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Pension Accounting and Corporate Earnings: The World According to GAAP

Peter Fortune

Abstract:

This study's underlying premise is that current pension plan accounting has two important negative effects. First, it distorts the measurement of earnings and net worth in the short run, as well as the pattern of earnings over future periods. Second, this distortion can send incorrect signals to investors about a firm's health, resulting in the mispricing of a firm's outstanding debt and equity instruments. The author demonstrates how these distortions are introduced, examines the magnitude of the distortions, and discusses proposals for reform.

JEL Classifications: E01, G12, G23, G35, M41

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The views expressed in this paper are solely those of the author and do not necessarily reflect the views of the Federal Reserve Bank of Boston or the Federal Reserve System.

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Pension plans play an important role in the measurement—or mismeasurement—of many important indicators of economic health.

One important area where pension plans are important is corporate earnings—the primary focus of this paper. Corporate earnings are crucial to our understanding of the U.S. economy. Beyond their importance as a determinant of asset prices, guiding our decisions about financial saving and investing, corporate earnings are a sign of general economic health: They affect the willingness of firms to increase capacity, to employ labor, and to make decisions that will shape the future of the firm, the industry, and the economy. In addition, earnings are a short-term leading indicator, providing early insights into the economy’s position in a business cycle.

Thus, pension accounting is an important component of our understanding of the health of firms and of the economy. This study addresses the role of pension plan accounting in the measurement and interpretation of corporate earnings. It is the first of a two-part study of defined-benefit pension plans. The second paper attempts to discover whether pension accounting has any “real” effects, by assessing the implications of pension accounting for the returns on common stocks. This paper provides important background information.

The first section of this study briefly outlines the history of pension-fund regulation and the alleged consequences of the accounting rules for pension plans under Generally Accepted Accounting Principles (GAAP). Among the topics is the Employee Retirement Insurance Security Act of 1974 (ERISA), the creation of the Pension Benefit Guaranty Corporation (PBGC), and the debate about whether pension trusts are relevant to assessment of the sponsor’s health. The second section compares GAAP accounting with current-value accounting for a specific company in order to show how pension-accounting rules work and how GAAP accounting differs from current-value accounting. The third section reports on some characteristics of defined-benefit (DB) pension plans at firms in the Standard and Poor’s 500 index, including the number of firms with DB plans, the funded status of plans, deviations between actual and expected returns on plan assets, and net pension costs of DB plans. The fourth section discusses some recent proposals for pension-accounting reform. Among these proposals are marking to market, more accurate measurement of the pension obligation, especially for funding purposes,

and adopting risk-based PBGC premiums. Many of these reforms have been proposed by the Administration or are on the agenda of Congressional committees. The fifth section discusses two lessons for pension asset managers: reassessing the risk of equities and focusing less on asset returns and more on balancing the risks of pension assets and liabilities. The paper ends with a summary.

While the focus of this paper is on corporate earnings, a few words on the role of pension plans in the interpretation of other indicators will reinforce the importance of pension plans and of plan accounting.

Personal income is a significant determinant of personal consumption. In recent years there has been a concern that consumption expenditures have risen relative to personal income. While this has bolstered aggregate demand and contributed to economic growth in the short run, it has also reduced personal saving and, perhaps, inhibited capital formation and future material well-being: From 1988 to 2000, the personal saving rate declined from 7.8 percent to 2.8 percent. About 2.1 percentage points of this 5-percentage-point decline have been attributed by Lusardi et al. (2003) to the accounting treatment of defined-benefit plans, defined-contribution plans, and IRA retirement plans. The reason lies in the way that the National Income and Product Accounts (NIPA) treat pension plans: NIPA includes employer and employee contributions, along with interest and dividends on plan assets, in disposable personal income. Both capital gains on plan assets and benefits paid are excluded because NIPA measures the economy's value added: Capital gains are not part of value added, and benefits paid by pension plans are withdrawals from assets, and thus also not part of value added.

Therefore, when benefit payments are high relative to pension contributions plus income on pension assets, no value added is recorded in NIPA and there is no change in personal income.¹ However, individuals receive more cash, and consumption rises relative to personal income. To add to this, taxes paid on pension benefits reduce disposable personal

¹ High ratios of benefits to contributions occur when there are high capital gains and companies either reduce their contributions or amend plans to increase benefits. Thus, even though consumers and retirees are better off during periods of stock market gains, NIPA records a decline in the saving rate which is often interpreted as a source of concern.

income even further. The result is a decline in the personal saving rate. Thus, if the goal is to explain consumption and saving, disposable personal income is not measured correctly.

Additional evidence of measurement conventions' distorting the relationship between consumption and saving is found in the way that labor costs (compensation) and unit labor costs (ULC) are computed. Compensation is defined as the average wages and salaries paid per employee. ULC, defined as compensation divided by average labor productivity, is often used as a measure of wage pressures on product prices: A high ULC figure generally means that compensation and benefit costs have risen faster than labor productivity, an indication that either product prices will increase or profit margins will decline.

Pension plans affect the calculation of compensation and of ULC because employer contributions to pension plans are included in labor costs, while benefits paid to retirees are not. During periods when returns on pension assets are high, plan sponsors typically reduce their contributions because plans are better funded; this behavior reduces both compensation and unit labor costs. Thus, just as measured personal saving responds inversely to the non-income returns on plan assets, so also do the figures on compensation and unit labor costs.

Returning to the main focus of this paper—the impact of GAAP on corporate earnings—we turn now to the history of defined-benefit pension plans.

I. Defined-Benefit Pension Plans

Early History

Defined-benefit pension plans, in which a company commits to a specific formula for paying retirement benefits to employees, were introduced in 1875, when American Express adopted the first employer-sponsored retirement plan. The impetus to develop DB plans is unclear, but in the 19th century individuals had few ways to invest their funds other than in bank deposits. Companies were typically privately owned, not publicly traded. With debt and equity instruments confined to a few industries like railroads, canals, and roads, diversification required large scale. The stock market was thin and trades were costly. Disclosure requirements were nonexistent, making analysis of the instruments particularly difficult; and financial

education was limited. Under these conditions, employees would willingly give up some take-home pay to compensate employers for financial services like pension-fund management.

While the tax incentives of deferred compensation are important today, they played no role at the federal level prior to the introduction of the federal income tax in 1913. The original income tax allowed corporations to deduct contributions to DB plans, but only for certain forms of deferred compensation. In 1921, tax deductibility was extended to a broader range of plans, such as stock bonus trusts and profit-sharing plans, thereby broadening the impetus of tax incentives. The financial services industry grew to manage plans with the entry of major insurance companies, such as the Teachers Insurance and Annuity Association in 1918 and The Metropolitan in 1920. As a result, the popularity of DB plans surged in the 1920s. The modern DB plan was initiated by General Motors in 1940.

However, DB plans have a troubled history. Many companies followed no standards for funding benefits, planning to pay them out of future earnings. All too often companies adopted restrictive vesting requirements that allowed benefits only for older employees with long service to the company, leaving younger employees unprotected and older employees tied to the firm. When companies ran into difficulty meeting their pension commitments, they could terminate their underfunded plans at will, exercising a “pension put option” and passing the insufficient pension trust-fund assets to retired employees. In a prominent case, Studebaker closed its South Bend plant in 1964, exercised this pension put, and moved its operations to Canada (Sass 1997). This case was a major impetus for pension reforms in the early 1970s.

ERISA and Subsequent Pension Legislation

In order to mitigate these problems, Congress passed the Employee Retirement Income Security Act (ERISA) in 1974. ERISA introduced vesting requirements, stipulating that an employee’s benefits for prior service in a single-employer plan either be fully vested after five years or gradually vested, with 20 percent vesting after three years and 20 percent vesting in each of the subsequent four years. It also mandated that companies compute the funded status of their plans at least every three years and that they make minimum contributions to pension plans.

To determine a plan's funding status, ERISA required that bonds be valued at cost, and equities at market. Until recently, benefit obligations had to be calculated using as the discount rate a markup over the 30-year U.S. Treasury bond yield.² ERISA also provided for waivers of the minimum funding requirements under certain circumstances: Up to five contribution waivers could be granted in a fifteen-year period; waived contributions had to be amortized over 15 years.

ERISA also created the Pension Benefit Guaranty Corporation (PBGC) to insure the benefit obligations of eligible pension plans. At the outset, the PBGC covered all vested benefit obligations under a terminated plan's agreement, without regard to the plan's generosity, subject to a maximum annual employee benefit (\$45,600 per year in 2005). The PBGC charged a fixed premium of one dollar per employee regardless of the plan's risk. If an eligible underfunded plan was terminated and passed to the PBGC, the PBGC could claim 30 percent of the firm's net worth. Thus, firms could create plans that were generous in vesting, retirement ages, or benefit levels, and then terminate them at will, forcing the PBGC to cover the unfunded obligations.

Ippolito (1989) points out that the PBGC's generous coverage and its low and risk-independent premiums created an insurance plan fraught with moral hazard, one that could easily become underfunded. Over time, there has been a tightening of the PBGC's covered benefits and an increase in premiums. At present, PBGC requires a fixed premium of \$19 per employee. If a plan is underfunded, ERISA requires a minimum contribution, and the PBGC levies an additional premium of \$9 per \$1000 of the underfunded amount. The premium structure is still independent of the market risk of the plan's assets and of the credit risk of the plan sponsor.

ERISA has been amended several times since its inception. The Single-Employer Pension Plan Amendments Act of 1986 (SEPPA) eliminated the ability of firms to terminate their plans at

² Corporations can use a different discount rate—typically the AA Moody's bond rate—for financial reporting than for ERISA reporting. The Pension Funding Equity Act of 2004 replaced ERISA's requirement of a 30-year U.S. Treasury bond rate with a composite corporate interest rate. After 2005, Congress is expected to adopt a new interest-rate index. The effect of this change is to reduce the pension benefit obligation.

will. SEPPA required that a pension plan could be put to the PBGC only under certain circumstances: filing for bankruptcy under Chapter 7 or 11, demonstrating that the company cannot continue in business without terminating its pension plan, or demonstrating that pension costs are “unreasonably burdensome.” SEPPA also allowed the PBGC to make a claim for up to 75 percent of the terminating firm’s underfunded amount in addition to the 30 percent claim on equity.

The Pension Protection Act of 1987³ (PPA) introduced the two-part PBGC premium discussed above. The PPA also reduced the limit on the number of contribution waivers allowed in a 15-year period from five to three. Most importantly, it considerably shortened ERISA’s amortization periods for pension underfunding: from 30 to 18 years for prior service obligations, from 30 to 10 years for actuarial assumptions, from 15 to 5 years for experience losses, and from 15 to 5 years for waived contributions.⁴

The Financial Accounting Standards Board

ERISA’s mandate was the funding of pension plans, not the accounting for pension plans. The reform movement also changed accounting rules and reporting requirements. The creation of accounting standards, beginning with the Committee on Accounting Procedure in the 1930s, has culminated in the Financial Accounting Standards Board (FASB). Created in 1972, with accounting authority delegated to it by the Securities and Exchange Commission, FASB pronounces its rules in Statements of Financial Accounting Standards (SFAS). At the end of 2003, there were 150 such statements, each addressing a specific issue in corporate accounting. These statements, supported by the FASB’s interpretations and other promulgations, have become known as Generally Accepted Accounting Principles (GAAP).

The road to an SFAS is not an easy one. Many proposals fall by the wayside or are dramatically modified before being codified in an SFAS. Only after heated debate among and between accountants, companies, and financial analysts is one issued. Each SFAS remains a controversial rule throughout its life. This is true of the primary subject of this paper, SFAS 87:

³ The Pension Protection Act of 1987 is the name given to the section of the 1987 Omnibus Budget Reconciliation Act that amended ERISA.

Employers' Accounting for Pensions. Effective since 1986, SFAS 87 has important implications for the interpretation of annual earnings and for the ability of financial statements to provide meaningful information.

SFAS 87 standardized the accounting for pension benefits. It also incorporated features that introduced smoothing of pension costs by recognizing only a portion of current gains or losses on pension assets and deferring the remainder into the future. In doing so, it reduced the sensitivity of current earnings to changes in pension-related gains and increased the sensitivity of future earnings to past gains. This was done to reduce the volatility of earnings so that, in principle, they better reflected a firm's long-term volatility. In practice, this smoothing has made current earnings less indicative of current business conditions, and it has created additional uncertainty in the interpretation of future earnings.

