risk, and the cost of writing and administering the insurance. I will ignore the expense factor. I also assume the cumulative PBGC deficit will be financed prior to the start of the new system by either a lump-sum tax on existing insureds or a transfer from the U.S. Treasury.

As in any insurance, there is no perfect model to predict the occurrence of claims, but sufficient data is available to establish classes of risks in the population. In the case of pensions, presumably pension plan, plan sponsor, and industry characteristics (notably financial indexes) will be used to assess risk.

The discussion of the PBGC experience in Chapter 3 indicates that default risks are disproportionately related to industry type and union plans. In a previous study of firm failures offering defined benefit plans over the 1978–83 period, for example, I found that the probability of failure for a firm comprised of 50 percent union workers was approximately double the average; and that plans experiencing a 15 percent

TABLE 10–4 Factors Affecting Default Risk

Factor	*Impact on Risk*
Current assets/current liabilities	−.102*
Equity/total firm value	−.208*
Plan sponsor size (assets)	−.009
Net income/assets	−.236*
Unionization of plan	−.028
Steel industry†	.270*
Five-year probability of termination in (stratified) sample 6.5%.	

Note: Numbers show incremental impact of factor on the probability of an insufficient pension plan termination at the PBGC from 1980 to 1984.

*Asterisk denotes coefficient statistically significant at the 95 percent level of confidence.

†Plans sponsored by firms in the industry characterized by a two-digit Standard Industrial Classification Code equal to 33 (primary metals group).

SOURCE: Jack VanDerhei, "An Empirical Analysis of Risk-Related Insurance Premiums for the Pension Benefit Guaranty Corporation," Final report submitted to the PBGC, 1988.

decline in employment over the 1972–81 period were also approximately 50 percent more likely to fail than average.[6]

Pension defaults were statistically analyzed in the VanDerhei study (see Chapter 6); the factors identified are shown in Table 10–4. VanDerhei analyzed the probability of a PBGC claim during the 1980–84 period from a sample of 1,518 defined benefit plans (with at least 100 participants) filing Forms 5500 in 1980. In his sample (stratified to oversample terminations), 6.5 percent of the plans made a claim against the PBGC during a five-year period. Coefficients denoted by an asterisk are significant at the 95 percent confidence level; otherwise, they are not statistically different from zero.

His findings show that plan sponsors with better financial characteristics (higher ratios of assets to liabilities, higher equity ownership shares, higher net income to assets) have lower probabilities of termination. The interpretation of the financial-variable coefficients is illustrated by the first entry: a decrease in the plan sponsor's ratio of current assets to current liabilities from, say, 1.0 to .75 increases the probability of terminating with a claim by 2.5 percent (equals −.25 times the coefficient −.102).

His results also show that, accounting for financial measures, pension plans in the primary metals industry exhibit a five-year termination probability 27 percent higher than plans outside the steel industry. Accounting for various financial characteristics of the plan sponsor, no additional information is provided by union status of the plan; the coefficient on unions is small and not statistically different from zero.

[6]See Ippolito, 1986.

EXPOSURE AT EXISTING ASSET VALUES

Control of exposure is a critical element in setting any insurance price and deserves particular attention in the case of pensions. The essential idea is that because premiums are collected on the basis of observed exposure, controls must be administered to prevent this exposure from expanding prior to the filing of a claim. Otherwise, premiums systematically will fall short of claims experience. Premiums must be assessed on the basis of expected exposure in the event of a claim. The discussion in this section will concentrate on control of funding levels relative to the average of funding levels among all insureds, assuming overall asset values do not change over time. In the next section, the discussion accounts for volatility of asset values.

Liability Calculation

To ensure a match between insured liabilities and those subject to the premium assessment, all benefits in the premium formula are expressed on a termination basis, discounted at a rate not to exceed the lower of 1 percent or the average real three-month Treasury bill rates over the most recent 20 years. These interest rates are consistent with guaranteed benefits in the indexed insurance policy.

The rule requiring liabilities to be calculated on a real basis prevents plans (particularly flat benefit plans) from imposing unfunded past service credits on the insurance system by increasing nominal benefits. The rule does not preclude the use of flat benefit formulas, but rather it requires firms to express these benefits in real terms for purposes of assessing exposure.

Similarly, to retain the integrity of the calculation over time, increases in *real* pension plan generosity are not insured except insofar as the increase applies only to future service. Real benefit increases due solely to increases in real wages in the firm are insured, if they have been incorporated in liability projections for purposes of paying premiums. In addition, I adopt McGill's proposal (see above) by excluding from the guarantee any real benefit increases granted during the five years preceding a claim.[7]

To calculate exposure for premium purposes, other actuarial assumptions are imposed by the carrier. In particular, assumed retirement ages must conform to the earliest eligible ages. Turnover and mortality assumptions also must conform to those set out by the insurance company. If statistical evidence to justify different assump-

[7]The rules could be changed if, at the time the insurance contract was signed, it was anticipated that real benefits would be increased within a specified range. In this case, premiums could be set to reflect this anticipated additional exposure. A five-year cliff rule, however, still would be appropriate in these contracts.

tions can be provided by the insured's actuary, alternative assumptions will be permitted by my hypothetical carrier.

