© *The Journal of Risk and Insurance*, 1993 Vol. 60, No. 1, 13-35

The Impact of Liabilities for Retiree Health Benefits on Share Prices

H. Fred Mittelstaedt
Mark J. Warshawsky

ABSTRACT

Health insurance provided by corporations to retired employees represents an important benefit to retirees and a significant and growing expense to employers. If liabilities for retiree health benefits have already reduced share prices dollar-for-dollar or at least in a similar manner to other liabilities, there would be little cause for concern that the introduction of new, more revealing, accounting standards for these benefits would lead to financial pressure on companies to reduce or cancel benefits. This study identifies firms as sponsoring or not sponsoring retiree health plans, and liabilities for retiree health benefits are estimated using the framework of the new accounting pronouncement on nonpension postretirement benefits. Stock value is regressed on several independent variables, including estimated retiree health liability. The results clearly suggest that retiree health liabilities impact stock prices. Furthermore, some evidence indicates that the impact may be less than balance sheet liabilities. This latter finding is consistent with market expectations that the firms or the federal government will take actions to reduce future payouts of health benefits to retirees by corporate sponsors, although it also may be due in part to measurement error associated with the variable for retiree health liabilities.

Introduction

This study examines the association between liabilities for retiree health benefits and share prices. Health coverage is often provided by large corpora-

---

H. Fred Mittelstaedt is Associate Professor in the Department of Accountancy, University of Notre Dame. Mark Warshawsky is Senior Economist for the Board of Governors of the Federal Reserve System, Division of Research & Statistics.

The views expressed in this article do not necessarily reflect the views of the Board of Governors of the Federal Reserve System or its official staff. This article has benefited greatly from comments received from two anonymous reviewers and from seminar participants at the American Enterprise Institute, Arizona State University, the Federal Reserve System, Georgetown University, the 1992 Miami University Conference on Current Pension Policy Issues, the 1991 National Bureau of Economic Research Summer Institute, and the University of Notre Dame. In addition, we acknowledge the research assistance of Carrie Cristea. Finally, the first author gratefully acknowledges the financial support of the College of Business at Arizona State University and Ernst & Young (in conjunction with the University of Notre Dame Department of Accountancy summer research grant program).

tions to their retired employees at no premium charge or on highly subsidized terms. In the past few years, however, escalating health care costs, aging workforces, and increasing financial pressures have led some employers to dramatically reduce or even eliminate these unfunded benefits. In this environment, concern has been expressed that corporations may reduce or cancel retiree health benefits *en masse* before retiree health liabilities are disclosed and income is decreased under the newly adopted *Statement of Financial Accounting Standards No. 106: Employers' Accounting for Postretirement Benefits Other Than Pensions* (Financial Accounting Standards Board, 1990). Retirees would then become exposed to the unexpected financial risk of uninsured medical care. If liabilities for retiree health benefits, however, have already reduced share prices dollar-for-dollar or at least in a similar manner to other liabilities on the balance sheet, the new accounting disclosures would create much less financial pressure for corporations to cut benefits.

Our evidence indicates that the market reduces stock prices because of retiree health benefit liabilities. Using the framework of Statement No. 106 and the terms of existing contracts, we find that the stock market values retiree health liabilities at about fifty cents on the dollar, significantly less than other liabilities appearing on the balance sheet. The less than dollar-for-dollar relation between stock prices and retiree health liability is consistent with the view that the market expects someone—corporations or the federal government—to do something that would effectively reduce the future burden of corporations for retiree health benefits. Such actions could range from corporations canceling or significantly reducing the level of benefits in retiree plans, thereby placing more of the burden for health care on retired individuals, to further socialization of health care in the form of expanded Medicare coverage or national health insurance. A middle-of-the-road action would be to allow companies some relief in the form of the tax deductibility of contributions to fund retiree health benefits.

Specification error is always a concern for the methodology used in this article. In particular, although our estimate of retiree health liability for each company is calculated using firm-level data, it reflects many assumptions based on aggregate trends. These liabilities may be measured with error relative to the market's estimate or to the true value of the liability. To address this issue, we employ an instrumental variable approach. The results reinforce the finding that the market values retiree health liabilities but calls into question the less than dollar-for-dollar relation between stock prices and retiree health liability. Thus, the less than dollar-for-dollar relation may be attributable to measurement error.

