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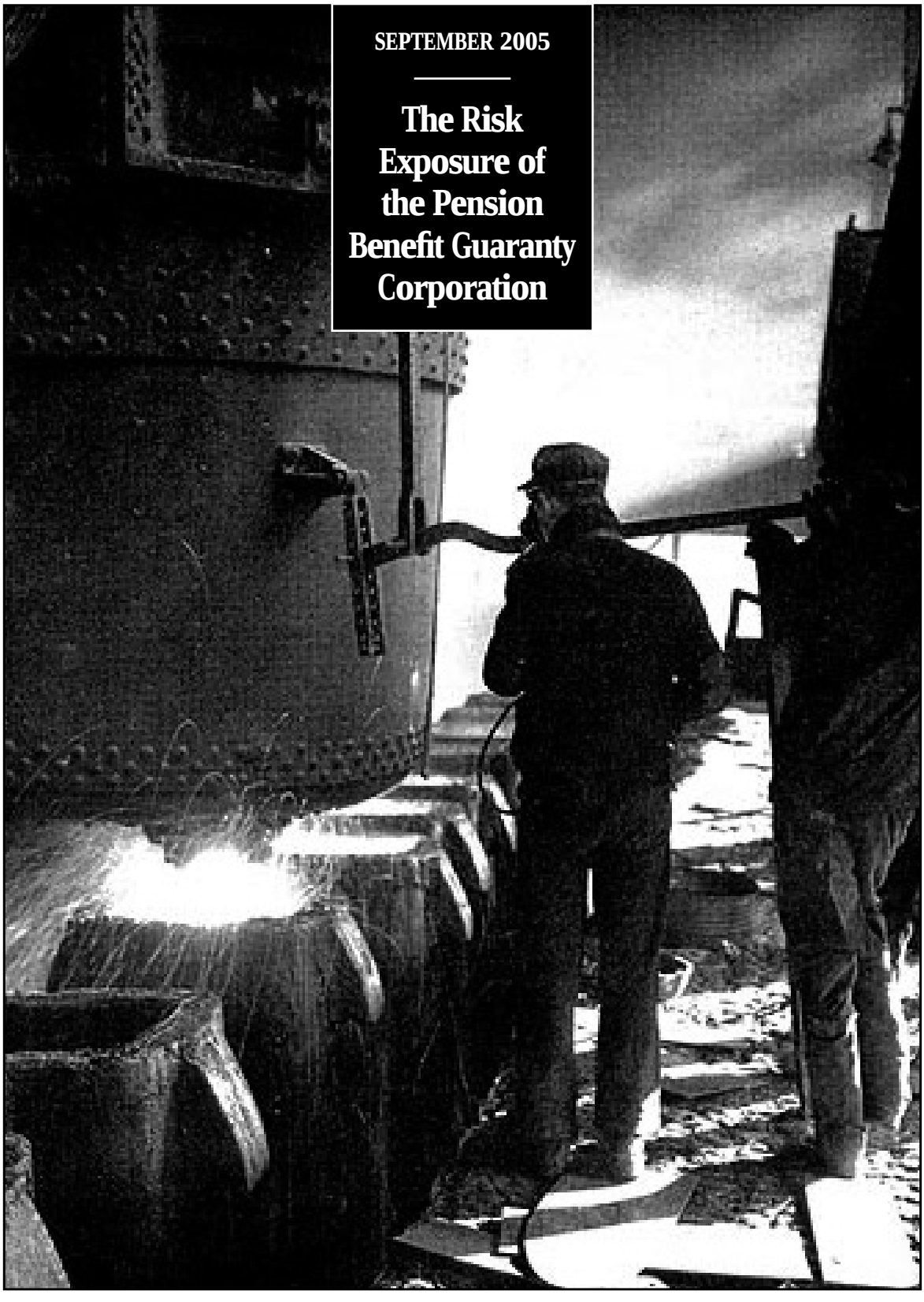

SEPTEMBER 2005

The Risk Exposure of the Pension Benefit Guaranty Corporation

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September 2005

The Congress of the United States ■ Congressional Budget Office

Note

The cover photograph comes from the Bethlehem Steel Company.

Preface

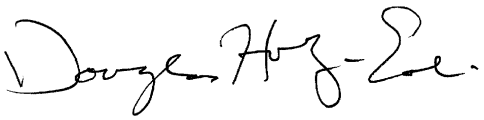
The recent transfer of several large defined-benefit pension plans to the federal Pension Benefit Guaranty Corporation (PBGC) by U.S. airline and steel companies has drawn attention to the potential cost of the government's pension insurance program. Although current law gives PBGC no claim on federal financial resources, the possibility of lost pension benefits or future federal legislation to cover those losses has increased interest in policies to strengthen PBGC's finances.

Evaluating such policies is complicated by the budgetary treatment of PBGC. Under current practice, some of the effects of policy changes are not recognized in the budget for many years. House Budget Committee Chairman Jim Nussle has asked the Congressional Budget Office (CBO) to evaluate the current budgetary treatment of PBGC and identify changes in accounting that would increase the accuracy, relevance, and reliability of budget estimates for insurance and related federal programs.

This paper is a partial response to the Chairman's request. It estimates the market value of federal pension insurance, analyzes options for reducing future shortfalls, and identifies budgetary alternatives that would make PBGC's finances more transparent to the Congress and the public. Consistent with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Wendy Kiska (CBO), Deborah Lucas (Northwestern University and the National Bureau of Economic Research), and Marvin Phaup (CBO) prepared the report under the direction of Roger Hitchner and Robert Dennis. (Roger Hitchner has since left CBO.) The authors thank Robert McDonald (Northwestern University) for valuable discussions. Paul Cullinan, Thomas DeLeire, Geoff Gerhardt, and Bruce Vavrichek offered helpful suggestions. Steven Weinberg provided programming assistance, and Amina Masood (formerly of CBO) assisted with research. Comments were also provided by seminar participants at CBO; the Northwestern University Law and Economics Colloquium; and the Finance Department, Kellogg School of Management, Northwestern University.

Janey Cohen edited the paper, with assistance from Christian Spoor, and Christine Bogusz proofread it. Rae Roy formatted the initial text and tables. Maureen Costantino prepared the paper for publication and designed the cover. Lenny Skutnik produced printed copies of the paper, and Annette Kalicki and Simone Thomas produced the electronic version for CBO's Web site (www.cbo.gov).



Douglas Holtz-Eakin
Director

September 2005

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Summary

The Pension Benefit Guaranty Corporation (PBGC), an agency of the federal government, has recently taken over several large pension plans of bankrupt U.S. airline and steel companies. At the same time, the agency's own financial condition has worsened, raising the specter of a sharply reduced pension for some insured workers or the need to provide taxpayers' dollars to PBGC. Under current law, PBGC insures pension benefits only to the extent that it has assets to make such payments from premiums, investment income, assets of failed pension plans, and recoveries from bankrupt plan sponsors. Although PBGC has no legal claim on the general fund of the Treasury, many policymakers and observers believe that a major shortfall at PBGC would prove untenable because the government has provided an implicit guarantee of pension plans—and that the law would be changed to provide the resources necessary to avoid losses of federally insured pension benefits by retirees. That prospect has prompted a search for policy changes that would reduce or eliminate projected losses. To inform such policies, this paper describes the key features of the current system, measures the current shortfall, and evaluates the effects of various policy alternatives on prospective losses.

Defined-benefit pensions are a form of employee compensation that is earned during working years but paid during retirement. To ensure payment of that deferred compensation, firms are required to put aside funds to meet the liabilities and to purchase insurance through the payment of premiums to PBGC. PBGC takes over ("terminates") defined-benefit pension plans sponsored by a single employer when that sponsor becomes insolvent and is unable to meet its pension obligations. In doing so, PBGC seizes the assets of the pension plan and assumes responsibility for paying insured pension benefits. Its loss on those plan terminations is the excess of insured plan liabilities over plan assets.

CBO's Estimates

The Congressional Budget Office (CBO) estimates that the present value of PBGC's net costs for defined-benefit pension insurance for single-employer plans over the next 10 years is about $86.7 billion. That total consists of two distinct components: $23.3 billion of losses from insurance claims for plans that have already terminated or whose termination is imminent, and $63.4 billion of prospective losses over the next 10 years for terminations that have not yet occurred, net of future premiums[1] (see Summary Table 1). Total costs ("sunk"—for plans that have been terminated—and prospective) for 15- and 20-year horizons are $119 billion and $141.9 billion, respectively.

Those estimates are the market value of insurance—the price that a private insurer would charge to accept the insurance obligations of PBGC for all plans that terminate over the time period. The value reflects the discounted cost of covered benefit payments over the lifetime of beneficiaries. It also incorporates a charge for the cost of market risk, a cost that arises because investors demand compensation for the fact that new claims are likely to be higher in bad economic times, when more sponsoring firms fail, and the value of pension assets are depressed.

Those market-value estimates should not be confused with budget estimates, which differ in two critical respects. First, under current law, PBGC is authorized to pay insured benefits only to the extent that it has acquired resources to do so from premiums, assets of terminated plans, investment income, and recoveries from bankrupt plan sponsors. Thus, federal liability and the

1. That estimate is extrapolated from directly estimated costs of $55.6 billion for a subset of insured plans with a total of about $1.4 trillion in plan liabilities for which recent data are available. Total liabilities of all defined-benefit plans are estimated by PBGC to be about $1.6 trillion as of January 1, 2003, implying a sample-to-universe scaling factor of 1.14. Unless otherwise noted, all estimates of future losses include that scaling factor.

Summary Table 1.

PBGC's Past and Projected Costs for Single-Employer Plans

(Billions of dollars)

	Market Value[a]
Accumulated Deficit, as of September 30, 2004	23.3
Prospective Net Costs	
Over 10 years	63.4
Over 15 years	95.7
Over 20 years	118.6
Total	
Over 10 years	86.7
Over 15 years	119.0
Over 20 years	141.9

Source: Congressional Budget Office based on information from the Pension Benefit Guaranty Corporation.

a. Estimated price that a private insurer would charge, in addition to current premiums, to accept the obligations arising from terminations over the indicated time period.

maximum budget cost of pension insurance are limited. In contrast, CBO's estimate of market value is for the entire shortfall, without regard to the current-law limitation on federal financial responsibility. Second, even if the Congress enacted legislation to guarantee PBGC's obligations, insurance programs are budgeted for on a cash basis, whereas CBO's present-value estimates take into account benefits that are paid far beyond the 10-year budget window.

CBO's estimate of $86.7 billion indicates that PBGC's accumulated deficit of $23.3 billion significantly understates the financial exposure from PBGC insurance. That is because PBGC's accumulated deficit does not include losses expected to be incurred in the future under current policy, beyond those that are imminent. Thus, even if the Congress provided funding to cover the currently reported shortfall, a large structural imbalance would remain between the value of PBGC's premiums and other income, and the prospective cost of future plan terminations. But current estimates of underfunding by pension plans—amounting to more than $450 billion—significantly overstate PBGC's financial risk. Most sponsors of underfunded defined-benefit plans probably will make up the current shortfalls through future contributions to the plans, although the condition of a smaller number of sponsors and plans will deteriorate over time.

Policy Options to Reduce Federal Costs

Several policy options are available to the Congress to induce plan sponsors to more fully absorb the costs of their pension commitments and thus to reduce prospective losses. Effective options fall into two broad categories: increasing premiums to better reflect the value of insurance; and increasing sponsor resources by tightening the rules that govern investment, accounting, and funding. Although such changes would tend to reduce the financial shortfall of the defined-benefit pension system, they also would affect the incentives of plan sponsors, both with respect to taking risks and continuing to offer defined-benefit pensions. Raising the costs to sponsors would tend to push some employers toward lower-cost options, such as defined-contribution plans, which shift investment risk to employees, or toward other forms of compensation.

Increasing PBGC's revenues by raising premiums could be structured in a variety of ways. One would preserve the prevailing structure: a fixed charge per participant plus a variable charge based on how much the plan is underfunded. In that case, CBO estimates that raising rates so that, in market-value terms, the present value of expected future losses would equal the present value of premium income, would require both the fixed and variable portions of the annual premium to be increased by a factor of 6.5.