SFAS 87 contains accounting and disclosure standards for single-employer, defined-benefit retirement plans, those plans in which a single employer is committed to making specified benefit payments to retirees based on the plan's benefit formula. FASB excluded multiemployer defined-benefit plans, such as the UAW plan that serves the auto industry, from the accounting requirements of SFAS 87, arguing that uncertainty about the legal obligations of an employer to a multiemployer plan, and the potential for events at one employer to affect other employers participating in the plan, made application of SFAS 87 problematic. Defined-contribution plans were also excluded from the SFAS 87 requirements because the employer's primary commitment in those plans is to make current contributions, not to pay defined future benefits.

FASB disclosure requirements are incorporated in several FAS statements: SFAS 87, SFAS 88: *Employers' Accounting for Settlements and Curtailments of Defined Benefit Pension Plans and for Termination Benefits*, SFAS 106: *Employers' Accounting for Postretirement Benefits Other than Pensions*, and SFAS 132: *Employers' Disclosures about Pensions and Other Postretirement Benefits*. SFAS 132, adopted in 1998, amended the disclosure requirements of SFAS 87, SFAS 88, and SFAS 106. Beginning in 1999, plan sponsors must report a reconciliation of beginning and ending balances for the projected benefit obligation and fair value of assets for pension plans.

⁴ FASB's amortization periods continue to run from 5 to 30 years, depending on the item amortized.

They must also report the *funded status*, defined as the difference between the pension obligation and the fair value of pension assets, and they must provide a reconciliation of that funded status with the net pension assets reported on the firm's balance sheet. Useful as this information is, it is presented in financial statement notes and is not incorporated into income and balance-sheet statements.

The Debate over Marking to Market

A major proposal for current reform is that pension accounting should be based on market-value accounting ("mark-to-market") rather than the accrual (book value) accounting of SFAS 87. Underlying this proposal is the view that pension funds are more like financial institutions, which are typically required to mark to market, than operating companies, which typically do not mark to market. Indeed, the economic status of a DB pension plan is that it is an entity that borrows from workers via wage and salary reductions, paying those employees back in annuities at retirement. If a worker had received a higher salary during the employed years and had put the extra income into annuities that begin payment at retirement, the financial institution selling the annuities would have been obliged to report the account status at market prices. The result of marking to market, it is argued, will be greater clarity about the condition of the pension plan and about the implications for the corporate sponsor and the beneficiaries.

Accountants and corporations object to marking pension-plan assets to market on several grounds. First, marking to market would create more volatility in reported earnings (although it would have little effect on a company's cash flow).⁵ Because volatility tends to be disliked by risk-averse investors, stock prices might be depressed. In addition, if bond covenants or other contracts were tied to earnings, volatility might affect the viability of those contracts. A counterargument to this objection is that stock prices should reflect the fundamental condition of a company, which is best measured by the present value of the company's future net income. Indeed, the absence of accurate short-term data might also

⁵ ERISA already requires mark-to-market accounting in computing a company's minimum funding requirements.

deprive investors of important information, resulting in a decline in stock prices. If volatility increases, the counterargument goes, so be it.

A second argument against marking to market is that investors and analysts will find financial statements confusing because, while the short-term picture may be clearer, the long-term picture will be fuzzier. While it is true that marking to market may not give an accurate picture of a firm's long-term prospects, it is equally true that the emphasis on the "long run" in GAAP accounting gives a poor picture of current conditions and, if market and book values do not converge, a poor picture of the long term as well. If security markets are reasonably efficient and the current prices of securities accurately reflect reasonable assessments of long-term outcomes, marking to market might give a clearer picture of both short-term health and long-term prospects.

A third argument for book-value accounting is that many other items in a firm's financial statements are measured as book values. To apply mark-to-market practices for one portion of the firm's financial statements, its pension plans, introduces an arbitrary component of volatility that might not exist if all items were marked to market. This objection has considerable merit when hedge accounting is the issue. Consider a contract to sell a commodity in the futures market to hedge against a decrease in spot prices for that commodity held in inventories. To count the inventories at book value but the futures contract at market value can clearly mask the underlying intent of the derivative strategy.

There are two counterarguments. First, pension plans are not a hedging activity. Rather, they are long-term obligations financed by assets with volatile prices, similar to the holdings of a financial institution with unmatched assets and liabilities. Just as we would have understood the Savings and Loan industry of the 1980s better if we had used mark-to-market accounting practices, so we might understand current pension plans better with these practices.

Second, GAAP accounting makes a distinction between operating assets and investments. Operating assets are carried at book value, and operating income is subject to accrual accounting. However, investments in marketable securities are typically treated as available for sale and are carried on the balance sheet at fair value, while dividends, interest and realized gains on marketable securities are treated as current income (unrealized gains or losses

are included in comprehensive income).⁶ Seen in this light, marking to market of pension assets seems reasonable.

A final point is that book-value accounting, by masking a firm's earnings volatility, may have encouraged pension fund managers to choose riskier portfolios in the belief that they could earn higher average returns without reporting the fluctuations in value. The increasing share of equities and, more recently, of real estate in pension funds is an example; these developments have exposed pension plans to greater downside risks and have threatened retirement goals in recent years. The move to higher-risk assets has rested on the premise of higher returns, but these higher returns are, at least in part, due to the risk premium required by investors: The higher average return earned is a windfall to pension plans only if pension fund managers are less risk averse than marginal investors or if the "equity premium" is too high, a point we will return to later.

Why SFAS 87 Might Make No Difference

This study's underlying premise is that current pension-plan accounting has two important effects. First, it distorts the measurement of earnings and net worth in the short run, as well as the pattern of earnings over future periods. Second, this distortion can send incorrect signals to investors about a firm's health, resulting in the mispricing of a firm's outstanding debt and equity instruments.

An underlying assumption is that a pension plan's assets are a corporate asset and its liabilities are a corporate liability. This view is controversial. One objection is that any GAAP-induced distortion of earnings and net worth may be irrelevant because SFAS 87 requires firms to report meaningful information about pension plans in the detailed footnotes of annual reports, and to provide other periodic reports such as ERISA's Form 5500, on pension fund condition. This, it is argued, allows financial analysts and attentive investors, skilled at decoding accounting statements, to unravel the effects of SFAS 87 on the pattern of earnings over time. If so, a difference between reported and "real" pension-related values is not

⁶ SFAS 115 requires securities with no readily available prices and securities that will be held to maturity to be carried at cost. Securities that are actively traded and those marked "available for sale" are carried at fair value.

meaningful—informed investors will see through the accounting fog, and the prices of the company's securities will contain accurate information on the pension plan's role in the firm's financial health. If true, a corporation's financial asset prices should not be affected by earnings and balance-sheet distortions, and employees should be able to understand the status of plans of which they are beneficiaries. Of course, a counterargument is that placing pension information on the back pages of an annual report encourages incorrect valuation by both investors and employees not skilled at decoding the available information.

A second argument against the distortion and mispricing hypotheses is that contributions to a pension plan, once made, are not available to the company. Pension assets, it is argued, are held in a trust managed by a board of trustees with legal prohibitions on distributing the assets to the company. Excluding the plan's obligations from the company's liabilities is appropriate because those liabilities can be "put" to the PBGC if the plan is underfunded. In short, a defined-benefit pension plan is an independent entity on which the parent company has no claims: If there are excess assets, they cannot be tapped by the company; if there are excess obligations, they are not owed by the company. The employer's only real obligation is to make contributions according to the trust agreement and ERISA's requirements. This position argues for excluding any recognition of pension assets or obligations on the balance sheet—even the net position that GAAP now requires, called "prepaid pension asset." Only the service-cost component of annual pension costs should be reported in the income statement, because other costs are borne by the trust fund.

But while it is true that the trust agreements prohibit payment to the company after contributions have been made, a company can reclaim excess assets. One approach is to reduce employer contributions until, over time, there are no excess assets. ERISA allows this, because contributions are required only for underfunded plans. A more immediate possibility is to terminate the pension plan in a process called "reversion." Following a reversion the company can establish a new pension plan with assets equal to the pension obligation of the terminated plan, taking the excess assets for general company use. Ippolito (1989) reports that in the 1980–87 period there were over 1,600 reversions of plans that were overfunded by at least \$1 million. Reversions were particularly prominent at firms with funding ratios exceeding 150 percent,

suggesting that the motive was to claim assets. The majority of those plans were re-established with new trust agreements having terms similar to those of the original trust.

Reversion of pension plans is not without costs. The excess assets, having been accumulated from tax-deductible contributions or from tax-exempt asset gains, are subject to the corporate income-tax rate, now 35 percent. In addition, since 1990, there has been a 50 percent excise tax levied to discourage reversion. This “reversion tax” is reduced to 20 percent if at least 25 percent of excess assets are transferred to a qualified replacement plan. This leaves the company with only 15–45 cents of each dollar of excess assets reverted.

Ippolito (2001) argues that the high reversion-tax rate has had the unintended consequence of discouraging firms from making contributions that might lead to overfunding. Indeed, the number of overfunded plans, and the extent of the overfunding for those plans with excess assets, fell sharply after the introduction of the reversion tax. Even so, reversion is a potential method of reclaiming assets if a replacement plan is adopted, suggesting that a firm can benefit from a substantial portion of the assets. And sharp pencils have been devoted to structuring reversions to avoid the reversion tax.

Whether a company with an underfunded plan owes the pension obligation depends on its ability to put that obligation to the PBGC. If the plan can be terminated without cost and the net pension obligation transferred to the PBGC, a company in severe distress, with little net worth, has no real liability to the PBGC. Companies in better health might face a PBGC prior claim on 30 percent of the company’s net worth, plus the recently added claim for 75 percent of underfunding. While this decreases the value of the PBGC put, exercising the put can still be rational.

Thus, *prima facie*, the irrelevance hypothesis has merit, but it is unacceptable in its extreme form: Excess assets can be taken by the firm, but a substantial portion of them might be paid out in corporate income and reversion taxes; excess obligations cannot be transferred to the PBGC at the employer’s will, but, if financial distress is evident, they can be put to the PBGC at some cost. In short, the firm can enjoy a significant portion of excess assets—but not all—and it might avoid a substantial proportion of excess obligations—but not all.

II. Pension Plan Accounting under SFAS 87

Measuring Annual Pension Costs

The annual cost of a single-employer defined-benefit pension plan is defined in SFAS 87 as the *net periodic pension cost* (NPPC), that is, pension costs (service costs plus interest costs plus other costs) less the expected return on plan assets. While all pension accounting necessarily involves assumptions about future values, the definition of NPPC is particularly influenced by assumptions designed to smooth the costs reported by employers, thereby reducing the volatility of net income. The primary source of this smoothing is found in the definition of the returns on the plan's assets, which are treated as a negative cost in deriving NPPC: SFAS 87 requires firms to use the *expected* returns on plan assets during a period, not the actual returns. The expected return is the rate of return anticipated by the firm to hold over the "long run." The use of expected return introduces an element of managerial choice into its calculation of labor compensation and net income, it contributes to the "other cost" component of NPPC (which is largely a recognition of past discrepancies between expected and actual return), and it has important implications for the measurement of pension cost, the value of pension plan assets, and net income.

Table 1 shows both "GAAP" and "actual" net periodic pension costs for Eli Lilly & Co., a large U.S. pharmaceutical company, for the five years from 1999 to 2003. This company is chosen simply for expository purposes—it does not necessarily represent either its own industry or industrial companies in general.⁷ In Table 1 the GAAP measure of NPPC, required by SFAS 87, recognizes the expected return on plan assets; "actual" NPPC uses the actual returns on plan assets, thus excluding the smoothing effect of SFAS 87.

The first item reported in GAAP NPPC is *Service Costs* (also called "normal costs"). These are the discounted value of estimated future pension benefits arising from the employment of covered workers during the current period. Service costs require assumptions about future salaries, benefits, and vesting ratios for each year of remaining service life.

⁷ Zion and Carache (2002) classified the pharmaceutical sector of the Standard & Poor's 500 as being relatively high in exposure to risks arising from pension plans—10th out of 50 sectors—but not even close to the auto components, automobile, and airline industries.

The second component, *Interest Costs*, represents the returns that must be paid on the pension obligation outstanding at the beginning of the period. That pension obligation, called the *Projected Benefit Obligation* (PBO), is the present value of estimated future benefits, calculated using an assumed discount rate, typically the rate on high-grade corporate debt such as Moody's AA yield.⁸ For Eli Lilly, the assumed discount rate in 2003 was 6.2 percent. Interest cost is simply the beginning-of-year PBO times the discount rate. Service and interest costs of this company totaled \$462.3 million in 2003.