The model used in this study for the valuation of a firm's equity is based on the work of several researchers whose work is based, in turn, on Tobin and Brainard (1977). The valuation of equity shares was examined by Feldstein and Seligman (1981) and Feldstein and Morck (1983) with special consideration for the informativeness of early standards for pension accounting and for the use of various discount rate assumptions in pension liability evaluations, respectively. The valuation of shares was examined by Hirschey and Weygandt (1985) to ascertain the impact of different amortization policies for advertising and

research and development. As in our study, Grant (1991) examines the impact of retiree health benefits on share prices.

Adding significantly to Grant (1991), our study constructs estimates of retiree health liability, addresses whether stock prices are reduced dollar-for-dollar for retiree health liabilities, implements more sophisticated statistical techniques, and uses more recent data from larger and more diverse samples. Differences between the two studies are discussed in more detail below.

Because of numerous unique institutional features of retiree health benefit contracts, the first section of this article provides a thorough discussion of typical plan provisions, accounting practices, and alternative assessments by the market. The second section describes a method for estimating the retiree health benefit obligation from existing accounting disclosures, which is then used to compute the retiree health benefit obligation variable employed in subsequent empirical tests. The third section gives the theoretical model and variables used to assess the impact of retiree health benefits on prices of corporate equity shares. The fourth section briefly outlines the criterion used in selecting the sample of companies utilized in the analysis, while the fifth section describes the empirical results.

Background

Retiree Health Benefit Contracts

Employer plans for retiree health benefits have existed since the 1950s. The Bureau of Labor Statistics (1989) in the 1988 survey of employee benefits offered by medium-size and large companies reports that approximately 45 percent of health plan participants would be provided with free or highly subsidized health insurance benefits upon retirement. For retirees under 65, these benefits are often identical to, and provided at the same terms as, health insurance benefits given to active workers. For retirees over 65, employer-provided retiree health plans supplement Medicare, particularly by covering outpatient prescription drugs. The costs of retiree health plans were for many years relatively small. More recently, however, skyrocketing health care costs, early retirement programs, and increased longevity have combined to cause a dramatic escalation of employer costs for retiree health plans. As evidenced by some employers' attempts to reduce or cancel benefit plans and by the resulting strikes and litigation pursued by unions and retiree groups, retiree health benefits have become an increasingly prominent and contentious issue. The bitter 1990 United Mine Workers' strike against the Pittston Coal Company centered on this issue, and currently a large class action suit is pending against General Motors to stop the reduction of benefits for retired salaried employees.

Although some employers view retiree health benefits as a mere gratuity, subject to their unilateral decision to amend or cancel the plan benefits, legal and practical considerations may make the benefits a fairly fixed obligation. As a legal matter, retiree health plans are not subject to the stringent vesting and funding requirements imposed by the Employee Retirement Income Security Act of 1974 (ERISA) on pension plans. Hence, the federal courts have

determined that whether an employer may legally cancel or modify retiree health benefits generally depends on the language of the relevant plan documents. When the language of the documents is ambiguous or documents do not exist, current legal doctrine in some federal court circuits holds that reference should be made to the intent of the parties as expressed in extrinsic evidence, such as statements made at exit interviews with workers and to the reasonable inference that retirement benefits are intended to last for the length of retirees' lives. In other circuits, however, no such inference is made, and greater latitude is given to employer decisions. In all circuits, if the language of plan documents unambiguously reserves the right to the employer to cancel or amend retiree benefits, courts will allow such actions. Moreover, all courts would probably allow unilateral changes in future retiree health benefits promised to active workers, even those near retirement age (see Warshawsky 1992a, chap. 4).[1]

More important than strict legal concerns, however, are practical matters such as ethics, labor relations (particularly in a unionized environment), and public relations that impose constraints on the ability of employers to act unilaterally on this issue. Many in the consulting, investment, and business communities also agree that, as a practical matter, a liability exists. According to Martens and Stevens (1990), of the 467 comment letters responding to the accounting standard for retiree health benefits proposed in 1989 by the Financial Accounting Standards Board (FASB) requiring the calculation of a liability, 69 percent agreed that a retiree health benefit liability exists, 14 percent stated that a liability does not exist, and 17 percent had no opinion.