Alternatives to simply scaling up the components of the current premium include tying premiums more closely to plan or sponsor risk. For instance, linking premiums to pension-asset risk could discourage excessive risk in plan investments. Other options that would also more closely align premiums with plan risk, and reduce cross-subsidies among sponsors, include basing premiums on the dollar value of insurance coverage rather than assessing a per capita fee, and charging higher premiums to plan sponsors with lower credit ratings.

A large rate increase could cause sponsors to drop existing plans and discourage new entrants into the defined-benefit system. The effect of reduced participation on insurance value, however, is ambiguous. On the one hand, to the extent that higher premiums discourage participa-

Summary Table 2.

Estimated Effects of Selected Policy Changes on PBGC's Net Costs for Single-Employer Plans Over Ten Years

(Billions of dollars)

	Market Value[a]
PBGC's Prospective Net Costs Over 10 Years Under Current Law	63.4
Effect of Policy Change	
Increase annual premium 6.5 times	-63.4
Limit a pension plan's investments in equities to 30 percent of plan assets	-9.9
Make permanent the increase in discount rates for calculating pension liabilities	8.1

Source: Congressional Budget Office.

a. Estimated price that a private insurer would charge, in addition to current premiums, to accept the obligations arising from terminations over 10 years.

tion by financially healthier sponsors, the estimates of the gains from higher premiums are overstated. On the other hand, policies that reduce participation have the effect of limiting the scope of coverage, thereby further reducing exposure. This paper does not attempt to quantify possible changes in participation as a result of policy changes.

Higher premiums, even if partially risk-based, would not significantly reduce the inherent risk of large losses arising in the future from underfunded sponsors. Policy options that would control costs by reducing future shortfalls include the following: matching more closely the expected cash inflows from pension assets with the expected cash outflows from pension liabilities by limiting the share of pension assets invested in stocks and other high-risk securities; incorporating the higher expected value of a plan's liabilities in the event of termination into the actuarial calculation of current liabilities; requiring the use of current (rather than lagged) market rates to calculate liabilities; and requiring more rapid closure of funding gaps when they arise. For instance, if the share of pension assets invested in equities was limited to 30 percent rather than the current unregulated level of about 70 percent, prospective insurance costs over 10 years would decrease by an estimated $9.9 billion (see Summary Table 2). In general, tighter funding rules have the potential to significantly reduce the government's risk but at the expense of imposing higher funding costs on plan sponsors. Higher funding costs, similar in effect to a premium hike, could discourage participation in the defined-benefit system. The advantage to such structural changes over premium increases, however, is that they tend to reduce system risk as well as lower expected costs.

Some policy changes under consideration would raise PBGC's net costs. For example, making permanent the increase in the discount rate specified in the Pension Equity Funding Act would reduce sponsors' contributions and increase 10-year prospective costs by over $8 billion.

Policy Options to Increase Transparency

Greater transparency in the defined-benefit pension system might contribute to reduced future losses and could take two forms. One would be to increase the transparency of pension assets and liabilities. That would permit shareholders, employees, and PBGC to better monitor the financial condition of plans. A second approach would be to increase the transparency of PBGC's financial status and thus permit the Congress to better monitor the agency's operations. An important consideration in the latter approach is the extent to which the Congress chooses to recognize the costs of pension insurance in the budget when they are incurred rather than when the cash outflows occur many years later; that is, to adopt some form of accrual budgetary accounting for PBGC.

The Risk Exposure of the Pension Benefit Guaranty Corporation

Introduction: The Pension Benefit Guaranty Corporation and the Employee Retirement Income Security Act

The Pension Benefit Guaranty Corporation (PBGC), an agency of the U.S. government, insures pension benefits for workers and retirees covered by most defined-benefit plans provided by private companies.[1] Defined-benefit plans generally provide a prescribed level of benefits to eligible retirees based on their tenure with the sponsoring employer and their wages.[2] About 44 million participants in more than 31,000 defined-benefit plans are currently protected by PBGC. From its inception in 1974 through fiscal year-end 2004, PBGC has assumed responsibility for the guaranteed benefits of participants in about 3,500 underfunded plans with financially troubled sponsors. Consequently, the agency is obligated to pay more than $3 billion annually to 500,000 retirees whose plans have now been taken over by PBGC. Another 550,000 participants who are not yet retired are owed benefits under terminated plans administered by PBGC.

PBGC insures two types of defined-benefit plans: multiemployer and single-employer plans. Multiemployer plans typically are collectively bargained and offered jointly by two or more unrelated employers, usually in the same industry, such as construction or transportation. Single-employer plans are the responsibility of a single sponsoring firm. Multiemployer programs expose PBGC to much less risk than single-employer plans, because multiemployer sponsors are jointly responsible for funding benefits and the level of guaranteed benefits is relatively low. PBGC's liability for multiemployer plans is currently $1.3 billion.[3] Because of differences in the types of plans and the risks to and responsibilities of PBGC, the law requires PBGC to report on the performance of single- and multiemployer programs separately. Unless otherwise noted, the data and estimates in this paper are for single-employer plans only.[4]

PBGC was created in 1974 under the Employee Retirement Income Security Act (ERISA). Enactment of ERISA was prompted in part by the failure of the Studebaker Company, whose underfunded plan left many workers with sharply reduced pension benefits. PBGC provides insurance to employees by assuming responsibility—subject to specified limits—for unfunded pension liabilities or the difference between a plan's insured liabilities and its assets when the sponsoring company is unable to meet its pension obligations.

1. For more details on the defined-benefit pension system and the operations of PBGC, see Congressional Budget Office, *A Guide to Understanding the Pension Benefit Guaranty Corporation* (September 2005).

2. Such plans are distinguished from defined-contribution plans, which provide only the level of benefits that may be financed through the investment of specified contributions from the employer and employee to the plan.

3. PBGC provides loans to troubled multiemployer plans rather than taking over the plans, but many of the loans end in default. The reported liability for multiemployer plans is the present value of projected future assistance for plans receiving support from PBGC on September 30, 2004.

4. Financial data for the multiemployer and single-employer programs are reported in Appendix A.

Although ERISA increased retirement security, some benefits remain at risk from the bankruptcy of a plan sponsor. Earned benefits are not guaranteed if they exceed PBGC's cap on annual benefits[5] or if they are subject to exclusion because they were granted within five years of a plan's termination. Further, vested benefits—which in an ongoing plan rise with a worker's wages and tenure—are fixed when the plan terminates, thus eliminating a valuable feature of ongoing pension plans. PBGC-insured benefits also are subject to reduction if the employee retires before age 65, which affects many retirement-eligible employees of financially distressed firms.

ERISA also regulates plan sponsors in ways that are intended to limit PBGC's losses. Those measures include mandatory premiums levied on plan sponsors, funding rules that limit pension underfunding, mandatory disclosure of pension funding levels to participants, and requirements for additional sponsor contributions to close gaps between plan assets and liabilities. ERISA permits sponsors some latitude in the valuation of pension assets and liabilities and in permitting sponsors to amortize funding shortfalls over several years. Sponsors must comply with Internal Revenue Code (IRC) requirements to qualify for the preferential tax treatment of income available to participants in qualified plans.[6] However, the IRC also limits the amount of pension overfunding that is tax-preferred to prevent abuse of the tax preference.

Fully funded plans can become underfunded as a result of fluctuations in interest rates and stock market prices and from changes in the actuarial assumptions used to calculate required contributions. Accordingly, PBGC is subject to considerable financial risk. That risk is evident in the wide fluctuations in funding of insured plans over time. For example, plan underfunding reported to PBGC varied from $29 billion (1997) to $7 billion (2000) to $354 billion (2004).[7] Some of that risk also is reflected in the swings in PBGC's reported deficit, which more than doubled between 2003 and 2004. The recent spate of large losses is attributable to the termination of a few large underfunded plans (see Table 1). The bankruptcies of Bethlehem Steel and LTV in 2003 left the PBGC to cover $3.7 billion and nearly $2 billion, respectively, in underfunded insured liabilities. More recently, PBGC assumed all of the pension plans of US Airways, at a cost of $3 billion, and agreed to take over certain plans of United Airlines, which has a gap between funded and guaranteed benefits of more than $6 billion.[8]

The risk of additional losses remains high, with 59 percent to 84 percent of large covered plans reporting funding gaps in excess of 10 percent in 2003.[9] The current, historically high level of underfunding can be attributed to the decline of the equity market from its peak in March 2000, which eroded the value of pension assets, and the simultaneous drop in interest rates, which caused the present value of pension liabilities to increase sharply.[10] The historically high figure reported by PBGC for "reasonably possible" losses (defined as underfunding

5. The statutory ceiling on guaranteed benefits for single-employer plans, which is indexed to the change in the Social Security wage base, is $3,801 per month, or $45,612 per year, for a single life annuity payable at age 65 for plans terminating in 2005. Benefits may exceed the ceiling if the plan has sufficient assets to fund them. See House Committee on Ways and Means, *Green Book* (2004), Section 14, pp. 1-16. For multiemployer plans, the ceiling is lower: $12,870 per year for a participant with 30 years of service under the plan. That ceiling is adjusted periodically by legislation rather than by linking it directly to the value of a related economic variable.

6. Similar tax treatment applies to qualifying defined-contribution plans, which also are subject to ERISA.

7. That amount of underfunding differs from the more widely reported estimate of more than $450 billion for the universe of plans. The smaller number is based on reports required of plans that are underfunded by more than $50 million or have large outstanding liens for missed contributions or Internal Revenue Service funding waivers. For details, see Pension Benefit Guaranty Corporation, *Pension Insurance Data Book 2003* (Spring 2004), Table S-45, available at www.pbgc.gov/publications/databook. For 2003-2004 values, see the Statement of Bradley D. Belt, Executive Director, Pension Benefit Guaranty Corporation, before the Senate Committee on the Budget, June 15, 2005.

8. Despite their substantial effect on PBGC's financial position, steel companies and airlines together constitute only 5 percent of the participants covered by PBGC.

9. That statistic is based on the percentage of public firms covered by Compustat, the company information service of Standard & Poor's, that have a defined-benefit pension plan. The percentage of plans that are underfunded depends on the definition of liabilities (see Appendix B).

10. The Standard & Poor's 500 Index declined by nearly 50 percent between March 2000 and October 2002. Over that period, the interest rate on 10-year Treasury notes fell from 6.26 percent to 3.94 percent.

Table 1.

PBGC's Ten Largest Claims, 1975 to 2004

Firm	Fiscal Year of Termination[a]	Claims (Billions of dollars)	Number of Covered Participants (Thousands)	Percentage of Total Claims Over 1975–2004 Period
Bethlehem Steel	2003	3.7	97.0	17.7
LTV Steel	2002, 2003, 2004	1.9	80.4	9.5
National Steel	2003, 2004	1.2	35.4	5.6
Pan American Air	1991, 1992	0.8	37.5	4.1
US Airways Pilots	2003	0.7	7.2	3.5
Weirton Steel	2004	0.7	9.2	3.3
Trans World Airlines	2001	0.7	34.2	3.2
Kaiser Aluminum	2004	0.6	17.6	2.7
Eastern Air Lines	1991	0.6	51.2	2.7
Wheeling Pitt Steel	1986	0.5	22.1	2.4
Total	n.a.	11.3	391.5	54.8

Source: Congressional Budget Office based on Pension Benefit Guaranty Corporation, *Pension Insurance Data Book* (2004).

Notes: Other large pension plans, including those of US Airways and United Airlines, have been terminated since 2004 or are pending termination.

n.a. = not applicable.

a. Multiple years indicate that the firm has multiple plans with different termination dates.

in plans sponsored by below-investment-grade sponsors) of $96 billion in 2004 further reflects the deterioration in the credit quality of a number of large U.S. corporations over the same period.

Current law sets higher premiums for substantially underfunded plans and, with exceptions based largely on prior contributions, firms are required to increase their plan contributions to amortize shortfalls between plan assets and liabilities. The annual insurance premium is $19 per participant, but significantly underfunded sponsors must pay an additional annual premium of $9 per $1,000 of unfunded vested benefits. Sponsors with plans that are less than 90 percent funded based on a "current liability" basis also are required to make deficit reduction contributions that close the funding gap over a period of approximately three to five years.[11] Nonetheless, Internal Revenue Service funding limitations and credit balances from prior years, among other provisions of law, enable some currently underfunded plans to avoid the underfunding premium and additional cash contributions. Financially distressed firms are most likely to make maximum use of various provisions of law to avoid contributions to plans in the period leading up to bankruptcy and also may fail to make required contributions.