Control of Defunding

Once the plan's liabilities and thus its underfunding ratio are calculated, several steps must be taken to ensure that the ratio is reasonably related to the underfunding ratio at the time of a claim. Toward this end, two plan benefit provisions are prohibited: shutdown benefits and lump-sum payments. The more general problem of defunding must also be addressed.

Shutdown benefits. Shutdown benefits are not included in the normal calculations of funding and thus can impose significant underfunding on the insurance firm prior to and at the time of termination. Following McGill, these benefits are not covered by my hypothetical insurance carrier's policy. The plan, however, can make a special promise to workers affected by a shutdown: it can promise to pay benefits at retirement age indexed at the lower of the inflation rate or the T-bill rate from the shutdown date to the age of normal retirement.

The provision locks in real benefits for special early retirees but does not increase exposure for the carrier. This is because indexation of benefits is assumed for all workers except those who quit the firm prior to retirement age.[8] In this event, the pension plan cannot factor shutdown possibilities into its turnover assumptions.

Lump-sum payments. Lump-sum payments present obvious opportunities for plans to circumvent the coinsurance feature of the insurance (see Chapter 7). Therefore, these payments should not be permitted in the plan, except insofar as they apply to de minimus amounts as defined by the insurance company.

General rule for defunding. Once the plan's exposure has been calculated at the start of the insurance period, generally no problem will arise if the plan's funding level is increased relative to the overall average of pension plans (in this case, they would receive a reduction in their exposure assessment). The problem arises when the plan sponsor wishes to reduce its funding ratio relative to the average.

The general rule constraining defunding is stated as follows: *If in relation to all plans' funding ratios,*[9] *the insured's funding ratio reaches a level 20 percent below the level at the time the contract is written, without receiving an exemption from the insurance firm, all*

[8]In the proposal, no indexing protection prior to normal retirement age is required for participants who quit the firm prior to the earliest permissible retirement age.

[9]The measure of overall funding ratios needs to be specified in the contract. The carrier might, for example, purchase this information from a large actuarial firm that would provide annual data based on a sample of its clients, assuming they were representative of the pension universe.

service accruals are frozen. After this point, accruals are permitted only insofar as future contributions maintain the defunding gap at no more than 20 percent.

The freeze in accruals must be accompanied by other actions. First, upon a freeze, the portfolio is converted entirely to Treasury bills to protect the insurance company against market volatility.[10] Second, the freeze triggers the payment of *insured benefits only* from the trust fund. The insured is free to continue paying full benefits promised by the plan but only by augmenting insured payments from the trust fund with monies contributed from the firm. These actions ensure that the underfunded portion of guaranteed benefits will be frozen at $1-F^*(1-.2)$, where F^* is the funding level observed when the firm started the policy (indexed to overall pension funding levels).

Third, and finally, the insurance policy written by the carrier will specify that following a plan freeze, (*a*) no insurance will be written for any new defined benefit plan that covers any of the same workers in the frozen plan, and (*b*) the insured is precluded from obtaining insurance from another carrier to cover any new plan designed to circumvent the coinsurance feature of the insurance. A defined contribution plan may be created (or an old one enhanced) if it provides (1) no past service credit, (2) equal contribution percents to all workers' accounts, and (3) no integration rules with the frozen plan.

That the policy permits some defunding prior to termination (equal to 20 percent) is a concession to the nature of the insurable event: firm failure. A firm encountering financial failure will likely have difficulty paying its required contributions. It is akin to a life and health insurance company, which expects to pay significant health benefits prior to the payoff of a life insurance policy. However, these benefits usually will be constrained by the carrier to reduce the moral hazard problem, just as defunding is constrained to 20 percent of the contracted amount (indexed to overall funding levels among insureds).

It is tempting to exempt "well-funded" pension plans from the defunding rule. If an insured has a funding ratio for insured benefits of, say, 140 percent, why not permit the plan to reduce the ratio to 100 percent without triggering a freeze? If the portfolio were 100 percent T-bills, this might be possible. Given the carrier's exposure to asset-value volatility, however, a 100 percent funding ratio presents substantial potential exposure to the carrier, compared to a ratio of 140 percent. This issue is discussed in more detail below.