Accounting for Retiree Health Benefits

Although it is fairly clear that liabilities for retiree health benefits exist, only limited firm-specific information about these benefits has been available to the investment community. Along with changes in accounting standards for pensions, the FASB has considered accounting guidelines for retiree health benefits since the late 1970s. In 1984, as a temporary measure pending the promulgation of final guidelines, the FASB required employers to disclose the annual cash outlays (pay-as-you-go costs) for retiree health benefits in their annual statements, if such costs were deemed to be material. In addition, the interim standard, *Statement of Financial Accounting Standards No. 81: Disclosure of Postretirement Health Care and Life Insurance Benefits* (FASB, 1984), required a brief description of the benefits provided, the employee groups covered, and the accounting and funding policies followed for these benefits.[2]

---

[1] We were unable to obtain information about the specific legal status of the retiree health plans for the companies in our sample. Such information would be a useful additional variable to include in the empirical analysis.

[2] Reports filed by employers for welfare benefit plans (including health insurance) with the federal government and available to the public under the requirements of ERISA contain some

In December 1990, the FASB issued the final version of the accounting standard first proposed in February 1989. Statement No. 106 applies to financial statements with fiscal years beginning after December 15, 1992. With promulgation of this new accounting standard, the FASB definitively expressed the view that retiree health benefits are a form of deferred compensation and not a gratuity,[3] imposing the requirement that accrual accounting be utilized for these benefits.[4] Furthermore, very explicit guidelines are given in the accounting standard about the assumptions and attribution methodologies to be used in valuing retiree health benefits, similar to those used under the *Statement of Financial Accounting Standards No. 87 — Employers' Accounting for Pensions* (Statement No. 87).

The shift to the new accounting standard is expected to significantly decrease net income and result in the disclosure and systematic accrual of a large previously undisclosed liability. Warshawsky (1992a) estimates that the new expense measure will be approximately five times the pay-as-you-go cost, and the accumulated postretirement benefit obligation will be approximately 30 times the pay-as-you-go cost. Coopers & Lybrand (1989, p. 100) estimate the ratio of new expense to pay-as-you-go cost to be 2.6 for a mature plan and 6.3 for an immature plan and estimates the ratio of accumulated postretirement benefit obligation to pay-as-you-go cost to be 15.7 for a mature plan and 33.3 for an immature plan. Warshawsky (1992a) estimates the total accrued liability that would have been reported by all corporations in 1988 if they had followed Statement No. 106 to be $332 billion. This compares to an unfunded pension liability of about $30 billion and long-term debt of approximately $1 trillion for the corporate sector in that year.[5] The U.S. General Accounting Office (1988) and the Employee Benefit Research Institute (1988), using lower cost assumptions and without valuing benefits for workers under age 40, estimate the 1988 accrued retiree health liability to be $221 billion and $247 billion, respectively.

---

dated information about general health plan provisions and expenses. These reports, however, do not reveal much about costs for retiree health benefits specifically.

[3] Espahbodi, Strock, and Tehranian (1991) examined the impact on equity prices of nine pronouncements by the FASB over the period 1984 through 1989 related to accounting for retiree health benefits. Although they could not find any significant market reaction on the other dates, they did find that around the issuance of the proposed standard on February 9, 1989, a group of 143 firms offering retiree health benefits suffered a significant decline in equity values of around 3 percent, while a control group of 100 firms not offering the benefits did not register any losses. Furthermore, they found that the negative abnormal returns were most pronounced for firms with few retirees relative to active workers, firms with high debt ratios, small firms, and firms currently reporting retiree health benefits on a pay-as-you-go basis. They interpreted their results as consistent with real losses associated with restrictions on firms' optimal contracting technology and the possibility of debt covenant violations.

[4] Although the new standard applies to all types of postretirement benefits, including life insurance and housing assistance, in dollar terms, only retiree health benefits are significant.

[5] The estimate of unfunded pension liability is an extrapolation based on Warshawsky (1992b), and the figure for long-term corporate debt outstanding comes from the Flow of Funds Accounts of the Federal Reserve Board.

This study examines the direct effects of retiree health benefits on share prices. The focus is on measuring the market's assessment of FASB Statement No. 81 disclosures and resulting projections of retiree health liabilities and on comparing this assessment to assessments of other corporate liabilities.

Market Assessment of Retiree Health Benefit Liabilities

There are five reasons why the market may value retiree health liabilities at an amount less than the amount calculated under Statement No. 106 and suggested by the terms of the existing contracts. Each of these reasons has different implications for the security of retiree health benefits.