Estimates of PBGC's Shortfall

The Congress is currently weighing policies to improve the soundness of the federal pension insurance system. The size of PBGC's prospective shortfall under current policy (in other words, not constrained by PBGC's resources) is key information in this effort, as are estimates of the effects of various policy alternatives on prospective costs. Although much information about PBGC's financial condition is publicly available, little is directed at pro-

11. See U. S. Government Accountability Office, *Private Pensions: Recent Experiences of Large Defined Benefit Plans Illustrate Weaknesses in Funding Rules*, GAO-05-294 (May 2005); and Statement of Bradley D. Belt, June 15, 2005.

Table 2.

Obligations and Collections of PBGC's On-Budget Account, 2004

	Millions of Dollars
Obligations	
Pension benefits and financial assistance	2,883[a]
Administrative expenses	285
Amount obligated but not disbursed	-7
Gross outlays	3,161
Collections	
Premiums	-1,139
Interest	-1,206
Transfers from nonbudgetary account[b]	-1,063
Offsetting collections	-3,408
Net outlays	-247

Source: Congressional Budget Office based on information from the Pension Benefit Guaranty Corporation and the Office of Management and Budget.

a. Includes $10 million of financial assistance to multiemployer plans.

b. These transfers are financed with assets from terminated plans (and investment income from those assets), all of which are held in the off-budget account. The transfers are partial reimbursement to the on-budget account for benefits paid on terminated plans. The proportion reimbursed equals the ratio of assets to liabilities in terminated plans.

viding a comprehensive measure of prospective costs and their responsiveness to changes in policy.[12]

The federal budget, for example, depicts PBGC's financial performance and prospects in terms of actual or projected cash outflows, for administrative costs and benefit payments, and inflows, from premium receipts and transfers from an off-budget account to an on-budget PBGC account. For 2004, the federal budget credited PBGC with a net cash inflow, or surplus, of $247 million (see Table 2).[13] (Net inflows are shown as a negative because the budget line is labeled "net outlays.") Thus, from a budget-year perspective, PBGC contributed positively to the government's current cash position, despite having assumed more than $3 billion of liabilities from failed steel and aluminum companies as well as large prospective losses from other large sponsors, such as United Airlines and US Airways.

The financial statements prepared by PBGC, by contrast, use an accrual basis of accounting that includes several more forward-looking measures of liabilities. For 2004, those statements indicate that PBGC incurred $12.1 billion more in obligations to others than it acquired in claims on others. Further, at year-end, those statements show that PBGC had accumulated a negative net position (liabilities exceeded assets) of $23.3 billion (see Table 3). The net position includes the present value of costs from already terminated plans and probable near-term terminations but excludes anticipated new claims arising in the future.

For measuring prospective shortfalls in the defined-benefit pension system under current and proposed changes in law, neither the budget nor the accounting measures are especially useful. The budget's 10-year horizon is generally too short to encompass PBGC's obligation for plans that terminate within the budget window because the bulk of payments will be made over several decades. Similarly, the financial statements, while useful in identifying unavoidable, or sunk, losses, are mostly "backward looking" in that they recognize the effects of pension plan terminations that have already occurred or that are anticipated in the near term.

PBGC's annual report also provides supplemental measures of risk exposure—the total amount of underfunding by covered plans, and an estimate of "reasonably possible" losses, which represents underfunding in plans sponsored by firms whose debt securities are rated below-investment grade. At fiscal year-end 2004, total underfunding of all insured plans was estimated to be more than $450 billion on a termination basis (that is, based on pension liabilities if the plan was to be taken over immediately by PBGC), up slightly from the previous year, and "reasonably possible" losses were reported to be $96 billion.

12. PBGC has developed a model, the Pension Insurance Modeling System (PIMS), that projects the future financial condition of PBGC under current and alternative policies. See "Impact on Contributions, Funded Ratios, and Claims Against the Pension Insurance Program of the Administration's Pension Reform Proposal," PBGC White Paper (April 6, 2005), available at www.pbgc.gov/publications. For additional detail on PIMS, see www.pbgc.gov/publications/databook/databk98.pdf.

13. PBGC is not accounted for on a pure cash basis because assets acquired from terminated sponsors are credited to the off-budget trust fund (see notes to Table 2).

Table 3.

Financial Statements for PBGC's Single-Employer Program as of September 30, 2004

	Billions of Dollars
Income Statement	
Income	
Premiums	1.5
Investments	3.2
Total	4.7
Expenses	
Administrative	0.3
Losses from completed and probable terminations	14.7
Other net expenses	1.8
Total	16.8
Net Income	-12.1
Balance Sheet	
Assets	
Cash	7.7
Fixed-maturity securities	17.3
Equities	11.1
Other	2.9
Total	39.0
Liabilities and Net Position	
Benefits for terminated plans	43.9
Benefits for probable terminations	16.9
Other	1.5
Total	62.3
Net Position	-23.3

Source: Congressional Budget Office based on information from the Pension Benefit Guaranty Corporation and the Office of Management and Budget.

Note: These statements reflect the transactions of both the on-budget and off-budget accounts.

Finally, PBGC reports a 10-year projected probability distribution of its future losses and net position based on its Pension Insurance Modeling System. That system generates projections by simulating many future economic paths that affect both the financial condition of plan sponsors and the underfunding of plans. It also calculates distributions of future insurance claims. For 2014, assuming the continuation of current policy, PIMS projects a mean net position for PBGC of negative $29.9 billion (in other words, an accumulated deficit of that amount). That projection implies net new obligations over the next 10 years of about $6.5 billion. PIMS also assigns a 5 percent probability to a deficit of $60 billion in 2014.[14] The probability of a positive PBGC net position in 10 years was estimated to be 2 percent.

A Prospective Market-Value Measure

PBGC incurs liabilities when the sponsor of a defined-benefit pension plan is no longer able to fund its pension promises—usually because of its own insolvency.[15] PBGC then assumes financial responsibility for the plan's guaranteed, unfunded liabilities.[16] A sponsor's financial distress and a plan's level of underfunding[17] are, thus, the two key determinants of PBGC's costs. Further, the failure of sponsors and the underfunding of plans are related, rather than independent, events. When the pace of economic activity slows, firms' revenues, stock market values, and interest rates all tend to decline. Those changes increase the probability of both financial distress for sponsors and underfunding of pension plans. The more severe a downturn, the greater the likely number of failures and the extent of underfunding in plans insured by PBGC.

14. Those future-value estimates cannot be interpreted as the market value of insurance because the calculations do not include risk adjustment. Rather, they represent the distribution of values for already incurred and probable losses that appear in PBGC's financial statements.

15. The terms "insolvency" and "bankruptcy" are used throughout this paper to denote events that trigger a transfer of unfunded pension obligations to PBGC. That usually occurs after a firm enters bankruptcy. However, PBGC does not assume the unfunded liabilities of all firms that enter bankruptcy and, conversely, PBGC may assume the unfunded liabilities of firms that are distressed but not formally in bankruptcy or liquidation.

16. Losses on multiemployer plans arise when the plan is unable to finance its benefit obligations and PBGC must make loans to the plan. The loans are rarely repaid.

17. The term "underfunding" is used here to mean the difference between the present value of pension liabilities and pension assets when a plan is terminated. Often, as in PBGC's annual report or in corporate financial statements, the term refers to an actuarial or accounting difference between assets and liabilities, which can be quite different from the present-value calculations that are relevant for estimating PBGC's costs. See also Appendix B.

In most years, however, PBGC assumes a relatively small number of claims for plan terminations. From 1975 to 2003, PBGC averaged about 120 termination claims per year, with the overwhelming majority consisting of small plans.[18] PBGC has only assumed 16 plans with more than 10,000 participants since 1975, and 11 of those have occurred since the stock market decline that began in 2000. Nevertheless, PBGC is exposed to the costly but low-probability event of the simultaneous bankruptcy of a number of large sponsors of defined-benefit plans because of conditions affecting the entire economy.

The Congressional Budget Office (CBO) estimates the value of PBGC insurance costs net of expected revenues by applying a method widely used by finance practitioners for valuing financial guarantees. Several previous studies have taken a similar approach to determining the cost of PBGC insurance.[19] That technique is especially useful for assessing the effects of various policy alternatives in reducing the costs of PBGC insurance. (See Appendix C for a more comprehensive description of the method.)

CBO's Estimates

Net cost is the present value of the unfunded insured liabilities of terminated plans minus the present value of premiums received. CBO's estimates of PBGC's net costs are the sum of backward-looking and forward-looking components. The backward-looking component reflects the difference between PBGC's assets and liabilities, including the pension liabilities and pension assets for plans that PBGC has assumed or expects to assume in the near term. CBO adopts PBGC's estimate of $23.3 billion for the value of past losses as of September 30, 2004.

Table 4.

PBGC's Projected Annual Claims

	Billions of Dollars
2004	3.5[a]
2005	6.5[b]
2006	3.7
2007	4.3
2008	4.7
2009	5.0
2010	5.2
2011	5.3
2012	5.3
2013	5.2

Source: Congressional Budget Office.

a. Claims for 2004 are actual. CBO's projection for 2004 was $7.3 billion, based on year-end 2003 data. The difference between projected and actual claims is attributable to several major claims projected for 2004 that did not occur until 2005.

b. Claims for 2005 include claims projected for 2004 but realized in 2005.

The forward-looking component of net costs is the estimated market price to insure all covered benefits of currently operating plans under current premium and funding rules over a specified period. Although losses could continue indefinitely under current policy, the uncertainty surrounding estimates increases at longer horizons, which is why most of the results are reported for a horizon truncated at 10 years.

Future annual claims against PBGC (pension plan liabilities minus plan assets for terminated plans) are projected to peak in 2005 because of the high level of current underfunding and the low credit quality of several large sponsors (see Table 4). After several years, however, projected claims average just above $5 billion per year.

There is much uncertainty surrounding those numbers, arising from uncertainty in levels of underfunding and rates of bankruptcy of plan sponsors. From 2004 through 2008, cumulative claims are expected to amount to about $23 billion (undiscounted), but there is more than a 20

18. Of the approximately 40,000 terminations of defined-benefit plans that have occurred since 1983, more than 90 percent have been "standard terminations"—those that were fully funded and entailed no cost to PBGC.

19. George G. Pennacchi and Christopher M. Lewis, "The Value of Pension Benefit Guaranty Corporation Insurance," *Journal of Money, Credit, and Banking*, vol. 26, no. 3 (August 1994, Part 2), pp. 735-753; Su-Jane Hsieh, Andrew Chen, and Kenneth R. Ferris, "The Valuation of PBGC Insurance Using an Option Pricing Model," *Journal of Financial and Quantitative Analysis*, vol. 29 (1994), pp. 89-99; and A. Marcus, "Corporate Pension Policy and the Value of PBGC Insurance," Chapter 3 in *Issues in Pension Economics*, Zvi Bodie, J. Shoven, and D. Wise, eds. (Chicago: University of Chicago Press, 1987). CBO's analysis extends those studies by incorporating more programmatic detail, by accounting for the contingent inflow of premiums to PBGC, and by considering a larger sample of insured plans and their current financial status.

percent chance that the total will be less than $8 billion, and a corresponding 20 percent chance that the total will exceed $25 billion. The cumulative totals from 2004 through 2014 are larger, because there is more time for plans to terminate. Cumulative claims over that period are expected to be about $49 billion, but there is more than a 40 percent chance that claims will amount to no more than $15 billion and a 10 percent chance that claims over the period will total more than $120 billion.

Because claims tend to vary with general market conditions, the market is not neutral to uncertainty. Specifically, sponsors are more likely to go bankrupt, and underfunding of plans will be larger, during times of weak economic performance; whereas the opposite occurs when the economy is strong. The biggest losses will occur when the equity markets, wealth, and income are at low levels—when money is most valuable. Private investors and firms require compensation to assume such market risk. That compensation manifests itself in insurance premiums that exceed expected losses discounted at risk-free interest rates. In fact, the market value of pension insurance is about twice the value obtained excluding the cost of risk (see Table 5).[20]

Over 10 years, the prospective market-value cost of the program is $63.4 billion. Adding PBGC's accumulated deficit of $23.3 billion results in a total cost of $86.7 billion. Extending the horizon increases total net costs to $119 billion for the next 15 years and $141.9 billion for 20 years.