The defunding rule does not preclude plans from contracting with

[10]As a practical matter, this conversion does not have to be made literally if other equally effective portfolio changes can be made at lower costs. For example, some combination of options and futures market transactions executed at the time of the benefit accrual freeze might protect the insurance carrier during the period in which the insured's funding deficiency is corrected.

the insurance firm to increase exposure. The plan may ask the insurance company to permit the plan to increase its exposure to some higher level. If the insurance company does not perceive a moral hazard problem—for example, the firm's financial condition and future prospects appear sound—higher exposure may be permitted, just as insureds may obtain higher life insurance coverage, subject to acceptance by the insurance company (usually in conjunction with a medical exam or other medical information). In some cases, the insurance company may permit the additional exposure with restrictions; for example, it might permit more underfunding exposure in exchange for a temporary lien on real property to last, say, three years.

Exposure Calculation

The discussion thus far suggests that underfunding (per plan per participant) for purposes of determining a premium is calculated as follows:

$$U^* = L^*(1-c) - A(1-g) \qquad (10-1)$$

where

A = Current trust assets at market value
L^* = Termination liabilities evaluated by using a 1 percent (or lower) interest rate, and other assumptions subject to insurance company restrictions
c = Coinsurance factor, equal to .5
g = Maximum permitted defunding (percent of assets), equal to .2

The funding ratio for the purpose of paying premiums is denoted by F^*:

$$F^* = A\,(1-g)/L^*\,(1-c) \qquad (10-2)$$

Funding levels for premium calculations under this insurance policy are approximated in Table 10–5 for the population of pension plans in 1986. Because the numbers are derived from Form 5500 data, I could not exactly recalculate retiree liabilities to conform to the indexed policy.[11] To approximate, I recalculated active participant liabilities at a 1 percent discount rate, reduced by a 50 percent coinsurance factor. I included 100 percent of termination liabilities for current retirees,

[11]In my carrier's insurance policy, benefits for retirees are recalculated in real terms as of their retirement date, reduced by half, and then indexed to death. Because the age distribution and retirement ages are not given in the Form 5500 data, these recalculations could not be made.

TABLE 10–5 Distribution of Exposure Levels

Funding Ratios (%) $A(1-g)/L^*(1-c)$	*Plans†*	*Participants*
100 or more	71.5%	69.9%
75–99	15.4	15.0
50–74	9.0	10.8
Less than 50	4.1	4.3
Average: 110		

L^* denotes vested liabilities, discounted at 1 percent; A denotes trust assets; g is percent of permissible defunding (set equal to .2); and c is the coinsurance factor (set equal to .5).

†Excludes plans with fewer than 100 participants.

SOURCE: 1984 Form 5500 Annual Pension Plan Reports.

discounted at 7.25 percent. This treatment of retirees is a proxy for calculation of their liabilities in real terms and reducing these by 50 percent.

The numbers in the table demonstrate that at the announced levels of permitted defunding ($g=.2$) and coinsurance ($c=.5$), 70 percent of all plans would pose no exposure for purposes of calculating the premium for the policy discussed above (beyond that affiliated with asset volatility—see below); 15.4 percent of plans would have up to 25 percent of their insurable benefits unfunded; and 13.1 percent of plans would have more than 25 percent of insurable benefits unfunded.

Administration of Insurance

Given the moral hazard potential in the insurance, the monitoring and reporting costs inherent in maintaining control of the insurance can be large. My hypothetical carrier will minimize these costs by requiring insureds to make the insurance company the administrator of the fund. Competition among carriers and/or constraints in the contract will ensure that the administrative cost will not be excessive.[12] The carrier will maintain all liability data, pay benefits, file annual reports to the government, etc. The carrier will also electronically or manually monitor all transactions with the custodial bank and retain authority to impose all constraints required to effect a plan freeze under conditions set forth in the contract (see above).

In this way, the insurance company has all the data required to operate the plan. It can calculate liabilities in the plans by using

[12]A new contract can be signed, say, annually. If a carrier tries to increase administrative cost assessments, the insured is free to shop for a new insurer. If a longer-term contract is beneficial to both parties, some limit in the range of administrative costs can be specified. The range can be indexed to some industry measure of various cost components.

insurance company assumptions and can continuously monitor the market value and portfolio composition of trust assets. It therefore is able to monitor funding levels: if the defunding rule is broken, the insurance firm can ensure that the accrual freeze procedure is enforced.