The third component of reported NPPC is *Amortization of Unrecognized Prior Service Cost*. This arises from amendments to the pension plan that affect the cost of services that were provided by covered employees in previous periods. For example, changes in benefits that are applied to past services, changes in vesting ratios, and changes in the assumed discount rate would be included. These unrecognized costs are not immediately incorporated into current pension costs. Rather, they are amortized over the remaining service life of covered employees. In 2003, Lilly reported \$11.9 million of amortization of unrecognized prior service costs.

The remaining two items capture the problematic components of GAAP pension accounting. The expected return on the plan's assets is the expected rate of return (the average rate of return that the company expects to earn on its pension assets over the service life of covered employees) times the "market-related value" of plan assets. The expected rate of return is derived by assessing the pension plan's asset structure (stocks, bonds, real estate, and other assets), computing a reasonable long-term rate of return for each asset class, and calculating an average return on assets. At year-end 2003, Lilly's pension plans held 77 percent of assets in equities, 10 percent in debt, 2 percent in real estate, and 11 percent in other assets. The expected rate of return was 9.27 percent.

Under SFAS 87, as noted above, the expected return on plan assets is computed as the expected rate of return times the *market-related value of plan assets*. The market-related value of plan assets is either the fair value of plan assets⁹ or a calculated value that recognizes changes in

⁸ The discussion here is about corporate reporting of pension-plan income and expenses. ERISA requires a different discount rate for funding purposes.

⁹ Fair value is the market value for actively traded securities, or an estimated value for inactively traded securities, real estate, and private equity.

fair value over a period not longer than five years (such as a five-year moving average of fair values). Eli Lilly uses the fair value of assets as the market-related value, reporting an expected return on plan assets of \$382.0 million in 2003; this shows as a negative item in the calculation of NPPC.

The use of expected returns rather than actual returns, and the option to use calculated values of plan assets rather than fair value, inserts a strong smoothing into the most volatile component of NPPC—the return on assets. If actual returns are less than expected returns, NPPC will be understated because a higher return (based on the expected rate of return) is deducted from costs; similarly, if actual returns exceed expected returns, NPPC will be overstated. Furthermore, if fair value of assets has been rising (falling) but the company uses a five-year average as its measure of market-related value of assets, NPPC will be higher (lower) in the current and next four years because the averaging of asset values attributes a smaller return to plan assets. In 2003, Lilly’s footnotes showed actual returns of \$579.2 million, but, because it reported only \$382.0 million of expected returns, NPPC was overstated by \$197.2 million.

When actual returns differ from expected returns there is an *unrecognized gain or loss* on the pension plan’s assets.¹⁰ If the expected rate of return is a correct forecast of the long-term rate of return, unrecognized gains or losses should be offset in the long run. However, their complete recognition could take quite a while, and they might never be properly recognized. To address this problem, SFAS 87 required that firms maintain a record of the accumulated value of unrecognized gains or losses and, under specific conditions, amortize that amount over five years or less, thereby ultimately recognizing it in NPPC. Amortization of unrecognized gains and losses is required if accumulated unrecognized gains or losses are outside a “corridor,” exceeding 10 percent of the greater of the PBO or of the market-related value of plan assets. The excess is amortized over a period not longer than five years. This is often called *Actuarial Gain*

¹⁰ SFAS 87 defines unrecognized gains or losses as arising only from differences between actual and expected rates of return, not from differences between fair value and the market-related value of plan assets. Any difference between fair value and market-related value of assets will be reflected over time in the averaging formula used to compute the expected return on plan assets.

(Loss) on Plan Assets. Eli Lilly, for which accumulated unrecognized losses existed in 2003, added \$52.0 million to NPPC for past discrepancies between actual and expected returns.

A measure of NPPC that more accurately reflects current conditions is reported in Table 1 as the “Actual” Net Periodic Pension Cost. Service and Interest Costs are the same as those in GAAP. But realized NPPC uses the actual rate of return on plan assets instead of the expected rate of return, and it uses fair value as a measure of market-related value. If actual returns are used, there is no unrecognized gain or loss to be amortized; hence the item. Recognized Actuarial Gain/(Loss) on Plan Assets is excluded. Also, Amortization of Unrecognized Prior Service Cost is excluded because all prior service cost is recognized in the period incurred. This last item is replaced by “Actuarial (Gain) Loss on PBO,” which reflects the changes in PBO arising from changes in assumptions required to calculate PBO.

Using actual returns and recognizing the actuarial gains and losses on the PBO significantly alters Lilly’s net income path. In four of the five years, actual pension costs exceeded GAAP pension costs. For example, the 2003 actual pension cost of \$375.6 million was more than twice the \$144.2 million NPPC reported in the income statement. The adjustment from reported to actual values translates to a 9.0 percent reduction in reported net income in 2003. In 2000, when the economy and stock market began to falter, using actual NPPC would have reduced net income by almost 13 percent. Over the five-year period, substituting actual pension costs for GAAP pension costs would have reduced reported net income by over 15 percent.

Thus, net income reported in any year can be substantially influenced by the pension accounting requirements of SFAS 87. Furthermore, unrecognized gains and losses incurred in one year can remain indefinitely unrecognized if accumulated unrecognized gains or losses remain small, not exceeding 10 percent of PBO or fair value. If unrecognized gains become large enough to trigger amortization, they can affect NPPC for up to five years. If returns on pension assets conform to the expected rate of return in the long run, the misreporting in one year will be offset by an opposite misreporting in later years, leaving the firm’s net income stream unaffected in the long run. But the path of earnings will be altered, perhaps dramatically, by the smoothing embedded in SFAS 87.

Measuring Pension Assets and Liabilities

There are three fundamental accounting items recognized in GAAP balance sheets for pension plans. The first two are measures of the pension obligation. The *Accumulated Benefit Obligation* (ABO) is the actuarial value of the pension plan's future obligations to its current employees and retirees based on current and past wages and salaries. This is what the plan's obligation to current and future retirees would be if the plan were to terminate in the current period. The second, the *Projected Benefit Obligation* (PBO), introduced above, is the actuarial obligation recognizing future estimated wage and salary increases—it is the ABO plus the present value of the benefits attributable to the assumed future increases in wages and salaries. The PBO is larger than the ABO when, as is common, a plan assumes wage and salary increases. Finally, on the asset side, is the *Fair Value of Plan Assets*.

Table 2 shows the determination of the year-end values of Eli Lilly's PBO and plan assets in 1999–2003. Section A shows that the year-end PBO is the beginning-of-year PBO (\$3,941.1 million in 2003) plus the current-year increase in obligations—the sum of service cost, interest cost, and the actuarial loss (or gain) from plan amendments or changes in assumptions affecting the PBO. From this is deducted the benefits actually paid. At year-end 2003, the company had a projected benefit obligation of \$4,648.6 million.

Section B of Table 2 derives the year-end fair value of the plan assets as the initial fair value plus additions to fair value due to actual returns on plan assets, employer contributions, and other adjustments. From this is deducted the benefits actually paid during 2003. The year-end 2003 fair value of the plan is \$3,700.1 million.

Section C shows that, at year-end 2003, the difference between the fair value of plan assets and the PBO is negative \$948.5 million, indicating that the company's plans are underfunded by nearly \$1 billion. This difference, called the *Funded Status*, reflects the condition of the plan if the assumptions about future employment, wages and salaries, vesting, and so on, are realized; Lilly's underfunding is substantial, amounting to 9.7 percent of reported year-end 2003 shareholder (book) equity.

But, as noted above, FASB does not require firms to report the pension plan's assets and liabilities on their balance sheets. Nor are firms required to report the net assets (the funded status) at market values. Rather, that information is found in notes to the financial statements. The balance sheet reports a very different value for net assets of the pension plans—a book value derived from SFAS 87. For Eli Lilly, the \$948.5 million underfunding—an “actual” net liability—becomes a \$1,409.7 million net asset. The underlying alchemy, shown in sections C and D of Table 2, adjusts the “market” values underlying the funded status to GAAP book values. This adjustment can be expressed in two ways. In section C, the *Net Amount Recognized on the Balance Sheet* is derived as the funded status plus the unrecognized net actuarial items due to accumulated unrecognized costs from prior service amendments, losses in fair value of pension assets due to differences between actual and expected returns, and the remaining unamortized obligations from the shift to SFAS 87 on January 1, 1986. The addition of unrecognized losses adjusts the value of plan assets from the fair value in section B to the book value reported on company balance sheets. During periods when actual returns are low, book value will exceed fair value and balance sheets will enjoy an upward adjustment of net assets.

An alternative approach to measuring the net asset recognized on the balance sheet is shown in section D of Table 2. This shows what the company reported on its balance sheet. Eli Lilly reported a *Prepaid Pension Asset* of \$1,613.3 million. This is the excess of cumulative employer contributions and expected returns over cumulative net periodic pension costs for those plans with a positive value. Deducted from this is an *Accrued Benefit Liability* (see below) of \$422.6 million; this is the minimum pension liability required by ERISA. Adding *Accumulated Other Comprehensive Income Before Income Taxes* gives the net amount recognized on the balance sheet.

Thus, at year-end 2003, the company reported on its balance sheet that net pension plan assets were \$2.5 billion greater than the actual net value (the funded status). Had these excess assets been deducted from net assets, reported shareholder (book) equity would have fallen by 26 percent, from \$9,764.8 million to \$7,226.8 million. In short, about a quarter of this company's reported net worth in 2003 was due to smoothing and deferral by SFAS 87!

Minimum Funding and Minimum Liability Requirements

As noted above, ERISA mandates minimum pension contributions and a minimum pension liability. The minimum pension contribution, called the *minimum funding requirement*, is equal to the normal cost (read: service cost) plus the unfunded ABO amortized over five to thirty years, depending on the source of the underfunding.¹¹ If a company's ABO is less than 80 percent funded in any year (or less than 90 percent funded in two of the last three years), an *additional funding requirement* states that the shortfall must be amortized over 3 to 5 years. The minimum contribution that must be paid is the greater of the minimum funding requirement or the additional funding requirement. In addition, ERISA specifies a *maximum contribution* equal to the amount that will fully fund the plan's PBO. This prevents companies from obtaining tax advantages by contributing to overfunded plans; it also discourages contributions to overfunded plans that might make them healthier if future net assets turn negative.

The recent United Airlines transfer of its pension plan to the PBGC highlighted a controversial feature of ERISA's funding requirements. If a company's accumulated contributions exceed its accumulated required minimum contribution, the excess, called the *ERISA funding credit*, is recorded as a credit balance that can be used to meet future minimum contribution requirements. This credit balance is assumed to earn the expected rate of return on plan assets. For example, if a company has accumulated a credit balance of \$25 million and faces a minimum contribution requirement of \$20 million, it can use \$20 million of its credit balance and pay no cash into the pension plan, leaving a \$5 million credit balance that will increase at the expected rate of return. This is possible even if the pension plan is severely underfunded, as was United's pension plan.

The purpose of the ERISA funding credit was to encourage companies to make additional contributions in good years, but the effect is to allow a company to meet its funding requirement without contributing that amount to the pension fund. United has been charged with using this device to make its pension plan appear sounder than it was, thereby misleading employees. While the credit balance does have this potential, its effect may not be as great as

¹¹ Actuarial losses on plan assets are amortized over five years, losses due to plan amendments are amortized over thirty years, and other losses are amortized over the remaining service lives of employees.

charged. First, SFAS 87 requires disclosure of the plan's funded status each year. Employee representatives, or employees themselves, could have determined the health of United's plan by reading the financial notes to the annual report. Second, the effect of the ERISA funding credit is to allow companies whose plans run into trouble to make only the minimum required cash contribution—something that they would be likely to do anyhow. In short, it may not affect the total contributions over time, just the timing of those contributions.

Even so, the ERISA funding credit is misleading in at least two respects. First, since the interest credited is at the expected rate of return, the credit balance can grow even when the value of pension assets is declining. Indeed, in a period of macroeconomic difficulty, the credit balance will grow, and cash contributions will decline, just when pension plans are becoming more fragile. Second, a company may impress workers with its commitment to its pension plan by making excess contributions, and it may report that its minimum contributions have been made, but it is misleading employees if the contributions have been made from the credit balance.