Comparing those estimates with numbers reported in PBGC's financial statements, the 10-year forward-looking market value of the insurance is only about 15 percent of the more than $450 billion in reported aggregate pension underfunding. Two factors explain most of that difference. First, bankruptcies occur infrequently. Many sponsors will correct their plan's underfunding over time, although funding gaps will also emerge in currently funded plans. Eliminating underfunding requires only that a firm stay in business long enough for required payments to restore balance or that the firm realizes high investment returns on pension assets. Second, the average excess return on stocks over bonds tends to increase funding levels over time, although at the cost of higher risk that increases the severity and cost of losses when they occur.

Table 5.

PBGC's Prospective Net Costs for Single-Employer Plans Over 10-, 15-, and 20-Year Horizons

(Billions of dollars)

	Discounted Value at Treasury Rates, Excluding Cost of Risk	Market Value, Including Cost of Risk[a]
10-Year Net Costs	32.4	63.4
15-Year Net Costs	45.8	95.7
20-Year Net Costs	55.0	118.6

Source: Congressional Budget Office.

Notes: Numbers do not include the accumulated deficit

Discounting the average insurance loss at a Treasury rate yields the amount that, if invested in Treasury securities today, would grow to cover the average of future expenses. It is not, however, enough to pay an insurer to cover the cost of the entire distribution of future expenses, which is what the higher market-value cost represents.

a. Estimated price that a private insurer would charge, in addition to current premiums, to accept the obligations arising from terminations over the indicated time period.

CBO's $63.4 billion forward-looking net cost estimate is far higher than the PBGC's estimate of $16.9 billion for probable losses. An important difference is that CBO's approach includes costs arising from firms that may become financially distressed in the future—not only from firms that already are in severe financial distress. At the same time, CBO's estimate is only two-thirds of the $96 billion in reasonably possible losses reported by PBGC. Two offsetting factors help explain the difference between CBO's estimate of prospective net cost and PBGC's estimates for reasonably possible losses. Reasonably possible losses include the entire amount of current underfunding of firms with below-investment-grade credit ratings. Most of those firms, however, are likely to remain in business long enough to substantially reduce their funding

20. A similar phenomenon would be observed in a comparison of actual stock prices and the expected value of future dividends and capital gains, discounted at a risk-free rate. The discounted value would far exceed the market price, because the latter includes compensation investors require to assume market risk.

gaps. However, the estimate of reasonably possible losses neglects the possibility that currently healthy firms will become distressed in the future and that the losses from currently troubled firms may grow larger.

Options to Reduce Federal Costs

In general, policy alternatives that reduce PBGC's exposure require imposing greater costs on plan sponsors and, indirectly, on beneficiaries. Sufficiently large changes would probably result in behavioral responses by sponsors or beneficiaries. However, the estimates discussed here do not incorporate such responses.

Options to place the costs of insurance more fully on sponsors and thus limit federal exposure fall into two broad categories: increases in the premiums charged to plan sponsors, and tighter investment and accounting rules for funding pension plans. The options that involve premium increases reduce the cost to the government but have little effect on its risk exposure. The second set of options would reduce costs by reducing the risk of underfunding. All of the options would raise the cost to employers of offering defined-benefit plans.

Changing Premiums

More than a decade ago, the Congress set annual insurance premiums to the PBGC at $19 per participant plus $9 per $1,000 of unfunded, vested benefits for single-employer plans. Since then, rates of insolvency by sponsors have increased, inflation has eroded the real value of premiums, and underfunding has become more prevalent. Accordingly, the Congress is considering increasing premiums.[21] One possibility is to adopt an actuarially fair premium structure—that is, one that would equate the present value of expected premium revenues with the present value of expected costs to PBGC. Many alternative premium structures, however, would be broadly consistent with actuarial fairness, including a uniform premium that does not vary according to sponsor or plan characteristics and risk-based premiums that reflect risk differentials among sponsors or plans.

Both uniform and risk-based fair premiums raise the question of whether it is desirable to cover costs arising from the current level of underfunding or whether premium charges should be entirely focused on prospective shortfalls. In the latter case, additional monies probably would be required to cover the portion of future losses arising from current underfunding. Those funds could be obtained either from government revenues or from supplemental assessments on the sponsors of underfunded plans.

Conceptually and practically, the prospective approach has several advantages. The idea of a fair insurance premium is intrinsically forward-looking: it is the expected cost of future adverse outcomes covered under the terms of the insurance policy. Setting uniform premiums to cover losses arising from current levels of underfunding requires fully funded plans to subsidize underfunded plans. That would tend to discourage low-risk firms from continuing to offer defined-benefit plans, weakening the system further by hastening the withdrawal of financially stable participants. Covering already-incurred costs with future premium revenues also involves partially double-charging for insurance. Sponsors that in the past paid required premiums and followed pension funding rules but nevertheless are currently underfunded because of changes in economic circumstances have already been charged for the risks associated with that eventuality.

A policy of charging a fair prospective premium does not preclude the possibility of requiring sponsors to make additional payments based on their current underfunding, as occurs under current law through deficit reduction contributions (DRCs). Currently, sponsors of plans that are funded to less than 90 percent of current liabilities are required to close funding gaps in excess of a threshold in approximately three years. Tightening DRC rules to require deficits to be covered more quickly and fully, for instance, would tend to reduce risk to PBGC and in turn would lower the fair premium rate.[22]

Fair Uniform Premiums. CBO estimates that a fair uniform premium—one that increases both the fixed and variable portion of current-law premiums by a fixed proportion—would yield premium charges that are 6.5 times larger than current rates, with a fixed payment of $123.50 per participant per year and a variable charge of $58.50 per $1,000 of underfunding. Although such a rate hike is likely to cause a reduction in the number of plans offered, it is difficult to predict how large that effect would be, and no behavioral response is incorporated

21. The Administration has proposed increasing the fixed per-participant premium to $30 per year.

22. If sponsors are required to close gaps in funding too quickly, they may choose to discontinue offering workers this benefit.

into the model. Even though a 6.5-fold increase is a large multiple, in dollar terms it corresponds to an increased fixed charge of only about $105 per employee per year. The higher variable portion, however, could be very costly for plans that become underfunded. It would provide an incentive to make up the shortfall more quickly but also could lead firms to eliminate that risk in the future by dropping the defined-benefit plans.

The Congress is also considering more modest proposals for increasing the current level of premiums while retaining the existing structure. For example, increasing the flat-rate premium from $19 per participant per year to $30 per participant would reduce PBGC's net cost by about $1.8 billion over a 10-year horizon (see Table 6).

Risk-Based Premiums. In addition to the variable premiums that severely underfunded plans now pay, a premium schedule that reflects sponsor- and plan-risk characteristics could reduce the incentives for excessive risk-taking and reward prudent behavior. It also could reduce cross-subsidies among firms, thereby mitigating the incentive for low-cost firms to leave the system. Some indicators of risk that could be used for risk-adjusting premiums include the equity-bond mix of pension assets, a sponsor's debt rating or leverage, and the value of insured benefits.

Pension Asset Risk. Under current law, firms are permitted to invest the majority of their pension assets in stocks and other risky securities, even though the pension liabilities they are financing have cash flows that are more similar to bonds. The resulting mismatch is one of the principal reasons that pension plans, including those sponsored by financially healthy firms, become underfunded during periods of falling stock prices. In addition, PBGC is subject to moral hazard, which is the tendency of those who have insurance to engage in riskier behavior than they would if they did not have insurance. Sponsors of defined-benefit pensions are under less pressure from participants and hence have weaker incentives to fully fund those plans with low-risk assets as a result of PBGC insurance. In addition, financially distressed plan sponsors whose survival is threatened have a strong incentive to invest in high-risk pension assets. The potential gains from such investments accrue to the sponsor via lower required contributions and may enable it to survive, whereas potential losses will be absorbed by PBGC if the firm fails.

One option that would encourage firms to limit risk in their pension assets would be to link premiums to the share of pension assets held in stocks and other risky investments. Such a premium also could reduce cross-subsidies among sponsors by matching premiums more closely with expected costs. A premium change that induced firms to reduce the share of pension assets held in stocks to 30 percent from the current level of about 70 percent would reduce PBGC's net cost over 10 years by $9.9 billion (see Table 6).[23]

Table 6.

Estimated Effects of Selected Policy Changes on PBGC's Net Costs for Single-Employer Plans Over Ten Years

(Billions of dollars)

	Market Value[a]
PBGC's Prospective Net Costs Over 10 Years Under Current Law	63.4
Effect of Policy Change	
Increase annual premium 6.5 times	-63.4
Increase flat-rate premium to $30 for all plans	-1.8
Increase flat-rate premium from $19 per participant to $30 for plans funded at 100 percent or more, $40 for plans funded at 90 percent to less than 100 percent, and $60 for plans funded at less than 90 percent	-3.9
Require all underfunded plans to pay the variable-rate premium	-0.9
Limit a pension plan's investments in equities to 30 percent of plan assets	-9.9
Increase the period over which underfunding is corrected by two years	3.4
Make permanent the increase in discount rates for calculating pension liabilities	8.1

Source: Congressional Budget Office.

a. Estimated price that a private insurer would charge, in addition to current premiums, to accept the obligations arising from terminations over 10 years.

23. The reduction in net cost excludes any change in premium income that might accompany the changed premium structure.

Sponsor Credit Risk. Risk-adjusted premiums might also be based on observable sponsor attributes such as its credit rating or an alternative measure of default risk. Charging a rate partially based on credit risk would reduce the extent to which less-risky firms subsidized riskier firms. Such risk adjustment may have little influence on risk-taking, however, because the premium is a relatively unimportant factor in firms' decisions about their line of business or debt structure.

Historically, the 10-year default probability for investment-grade firms is 2.7 percent, but it rises to 28.3 percent for below-investment-grade firms.[24] To quantify the cost differential associated with the higher default probability, rated firms are divided into two broad categories: investment grade (BBB and above) and noninvestment grade (below BBB).[25] CBO's analysis indicates that premiums for below-investment-grade firms would need to be increased 18.5 times just to reduce net cost per dollar of insured benefits to the cost for investment-grade sponsors.

Charging a fair rate to high-risk firms may be impractical, however, because once a firm's financial condition deteriorates, it may be too late to collect premiums sufficient to cover the firm's increased costs to PBGC. Thus, as with most insurance, most costs must be covered prospectively.

Insured Benefits. The current policy of basing the fixed portion of the premium on the number of plan participants rather than the dollar value of insured benefits is another factor that disconnects premium charges from plan risk. That is because PBGC's exposure is related to the size of the covered liability, which varies considerably among participants and with the extent to which the plan is underfunded. Young and low-wage workers have low accumulated benefits, whereas older and more highly compensated workers and retirees have larger insured benefits. Consequently, a level premium tends to favor firms with many retirees or older workers at the expense of firms with predominantly young workers. Basing the premium instead on insured benefits would make employers' costs more closely reflect risk as well as reduce cross-subsidies and the disincentive for firms with newer employees to offer defined-benefit pensions.

The magnitude of the effect of the per-participant component can be demonstrated by dividing the current flat-rate premium by the amount in dollars of insured coverage for each firm in CBO's sample. The indicated range of premiums paid per dollar of insured coverage among sponsors is striking. The highest 10 percent of firms, in terms of coverage per worker, pay an average of 0.6 percent of the pension-benefit obligation, whereas the lowest 10 percent of firms pay 2.3 percent of the pension-benefit obligation. The fraction of retirees relative to total participants in each firm explains a considerable amount of that variation, with a strong negative correlation (-0.4) between the fraction of retirees and the premium per dollar of pension-benefit obligation. That finding suggests that one reason for the decline in defined-benefit-plan offerings among newer firms may be the policy of charging a flat premium per participant.

Regulating Pension-Investment Risk

Although some firms might be induced to reduce the share of pension assets invested in stocks by risk-based premiums that are sensitive to portfolio risk, some observers have recommended that firms should simply be required to fund their pension liabilities with a higher proportion of investment-grade bonds, whose cash inflows would closely match the outflow of pension benefits.[26] Such a requirement might be more effective than risk-based premiums, especially for sponsors that are financially troubled and for whom moderately higher premiums might not be much of a deterrent to risk-taking.