By having the insurance company administer the fund, monitoring costs of the insurance are substantially reduced, and, in the event of a claim, no time is lost or cost imposed owing to requirements to audit plan records to set benefit levels. The plan sponsor loses no flexibility in the plan. It can still set funding levels (subject to defunding rules), choose its portfolio, and set benefit levels. Because the insurance firm administers the plan, however, it is aware of the plan's financial characteristics and condition and can implement insurance rules without impediments created by imperfect and untimely information passing from the plan sponsor to the insurance firm.[13]

ADJUSTMENTS FOR PORTFOLIO RISK

The insurance company faces risks even if all insureds retain sufficiently high funding ratios, so in a typical time period, guaranteed exposure levels are zero. The problem arises because of volatility in asset values. The easiest way to think about this is to suppose all insureds have target funding ratios of 100 percent of guaranteed benefits; and there is no problem of defunding prior to termination ($g=0$). To make the numbers easy, suppose assets equal 100.

Factors Affecting Risk

Table 10–6 illustrates a highly stylized example. Each of four pension plans holds 100 percent funding ratios against insured benefits, and each has chosen to invest 100 percent in a single class of securities: one in the Standard & Poor's 500 stock index, one in a small stock index, one in long-term bonds, and one in Treasury bills. We will follow these portfolios for only one period, so it is convenient and inconsequential to ignore interest and dividend accruals. It is assumed that insured benefits are indexed and that expected rates of return on investments are constant.

It is assumed that the small stock index has a *beta value* of two relative to the S&P. This means that if the S&P 500 index falls by 10

[13]The possibility must also be entertained that firms in growing financial trouble may have incentives to misrepresent reportable information to the insurance firm. Because Congress probably would not permit workers to accept insurance losses beyond those specified in the coinsurance clause and a court claim may not be paid in full in bankruptcy proceedings, the onus is on the insurance carrier to maintain direct monitoring of pension funds.

TABLE 10–6 Illustration of Portfolio Risk

Portfolio	*Initial Value*	*S&P Stock Index Falls 50 Percent*	*Inflation Doubles*
1. 100% S&P index (Beta=1)	100	50	100*
2. 100% small stocks (Beta=2)	100	0	100
3. 100% long bonds (infinite horizon)	100	100	50
4. 100% T-bills	100	100	100

*For the sake of the example, it is assumed that inflation effects on stock prices net out to zero.

percent, the small stock index falls by 20 percent. If, after our initial snapshot (when premiums are assessed in these plans), the S&P index falls by 50 percent, the insurance company has exposure equal to 50 in the S&P stock portfolio and to 100 percent in the small stock portfolio. I assume that interest rates are stable during this period, so that exposure in the bond and T-bill portfolios remains at 100.

Now suppose stock values are stable, but the inflation rate doubles. And, for simplicity, assume the long bonds have infinite lives and real interest rates are zero. This makes it easy to calculate that long-bond values will be reduced by 50 percent.[14] The insurance company faces exposure equal to 50. Once again, the T-bill portfolio remains at 100: higher inflation rates merely translate to higher interest rates in each succeeding T-bill turnover, and hence no capital losses are sustained. Thus, in portfolios comprised of stocks and bonds, exposure to the insurance carrier can increase owing to volatility of the underlying value of these securities.

It is tempting to think that the exposure calculations are symmetric; that in riskier portfolios, exposure can fall as well as increase. But this is only partially correct. First, increases in asset values do not always benefit the insurance company. This is illustrated in Table 10–6. If either of the portfolios doubles from 100 to 200, the exposure of the insurance firm would still be zero. That is, if a termination occurs when insurance plans have surpluses, the insurance company does not receive a portion of the excess.

Second, the probability of firm failure (and thus a claim) is not independent of market conditions. If stock market values double, fewer firms are likely to fail; if stock values decrease by 50 percent, more firms are likely to fail.

[14]The price of an infinitely lived bond is $1/i$, where i is the interest rate. Thus, if the interest rate doubles, bond values fall by 50 percent.

Third, when portfolios have lots of volatility, the probability of insolvency of the insurance firm increases. If stock values decrease by 50 percent and remain there for several periods, the cumulative claims by more highly exposed plans can threaten the insurance company's solvency. Thus, insuring more volatile portfolios requires higher returns to insurance company investors and larger reserve requirements, which translate to higher premium requirements.[15]

These arguments suggest that the rate structure must reflect portfolio risk. When the pension plan portfolio comprises only T-bills, this risk is essentially zero: the beta value is zero, and exposure to inflation risk is virtually zero. As the insured holds higher beta portfolios or portfolios with higher shares of long-term bonds, the risk of higher exposure increases, which in turn should be reflected in premium rates.

Calculations of Additional Exposure

Calculation of portfolio exposure requires analysis of portfolio volatility over time. For example, the average level of beta and long-bond share held by pension plans during the years 1977 through 1983 were .5 and 54 percent, respectively.[16] Column 1 in Table 10–7 shows the volatility in ongoing funding ratios for the average of all plans over the 1960–87 period. The largest reduction in funding ratios (34 percentage points) occurred from 1972 to 1974, when funding ratios fell on average from 86 percent to 52 percent. The three-year cumulative reduction in funding ratios occurred during the same period (29 percentage points from 1972 through 1975).