SFAS 87 also specifies that companies must report a *minimum pension liability* equal to the unfunded ABO—that is, the excess, if any, of the ABO over the fair value of plan assets. The minimum pension liability is reported in the notes to the financial statements as an accrued benefit liability. In 2003, Eli Lilly reported an accrued benefit liability of \$422.6 million (Section D, Table 2).¹²

III. Assessment of S&P 500 Defined-Benefit Pension Plans

Recent studies at Credit Suisse First Boston provide valuable assessments of the implications of pension-plan accounting (Zion and Carache 2002, 2004). The earlier study examines the pension plans of S&P 500 companies in 1999–2001, with estimates for 2002. The second study updates the first study to 1999–2003, with forecasts for 2004–2006. This section builds on those studies. Data were provided by Compustat and supplemented by examination

¹² The minimum pension liability does not affect net assets because an intangible asset is recorded as an offset.

of annual 10-K reports to the SEC for companies for which relevant Compustat data were not available. Data were also generously provided by David Zion at Credit Suisse.

Figure 1 shows the number of firms with DB plans in the Standard & Poor's 500 Common Stock Price Index (S&P 500) in 1991–2003. We define a firm as having a DB plan if it reported a positive PBO. The count of firms with DB plans is done in two ways. The “current S&P 500” count includes only the 500 firms in the S&P 500 at each year end. “All S&P 500” firms are those that were in the index at any time in the thirteen-year period; that is, it includes firms that left the index because of replacement, merger, or acquisition. There were 816 firms in the index at some time during the period.

At year-end 2003, 350 firms, 70 percent of the S&P 500 Index firms, had DB plans. Table 3, taken from the CSFB's 2002 study, shows that most of the firms with DB plans are firms in older industries: All of the firms in the S&P 500's Aerospace, Autos, Utilities, and Tobacco industries had DB plans; none of the software, internet, or wireless telecom firms had a DB plan. This reflects, in part, the maturity of the firms with DB plans, the availability to newer firms of alternative retirement plans, such as defined-contribution plans, and disincentives to form new DB plans, among them ERISA requirements and the reversion tax.

The number of S&P 500 companies with DB plans has declined. Of the 816 firms that were in the S&P 500 at some time during 1991–2003, 527 had DB plans in 1991, and only 411 had DB plans in 2003. While some of the decline might be attributed to firms' merging or failing, the same pattern exists for the 500 current-year S&P 500 firms: There were 419 with DB plans in 1991, 350 in 2003.

Figure 2 shows the average excess return on DP plan assets—the actual rate of return on plan assets less the expected rate of return—for current-year S&P 500 companies with DB pension plans over the five-year period 1999–2003. In 1999, the excess return was 7.6 percent of plan assets. But in 2002, the excess return was *negative* 20.7 percent of plan assets, a large decline on anyone's scale.

The S&P 500 Balance Sheet

As noted above, GAAP requires that firms report prepaid pension assets or accrued pension costs on their balance sheets, depending on whether the DB plans have a net asset or liability position (at book value). This is subject to several criticisms. First, by focusing on a net position, the value of assets and obligations is masked. Two companies can have identical values of, say, prepaid pension assets, but one might have far greater values of both assets and liabilities. Or, there might be a different mix of volatilities of asset and liability returns, with one company exhibiting more sensitivity to changes in interest rates and asset prices—a sensitivity not revealed by GAAP unless the analyst pays close attention to the financial statement notes.

Second, the net pension values reported under GAAP—prepaid assets or accrued pension costs—are book values, related only weakly, if at all, to market values. This is apparent in Table 2, which shows how Eli Lilly’s “Net Amount Recognized in the Balance Sheet” is derived from its Funded Status—the market value of net assets. The difference is the unrecognized values that arise from several sources, particularly the differences between expected and actual asset returns, and the actuarial gains and losses on the PBO.

An alternative approach, promoted by Zion and Carache (2002), is to focus on the funded status of the pension plan. This marks the pension fund’s assets to market rather than using book values. Figure 3 reports the S&P 500’s funded status for both current-year and all S&P 500 companies. In the early 1990s, S&P 500 firms were, on average, close to fully funded. During the stock market boom of 1996–2000, the S&P 500’s funded status moved into positive territory, peaking in 1999 at \$302.7 billion. But by 2001, with the sharp decline in stock prices, overfunding had disappeared, and in 2003, the current-year S&P 500 companies were underfunded by \$185.6 billion—a \$487 billion decline in funded status over two years!

Figure 4 shows funded status relative to two measures of shareholder equity: the book value of equity, or book capitalization, as reported in a firm’s financial statements, and the market value of equity, or market capitalization, defined as the number of common shares outstanding at year-end times the year-end price per share. Because market capitalization typically exceeds book value, the funded status is a smaller share of market capitalization than of book capitalization. In 1999, funded status overfunding peaked at 13.7 percent of book

capitalization and 3.4 percent of market capitalization. By 2003, this had slipped to underfunding of 6.1 percent of book equity, 2.2 percent of market equity.

Figure 5 shows both the funded status and the prepaid/accrued pension costs for current-year S&P 500 firms. This is a direct measure of the balance-sheet differences that would be reported if the book values under GAAP pension accounting were replaced with market values. As shown in our pharmaceutical company example (Table 2), the difference is in unrecognized gains and losses on plan assets and unrecognized prior service costs. Figure 5 demonstrates that the market value and book value of net pension assets are only loosely related. In five of the 13 years (1991, 1992, 1995, 1997, and 2002) the values have opposite signs: Companies reported net assets when there were actually net liabilities, or the reverse. In one year (2001), there were substantial accrued pension costs on the balance sheet while funded status was balanced. In other years, funded status was of the same sign as prepaid/accrued costs, but generally the funded status is more volatile; this again reflects the smoothing inherent in SFAS 87.

The S&P 500 Income Statement

The distinction between book and market values carries over to the income statement. Figure 6 shows the ratio of NPPC to reported earnings (excluding extraordinary items) of current-year S&P 500 companies in each year. In 1991, there were almost 18 cents of NPPC for each dollar of earnings. By 2000, NPPC had turned negative—pension costs, at book value, were adding to reported income. This was, of course, due to the shift of pension portfolios from bonds to stocks, which increased the expected rate of return, and to the even sharper rise in stock prices that increased actual returns and created a cache of unrecognized gains that could be amortized. But by 2003, NPPC had returned to about 14 cents for each dollar of earnings.

A measure of the market value of pension costs can be constructed, following the line of analysis for Eli Lilly. The actual return is substituted for both the expected return and actuarial gain (loss), and these two items are deleted from the NPPC calculation. In addition, changes in the PBO due to plan amendments or discount rate changes are included. These are reported in financial statement notes as actuarial losses (gains) in benefit obligation. In this way, the

measure of pension costs considers what actually happens to the value of the plan's assets and obligations. The result is a measure of the cash value of NPPC that we call "actual" NPPC.

Figure 7 shows, for the 500 current-year S&P 500 firms, the pattern of actual and reported values of NPPC in 1999–2003.¹³ For each year, the average values per firm are shown. The results are impressive: In 1999–2002, the GAAP values of NPPC are quite small, while the actual values are quite high (in absolute value). Only in 2003, a year when both measures of pension cost were fairly low, did GAAP cost exceed actual cost. The volatility of GAAP NPPC is substantially less than the volatility of actual NPPC—actual NPPC volatility, as measured by the standard deviation of the average NPPC per firm over the five years, was almost eleven times that of GAAP NPPC!

IV. Reform Proposals

The increased fragility of defined-benefit pension plans has led to a variety of proposals to reform the reporting, funding, and insuring of those plans. In February, 2005, the Bush Administration released the document "Strengthen Funding for Single-Employer Pension Plans," which focused on reforms in ERISA's minimum contribution requirements and its rules for measuring pension obligation. In addition, four Congressional committees have responsibility for pension legislation: the Senate Finance Committee; the Senate Committee on Education, Labor and Pensions; the House Ways and Means Committee; and the House Education and Workforce Committee. Several congressional committees are currently developing reform proposals. Finally, FASB is reported to be on the verge of creating a task force for pension accounting.

¹³ Data on actual returns and actuarial loss (gain) on PBO were provided for 1999–2002 by David Zion at CSFB. Missing data, and all 2003 data, were filled in from firm annual 10-k reports or Annual Reports to shareholders. In some cases, actuarial loss (gain) on PBO does not fully capture the actuarial changes in the PBO. For example, Eli Lilly reported a reduction in discount rate and foreign currency adjustments on a separate line. In order to maintain consistency with Zion's data, we have recorded only the actuarial loss (gain) component.

Marking to Market

This major accounting reform requires FASB support and SEC approval. As noted above, the disclosure requirements of SFAS 87 require that firms report the fair value of plan assets and the present value of plan benefits, as well as the details of those calculations. Financial analysts are, therefore, armed with much of the information needed to adjust GAAP accounting to a more current basis. However, this information is relegated to the annual report's financial notes. Among the more significant reform proposals has been to integrate this information into the income statement and balance sheet. The balance sheet can be marked to market by eliminating the prepaid pension benefit/accrued pension liability and replacing it with the plan's funded status, as we have done above. This approach has recently been adopted by the International Accounting Standards Board's 2004 revision of IAS 19. The practice was also adopted by the United Kingdom in 2001 (FRS 17).

Marking to market would also affect the income statement. At present, pension costs are defined as the net periodic pension cost, a definition followed by IAS 19 and FRS 17. In addition to the smoothing discussed above, NPPC also has the problem that it is treated as an operating expense, creating a charge against operating income for such non-operating costs as the interest cost and "other" costs less the expected return on plan assets. There is considerable debate about how the components of NPPC should be reported in the income statement, but there is broad (though far from universal) agreement that the calculation of NPPC and the way it is reported need to be changed. Among the issues holding back action on this is the problem of transitional costs: At present there are substantial unrecognized actuarial gains and losses that would have to be moved into the income statement.

Measuring the Pension Obligation

Measurement of ABO and PBO depends on a number of actuarial assumptions, among them the discount rate. The discount rate guidance from FASB has differed from that of ERISA's guidance for funding requirements. FASB suggests that a single discount rate be used and that it be the rate used for "settlement of pension obligations." Typically, this general guidance has led to adoption of a high-grade Moody's corporate bond rate as the discount rate. However, for

funding purposes ERISA has, until recently, required use of a discount rate no more than 105 percent of a four-year moving average of the 30-year U.S. Treasury bond rate. This has two important effects. First, because the 30-year Treasury bond rate is significantly below the rate on high-grade corporate bonds, ERISA's discount rate for funding purposes created a larger PBO and a larger minimum funding requirement than would FASB's discount rate for reporting. Second, the use of a moving average has meant that when interest rates are rising (falling) the PBO is falling (rising) more slowly than current conditions would indicate; smoothing is introduced into funding requirements.

In the light of the termination of the 30-year Treasury bond in 2001, and, perhaps, combined with pressure from companies that faced larger funding requirements during the stock market decline in 2000–2001, ERISA has moved to an interim discount rate formula that more closely approximates corporate bond rates.¹⁴ The final rate formula will be determined by Congress. However, the moving-average formula is expected to be maintained, tending to maintain smoothing in the path of pension benefit obligations.

The practice to date has been to use a single discount rate rather than the yield curve. When, for example, the slope of the yield curve is rising sharply, a company anticipating near-term retirement of a larger portion of employees will have a higher PBO than a similar company with retirements occurring farther into the future. This would not be reflected in benefit obligation measurements using a single discount rate. The Bush Administration has proposed using yield-curve information instead of a single discount rate. The U.S. Treasury would have responsibility for guidance on the structure of the yield curve in each year.

Eliminating the ERISA Funding Credit

As noted above, if a sponsor's contribution exceeds its minimum funding requirement, the excess can be used in later years to offset the minimum required contributions, even if the value of extra contributions has been lost. In addition, the credit balance is itself credited with a return equal to the expected return on plan assets, not the actual return. While this does not create plan failures, it can mislead plan participants into believing that the sponsors are making

contributions when they are not. The Bush Administration has proposed ending this practice: Minimum funding contributions would be made in cash if Congress were to adapt this proposal.

The Bush Administration recognizes that the ERISA funding credit was adopted to encourage plan sponsors to make contributions above the required minimum. To maintain this incentive, the Administration proposes replacing the current tax rule that prohibits deductions for contributions to overfunded plans with a rule that allows tax deduction of contributions to plans that are less than 130-percent funded.

Changing Rules for Amortizing Underfunded Plans

At present, minimum contributions are equal to the service cost plus amortization of the amount underfunded (ABO less fair value of plan assets). Sponsors of overfunded plans must still contribute the service costs, thus increasing the amount of overfunding. The Administration proposes that overfunded plans use the overfunded amount as a credit against service costs. In this way, sponsors would not be compelled to add to the overfunding of plans.

The Administration also proposes a change in amortization periods. Currently, these range from 5 years (for actuarial losses on plan assets) to 30 years (for plan amendments). Instead, a 7-year period would be used, regardless of the source of underfunding.