PBGC has taken steps to reduce risk in its own portfolio by better matching the risk of assets and liabilities, and it expects the portion of invested assets allocated to equities to decline to between 15 percent and 25 percent of total invested assets over the next two years. A similar mix could be required of private firms. For example, reducing the share of stocks in pension assets from the current average of 70 percent to 30 percent would reduce the market value of PBGC's insurance by $9.9 billion.

24. Standard & Poor's, "Annual Default Study: Corporate Defaults Poised to Rise in 2005," *Global Fixed Income Research* (2005), p. 17, Table 10.

25. Credit ratings are available for a subset of 678 of the 1,179 firms for which CBO has data.

26. Zvi Bodie, "Straight Talk About Government Pension Insurance," *Milken Institute Review*, vol. 7, no. 1 (2005).

Changing the Rules for Calculating Pension Liabilities

Another major source of cost and risk to PBGC arises from the large discrepancies that sometimes occur between a best estimate of the true economic liabilities of a pension plan and the current-liabilities measure that determines required funding.[27] Under existing rules and depending on market conditions, plan liabilities may be under- or over-stated, and plans may be commensurately over- or underfunded relative to an economic measure of the funding gap.[28] (See Appendix B for a discussion of funding measures.)

Several factors make estimates of current liabilities poor proxies for true economic liabilities: projections of future benefit payments are downward-biased relative to PBGC's expected obligations in the event of a distress termination; and the rate used to discount future cash flows is not a current market rate and neglects that the market assigns different rates to cash flows with different maturities.

Even plans that are close to fully funded by current measures often have large gaps between measured and actual liabilities when they are terminated.[29] Two illustrative cases are the plans for employees of Bethlehem Steel and the pilots of US Airways, both of which reported high funding levels in the years immediately prior to their termination, when their funding levels were determined to be less than 50 percent (see Table 7). A feature of some plans that inflates termination liabilities over current liabilities is the presence of shutdown benefits. Shutdown benefits are triggered by the shutdown of one or more plants within a company or by permanent layoffs within a firm, and those benefits qualify workers for retirement as early as age 42. PBGC is responsible for paying shutdown benefits if they are triggered before a plan is terminated, but the benefits are not recognized as liabilities before they are triggered. Such benefits, however, are common only in large unionized manufacturing companies and account for only a small portion of realized costs.

In CBO's analysis, the difference between current and termination liabilities is a large component of PBGC's net costs. That is because current liabilities, which determine whether a plan is fully funded, are systematically lower than termination liabilities, which more closely reflect the cost to PBGC in the event of a plan's termination. Adjusting liabilities to better reflect costs in the event of a termination could reduce the high cost of systematic underfunding under current rules. However, requiring low-risk sponsors to fund to the level of termination liabilities would result in systematic overfunding, since most plans do not fail.

Another shortcoming of the current measure of a plan's liabilities is that discount rates are backward-looking: vested pension benefits are discounted at a four-year weighted average of past interest rates. A change requiring the use of current market rates matched to the maturity of cash flows for discounting pension liabilities would provide a more accurate and timely picture of PBGC's exposure and bring the estimates more in line with standard valuation practices. Some sponsors of defined-benefit plans have opposed the use of current interest rates to calculate pension liabilities because it would increase the volatility of funding requirements. However, funding requirements could be modified to reduce the variability caused by more timely and accurate estimation of current liabilities without sacrificing correct valuation.

There is considerable disagreement about the appropriate discount rate to use in calculating pension liabilities for the purpose of determining funding requirements. Proponents of using a long-term Treasury bond rate argue that the guaranteed benefits are virtually risk-free, and hence that rate is appropriately conservative. Others argue that the use of a risk-free rate is inappropriate because the obligations are not risk-free (for instance, they depend on future wages that are risky) and that using a Treasury rate results in inflated liability values. Previously, an average of rates for 30-year Treasury securities had

27. The rules for calculating pension assets and liabilities are complex and differ according to whether the quantities are for financial-reporting purposes, for determining pension funding obligations, or for calculating the variable-rate premium. See U.S. Government Accountability Office, *Private Pensions: Recent Experiences of Large Defined Benefit Plans*.

28. Valuation distortions tend to be smaller on the asset side because market values are used for most investments. Still, rules that allow for smoothing estimated asset values also reduce the accuracy of funding-gap calculations.

29. In part because of interest rate distortions—other factors including those pertaining to shutdown benefits, early retirement, and lump-sum distributions also play a role—PBGC officials have argued that current liability is "a measure with no obvious relationship to the amount of money needed to pay all benefit liabilities if the plan terminates." Testimony of Bradley D. Belt, Executive Director, Pension Benefit Guaranty Corporation, before the Senate Committee on Finance, March 1, 2005.

Table 7.

Reported Funding Levels and Premium Payments for the Bethlehem Steel and US Airways Pilots' Plans, 1996 to 2002

	1996	1997	1998	1999	2000	2001	2002
				Current Liability Funding Ratio (Percent)			
Bethlehem	78	91	99	96	86	84	NR
US Airways	97	100	91	85	104	94	NR
				Was the Company Required to Make a Deficit Reduction Contribution?			
Bethlehem	Yes	No	No	No	No	NR	NR
US Airways	No	No	No	No	No	No	NR
				Variable-Rate Premium Payments			
Bethlehem	$15 million	$17 million	0	0	0	0	0
US Airways	$4 million	0	0	0	$2 million	0	0
				Contributions to the Retirement Plan			
Bethlehem	$354 million	$32 million	$31 million	$8 million	0	0	0
US Airways	$112 million	0	$45 million	0	0	0	0

Source: Congressional Budget Office based on information from the Pension Benefit Guaranty Corporation.

Notes: Bethlehem Steel's plan was terminated in 2003. It had a termination funding ratio of 45 percent and unfunded benefit liabilities of $4.3 billion, of which PBGC is responsible for $3.7 billion. US Airways pilots' plan was also terminated in 2003. It had a termination funding ratio of 35 percent and unfunded benefit liabilities of $2.2 billion, of which PBGC is responsible for about $700 million.

NR = not reported.

been used, but the Pension Funding Equity Act of 2004 substituted indexes of rates on high-grade corporate bonds for years 2004-2005 (that temporary change is reflected in all cost estimates reported in this paper). The law further permits plan sponsors to choose a discount rate between 100 percent and 90 percent of the designated rate, but the higher rate is usually chosen.

The policy option analyzed here is to make the currently temporary switch from a 30-year Treasury bond rate to a high-grade corporate bond rate permanent after 2005. The effect of any increase in the assumed discount rate for liabilities is to increase PBGC's costs, because such an increase results in firms' holding fewer pension assets.

To project the effect of a switch to the corporate rate, CBO adjusted pension liabilities downward by multiplying by the ratio of two annuity factors implied by the old and new discount rates. Typically, a high-grade, long-term bond yields 1 percent to 2 percent more than a 30-year Treasury bond. Projected cash flows from premiums and deficit reduction contributions are then based on the lower liabilities.[30] Liabilities are assumed to be at their original level, however, for the purpose of computing the cost to PBGC at the time a plan is terminated. That assumption captures the idea that increasing the discount rate reduces required payments but has no effect on the actual costs of future obligations.

The result of this analysis indicates that a permanent increase in the discount rate from 4.8 percent to 6 percent would cost PBGC about $8.1 billion (see Table 8). That result is consistent with the general point that a higher rate always leads to a lower present value of obligations, which in turn leads to commensurately lower estimates of underfunding, deficit reduction contributions, and variable premiums. Hence, a higher discount rate lowers the current-period cost to plan sponsors but increases the risk exposure of PBGC. The incremental cost increase gets

30. The original liability of each firm is assumed to be a 20-year annuity, originally discounted at a rate of 4.8 percent. The value of the liability is adjusted by the ratio of the original discount rate to the new, higher rate.

Table 8.

Net Cost to PBGC of a Permanently Higher Discount Rate

Long-Term Discount Rate (Percent)	Cost Increase Compared with a 4.8 Percent Rate (Billions of Dollars)
6.0	8.1
7.0	14.5
8.0	19.2

Source: Congressional Budget Office.

smaller as the discount rate rises further because, at some point, few firms appear to be underfunded, and sponsor payments decline no further. The largest costs from basing liabilities on an artificially high discount rate come from heavily underfunded firms, which benefit from a large cutback in deficit reduction contributions and the deficit-based component of the premium.

Options to Increase Transparency

To understand and control PBGC's risk exposure, policymakers must be able to monitor the financial performance and condition of the defined-benefit insurance system and of PBGC. To that end, PBGC's annual report includes extensive information about the financial status of defined-benefit plans as well as the position of PBGC as a result of losses incurred to date. However, the Congress primarily relies on budget estimates for information about the cost of current and alternative policies. To assure that those estimates are appropriately prospective and accurate, the budget may need to become more comprehensive in recognizing PBGC's transactions and committed obligations. To that end, the Congress may wish to consider extending the use of accrual measures to the budgetary accounting for PBGC. Further, privatization could illuminate the costs that the government incurs by requiring payments to private providers of insurance.

Alternative Budgetary Treatments

The budget currently includes three types of financial information about PBGC: cash flows that are included in budget outlays and the deficit, cash and noncash financial flows that are excluded from the budget totals, and supplementary accounting information in the form of balance sheets for PBGC. Budget outlays and the deficit include those cash inflows and outflows that are accounted for in PBGC's on-budget fund. That account is charged with benefit payments for terminated plans and administrative expenses. It is credited with premium receipts, interest on investments in Treasury securities held by the on-budget fund, and transfers from PBGC's off-budget trust fund (see Table 2 on page 4).

The transactions of the off-budget trust fund, including the acquisition of assets and liabilities of terminated plans (net claims), are reported in the budget's supplementary disclosures but are not included in the budget totals when the transactions of the off-budget fund occur. That practice delays recognition of losses, often for decades, until benefits are paid. At the same time, premiums and transfers to the on-budget account from the off-budget account are recognized as received. As a consequence, and despite large prospective losses from underfunded terminated plans, PBGC transactions have usually reduced total budget outlays and the federal deficit. In fact, the budget recorded its first annual net cash outflow for PBGC in 2003 of $229 million. For fiscal year 2004, net budget outlays for PBGC were once again negative, representing a net cash inflow. Thus, net budget outlays for PBGC are not indicative of the financial position of the insurance program.

A key measure of financial performance for an insurance program—currently omitted from both financial and budgetary accounting—is the expected cost of future claims, net of expected future premiums. To more accurately report the cost of current transactions, some deferred payment programs are currently accounted for in the budget on an accrual basis. Those include direct loans, loan guarantees, and capital leases. A credit guarantee is a form of insurance. Thus, the logic for putting credit guarantees on an accrual basis may apply equally to insurance.

Treating PBGC as a Trust Fund. Before considering accrual budget measures for PBGC, the Congress may wish to address the more fundamental issue of whether federal pension insurance gives rise to a federal obligation. Under current law, neither PBGC nor insured pension beneficiaries have a claim on federal funds to make up a financial shortfall between insured benefits and PBGC's accumulated assets. If, on the one hand, the Congress intends to maintain that limit on federal liability, then the income and assets of PBGC could be reclassified as trust funds—amounts owned by others and held for their exclusive benefit by the government. In that case, it would

be consistent with current budget concepts to take the on-budget account off-budget. If premiums are considered compulsory governmental levies that are earmarked for pension insurance, those collections could be credited to an on-budget account and immediately paid out to the off-budget trust account. That treatment would include premiums in governmental revenues but bar their inclusion in the budget deficit or surplus. Further reflecting the governmental status of PBGC, the cost of administering the program could be paid from the on-budget account and financed by either insurance premiums or a general-fund appropriation.

Accruing PBGC's Cost. If, on the other hand, the Congress provided an explicit guarantee of federal pension insurance, then it could consider accruing increases in PBGC's shortfall in the budget. To that end, the valuation methods developed by CBO and described in more detail in Appendix C could be used to estimate a periodic accrual cost of PBGC pension insurance—the change in PBGC's total net value per period—on a market-value basis. Thus, one policy option is to substitute that charge for the current budgetary measure of net outlays. Other possible accrual changes include the unpaid annual premium that would be required to reduce PBGC's cost to zero.