Consider the portfolio exposure presented by the funding ratio volatility in the table. Suppose the portfolio for the typical pension over the entire period exhibited a beta equal to .5 and bond share equal to 54 percent. Suppose further that the insurance policy was written against ongoing liabilities subject to a 25 percent coinsurance factor; also assume that the defunding factor (g) is zero. This means funding ratios for insured benefits (column 2) are 133 percent higher than the ongoing ratios (owing to the 25 percent coinsurance factor). The funding ratios for insured benefits are shown in column 2 of Table 10–7.

The average insured funding level is 100 percent. But this does not mean no exposure is experienced over the period. In 11 of the 28 years shown, exposure was positive primarily because of market asset

[15]The insurance firm's insolvency probability can be reduced through a surcharge-rebate system with the insurance group (see above), but the cost of operating this system must be assigned to portfolios that pose more portfolio risk.

[16]The beta value describes the entire pension portfolio, including bonds, not just stock. See Ippolito and Turner, 1987.

TABLE 10–7 Portfolio Exposure, 1960–1987

Year	Funding Ratios		
	Ongoing (1)	*With 25 Percent Coinsurance (2)*	*Exposure (3)*
1960	72%	96%	4%
1961	77	102	0
1962	70	93	7
1963	76	101	0
1964	80	106	0
1965	80	106	0
1966	74	98	2
1967	77	102	0
1968	82	109	0
1969	71	94	6
1970	75	100	0
1971	81	108	0
1972	86	114	0
1973	67	89	11
1974	52	69	31
1975	63	84	16
1976	74	98	2
1977	72	96	4
1978	65	86	14
1979	69	92	8
1980	84	111	0
1981	77	102	0
1982	85	113	0
1983	92	122	0
1984	95	126	0
1985	88	117	0
1986	90	119	0
1987	102	136	0
Average	75%	100%	3.5%

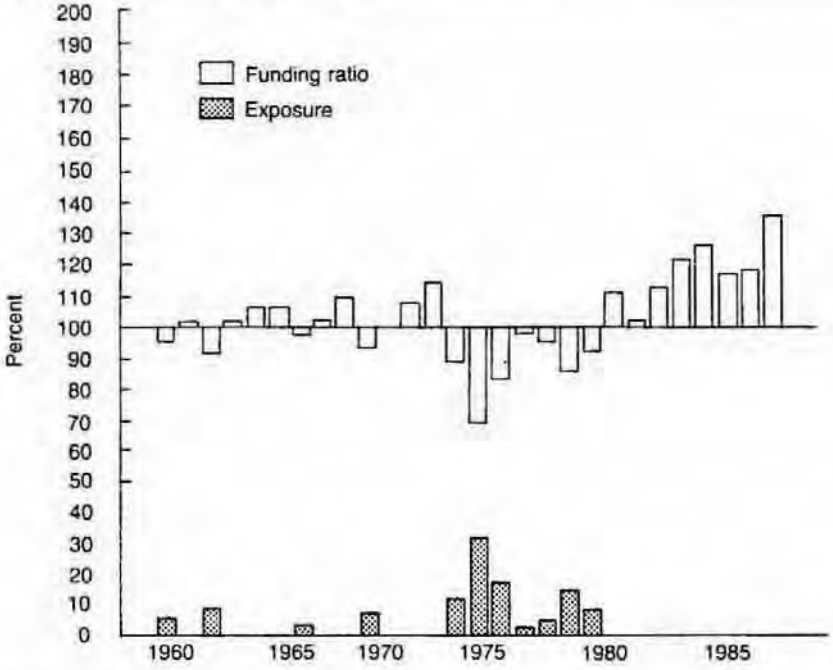
Note: Funding ratios calculated at beginning of plan year, usually January 1.

SOURCE: 1953–1984, Richard Ippolito and Walter Kolodrubetz, *The Handbook of Pension Statistics, 1985* (Chicago: Commerce Clearing House, 1986). After 1984, Wyatt Company, *1986 Survey of Actuarial Assumptions and Funding* (Washington, D.C.: 1987).

volatility, particularly over the 1973–79 period (see column 3 of Table 10–7 and Figure 10–1). On average, exposure was 3.5 percent of insured liabilities. Thus, in this example, systematic exposure (E) is zero and market exposure (say, M) is $.035L^*$, where L^* denotes insured liabilities.