PBGC Insurance Premiums

The Pension Benefit Guaranty Corporation charges an insurance premium of \$19 per employee plus \$9 per \$1000 of the underfunded amount. The premium is unrelated to the two important risks that pension plan participants face. The first is the market risk of the plan's assets. Though fixed-income instruments are not without market risk, the shift in asset allocation from debt to equities has increased the market risk of pension plans. The second risk is credit risk. If a plan becomes underfunded, the sponsor is expected to make contributions that will restore full funding. If the company's health fails, this may not occur. Current PBGC

¹⁴ The 30-year Treasury bond was reintroduced in August, 2005.

premiums treat a plan's risk as related to its current underfunding, without reference to market and credit risks.

Some observers have argued that only credit risk matters. The rationale is that if a plan's asset value falls, there is no loss to beneficiaries as long as the company meets its obligation to restore full funding. However, market and credit risks are correlated: Times of major losses in asset values are often times when the financial health of plan sponsors is weakened. For example, a period of poor corporate profits and rising interest rates is likely to reduce asset values at the same time as the sponsor's ability to make contributions is weakened. Thus, both market and credit risks affect the ability of the PBGC to cover adequately the obligations of pension plans, and the failure to charge for those risks creates moral hazard, inducing firms to provide more generous benefits and to invest in riskier assets than is prudent. There is wide agreement that the PBGC should adopt a risk-based structure of premiums, but little agreement on how that structure should look.

V. Lessons for Pension Asset Managers

The recent pension fund experience has not only led to a call for reform. It has also induced pension asset managers to rethink their approach to asset allocation. From 1992 to 2001, the share of financial assets held directly or indirectly in common stocks by U.S. households rose from 33.7 percent to 56.0 percent.¹⁵ Private pension funds also increased their equity share, though less sharply: from 56.8 percent in 1992, to 61.9 percent in 2001.¹⁶ The increase in the equity share contributed to the S&P 500's move from a fully funded status in the early 1990s to an overfunded status in 1999–2000, and then to an underfunded status in 2002–2003. This section discusses briefly why that shift occurred and whether it was consistent with reasonable risk management practices.

¹⁵ Survey of Consumer Finances, Federal Reserve System. Of course, rising stock prices were an important source of the increase, but households responded by maintaining a high equity share rather than by rebalancing their portfolios.

¹⁶ Federal Reserve System Flow of Funds data. These calculations assume that all pension plan holdings of mutual funds are in equities. It also includes defined contribution plans, IRAs, and other private retirement funds.

The Increasing Equity Share

According to Ibbotson Associates (1997), the average total return on large-cap common stocks from the end of 1925 through 1996 (a year of “irrational exuberance”) was 10.71 percent. This was 5.07 percentage points greater than the 5.64 percent average return on long-term corporate bonds. An important unresolved question is whether this “equity premium” was gravy—a free windfall to equity investors—or a necessary reward for the additional risks of equities. To the extent that the equity premium was gravy, pension asset managers had good reason to shift from debt instruments to equities, as they did during the 1990s. However, if the premium was a reward for risk, so that risk-adjusted returns on stocks were not significantly greater than risk-adjusted corporate bond returns, plan managers should not have shifted asset allocations.

Nobody knows what pension asset managers thought, though many observers would vote for the gravy end of the spectrum. But during the 1990s there was a growing academic literature suggesting that the equity premium was “too high” and that the rewards to investing in stocks were far greater than equity risk required. A popular and influential book (Siegel 1994) argued that in the long run the high equity premium was not due to the risk of stocks. Rather, it argued, while the return on stocks had considerable short-run volatility, its long-run volatility was low. Stocks were almost riskless in the long run, and the probability of poor performance was extremely low for investors with a long time horizon, such as the young and pension beneficiaries.

The view that stocks are nearly risk free in the long run certainly had its critics. Paul Samuelson (1963) pointed out that while the probability of losing any specified amount declined as the horizon increased, virtually disappearing with very long horizons, there still remained an improbable but very high loss that could be incurred. The correct approach to investing, he argued, cannot rest on probabilities alone. It also must consider the pain experienced with sizable losses. This might lead risk-averse investors to attach a high risk premium to long-term investments in common stocks, even though the probability of losing is quite low.

Bodie (1995) made the same point without resorting to risk aversion. He showed that if a put option is purchased to insure against receiving less than the accumulated value of a risk-free investment, the premium on the put increases with the horizon. Because the cost of insurance increases with the horizon, the risk of investment in common stocks must also increase with the horizon.

However, these critics did not win the day. At the same time, there was a developing view among academics that the equity premium was too high: No reasonable estimates of investor risk aversion could justify its size, leaving the conclusion that investment in stocks provided an excess risk-adjusted return. In short, the equity premium was too high to be warranted by risk alone. Not only was the risk lower over a long horizon, it appeared that the reward was quite high.

Subsequent research indicated that, while still high, the equity premium had declined during the 1990s. Investors were not as concerned as before about the risks of common stocks, so they did not require the high risk premiums that they had in the past. This declining risk aversion, some argued, accounted for the high returns experienced in the last half of the 1990s: As the required return on stocks fell, price-earnings multiples rose sharply. It also implied that while investors could benefit in the near term from investing in stocks, in the long term stock returns would stay at a level below the historical average. The message for pension managers was that the high returns on stocks during the late 1990s might be only temporary but should still be exploited.

Still other academics argued that financial theory rejects the common notion that older investors should hold a lower share of assets in equities and more in bonds than younger investors. The share of assets held in common stocks, it was argued, should be the same for an 80-year-old as for a 40-year old. The implication is that pension plans, concerned about the welfare of current and future retirees, should not hesitate to invest in stocks simply because the beneficiaries will be older when they retire.¹⁷

¹⁷ These studies assumed constant relative risk aversion, hence they did not allow for extreme loss aversion. They also focused on stocks versus bonds, ignoring the role of housing and of human capital in the portfolio.

In short, a number of new ideas in the 1980s and 1990s suggested that long-term investors should have a high equity share. FASB's SFAS 87, perhaps unintentionally, encouraged pension plans to do just that by allowing firms to deduct the expected return component of income from operating earnings. And the PBGC also went along by investing its own portfolio heavily in common stocks.

Recent experience has confirmed Samuelson's observation. In the long run, the probability of pension plans slipping from overfunded to underfunded status is extremely low, but when it happens, as it has, the consequences are grave: Low-probability events are worth avoiding if they have great consequences. Today, pension plan beneficiaries are anxious, the PBGC's viability is in question, legislators are calling for reform, and the pension industry is in some disarray. While the health of companies is the primary factor in pension plan terminations, the poor performance of common stocks since 2000 has occurred at a time of poor financial health in the industries most reliant on defined-benefit plans. This has exacerbated the probability of pension plan underfunding and plan termination.

Matching Plan Assets and Liabilities

One of the first lessons learned by financial institution risk managers is to "immunize" a portfolio from risks by matching the risk characteristics of assets and liabilities. Failure to do this is at the heart of a number of financial failures, among them the Penn Central Crisis and Franklin Bank failures in the 1970s, the Savings and Loan crisis in the 1980s, and now, the current pension-plan crisis. Penn Central Railroad was financing its rolling stock with short-term certificates of deposit; savings and loan companies were financing their holdings of long-term fixed-rate mortgages with short-term variable-rate deposits; and pension plans, by choosing to invest heavily in stocks, have financed highly volatile long-duration assets with less volatile and shorter-duration long-term liabilities.

The time-honored way to immunize is "duration matching," that is, matching the duration of assets to the duration of liabilities. Because duration is defined as the sensitivity of prices to changes in interest rates, duration matching means that if, say, interest rates rise, the value of both the assets and liabilities will fall by the same amount, leaving net worth

unchanged. While implementing this in a complex financial world is difficult—there is a whole yield curve of interest rates to consider, and asset prices respond to many factors other than interest rates—the failure to follow this lesson has been at the heart of many financial failures and has contributed to the current pension controversy.

The shift toward common stocks has created unmatched assets and liabilities. Stocks are a very long duration asset whose prices are highly sensitive to interest rates and to a host of other fundamental factors. Pension obligations are shorter-term liabilities with less sensitivity to interest rates and with credit risk as the primary remaining source of risk. Clearly, pension beneficiaries have been exposed to considerable risk as a result of this portfolio imbalance.

Among the questions an immunizing pension portfolio manager must resolve are, what should be immunized and how should that be achieved? Some argue for immunizing the projected pension obligation (PBO), the sum of the accumulated pension obligation (ABO), and the present value of future pension increases due to rising wages and salaries. At any time, the ABO is fixed in nominal value because its characteristics, such as vesting, benefit levels, and employee demographics, are known. The only unknown is the future path of interest rates, which will affect future ABO calculations. Thus, the ABO can be readily immunized with assets held in bonds with the same duration.

However, the component of the PBO due to future wages and salaries is based on an assumed rate of compensation increase and on vesting rules and employee demographics that might change. Thus, the wage and salary component of PBO is an uncertain liability whose value depends on the future path of the compensation of that specific firm's employees, as well as the other factors just cited. There are no instruments available that can hedge against that liability. Even an instrument indexed to broad measures of price or wage inflation will not provide a complete hedge against compensation increases at a specific firm. Any hedge used will be imperfect, leaving an unavoidable and perhaps sizable "basis risk."

Proponents of immunizing the PBO often argue that stocks should be used. However, stock returns are only weakly correlated with general inflation, even more weakly with a firm's compensation path. This suggests that there is really no way to hedge against future firm-specific wage and salary increases.

In recent months, there has been recognition that asset-liability matching requires a shift from stocks to bonds in pension portfolios. According to Capon (2005), Greenwich Associates, a financial consulting firm, projects a fall in the share of common stocks in pension assets from the current 64 percent (their measure) to 50 percent in the next decade. This rebalancing has, some claim, contributed to the “mystery” of rising short-term rates and stable long-term interest rates, as pension fund transactions drive bond prices up.

VI. Summary and Conclusions

If analysts and investors thoroughly scrutinize the notes to a corporation’s financial statements they can adjust both income statements and balance sheets to reflect the actual state of its defined-benefit pension plans. In this case, the problems posed by GAAP accounting have no larger problems outside the financial.

But if, as seems likely, these adjustments are not fully embedded into the market prices of the firm’s equity and debt, there might be several adverse consequences. Creditors might judge the firm to be more or less credit worthy than it is, shareholders might incorrectly assess the current state of the firm’s finances, and they might incorrectly project the firm’s future financial condition. Holders of the firm’s employee stock options, and those who buy or sell exchange-traded options, might incorrectly assess the volatility of returns on the firm’s assets. These incorrect assessments affect the prices of corporate debt and equity, and lead investors to make the wrong portfolio allocations. Corporate managers might also mismeasure the marginal cost of labor, leading to incorrect employment decisions.

These are matters for future study, but an essential background to these potential problems is provided in this study of GAAP accounting for pension plans.

FASB’s SFAS 87 introduces a variety of rules that have the intent and effect of smoothing both income statements and balance sheets. When compared with a “mark-to-market” approach that recognizes market values rather than book values, we find that the volatility over a five-year period of actual pension costs is more than ten times the volatility of GAAP

measures of pension costs. We also find that underfunding of pension accounts is much greater on average, and has higher volatility, than GAAP accounting suggests

A substantial part of this potential misdirection is due to the role played by the return on pension assets in GAAP accounting. When computing the annual value of pension costs, the return on pension assets is properly treated as a deduction from costs. However, GAAP requires the firm to use its “expected” pension asset returns rather than the actual returns experienced by the pension fund. By choosing a high expected return, management can make pensions appear less costly; the same effect is achieved if expected returns are reasonable but actual returns are disappointing. Should either of these occur, pension costs in the current year will be understated and earnings will be overstated. An opposite effect will occur gradually in future years as the discrepancy between expected and actual returns is amortized.

This problem extends to the balance sheet. Firms report a book value of net pension assets or liabilities on their balance sheets. These “prepaid pension assets” or “accrued pension liabilities” also assume that pension assets have grown and continue to grow at the expected rate of return. Once again, although amortization is supposed to eventually equate actual and book values, the process leads to extended periods of discrepancy between net pension assets at GAAP and at market values. We find (Figure 5) that, during 1991 through 2000, GAAP reporting of net pension assets and current-value reporting of funded status often gave conflicting signals about pension-plan health. Indeed, in five of the thirteen years the two reporting methods gave opposite signs for net assets.