Recognizing an accrual charge for PBGC in the budget would require periodic appropriations to and transfers from PBGC that correspond to the change in the value of the insurance. That is, PBGC's annual increase (or decrease) in total costs would be financed (or liquidated) by an appropriation from (or payment to) the general fund of the Treasury. Those transfers could be reflected in the budget deficit by paying appropriated sums for losses to the off-budget trust account and by requiring a reverse flow from the trust account to the on-budget PBGC account in the event of a trust fund surplus. To prevent the cost of risk—currently borne by taxpayers without recognition in the budget—from accumulating in PBGC's trust account, PBGC could also make a payment to the Treasury's general fund for the cost of risk.

Accounting for Sunk Costs and Reserve Accumulation. Accrual budgetary treatment of PBGC, like cash accounting, would fail to fund past or sunk PBGC losses. Those losses might be financed with a one-time catch-up appropriation to PBGC's trust fund for the accumulated deficit. Inasmuch as those losses were incurred in previous periods, they could be treated to leave the budget totals for the current year unaffected by legislation that provides their financing.

Privatization

Another option that might facilitate control of PBGC's costs would be to transfer the agency to private owners or to replace it with private policies purchased by sponsors from competing private insurers. Privatization could accelerate the recognition of past losses in the budget because the current deficit would have to be reduced, presumably by Congressional appropriations, before a private entity would be willing to assume the program's obligations. Because PBGC insurance is mandatory, the government would probably remain involved in regulating the terms of the insurance. That continued involvement raises the question of how much risk and responsibility the government effectively can transfer to private providers. Nevertheless, the risk to the government would most likely be less than under current policy.

APPENDIX

A

The Pension Benefit Guaranty Corporation's Financial Data: Single-Employer and Multiemployer Programs

The Pension Benefit Guaranty Corporation publishes financial statements for each fiscal year in a *Performance and Accountability Report* as required by the Office of Management and Budget's Circular No. A-11. The report includes sections titled Management's Discussion and Analysis of Financial Condition and Results of Operations; Statements of Financial Condition, Operations and Changes in Net Position, and Cash Flows; and extensive explanatory Notes. Those reports are available at www.pbgc.gov/docs. Reported assets, liabilities, and net position for the single-employer and multiemployer programs are provided here for 1980 through 2004 (see Table A-1).

Table A-1.

PBGC's Assets, Liabilities, and Net Financial Position for Single-Employer and Multiemployer Plans, 1980 to 2004

(Millions of dollars)

	Single-Employer Plans			Multiemployer Plans			Combined
	Assets	Liabilities	Net Position	Assets	Liabilities	Net Position	Net Position
1980	430	524	-95	21	30	-9	-104
1981	467	656	-189	28	29	-1	-190
1982	773	1,106	-333	40	29	11	-322
1983	1,085	1,608	-523	52	46	6	-517
1984	1,063	1,525	-462	61	44	17	-445
1985	1,155	2,480	-1,325	78	52	27	-1,298
1986	1,740	3,766 [a]	-2,026[a]	98	54	45	-1,981
1987	2,163	3,712	-1,549	114	45	68	-1,481
1988	2,422	3,965	-1,543	129	37	92	-1,451
1989	3,059	4,183	-1,124	161	37	123	-1,001
1990	2,797	4,710	-1,913	190	58	132	-1,781
1991	5,422	7,925	-2,503	238	75	163	-2,340
1992	6,381	9,118	-2,737	283	114	169	-2,568
1993	8,267	11,164	-2,897	407	131	276	-2,621
1994	8,281	9,521	-1,240	378	181	197	-1,043
1995	10,371	10,686	-315	477	285	192	-123
1996	12,043	11,174	869	505	381	124	993
1997	15,314	11,833	3,481	596	377	219	3,700
1998	17,631	12,619	5,012	745	404	341	5,353
1999	18,431	11,393	7,038	692	493	199	7,237
2000	20,830	11,126	9,704	694	427	267	9,971
2001	21,768	14,036	7,732	807	691	116	7,848
2002	25,430	29,068	-3,638	944	786	158	-3,480
2003	34,016	45,254	-11,238	1,000	1,261	-261	-11,499
2004	38,993	62,298	-23,305	1,070	1,306	-236	-23,541

Source: Congressional Budget Office based on Pension Benefit Guaranty Corporation, Annual Reports (1980–2004).

a. The deficit of $3.8 billion that was originally reported for 1986 declined after a Supreme Court ruling restored three pension plans and returned their pension obligations of $1.8 billion to LTV Corporation.

APPENDIX

B

Accounting and Funding Measures of Firms' Pension Liabilities and Underfunding

A firm's pension liability is the present value, on the reporting date, of promised future benefit payments. However, pension liabilities are measured in different ways for different purposes. For reporting purposes, liabilities are measured according to accounting rules set by the Financial Accounting Standards Board, but for determining funding levels, they are measured according to the rules set by the Employee Retirement Income Security Act or the Internal Revenue Code. Further, because underfunding is the difference between pension liabilities and assets, the degree to which a plan is funded varies according to whether the funding or accounting measures are used.

The accounting measures used in a firm's financial statements and 10-K filings to the Securities and Exchange Commission are the accumulated benefit obligation (ABO) and the projected benefit obligation (PBO). The ABO is based on the number of active workers, retirees, and beneficiaries in the pension plans; current pay; and length of service. The firm chooses a discount rate to apply to future benefits based on a market rate for long-term securities. The PBO differs from the ABO in that it also includes provisions for assumed future wage growth for active workers. Both measures are highly sensitive to actuarial and economic assumptions, which are not consistent among firms. Accounting rules also require firms to recognize a liability on their balance sheets when pension assets are less than the ABO, and many firms choose to fully fund to the reported ABO rather than recognize the additional liability.

The funding rules, however, refer to current liability and termination liability. Current liability is conceptually similar to ABO, but may differ from the ABO in the actuarial assumptions and discount rates that it uses. Further, there are different measures of current liability that use different discount rates depending on the funding rule that is being applied. For example, the current liability used to determine whether deficit reduction contribution (DRC) payments are required may reflect a discount rate that differs from that used for determining whether variable-rate premiums are required.

Termination liability applies when plans are terminated. It differs from ABO and current liabilities in that it includes the higher costs of early retirement, lump-sum distributions, and skipped contributions by financially distressed firms prior to a plan's termination. Termination liability also differs from ABO and current liabilities because it uses different assumptions about discount and mortality rates.

Several of these factors have been important in recent terminations. For example, US Airways made no contributions to its pension plan for pilots for four years prior to the plan's termination in March 2003 with $2.2 billion in unfunded benefits, and United Airlines recently announced it would forgo paying several billion dollars in required contributions. The Pension Funding Equity Act of 2004 placed a two-year moratorium on deficit reduction contributions by the passenger airlines, iron ore pellet, and steel industries. In addition, impending bankruptcy can lead to a higher rate of early retirement, and firms also may substitute benefit promises—that, after bankruptcy, they would not have to fulfill—for higher wages. The overall effect of those factors can be large. For instance, in its last filing, Bethlehem Steel reported that it was funded at 84 percent of current liabilities. On a termination liability basis, it was funded at only 45 percent, with underfunding of about $4.3 billion.

For modeling purposes, the Congressional Budget Office (CBO) uses the ABO reported in company financial statements as the best publicly available approximation of current liability for calculating both DRC requirements and variable rate premiums.[1] Because CBO lacks detailed information about termination liabilities, it follows past studies and increases current liabilities by 20 percent to approximate termination liabilities. That assumed markup is necessary to account for the increase in promised benefits as a firm approaches insolvency or, more generally, the difference between the liability realized at termination and the reported current liability.

1. Current liabilities are reported by firms on Internal Revenue Service Form 5500 but are only available with a lag of two or more years.

APPENDIX

C

The Congressional Budget Office's Pricing Model for the Pension Benefit Guaranty Corporation

The Congressional Budget Office's (CBO's) pricing model estimates how much a private insurer would charge to assume the unfunded obligations of the Pension Benefit Guaranty Corporation (PBGC) over a specified time horizon. PBGC is liable for a company's pension obligations only if the company is bankrupt and if dedicated pension assets fall short of the value needed to cover vested pension obligations.[1] That is, the plan can be significantly underfunded with no ultimate cost to PBGC if the plan's assets increase to cover the liabilities before the firm fails. Conversely, fully funded or overfunded plans still represent a risk to PBGC because future declines in a plan's asset value or increases in liability value can cause it to become underfunded. CBO's valuation model, which values the agency's insurance as a financial option, takes those factors into account in estimating the prospective cost of insurance.

The general idea behind options-pricing methods is that assets with the same payoffs must have the same price. Thus, it is possible to infer the price of an option—in this case, PBGC's guarantee—from the price of a portfolio of assets that has the same payoff as the guarantee.[2] The valuation model employs a stochastic simulation[3] that projects the evolution of:

- The sponsor's assets and book value of liabilities in order to assess the likelihood of insolvency, which occurs when the value of assets falls sufficiently below the value of liabilities;
- Pension plan assets relative to benefit obligations in order to estimate the shortfall for terminated plans; and
- Projected premium payments to PBGC, contingent on the projected level of pension plan funding and whether the firm is solvent.

With those building blocks, CBO calculates a probability distribution of insurance losses to PBGC at each future date. The cost of PBGC insurance is the present value of those expected losses, calculated using risk-adjusted discount rates—rates that vary according to the severity of market risk along each simulated time path. Premiums are similarly discounted using risk-adjusted rates. The difference between the present value of insurance and the present value of premiums received is the market value of the insurance obligation, or the cost of the potential liability to the government if it were to cover PBGC's shortfalls from future losses.

1. PBGC may, but rarely does, assume a plan's liabilities when pension assets fall to sufficiently low levels, even though the firm remains solvent. That can be costly to the firm because PBGC will file a claim against the firm for all of the plan's underfunding, not just for the portion of underfunding that the agency guarantees.
2. See, for example, Robert L. McDonald, *Derivatives Markets* (New York: Addison-Wesley, 2003), Chapter 10.
3. To accommodate the compound option and the detailed program rules, the options-pricing model is solved using a Monte Carlo simulation.

Table C-1.

Sources and Uses of Data for CBO's Model

Variable	Source	Additional Notes
	Assets	
Initial Market Value of Firm Assets	Model generated	
Firm Asset Volatility	Model generated	Idiosyncratic risk bounded between 5% and 50%
Industry Asset Beta	http://pages.stern.nyu.edu/~adamodar/	To determine the expected return on firm assets and to set boundaries on asset volatility estimates
	Equity	
Equity Dividend Yield	S&P Compustat	
Market Value of Equity	S&P Compustat	To convert the equity dividend yield into an asset dividend yield
	Liabilities	
Long-Term Debt Category	S&P Compustat	Broad rating categories (that is, without modifiers)
Industry Average Debt Ratio	S&P Compustat	S&P's GICS Group determines the industry classification
	Pensions	
Initial Value of Pension Assets	S&P Compustat	
Initial Value of Pension Liabilities	S&P Compustat	The accumulated benefit obligation approximates the current liability; used to determine funding requirements
Plan Participants	IRS Form 5500	Number of pension plan participants
Requirements for the Model Used to Determine the Initial Market Value and Volatility of Firm Assets		
Market Value of Equity	S&P Compustat	
Equity Volatility	http://pages.stern.nyu.edu/~adamodar/	
Initial Book Value of Liabilities	S&P Compustat	
Weighted Average Maturity of Firm Debt	S&P Compustat	

Source: Congressional Budget Office.

Note: S&P = Standard & Poor's; GICS = Global Industry Classification System; IRS = Internal Revenue Service.

Table C-2.