The above example assumes zero systematic exposure on average. Portfolio volatility exposure would be lower for plans that have higher funding ratios. In the above example, if the coinsurance factor had been 50 percent, the average funding ratio for insured benefits would be 150 percent. There would have been no portfolio exposure to the insurance

FIGURE 10–1 Changing Funding Ratios, 1960–1987



carrier over the entire 28-year period shown in the table because a sufficient cushion would have existed to protect against asset volatility in all years. For example, in 1974, when the ongoing funding ratio was at its lowest level, the funding ratio for insured benefits with a 50 percent coinsurance feature would have been 104 percent.

In general, a series of exposure tables would be created to calculate historical values of market exposure (M). The level of exposure would be a function of portfolio risk characteristics and average funding levels in the insured's pension plan portfolio.[17]

In essence, the insurance carrier is offering a kind of portfolio insurance, except the insurance applies only to plans if they terminate. The carrier will protect its position by continually buying options to sell equity securities in the futures market.[18] The cost of insurance will reflect the price of these options denoted, say, by y.[19]

[17]For a more detailed treatment of this issue, see Marcus, 1983.

[18]This is distinct from some versions of "portfolio insurance" designed to transact in the futures market at some future date, conditional on values of predetermined market variables.

[19]Because the carrier will not be entirely able to hedge its risks, some limit to portfolio exposure will likely be part of the contract.

Rate formula. Assuming all portfolio risks can be hedged, we can now write the premium formula that characterizes an insurance policy:

$$P = qU^* + yM(U^*,R) \qquad (10\text{–}3)$$

where

P = Per participant premium
q = Probability of default
U^* = Systematic per participant exposure defined in Equation (10–1)
M = Exposure presented by asset value volatility, conditional on U^* and portfolio risk characteristics (R)[20]
y = Cost of holding hedging instruments, per dollar of market exposure

THE INSURABLE EVENT

A prominent feature of the premium charge is the probability for filing a claim, denoted by q. As discussed in previous chapters, the definition of the insurable event has changed somewhat over time. Prior to the enactment of the Single Employer Pension Plan Amendments Act (SEPPAA) in 1986, a claim could be filed by any plan sponsor willing to trade plan underfunding for 30 percent of net worth. SEPPAA constrained the event to be related to one of four distress criteria, including Chapter 7 or Chapter 11 of the Bankruptcy Code, or demonstration that the firm will fail unless the pension is terminated, or that the sole reason for funding deterioration is the contraction of an industry (see Chapter 5). The Pension Protection Act of 1987 changed the Chapter 11 criterion to also require that in the absence of plan termination, reorganization would not be possible under Chapter 11.

While these changes have worked to constrain the insurable event, they still retain significant potential for moral hazard. Paying off claims outside of firm failure is akin to paying life insurance benefits to individuals who are in poor health but not necessarily fatally ill.

The application of sound insurance principles suggests the policy be paid off only on the condition of dissolution of the firm. If the firm continues in whole or part as the ongoing entity, the incentive remains for the insured to distort its behavior to obtain a transfer from the insurance firm.

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[20]In the example demonstrated in Table 10–7, if U^* is zero, exposure from market volatility averaged 3.5 percent times liabilities; but if U^* was *negative* 50 percent (target funding ratio equals 150 percent), exposure from market volatility was zero over the time period considered. If the portfolio were invested entirely in Treasury bills, exposure from market volatility also would be zero.

A lesson from the PBGC's experience is that in the absence of strict requirements for firm failure, insureds will try to find ways to obtain payments from the insurance company to acquire transfers for subsidizing their operations, thereby giving them an advantage over their competitors. This advantage, in turn, invites other firms to engage in the same procedure. For these reasons, the insurable event in my hypothetical insurance carrier's contract will be approved by the courts of a filing under Chapter 7 of the U.S. Bankruptcy Code (or similar filings under state laws).[21]

The insurance company will be fully protected by this rule, but situations could arise in which workers would not be paid their pensions. I presume Congress will require workers to receive their guaranteed benefits regardless of disputes between the insurance company and the plan sponsor.

Consider the following example. A plan sponsor has assets in trust equal to insured benefits; after it encounters financial difficulty, the funding ratio falls to 80 percent. The insurance firm reacts by freezing accruals. This, in turn, triggers various protections for the insurance company (discussed above) that freeze the funded portion of guaranteed benefits at 80 percent. (These actions include conversion of the portfolio to Treasury bills and restriction of benefit payments to the guaranteed benefit level from the trust fund.)

Now suppose the firm makes no further contributions to the trust fund, so that ultimately funds available to pay the frozen benefits are insufficient by 20 percent. If the firm enters Chapter 7 of the Bankruptcy Code (dissolution), the insurance company will pay off the claim. But suppose the firm enters Chapter 11 (reorganization), and the pension obligations are dissolved by the bankruptcy court. The pension insurance is not paid off because the insurable event is not satisfied. But because of insufficiency in the terminated pension plan trust fund, workers will receive only 80 percent of their insured benefits.