Defined-benefit pension plans appear to be disappearing from the corporate menu of benefits. The Financial Accounting Standards Board is embarking on a major overhaul of pension accounting. And recent legislation proposed by the Administration and by Congressional committees is designed to address problems with ERISA funding requirements and with the federal government’s insurance of pension plans. The adverse effects of pension plan accounting might well be mitigated in the future, but this study demonstrates how far we must travel.

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Table 1

Net Periodic Pension Cost for Defined Benefit Pension Plans Eli Lilly and Company (Millions of Dollars)

	Year				
	2003	2002	2001	2000	1999
a. GAAP Net Periodic Pension Cost	144.2	64.5	45.2	31.5	41.5
Service Cost	196.2	170.2	156.0	130.1	127.7
Interest Cost	266.1	254.3	242.4	219.6	193.7
Amortization of Unrecognized Prior Service Cost ¹	11.9	16.1	19.3	16.9	11.5
Recognized Actuarial (Gain)/Loss on Plan Assets ³	52.0	21.9	9.8	5.9	3.7
less: Expected Return on Plan Assets ²	(382.0)	(398.0)	(382.3)	(341.0)	(295.1)
b. "Actual" Net Periodic Pension Cost	375.6	802.2	818.9	416.8	(263.0)
Service Cost	196.2	170.2	156.0	130.1	127.7
Interest Cost	266.1	254.3	242.4	219.6	193.7
Actuarial (Gain)/Loss on PBO ^{3,4}	492.5	152.8	38.2	205.8	(40.8)
less: Actual Return on Plan Assets	(579.2)	224.9	382.3)	(138.7)	(543.6)
c. Over-Reported Net Periodic Pension Cost (a-b)	(231.4)	(737.7)	(773.7)	(385.3)	304.5
Reported Net Income	2,560.8	2,707.9	2,780.0	3,057.8	2,721.0
Percent of Reported Net Income	(9.0%)	(27.2%)	(27.8%)	(12.6%)	11.2%

Source: Eli Lilly & Co. annual reports. Numbers in parentheses are negative.

¹ Amortization of Unrecognized Prior Service Costs is the value of past actual increases (decreases) in PBO arising from changes in actuarial assumptions, such as the discount rate, assigned to the current year.

² The expected return is the expected rate of return times the market-related value of assets. For this company, market-related value is defined as fair value. The expected rate of return on plan assets is 9.27% in 2003 and 10.5% in previous years.

³ Recognized Actuarial Gain/(Loss) on Plan Assets is amortization of unrecognized loss (gain) arising from prior differences between expected and actual returns on plan assets. If actual returns are used to compute net periodic pension costs, as in panel b, there are no prior differences to amortize. Actuarial (Gain)/Loss on PBO is the actual reduction or increase in the PBO in the current year due to changes in assumptions. See Table 2 for its construction.

⁴ In its reports, the sample company distinguished between "Reduction in discount rate and foreign exchange rates and other adjustments," on the one hand, and "Actuarial Gain/(Loss)," which arose from other sources. These have been combined.

Table 2

Balance Sheet And Off-Balance Sheet Values Defined Benefit Pension Plans Eli Lilly and Company (Millions of Dollars)

	Year				
	2003	2002	2001	2000	1999
A. Projected Benefit Obligation, beginning of year	3,941.1	3,598.7	3,380.1	3,004.4	2,898.8
Service Cost	196.2	170.2	156.0	130.1	127.7
Interest Cost	266.1	254.3	242.4	219.6	193.7
Actuarial Loss (Gain) ¹	492.5	152.8	38.2	205.8	(40.8)
Less: Benefits Paid	(247.3)	(234.9)	(218.0)	(179.8)	(175.0)
Projected Benefit Obligation, end of year	4,648.6	3,941.1	3,598.7	3,380.1	3,004.4
B. Fair Value of Plan Assets, beginning of year	3,161.3	3,182.1	3,732.1	3,532.0	3,069.6
Actual Return on Plan Assets	579.2	(224.9)	(382.3)	138.7	543.6
Employer Contribution	149.1	402.7	63.1	270.0	122.1
Benefits Paid	(247.3)	(234.9)	(218.0)	(179.8)	(175.0)
Other Adjustments	57.8	36.3	(12.8)	(28.8)	(28.3)
Fair Value of Plan Assets, end of year	3,700.1	3,161.3	3,182.1	3,732.1	3,532.0
C. End-of-year Funded Status (B-A)	(948.5)	(779.8)	(416.6)	352.0	527.6
Unrecognized Net Actuarial Loss	2,286.1	2,028.0	1,142.7	298.8	(36.0)
Unrecognized Prior Service Cost	72.1	78.3	208.5	227.2	119.3
Unamortized Net Obligation at SFAS Adoption	0	0	1.1	1.7	1.6
Net Amount Recognized on Balance Sheet	1,409.7	1,326.5	935.7	879.7	612.9
D. Net Amount Recognized on Balance Sheet	1,409.7	1,326.5	935.7	879.7	612.9
Prepaid Pension Asset	1,613.3	1,515.4	1,102.8	1,032.5	741.1
Accrued Benefit Liability	(422.6)	(398.1)	(371.1)	(302.9)	(237.6)
Accumulated Other Comprehensive Income	219.0	209.2	204.6	150.1	109.4
E. "Excess" Assets Recognized on Balance Sheet (D-C)	2,538.2	2,106.3	1,352.3	527.7	85.3
Shareholder Equity, Book Value	9,764.8	8,273.6	7,104.0	6,046.9	5,013.0
Per Cent	26.0%	25.5%	19.0%	8.7%	1.7%
Shareholder Equity, Market Value ²	75,257.8	79,787.5	96,467.8	89,877.5	84,772.0
Per Cent	3.4%	2.6%	1.4%	0.6%	0.1%

Source: Eli Lilly & Co. annual reports. Numbers in parentheses are negative.

¹ Actuarial (Loss) Gain in computing PBO is the change in PBO attributable to plan amendments and to changes in assumptions, such as discount rates, employee service lives, future wage and salary increases. In its reports, the sample company distinguished between "Reduction in discount rate and foreign exchange rates and other adjustments," on the one hand, and "Actuarial Loss(Gain)," which arose from other sources. These have been combined.

Table 3

**Percent of Firms in S&P 500 with Defined Benefit Pension Plans
by Standard & Poor's Industry Group**

S&P Industry Classification	Percent	S&P Industry Classification	Percent
Aerospace & Defense	100.0	Diversified Financials	78.3
Air Freight & Logistics	100.0	Household Durables	76.9
Auto Components	100.0	Pharmaceuticals	76.9
Automobiles	100.0	Food & Drug Retailing	75.0
Beverages	100.0	Health Care Equipment & Supplies	75.0
Building Products	100.0	IT Consulting & Services	75.0
Chemicals	100.0	Electrical equipment	71.4
Construction & Engineering	100.0	Airlines	66.7
Construction Materials	100.0	Personal Products	66.7
Containers & Packaging	100.0	Media	62.5
Electric Utilities	100.0	Electronic Equipment & Instruments	60.0
Energy Equipment & Services	100.0	Commercial Services & Supplies	57.9
Food Products	100.0	Multiline Retail	53.8
Gas Utilities	100.0	Health Care Providers & Services	50.0
Household Products	100.0	Trading Companies & Distributors	50.0
Industrial Conglomerates	100.0	Computers & Peripherals	45.5
Leisure equipment & Products	100.0	Hotels, Restaurants & Leisure	45.5
Machinery	100.0	Biotechnology	40.0
Office Electronics	100.0	Textiles, Apparel & Luxury Goods	38.5
Paper & Paper Products	100.0	Communications Equipment	33.3
Road & Rail	100.0	Specialty Retail	25.0
Tobacco	100.0	Real Estate	19.0
Diversified Telecom Services	88.9	Semiconductor Equipment & Products	5.9
Metals & Mining	87.5	Software	0.0
Oil & Gas	87.5	Internet & Catalog Retail	0.0
Insurance	83.3	Internet Software & Services	0.0
Multi-Utilities/Unregulated Power	83.3	Wireless Telecom Services	0.0
Banks	82.8		

Source: Zion & Carache (2002), Credit Suisse First Boston, Exhibit 4.

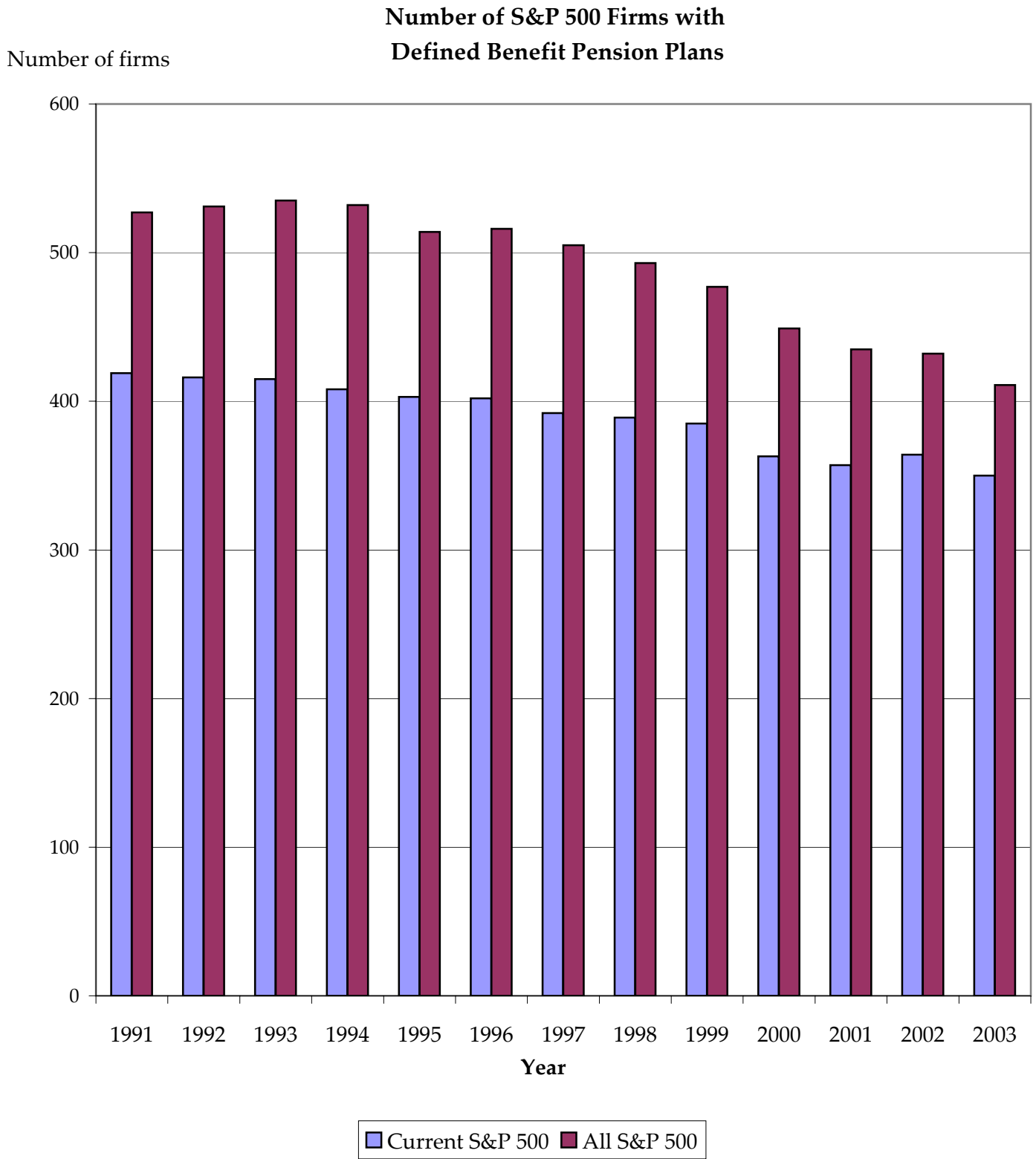
Table 4**2002 Minimum Pension Liability Charge to Equity***

Company	2002 Minimum Pension Liability (millions)	2001 Shareholder Equity (millions)	Percent of Equity
Maytag Corp.	\$ 93	\$ 24	388%
TRW Inc.	2,244	2,186	103
US Steel Corp.	1,612	2,506	64
General Motors Corp.	10,894	19,707	55
Hercules Inc.	383	712	54
Pactiv Corp.	837	1,689	50
Allegheny Technologies Inc.	452	945	48
Inisys Corp.	983	2,113	47
Xerox Corp.	1,034	2,290	45
Cummins Inc.	437	1,025	43
Navistar International	473	1,127	42
Kellogg Co.	356	872	41
Black & Decker Corp.	299	751	40
Ford Motor Co.	3,005	7,786	39
NCR Corp.	738	2,027	36
Eastman Kodak Corp.	1,039	2,894	36
Delta Airlines Corp.	1,388	4,024	34
ITT Industries corp.	474	1,376	34
Equifax Inc.	83	244	34
Yum Brands Inc.	35	104	34
Int'l Business Machines Corp.	7,806	23,614	33
Boeing Co.	3,351	10,825	31
Colgate-Palmolive Co.	255	846	30
Lockheed Martin Corp.	1,850	6,443	29
Ball Corp.	132	504	26
Raytheon Corp.	2,795	11,290	25

Source: Zion & Carache (2002), Credit Suisse First Boston, Exhibit 14. The minimum pension liability is projected for 2002 by Zion and Carache.