Assumptions of CBO's Model

Parameter	Value	Additional Notes
Stock Weight in Pension Portfolio	70%	
Stock Market Beta	1.0	
Bond Market Beta	0.1	
Pension Asset Beta	0.73	Derived from the stock weight in the pension portfolio and assumed stock and bond betas
Risk-Free Rate	3.5%	
Expected Return on Stock Market	7.0%	
Expected Return on Firm Assets	Variable	Derived from the industry asset beta, risk-free rate, and stock market expected return
Expected Return on Pension Assets	6.1%	Derived from the pension asset beta, risk-free rate, and stock market expected return
Stock Market Volatility	18%	
Pension Asset Idiosyncratic Risk	0	
Pension Asset Volatility	13.1%	Derived from the pension asset beta, stock market volatility, and pension asset idiosyncratic risk
Recovery Rate on Failed Pension Plans	7%	
Interest Rate on Firm Debt	Variable	Risk-free rate (rf) for firms rated A and higher, rf + 1.5% for firms rated BBB and nonrated firms, and rf + 2.1% for non-investment-grade firms
Target Debt Ratio	Variable	Target is the initial debt ratio for investment-grade firms and for non-investment-grade firms with an initial ratio below the industry average, and the industry average debt ratio for highly leveraged non-investment-grade firms
Rate of Movement Toward Target Debt Ratio	Variable	10% for firms rated A or higher, 3% for firms rated BBB and nonrated firms, and 2% for non-investment-grade firms
Rate of Net Growth of Pension Plan Liabilities	0	
Markup for Pension Plan Liabilities (at default)	20%	Termination liability is calculated by applying a 20% markup to current liabilities at the time of firm default
Fixed-Rate Premium	$19	
Variable-Rate Premium per $1,000 of Underfunding	$9	
Criterion for Funding Waiver	72%	IRS funding waiver is granted when firm assets are less than or equal to 72% of firm liabilities
Criterion for Firm Bankruptcy	70%	Firm bankruptcy occurs when firm assets are less than or equal to 70% of firm liabilities
Criterion for Required Deficit Reduction Contribution (DRC) Payments	85%	DRC payments are required when pension assets are less than 85% of pension liabilities
Criterion for Variable-Rate Premium Payments	90%	Variable-rate premiums are required when pension assets are less than 90% of pension liabilities
Criterion for Voluntary Termination	200%	Firms terminate their pension plans when assets are at least twice as large as pension liabilities

Source: Congressional Budget Office.

Note: IRS = Internal Revenue Service.

Initial Data

CBO's options-pricing model relies on publicly available information from a variety of sources for model inputs, and CBO generates some initial values using supplementary models as described below (see Tables C-1 and C-2 for the inputs and assumptions, along with their sources).

- The initial market value of a firm's assets is estimated from market equity, the book value of liabilities, and a model that derives the market value of debt from those inputs.
- The initial book value of a firm's liabilities is derived from the firm's 10-K filings with the Securities and Exchange Commission (SEC). Liabilities equal the sum of short- and long-term debt, plus pension plan underfunding, as reported on a firm's balance sheet.[4]
- Pension assets are valued initially using reported values from corporate filings.
- The initial value of pension liabilities is estimated using the accumulated benefit obligation (ABO) value derived from a firm's balance sheet (see Appendix B).

The initial market value of a firm's assets must be estimated because it cannot be observed directly or derived from book values. By definition, the market value of a firm's assets equals the sum of the market value of stockholders' equity and the market value of the firm's debt liabilities. The market value of a firm's equity is readily available for the publicly traded companies that account for the vast majority of PBGC's coverage. The book value of debt, which is recorded on a firm's balance sheet, also is readily obtainable from SEC filings. The market value of debt, however, is generally not available and must be estimated.

For debt, one important reason that book and market values often diverge is the possibility of bankruptcy, because in that case investors do not expect to receive the entire promised (book) amount on debt securities. The greater the probability of financial distress, the lower the market value relative to book value.

The potential difference between book and market values can be large for the distressed firms that represent the largest risk to PBGC, and upward-biased estimates of firms' liabilities would result from using book value as a proxy for market value.[5] To adjust for the difference between the book value and market value of a firm's debt, CBO employs the insights of Robert Merton, who demonstrates how to use available information on stock returns and industry asset-price volatility to estimate the market value of a firm's liabilities.[6] He notes that equity is like a call option on the assets of a firm, with a strike price equal to the face value of debt. Hence, given the market value of the equity, the volatility of that value, and the face value and maturity of the debt, options-pricing formulas can be used to infer the market value and volatility of a firm's assets.

The Simulation Model

The analysis proceeds by projecting the distribution of four interrelated variables over time: the market value of a firm's assets, the book value of its liabilities, the market value of its pension fund assets, and the market value of its pension fund liabilities. Bankruptcy is triggered when the market value of a firm's assets falls sufficiently below the book value of its liabilities. If a pension plan is underfunded when the sponsor's bankruptcy occurs, the underfunding is a cost to PBGC.

Market Value of a Firm's Assets

A firm's assets tend to grow over time, but year-to-year changes are volatile and reflect overall market conditions, variations in product demand, management decisions, and other unanticipated events. In the model, the projected path of asset values for each firm is based on the current market value of assets, historical average asset returns, and estimated asset volatilities.[7] Specifically, assets grow on average at their expected rate of return to inves-

4. For a few companies, underfunding of pension plans adds considerably to their obligations, but for most firms with underfunded pensions, the obligation is small relative to debt outstanding.

5. Changes in market interest rates also can drive a wedge between the book and market values of debt, especially for long-term securities. That factor is probably less important, however, in the relatively stable interest rate environment in recent years.

6. Robert C. Merton, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance,* vol. 29, no. 2 (1974), pp. 449-470; and Robert C. Merton, "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees: An Application of Modern Option Pricing Theory," *Journal of Banking and Finance,* vol. 1, no. 1 (June 1977), pp. 3-11.

7. The capital asset pricing model (CAPM) is used in conjunction with industry "betas" to estimate expected returns. Volatility estimates are derived from a model based on Merton (1977) and bounded above and below to reduce approximation error.

tors, net of a constant dividend payout rate (equal to the initial payout rate for each firm). Interest payments, which ultimately must also be financed out of earnings, are accounted for by increasing a firm's liabilities at the promised rate of interest. Those assumptions imply that, on average, the growth of a firm's assets net of its liabilities equals the total after-tax return on assets minus dividends and interest payments, and that there are no equity issues or repurchases.

Book Value of a Firm's Liabilities

A firm's liabilities vary over time as new obligations are incurred and old debts are repaid. Liabilities grow each year at an interest rate that broadly reflects credit risk. Firms rated A and above accrue interest at the risk-free rate, firms rated BBB and firms that are not rated accrue interest at the risk-free rate plus a spread of 1.5 percent, and firms rated below BBB accrue interest at the risk-free rate plus a spread of 2.1 percent.

CBO assumes that firms face limits on their leverage, or the proportion of their assets they can finance through borrowing, and that they tend to gradually adjust liabilities over time in the direction of a target ratio to assets. In practice, targets seem to vary widely among industries and even among firms within industries. The target ratio for investment-grade and nonrated firms is assumed to be the initial ratio of debt to assets. For below-investment-grade firms, the target is set halfway between the initial ratio and the industry average when the firm is more highly leveraged than the industry average. The rate of convergence to the target is a choice variable that can be used for sensitivity analysis. For most of the analysis, however, the rate of convergence is set to 10 percent per year for firms rated A and above, 3 percent per year for firms rated BBB or firms that are not rated, and 2 percent per year for firms rated below BBB.[8] For the financially distressed firms that pose the greatest risk to PBGC, increasing leverage further is difficult because new lenders are reluctant to assume the high level of risk, and restrictive covenants from old lenders may preclude the issue of additional debt. However, if distressed firms do manage to avoid insolvency, their liability-to-asset ratio will tend to shrink toward a normal level over time as asset values recover.

Calibration to Bankruptcy Data

Transfer of net pension liabilities to PBGC occurs when a firm is bankrupt. In the model, the probability of bankruptcy depends on assumptions about a firm's asset volatility, the evolution of the firm's liabilities, and the trigger point for bankruptcy. To ensure that the probability of bankruptcy is consistent with experience, the model is calibrated to generate default rates close to the historical five- and 10-year default probabilities reported by Standard & Poor's for each broad credit-rating category. Default probabilities are sensitive to many of the model's assumptions, including asset volatility, the interest rate on debt, the dividend yield, and the rate at which liabilities move toward the target liability-to-asset ratio. The assumed interest rate spreads and liability adjustment rates are adjusted to obtain default probabilities in line with historical values.

Market Value of Pension Assets

The future value of pension assets is uncertain because of variations over time in the rate of return on risky investments. In addition, pension assets are affected by the rate of a firm's contributions and the rate at which funds are drawn down to pay beneficiaries.

Typical plans invest in a mix of common stocks (both domestic and foreign), corporate and government bonds, and real estate, with 60 percent to 70 percent of funds in common stocks. Firms have some discretion in the types of investments that fund their pension plans, and although there is some variation among firms, in the base case, all investment portfolios have a common risk/return profile.

The distribution of pension asset returns is based on the assumption that 70 percent of assets are held in stocks and 30 percent in bonds. The expected return on pension assets is based on the capital asset pricing model, with a stock market beta of 1 and a bond market beta of 0.1. The expected stock market return and standard deviation are taken to be 7 percent and 18 percent, respectively, and stock holdings are taken to be fully diversified so their risk is entirely market risk. The risk-free rate is fixed at 3.5 percent. Those assumptions result in an expected return on pension assets of 6.1 percent and a standard devi-

8. George G. Pennachi and Christopher M. Lewis, "The Value of Pension Benefit Guaranty Corporation Insurance," *Journal of Money, Credit, and Banking*, vol. 26, no. 3 (August 1994, Part 2), pp. 735-753. Pennachi and Lewis add a stochastic component to the value of liabilities to capture volatility caused by factors such as interest rate changes. For simplicity, and because the volatility of liabilities is relatively low, liabilities are assumed to be deterministic. That assumption reduces the estimated cost of insurance relative to Pennachi and Lewis's estimates.

ation of 13.1 percent. The estimate of pension asset volatility is conservative because of the assumptions that the stock portfolio is fully diversified and that there is no idiosyncratic risk associated with the bonds or other asset classes.

Stock returns are positively correlated with a firm's asset returns because both are affected by common market influences and, to a lesser extent, because firms hold some of their own stock in pension asset accounts.

Contributions

The Internal Revenue Code and the Employee Retirement Income Security Act impose minimum funding requirements for defined-benefit pension plans. Under the minimum funding rules, sponsors must invest an amount equal to the plans' normal cost (in other words, any growth in estimated liabilities) each year. In addition, required contributions depend on the degree to which the plan is underfunded. Special funding rules, referred to as deficit reduction contribution (DRC) rules, require additional contributions from sponsors of underfunded plans, which are generally defined as plans with a ratio of assets to liabilities below 90 percent. Because pension liabilities are held fixed in the base case, there are no normal costs (except in some of the sensitivity analysis), and DRC payments are the only external source of funds.

A plan is subject to the DRC when its ratio falls below 90 percent, with special rules for plans with a ratio between 80 percent and 90 percent. The model approximates the 80 percent to 90 percent case by assuming that DRC payments are required whenever the ratio of assets to liabilities falls below 85 percent. The required DRC increases with the size of the funding gap. Those rules are represented in the model by assuming that for firms with a ratio of pension assets to liabilities below 60 percent, a contribution equal to 30 percent of the deficit is required each year. The DRC declines linearly to a contribution equal to 18 percent of the deficit as funding levels increase. Normal cost contributions are assumed to continue even when the 90 percent minimum is reached, because most firms voluntarily contribute until they are 100 percent funded on an ABO basis to avoid requirements by the Financial Accounting Standards Board to report a minimum liability in their financial statements. The fact that many firms stop making DRC payments in the months leading up to bankruptcy is adjusted for through a cost-inflation factor that is discussed below in the section on termination liabilities.

Market Value of Pension Liabilities

Estimating pension fund liabilities requires detailed information about the age and demographic structure of the covered workforce, expected job tenure with the firm, the formulas that determine pension and survivorship benefits, estimates of life expectancies and wage growth, and a model to use that information to generate the present value of liabilities. Lacking such information, this analysis uses the value of ABO liabilities reported in the 10-K filings of sponsors as a proxy for current liabilities (see Appendix B).

Projecting a firm's pension liabilities going forward through time would require similarly detailed information about the composition of a firm's workforce and demographic trends. CBO makes the simplifying assumption in the base case that liabilities do not grow. A fixed level of liabilities would be observed for a firm with a balance between workers and retirees, such that the increasing present value of vested benefits for workers as they near retirement just offsets the falling present value of benefits for retirees as they age. For most firms, growth in liabilities is matched by normal contributions to pension assets. Hence, the fact that the cost of insurance depends on the gap between assets and liabilities rather than their levels mitigates the effect of the assumption of zero-liability growth.