First, firm-specific information on the benefits under current accounting conventions has been limited to annual cash outflows associated with retirees. Expenses and liabilities associated with *future* commitments are not disclosed. If too little information regarding health plans is disclosed currently, as suggested by the FASB in Statement No. 106 (1990, paras. 124-125), then there may be a very low association between retiree health liabilities and stock values. We would be surprised to find evidence for this scenario, however, because most studies have shown that markets are efficient processors of information. In particular, because of the very significant size of retiree health liabilities for many companies and the attention drawn to them in recent years by the deliberations of the FASB on the appropriate method of accounting for retiree health benefits, one would expect that estimates for these liabilities should be rather accurately reflected in share prices. Indeed, Standard & Poor's Corporation (1989) and some stock analysts (see, for example, discussions in Freudenheim, 1989, and Henriques, 1989) state that bond ratings and stock prices already reflect rough estimates of retiree health liabilities.

Second, as argued by Pauly (1991), workers may already have taken cuts in wages or produced more output in recognition of the value of future health benefits to be received in retirement. According to this view, share prices should not reflect much, if anything, for the liability to provide retiree health benefits, because the costs for retiree health insurance will have been offset by extra revenues received owing to lower labor costs or higher productivity. Although logically possible, Pauly's view of the exchange implicit in the retiree health contract runs counter to experience. In a theoretical model consistent with the thrust of Pauly's argument, the terms of the retiree health contract are assumed to be the optimal bargain for the corporate sponsor and its employees, based on a full set of information. Hence, any changes in the surrounding environment—whether stricter accounting rules or increases in the rate of health care cost inflation—should not lead to any changes in either wages or retiree health benefits. Furthermore, these changes in the environment should cause no expressions of discomfort. Yet there has been a very intense negative corporate reaction to Statement No. 106, and numerous discussions in the press have taken place concerning how retiree health benefit plans may soon be curtailed or eliminated.

Third, the market may anticipate that quasi-monopsonistic corporations will reduce wages (especially of older current workers) and that regulated or monopolistic companies will increase prices to offset the liability for retiree health benefits. If either action is taken, share prices will not be reduced to the extent of the liability for retiree health benefits. Although this view is more realistic than the view of competitive labor markets for some of the sponsors of retiree benefits, it is still not without difficulties. A reduction in wages of current workers would require the passive acquiescence of labor unions—an unlikely event—and an increase in prices for regulated firms would require the approval of political authorities—also an uncertain prospect.

Fourth, the market may expect firms to amend or cancel benefits unilaterally, despite the negative effect on labor relations and the uncertain legal authority for such actions. Clearly, if there is a significant probability that benefits will be canceled or cut substantially, without an adverse reaction from the union or other employee groups, much less than full recognition by the market is warranted. Even with the expectation that a strike or a lawsuit will result, the market may believe that the company will prevail in such altercations and, hence, discounts significantly the liability for retiree health benefits.

Finally, the market may expect a reduction in corporate liabilities for retiree health benefits to result from future government action related to Medicare, national health insurance, the efficiency of the health care sector, and tax deductibility of contributions to retiree health benefit trusts. For example, the Medicare Catastrophic Care Act of 1988, if it had been retained, would have significantly reduced employer liabilities for health benefits provided to retirees over 65.

It may appear surprising that we did not mention the tax deductibility of corporate benefit payments as another reason why retiree health liabilities would be valued at less than dollar-for-dollar. As explained more fully by Feldstein and Seligman (1981), when deferred compensation benefits cannot be prefunded on a tax-favored basis, but instead will be funded on a pay-as-you-go basis, as is done currently for retiree health benefits, it is likely that the tax deductibility of benefit payments will not matter much, if at all. Therefore, under the Modigliani and Miller (1963) hypothesis, where tax deductibility matters for other corporate liabilities, such as debt, but does not matter for retiree health, other corporate liabilities should be valued *less* than the retiree health liability. If the Miller (1977) hypothesis is invoked instead, then tax deductibility should not matter for any type of liability, and valuations should be equivalent.

As mentioned above, this study aims to examine the extent to which the health liability to be calculated under Statement No. 106 is currently reflected in stock prices. A method for converting disclosed pay-as-you-go costs to Statement No. 106 liabilities is described briefly in the next section. Details of the procedures are given in Warshawsky (1992a) and also can be obtained from the authors.