* Minimum Pension Liability is the excess of the accumulated benefit obligation over the fair value of plan assets. It represents the sponsor's liability if the pension plan is immediately terminated. Shareholder equity is reported equity, not market capitalization.

Figure 1

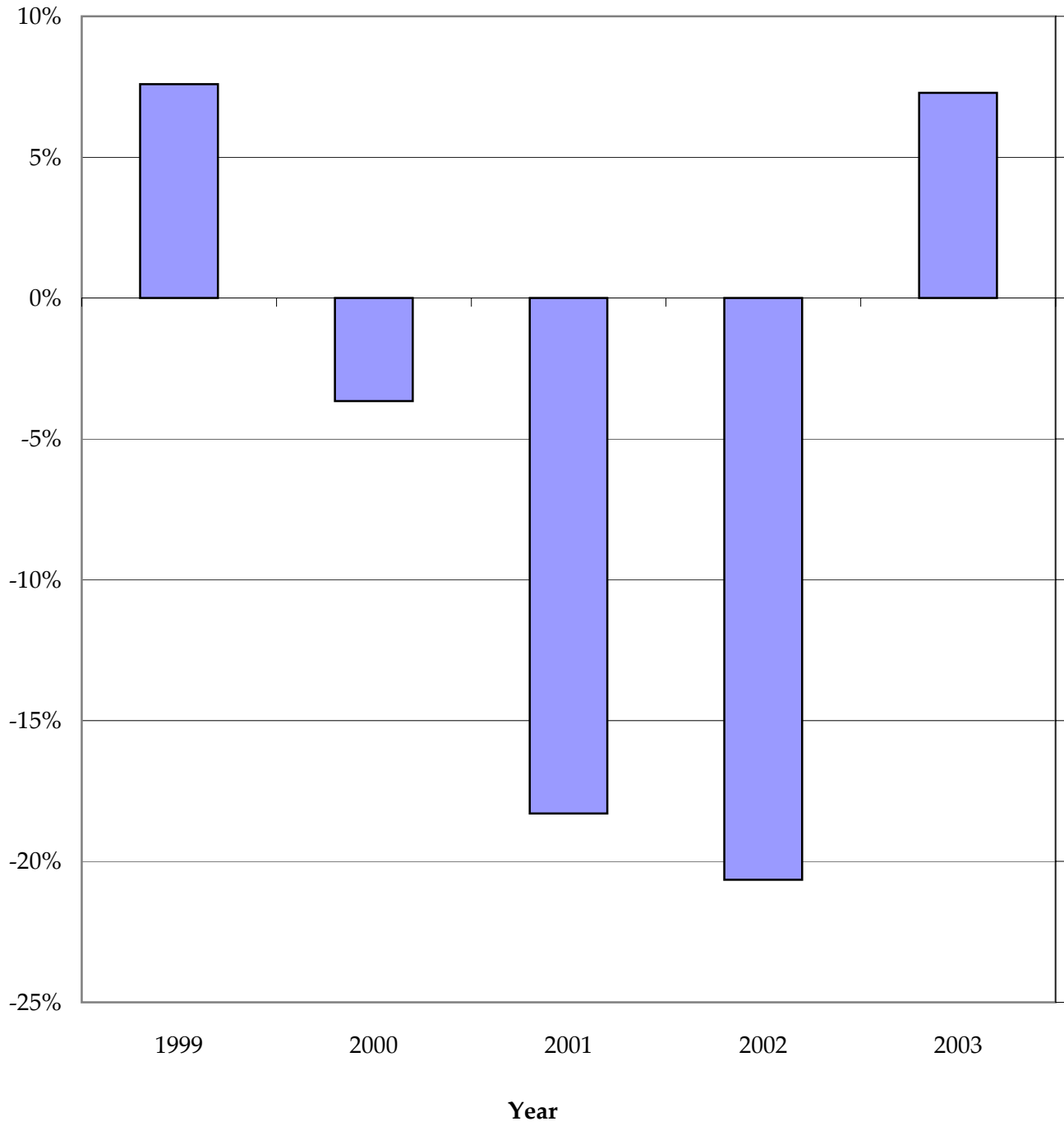


Source: Compustat and author's calculations

Figure 2

**Excess Returns on DB Plans:
Current-Year S&P 500 Firms with Defined Benefit Pension Plans**

Average excess return

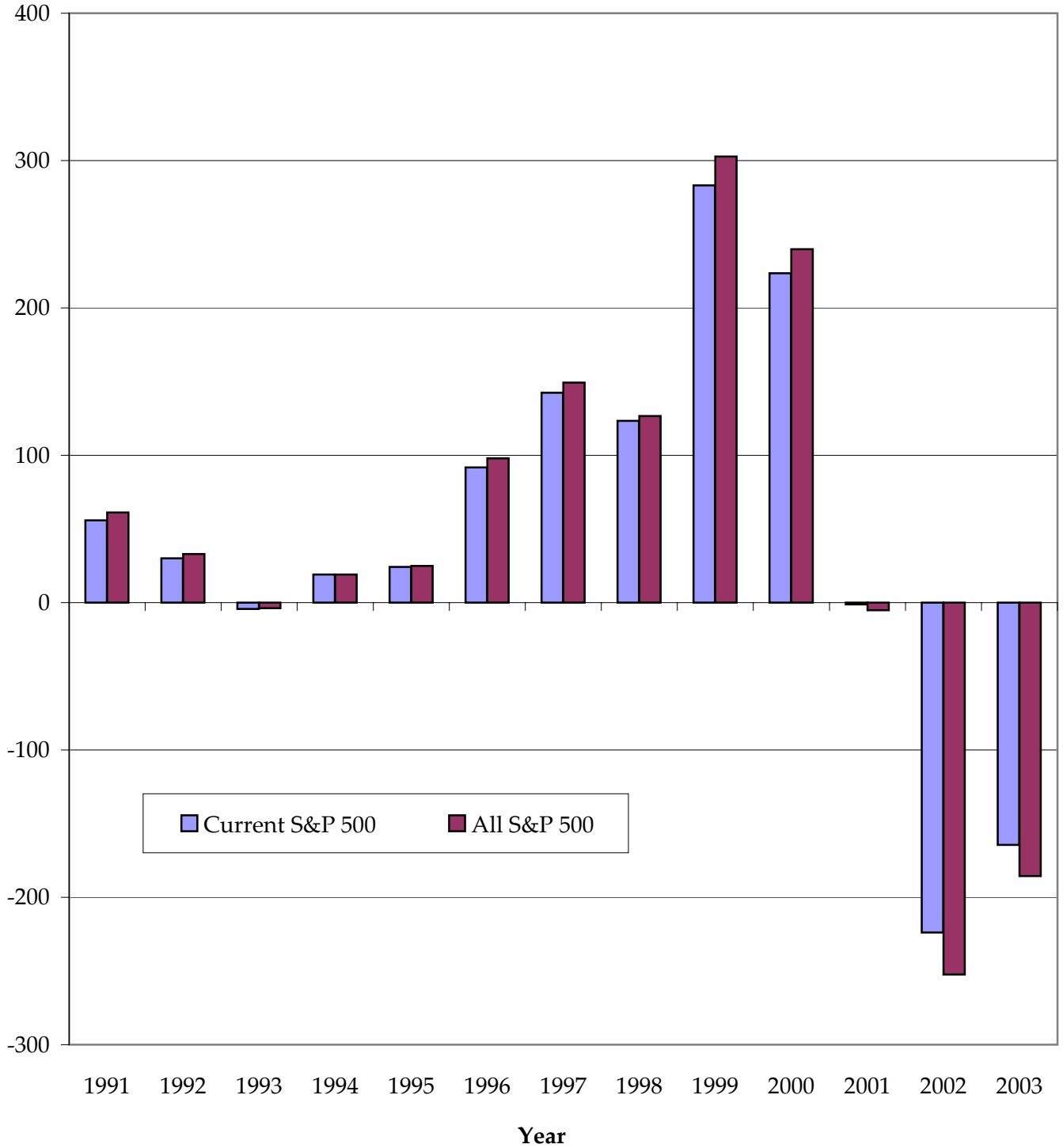


Source: David Zion, CSFB, Company Reports, and author's calculations

Figure 3

Funded Status of S&P 500 Firms
with Defined Benefit Pension Plans

\$ billions

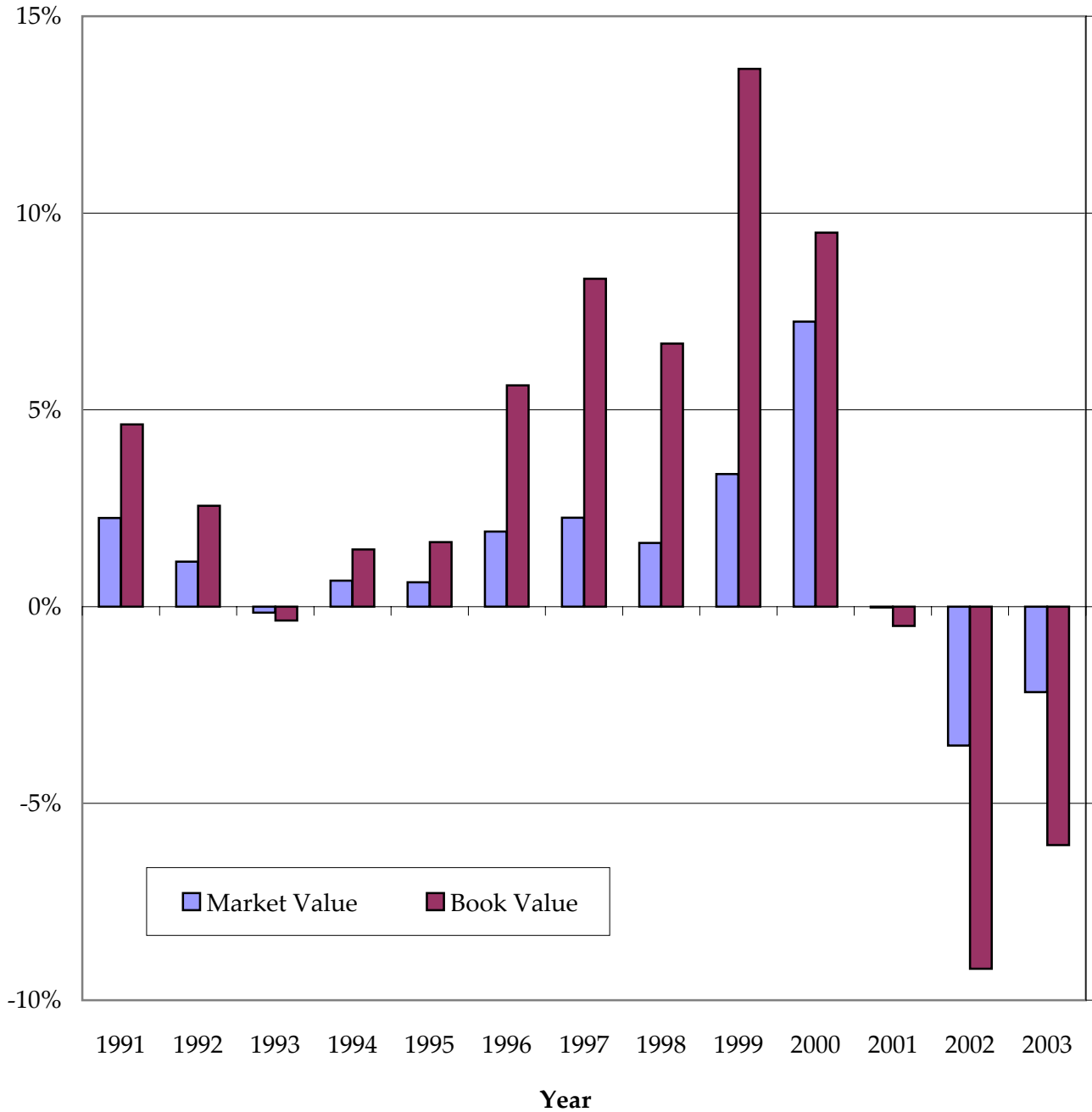


Source: Compustat and author's calculations

Figure 4

Funded Status and Equity:
Current-Year S&P 500 Firms
with Defined Benefit Pension Plans