PBGC's coverage is capped for high-wage beneficiaries. Information is not readily available to differentiate at the firm level between total reported pension liabilities and liabilities insured by PBGC. Thus, the estimated costs are biased up to the extent that some uninsured liabilities are identified as insured in the model. However, the percentage of benefits affected by that provision is small.

Termination Liabilities

Bankrupt firms with underfunded pension plans have historically imposed larger costs on PBGC than the level of underfunding they reported immediately prior to bankruptcy. That is, termination liabilities usually exceed current liabilities. Cessation of pension contributions in the period leading up to bankruptcy explains some of the difference.

To reflect that experience, CBO assumes that estimated pension liabilities, as measured by the ABO, increase by

20 percent at bankruptcy.[9] Further, the possibility of reduced deficit reduction contributions when firms experience severe financial distress is reflected in the assumption that those payments cease when the ratio of a firm's assets to its liabilities falls to 72 percent (2 percentage points above the level at which bankruptcy occurs).

One offsetting factor is that PBGC has some claim to the unsecured assets of bankrupt firms. Historically, recovery rates by PBGC are low, however, and have declined in recent years. Consistent with recent experience, the recovery rate is assumed to be 7 percent of the unfunded liability.

Terminations of Plans

Terminations of pension plans generally occur when a firm goes bankrupt. Companies declare bankruptcy when the value of their assets falls sufficiently below the book value of their liabilities. Consistent with previous studies, CBO set the bankruptcy trigger at a 70 percent ratio of a firm's assets to its liabilities.[10]

Firms occasionally terminate plans voluntarily when it is financially advantageous to do so. Regulations preclude firms from withdrawing any excess balances from overfunded pensions to use for other purposes. They can, however, access those assets if they voluntarily terminate their pension plans. Such terminations are uncommon, and firms that terminate plans must pay a tax penalty on the excess balances. When voluntary terminations do occur, they reduce premium payments to PBGC and lower the average quality of the remaining covered firms. In the model, if pension assets rise to twice the level of pension liabilities, a condition that rarely occurs, it triggers a voluntary termination.

The number of covered participants changes over time. Some sponsors choose to terminate plans and switch to some other form of compensation for their employees, thus reducing the participant base. At the same time, new sponsors enter the system. Because it is hard to predict the net effect of those changes, CBO follows only the current population of participants. The participant base declines over the estimation period because of insolvencies or voluntary terminations resulting from significant overfunding.

Premium Payments

Current law requires firms to pay a base premium of $19 annually per participant, plus an additional annual charge of $9 per $1,000 of underfunding. The charges are currently uncapped.[11] Premiums are assumed to be paid in full except in the event of a firm's bankruptcy or voluntary termination of its pension plan.

Estimated Net Costs

CBO's model assigns a cost to PBGC when a firm enters bankruptcy and simultaneously has an underfunded pension on a termination basis. The cost is the present-value difference between the termination liability and the market value of pension assets at the time of the firm's default. The model also estimates the present value of premium payments collected up to the point of default. The cost and premium for each firm are then netted together and summed across all firms to determine the expected net cost to PBGC.

9. Pennachi and Lewis, "The Value of Pension Benefit Guaranty Corporation Insurance," makes the same assumption.

10. Although a firm could declare bankruptcy at a higher asset-to-liability ratio, most choose to continue operations with the hope of recovering.

11. Between January 1988 and June 1996, there was an upper limit on the variable-rate premium of between $34 and $53 per participant.

APPENDIX

D

Reconciling CBO's Estimates of Underfunding with Those of the Pension Benefit Guaranty Corporation

The Congressional Budget Office's (CBO's) data set includes pension details for 1,179 publicly traded companies included in Compustat, Standard & Poor's company reporting service database, as of November 2004. The reporting period for 1,114 companies is fiscal year-end 2003, with the remaining companies reporting data for fiscal year-end 2004. All information entered in CBO's model is publicly available from 10-K filings with the Securities and Exchange Commission. Pension asset values are generally marked to market, whereas pension liabilities represent obligations incurred as of the financial reporting date. In contrast, the Pension Benefit Guaranty Corporation (PBGC) relies largely on confidential filings of pension plans' market value of assets and termination liability, required under section 4010 of the Employee Retirement Income Security Act for companies with more than $50 million in unfunded pension liabilities. When reporting underfunding for fiscal year 2004, PBGC primarily incorporates reported numbers from the 4010 filings made by December 31, 2003.

Although CBO's and PBGC's databases differ substantially in many respects, their summary data for the extrapolated universe of defined-benefit pension plans are not very different. For example, total plan liabilities in CBO's data set are $1,365 billion, while PBGC reports $1,553 billion.[1] To approximate the universe of total plans insured by PBGC, CBO applied a scaling factor of 1.14 ($1,553/$1,365) to its final estimates.

PBGC reports $354 billion of underfunding on a termination basis for 2004 based on the 4010 filings, whereas CBO reports underfunding of $378 billion for its sample of publicly traded companies. Presumably, most firms required to file under section 4010 will be the publicly traded companies within CBO's sample. Similarly, PBGC estimates total plan underfunding for 2004 in excess of $450 billion on a termination basis, whereas CBO's scaled estimate is $431 billion.[2]

CBO's measure of the total accumulated benefit obligation is $1,365 billion, and the total termination liability is $1,638 billion, which is simply the grossed-up accumulated benefit obligation (see Table D-1). However, when CBO reports those data for underfunded plans, the difference between the current liability and termination liability is more than 20 percent larger than the accumulated benefit obligation. The reason for that difference is that more plans are underfunded on a termination-liability basis than on a current-liability or ABO basis. The value of pension assets reported on a termination-liability basis compared with a current-liability basis is similarly larger, again reflecting the additional plans classified as underfunded on a termination basis.

1. Pension Benefit Guaranty Corporation, *Pension Insurance Data Book* (2004), Table S-42, p. 67. Reported plan liabilities are as of the beginning of 2002.

2. Statement of Bradley D. Belt, Executive Director, Pension Benefit Guaranty Corporation, before the Senate Finance Committee, June 7, 2005.

Table D-1.

CBO's Measures of Pension Liabilities, 2003

(Billions of dollars)

	All Plans	Underfunded Plans
Underfunding on a Current-Liability Basis		
Current Liability	1,365	990
Pension Assets	1,269	841
Underfunding	n.a.	148
Underfunding, scaled[a]	n.a.	169
Underfunding on a Termination-Liability Basis		
Termination Liability	1,638	1,523
Pension Assets	1,269	1,144
Underfunding	n.a.	378
Underfunding, scaled[a]	n.a.	431

Source: Congressional Budget Office.

Note: n.a. = not applicable.

a. Total liabilities of all defined-benefit plans are estimated by PBGC to be $1,553 billion as of January 1, 2003, implying a sample to universe scaling factor of 1.14.

APPENDIX

E

Sensitivity Analysis

This appendix reports the sensitivity of the cost estimates to several of the model's assumptions, including the volatility of a firm's assets, the trigger point for bankruptcy, the evolution of a firm's debt levels, the risk-free rate, the growth rate of a firm's liabilities, and a sponsor's risk. It also illustrates how taking into account the price of market risk affects the Congressional Budget Office's (CBO's) estimates.

The volatility of a firm's assets is a critical determinant of the probability of a firm's insolvency—and hence of the Pension Benefit Guaranty Corporation's (PBGC's) losses. A firm's asset volatility is not directly observable and must be estimated. The firm's stock price and volatility, together with information on liabilities, is used in an options-pricing model to infer the value and volatility of the firm's assets (see Appendix C). The base-case volatilities generate default probabilities consistent with historical data for broad rating categories. To assess the sensitivity of CBO's estimates to asset volatility, net costs are recalculated setting volatility equal to 80 percent and 120 percent of the base-case estimate for each firm. The result is a range of net forward-looking costs for 10 years ranging from $32.9 billion at 80 percent volatility to $98.6 billion at 120 percent volatility.

The evolution of a firm's liabilities also affects the probability of bankruptcy. In the base case, firms are assumed to gradually adjust debt levels to a target ratio, with faster adjustment for more highly rated firms (see Appendix C). In the alternative case considered here, firms do not adjust liabilities, which grow steadily with accumulated interest owed. The alternative raises estimated net costs by $22.7 billion. The increase occurs in this case because—unlike the base case, in which firms that experience low returns reduce their debt—there is no debt adjustment.

The estimates also are potentially sensitive to the assumed ratio of liabilities to assets that triggers bankruptcy, since a lower trigger decreases the probability of default. In practice, managers have considerable discretion in when to seek protection from creditors through bankruptcy, and debt ratios at the time of bankruptcy vary widely. In the base case, CBO follows the common practice of assuming that default occurs when assets fall below 70 percent of book liabilities. Increasing the trigger to 75 percent of book liabilities boosts estimated 10-year costs by $17.3 billion.

The probability of a sponsor's default, and hence of costs transferred to PBGC, varies systematically with the volatility of assets and the leverage ratio. Although those two factors interact, here their effects are considered separately. Specifically, the model is used to calculate the increase in premiums necessary to equate the cost per dollar of insured benefits for all risk groups. In each case, the cost to PBGC is set to that of the lowest-risk group. Because even those low-risk groups pay less than a fair premium rate now, greater rate increases would be necessary to balance premiums and costs. The results reveal that the riskier firms with underfunded plans are heavily subsidized under the current premium structure.

For its analysis, CBO divided firms into three similarly sized groups by asset volatility (see the top panel of Table E-1).[1] The premium increment reported is relative to firms with asset volatility of less than 13 percent, the lowest-risk group. The premium is set so that the net cost per dollar of pension liabilities is equalized among the

1. CBO's model generates asset-volatility estimates for individual firms, which are used in those estimates. In general, a firm's asset volatilities are not directly observable, but industry classifications could be used as proxies.

Table E-1.

Premium Multiples to Equalize Costs Across Risk Groups

Risk Factor	Multiple of Current Premium
Firm Asset Volatility	
Less than 0.13	1.0
0.13 to 0.21	2.0
More than 0.21	10.6
Liability-to-Asset Ratio	
Less than 0.39	1.0
0.39 to 0.66	2.7
More than 0.66	10.1

Source: Congressional Budget Office.

Note: Firms with assets in different volatility classes or with different ratios of liabilities to assets present different risks of bankruptcy and hence of plan termination. This table reports by what factor premiums (both fixed and variable) would have to be multiplied in order to equalize PBGC's expected costs for each risk group with that of the lowest risk group.

three groups. The large effect of asset volatility on the probability of bankruptcy explains the large increase in premiums required to bring the cost of high-risk firms in line with that of low-risk firms.

A lower liability-to-asset ratio reduces the risk of bankruptcy and hence reduces expected costs. As with volatility, the firms are divided into three approximately equally sized groups. The premium increment reported (see the bottom panel in Table E-1) is relative to the firms that have a leverage ratio below 39 percent. The premium for firms in the other two groups is increased so that the net cost per dollar of pension liabilities is equalized.

The market risk inherent in PBGC's guarantees is a significant component of cost in all of CBO's estimates. That is because the guarantee is more likely to be called upon when overall economic conditions are depressed and the resources expended most valuable. As discussed earlier, the correlation between an economic downturn and an increase in PBGC's net liabilities arises for two main reasons: the value of plan assets, which are composed largely of stocks, tends to fall in downturns, leaving plans underfunded; and the probability of bankruptcy increases when the economy is weak, increasing the likelihood that underfunded plans will have to be assumed by PBGC.[2]

To measure the effect of market risk, the forward-looking net cost of $63.4 billion can also be compared with an estimate that excludes the cost of market risk by discounting projected cash flows at a Treasury rate. Using a Treasury rate, PBGC's net cost is estimated to be about half of its fair market value. However, the result is highly sensitive to the assumed equity premium. Market risk thus accounts for a substantial share of the cost of PBGC insurance. That is probably a more important factor for pensions than for many other federal credit and insurance programs because there are two compounding sources of market risk: bankruptcies by plan sponsors tend to increase during bad economic times and, simultaneously, underfunding of pension plans tends to increase both because the value of plans' assets falls when the stock market is down, and the value of liabilities increases with lower interest rates.

2. PBGC's Pension Insurance Modeling System also includes a link between economic downturns and PBGC's costs.

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