Congress could solve this problem by requiring firms emerging from Chapter 11 of the Bankruptcy Code to bring their pension obligations with them. In the absence of a change in the law, the insurance carrier can address this problem in at least two ways.

The first option is to decrease insurance benefits by the amount of the underfunding (in this case, 20 percent) at the time of termination in Chapter 11. Workers thus suffer some reduction of benefits beyond their coinsurance portion, which is feasible if the overall coinsurance does not violate the limits which I assume will be set by Congress (see Table 10–1).

Second, the insurance policy could be written with collateral

[21]To prevent the potential for abuse, the language might specifically prohibit the firm from continuing as an ongoing entity, even after a Chapter 7 bankruptcy.

posted in an amount sufficient to pay for 20 percent defunding (plus some allowance to protect against asset volatility). In the event of default outside the insurable event, the insurance company would be fully protected, and workers would receive their full guaranteed benefits for all service credited prior to a pension freeze. The lien would become null and void on a successful filing under Chapter 7 of the Bankruptcy Code (or comparable filings under state law).[22]

THE ASSIGNED RISK POOL

In the insurance scheme described above, all insureds are assessed premiums determined in the free market, unless a price quotation below $200 per participant per year cannot be found for basic benefits coverage. In this event, these plans are put into an assigned risk pool, which is subsidized by those outside the pool. This subsidy, however, is reduced by application of special rules that apply to all plans entering the pool. These rules affect benefit levels and funding rules. The rules governing those in the pool are determined by the regulatory agency.

Special Benefit Limitations

When a plan enters the assigned risk pool in my hypothetical pension system, various rules are triggered to prevent the subsidization of exorbitant pension payments. In the proposal considered here, those paying the subsidy will not be required to subsidize benefits exceeding the average of those available in their own plans and will subsidize only payments made for retirement-age years.

More particularly, plans in the pool are constrained from making full benefits to any participant younger than age 62. Participants may receive benefits prior to this age, but only in amounts reflecting a full actuarial reduction. Moreover, the amount of full benefits to all participants in the plan is subject to a maximum payment equal to the average benefit payment (as a percentage of wage and service) paid by all insureds in the system (adjusted to an age-62 equivalent). Further, postretirement inflation adjustments made while plans are in the pool are limited by the average of all such adjustments in the entire sample of insureds.

Special Funding Rules

As long as insureds remain outside the pool, they may maintain low funding levels indefinitely. They are only precluded from defunding

[22] Ibid.

their plan according to rules set out by their insurance carrier. Once in the pool, however, special funding rules are triggered to amortize guaranteed liabilities calculated at the pool-constrained benefit levels.

Suppose a plan enters the pool with liabilities of $100 and assets of $50. Benefit restrictions while in the pool reduce liabilities to $80: the firm is required to amortize the remaining $30 deficiency over a reasonable period of time, say, 12 years. Moreover, normal cost contributions must be at least equal to those calculated to meet additional guaranteed accruals. Calculations must conform to assumptions as determined by the pool regulator; insured liabilities cannot be discounted by a rate in excess of 1 percent.

In addition, once a plan is in the pool, defunding (relative to overall funding levels) is not permitted. If a plan in the pool fails to make a required contribution or permits its funding ratio (indexed to overall funding ratios) to fall below the level it had at the time it entered the pool, all plan accruals are frozen, trust assets must be converted to 100 percent Treasury bills, and benefits are reduced to 50 percent of the pool-constrained benefits (indexed to prices). The freeze persists until the funding deficiencies are remedied by the plan sponsor.

Portfolio Exposure

To prevent plans in the pool from providing unreasonable volatility risks to those subsidizing the pool, plans entering the pool are required to alter their portfolios. The pool rules might require, for example, all portfolios to comprise at least one third Treasury bills; the beta value to be less than the median level for all insured plans; and the share and duration of its bond portfolios to be less than the median for all insured plans.

Termination While in the Pool

If a plan terminates in the pool, basic pool benefits will be indexed and reduced by a 50 percent coinsurance factor.

Participation in the Pool

To be eligible for the pool, firms must show they are unable to find a *basic benefits policy* (akin to the one in the pool) for less than $200. To enforce this, the pool price will not be set below $200 for any pool member. As long as the premium outside the pool is greater than $200, the plan remains in the pool.