Percent of equity



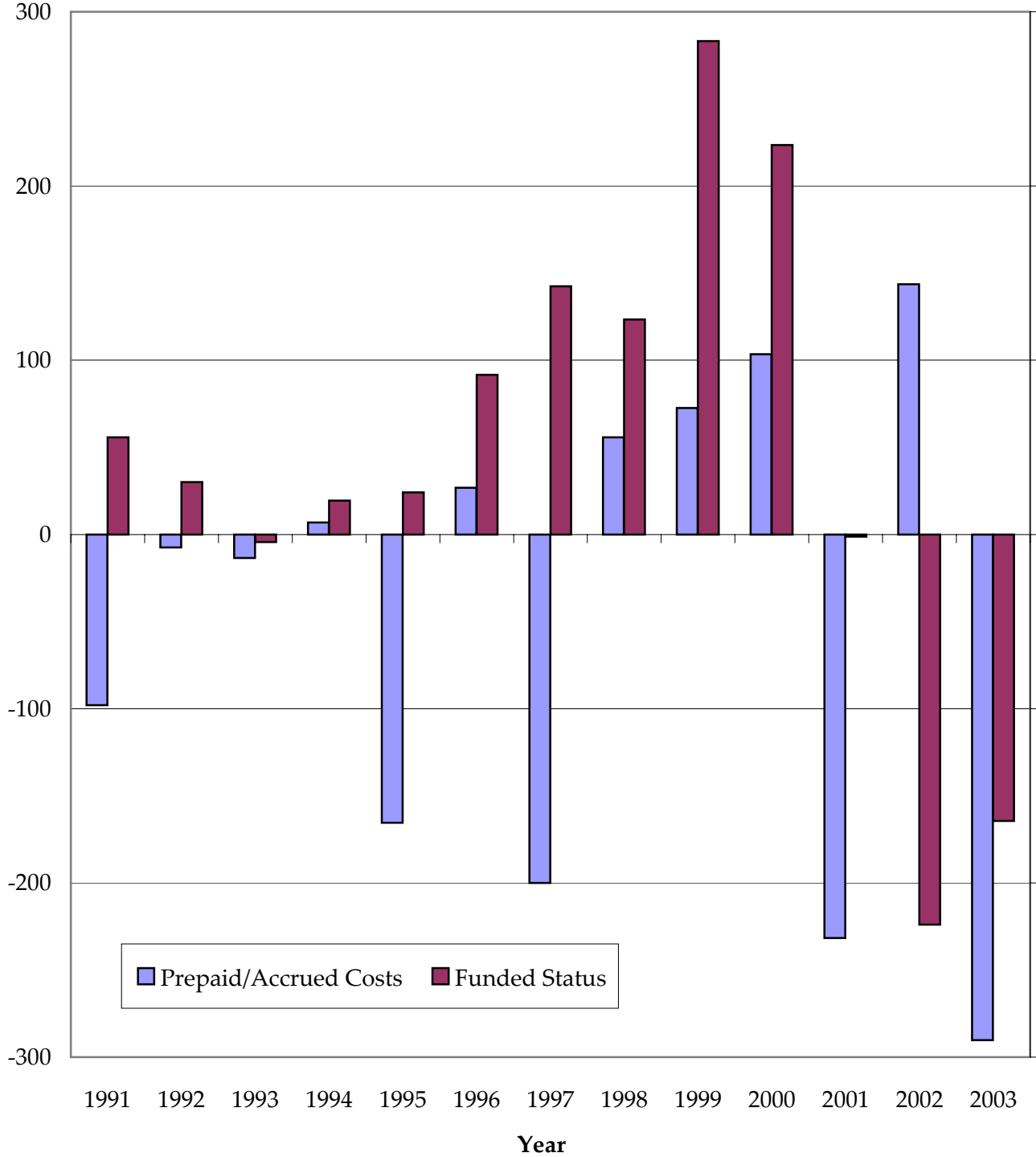
Note: Figure shows DB pension funded status as a share of market equity or book equity.

Source: Compustat and author's calculations

Figure 5

Prepaid/Accrued Pension Costs and Funded Status:
Current-Year S&P 500 Firms with Defined Benefit Pension Plans

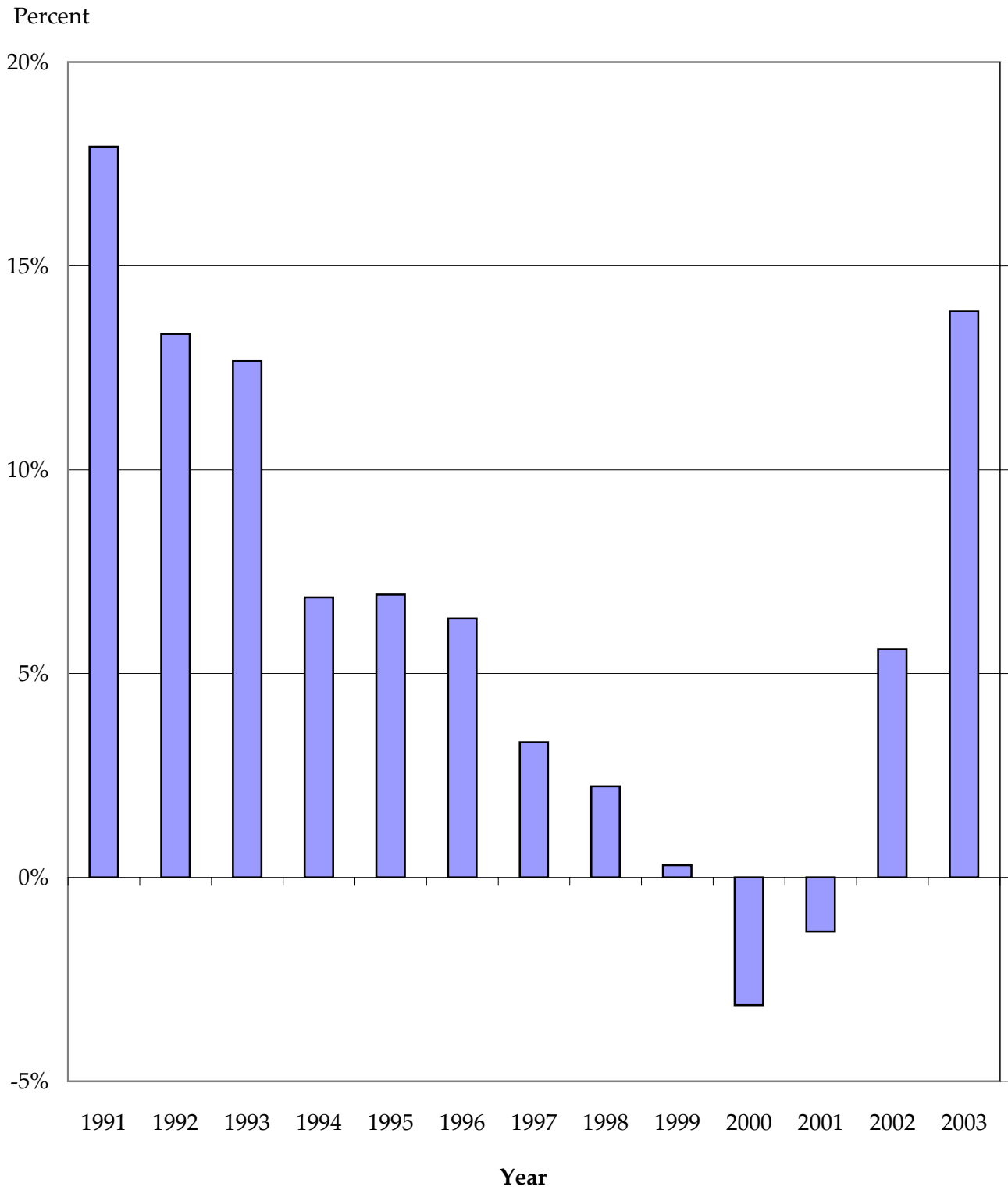
\$ billions



Source: Compustat and author's calculations

Figure 6

Net Periodic Pension Cost as Percent of Earnings per Share:
Current-Year S&P 500 Firms with Defined Benefit Pension Plans

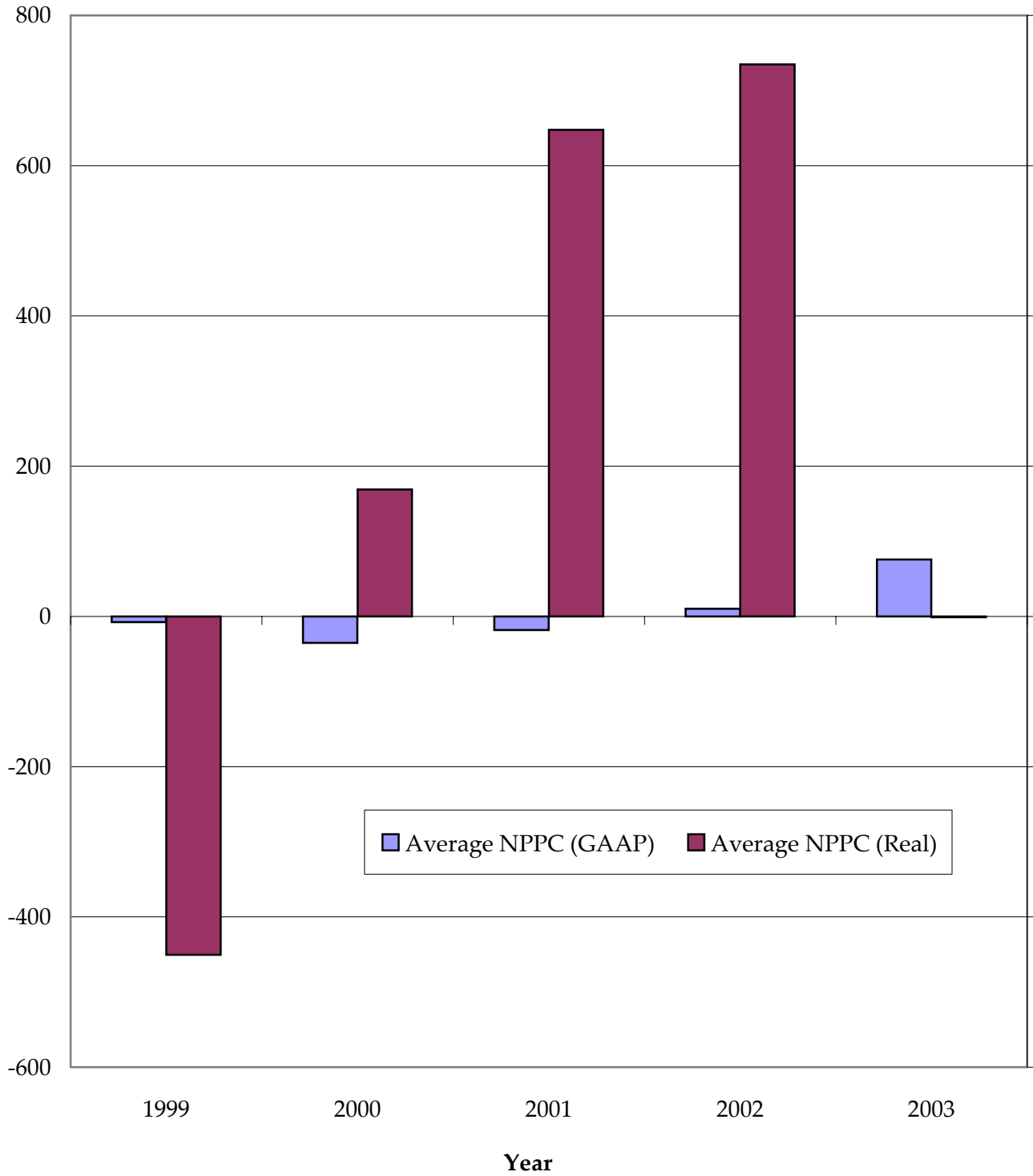


Source: Compustat and author's calculations

Figure 7

Net Periodic Pension Costs:
Current-Year S&P 500 Firms with Defined Benefit Pension Plans

\$ Millions per firm



Source: David Zion, CSFB; Company Reports; author's calculations