Estimation of Accrued Liability

Table 1 shows the retiree health liability as the sum of the present value of benefits owed to three sets of participants: retirees, fully eligible employees, and potentially eligible employees. The present value of benefits owed to current retirees is obtained by discounting the stream of expected future health care costs for current retirees and their spouses using appropriate discount and medical inflation rates. The present value of benefits owed to currently eligible active employees is calculated similarly, except that benefit amounts are adjusted to allow for varying future retirement dates. The present value of benefits due to potentially eligible active employees differs by allowing for the probability of termination of employment prior to becoming fully eligible for retiree health benefits. The term E_n reflects that potentially eligible active employees have not earned fully their retiree health benefits—consistent with the terms of Statement No. 106.

General assumptions are made about per capita health care costs, the portion of the health cost paid by Medicare and employer-provided health insurance, the discount rate, and the medical inflation rate. All assumptions (shown in the first footnote to Table 1) represent our best estimates based on recent medical cost and actuarial data. Ideally, firm specific information, such as age distributions, turnover rates, and spousal coverage, also would be used to compute the liability. However, this is not feasible given the inaccessibility of proprietary firm data. Therefore, firms are categorized into one of five demographics groups developed by the American Academy of Actuaries Committee on Pension Actuarial Principles and Practices (AAAC) (1985) for which age distributions, turnover rates, and so on are given.

The AAAC provides enough detail to estimate the health liability, pay-as-you-go cost, and resulting health liability/pay-as-you-go cost index (hereafter, the liability-to-cost ratio) for each demographic group. A liability for each firm is estimated by multiplying its reported pay-as-you-go cost by the index of the assigned group. The liability-to-cost ratios for the five groups are 19.91, 20.39, 29.34, 38.28, and 52.77. In general, groups with a larger proportion of retirees have lower liability-to-cost and expense-to-cost ratios. These estimates are consistent with, although slightly higher than, estimates found in a Coopers & Lybrand (1989) field study based on data obtained from 26 firms.

As stated previously, the ratios are calculated using best estimates for economic and actuarial assumptions. However, the magnitude of the liability-to-cost ratio is particularly influenced by the relation between the discount rate and the medical inflation rate. We assume a discount rate of 9 percent and a medical inflation rate of 8 percent. If both rates are set at 8 percent for the group with the median original liability-to-cost ratio (29.34), the ratio increases by 19 percent; if the discount rate is decreased to 7 percent, leaving the medical inflation rate at 8 percent, the ratio increases by 43 percent.

Firms are assigned to demographic groups on the basis of the change in the number of employees over the period 1986 to 1989, as reported in Standard & Poor's Compustat data base. Although this classification method is rather

Table 1
Calculations Used to Compute Health Liabilities and Costs

1. Present value of benefits owed to current retirees:

$$\sum_{x=55}^{105} R_x \sum_{a=x}^{105} H_a (1+S) \frac{(1+m)^{a-x}}{(1+i)^{a-x}} ps_{a|x}.$$

2. Present value of benefits owed to fully eligible active employees:

$$\sum_{x=55}^{65} FE_x \sum_{y=x}^{65} pr_{y|x} \frac{(1+m)^{y-x}}{(1+i)^{y-x}} \sum_{a=y}^{105} H_a (1+S) \frac{(1+m)^{a-y}}{(1+i)^{a-y}} ps_{a|y}.$$

3. Present value of benefits owed to potentially eligible active employees:

$$\sum_{n=1}^{89} ATG_n E_n pe_n \frac{(1+m)^{z_n-x_n}}{(1+i)^{z_n-x_n}} \sum_{y=z_n}^{65} pr_{y|z_n} \frac{(1+m)^{y-z_n}}{(1+i)^{y-z_n}} \sum_{a=y}^{105} H_a (1+S) \frac{(1+m)^{a-y}}{(1+i)^{a-y}} ps_{a|y}.$$