Plans can voluntarily exit the pool if they are willing to pay the free market premium. Thus, if the market premium for a plan is $300 per participant, the plan may elect to pay the premium instead of con-

TABLE 10–8 Special Rules for the Assigned Risk Pool

1. Participation	Entitled to participate if insured cannot find insurance for a basic benefits policy for less than $200 per person per year
	May voluntarily remain outside the pool by paying premiums in excess of $200
2. Price	$200 per participant per year
3. Benefits	Full benefits payable no earlier than age 62. Benefits are the lower of plan benefits or average benefits payable in all pension plans (adjusted to age-62 retirement age)
4. Funding	Minimum funding rules are altered to require contributions based on wage projection (even in flat benefit formulas); the net discount rate cannot exceed 1 percent.
	Existing underfunding is amortized over 12 years.
5. Termination benefit	If an insurable event occurs to a pool-insured plan, the insurance benefit is equal to the basic pool benefit, reduced by 50 percent, and indexed to the lower of prices or T-bills.

tinuing in the pool. In this event, the plan is subject to whatever rules are set by their insurance carrier. (Rules for the assigned risk pool are summarized in Table 10–8.)

CONCLUSION

In this chapter, an attempt was made to build a pension insurance system that incorporated economic principles and reflected the experience of the Pension Benefit Guaranty Corporation. The proposal is not unique; other equally efficient or better proposals could be developed. It accepts the constraints that the insurance at some level is mandatory and that some maximum premium must characterize the system.

The proposal minimizes the impact on pension plans in firms that pose little risk by (1) permitting pension plans to choose among various insurance policies and (2) minimizing the subsidy to plans that provide lots of exposure and risk. The latter objective is attained by creating an assigned risk pool, akin to casualty insurance, to be populated by plans that cannot find insurance against basic benefits for an annual premium less than $200 per participant in 1985 dollars and are unwilling to pay more. Pool members are subject to a basic benefits package; pension payments cannot exceed average industry benefit payments starting at age 62. They are also subject to special portfolio and funding rules while in the pool.

The insurance policy of the hypothetical carrier described herein pays a benefit set in real terms, reduced by some coinsurance factor. This means regardless of the nominal interest rate, workers of all ages receive a real indexed insured benefit, reduced by a factor of 50 percent. Compared to ongoing benefits in 1986 (which are less than completely indexed), this policy incorporates a roughly 30 percent coinsurance factor for active participants and 15 percent for retirees.

The indexing feature of the insured benefit limits the coinsurance factor. This policy is important in my hypothetical carrier's policy because to protect itself and workers from wholesale defunding by plan sponsors, a pension plan is frozen if its funding level (indexed to average funding ratios in all plans) falls by more than 20 percent. On a freeze, benefits are automatically reduced to the insured level, and the portfolio is converted to 100 percent Treasury bills. Insurance protection is denied to any defined benefit plan created after a freeze. While this procedure freezes future accruals, all workers are assured of absorbing only approximately 30 percent of their expected benefits on termination. My hypothetical assigned risk pool pays the same type of insured benefit if termination occurs while in the pool. The coinsurance factor for these workers and retirees is applied to the basic benefit levels permitted by the pool.

How is the transition made from the existing pension insurance program to a system like the one described above? One way is to make an immediate conversion as of some retrospective date. This would deny huge transfers to perhaps hundreds of plans that have queued at the proverbial PBGC transfer window. Rather than close the window completely and immediately, Congress could give all existing plans the right to qualify for the insurance under the old rules. To qualify, however, the plan must be terminated at the time the new legislation is enacted.

All future service (plus inflation indexing of past service) must be financed by a new plan. The new plan would be covered by the new pension insurance rules. Existing funding rules would continue to apply to the terminated plans.

This transfer rule would have little impact on firms at the front of the PBGC queue. Those further back (that is, those who otherwise would receive transfers in future years) would receive smaller real transfers because inflation will erode the value of benefits frozen at their nominal levels at the transfer date. To reduce moral hazard, a five-year cliff guarantee rule would be imposed to prevent firms from trying to increase benefits in the old plan prior to the conversion date. Alternatively, a retrospective date for the freeze could be chosen.

Suppose expected annual claims against the PBGC are $600 million per year (see Chapter 6). If claims will increase at the rate of 8 percent per year owing to wage increases, and if the long-term interest rate is 10

percent, then claims are discounted at a net 2 percent. Thus, the present value of claims of the existing system in 1987 is $30 billion in real terms. If claims' levels are frozen in nominal terms, the claims are discounted at the full 10 percent (wage growth is zero). The present value of claims is then reduced to $6 billion. Thus, the freeze reduces the cost of the existing system by 80 percent but promises sufficient transfers to those in the front of the queue, to reduce intense political opposition to the new scheme.

The $6 billion transfer would be financed by a one-time lump-sum exit tax on all participants on the day of the transfer. In exchange for approximately $240 per head (there are roughly 25 million participants in single-employer defined benefit plans), firms gain the opportunity to operate defined benefit plans with fewer government constraints and lower subsidy payments.