4. Retiree health liability:
   Calculation 1 plus calculation 2 plus calculation 3.

5. Pay-as-you-go cost:

$$\sum_{x=55}^{105} R_x H_x (1+S).$$

6. Liability-to-cost ratio:
   Calculation 4 divided by calculation 5.

Note: R_x = number of retirees age x, H_x = annual health benefit cost to an employer for a retiree age x (H_x for a 55-year-old retiree is $1,500 and is assumed to increase 5 percent per age over the ages 55 through 70; for retirees over 65, it is assumed that the employer is responsible for only 30 percent of the cost because of Medicare), S = proportion of retirees whose spouses are also covered by the retiree health benefit plan, FE_x = number of fully eligible active workers age x (full eligibility is assumed to be age 55 with ten years of service), ATG_n = number of potentially eligible active workers in age tenure profile n, E_n = proportion of retiree health benefit earned to date by group n, m = rate of health inflation (assumed to be 8 percent in 1988), i = the discount rate (assumed to be 9 percent in 1988), $ps_{a|x}$ = probability of survival to age a, given that retiree is currently age x, $pr_{y|x}$ = probability of a worker retiring early (before age 66) at age y, given that the worker is currently age x, pe_n = probability of potentially eligible workers in age-tenure group n remaining with the firm until full eligibility, z_n = earliest possible retirement age for age-tenure group n (in most cases age 55), and x_n = average age of employees in age-tenure group n.

simplistic, it is thought that the rate of growth of the number of employees is negatively correlated with the relative proportion of older long-service active workers and retirees among plan participants and is also negatively but weakly correlated with the probability that active workers will remain with the company until eligible for benefits.

Model and Measurement of Variables

Using the approach of Tobin and Brainard (1977), if the market value of the firm's total assets is represented by MVA, and the replacement cost of the physical (tangible) assets is MVT, then

$$MVA = q(MVT). \quad (1)$$

The parameter q (often called Tobin's q) represents the ratio of the market value of a firm to the replacement cost of its assets. Q may be expected to often exceed one because of the existence of some intangible assets, such as market power, unique factors of production, research and development, advertising, and so on.

The market value of the firm's equity, represented by MVE, equals MVA less its liabilities, including pension and retiree health liabilities, denoted MVL. Hence,

$$MVE = q(MVT) - MVL. \quad (2)$$

Following Feldstein and Seligman (1981) and Grant (1991), q is considered a linear function of research and development (R&D), advertising (ADV), growth (GROW), and risk (RISK). Thus, equation (2) can be expressed as

$$MVE = (\gamma_1 R\&D + \gamma_2 ADV + \gamma_3 GROW + \gamma_4 RISK)\ MVT - MVL. \quad (3)$$

Dividing equation (3) by MVT yields

$$MVE/MVT = \gamma_1 R\&D + \gamma_2 ADV + \gamma_3 GROW + \gamma_4 RISK - MVL/MVT. \quad (4)$$

The variable MVE/MVT may be interpreted as an equity q (Grant, 1991). After decomposing MVL into three components—balance sheet liabilities, off-balance sheet pension liabilities, and off-balance sheet retiree health benefit liabilities—the multiple regression analogue of equation (4) can be written as

$$MVE_i/MVT_i = \gamma_0 + \gamma_1 R\&D_i + \gamma_2 ADV_i + \gamma_3 GROW_i + \gamma_4 RISK_i + \gamma_5 MVBL_i/MVT_i + \gamma_6 NPA_i/MVT_i + \gamma_7 RHL_i/MVT_i + \varepsilon_i, \quad (5)$$

where γ_0 = an intercept,
ε_i = a disturbance related term,
$MVBL_i$ = the market value of balance sheet liabilities,
NPA_i = the market value of net pension assets, and
RHL_i = the market value of retiree health liabilities.

The procedures used to operationalize equation (5) are described below.

The market value of shareholders' equity is defined as price times number of shares outstanding, measured at three and one-half months after the fiscal year end. The delay after the fiscal year end ensures that the 10K forms and annual reports containing retirement plan information had been disseminated prior to the price observations (see Harris and Ohlson, 1987). The price and

share data are obtained from Center for Research in Security Prices (CRSP) tapes.

Because the replacement cost of tangible assets and the market value of balance sheet liabilities are not disclosed in financial statements,[6] it is common to use the book value of balance sheet tangible assets (BVT) and book value of balance sheet liabilities (BVBL) as surrogates (see, for example, Beaver et al., 1989). In addition, Landsman (1986) does not reject the null hypothesis that regression coefficients for book assets and book liabilities are different from their theoretical coefficients derived using market values. Therefore, we also substitute book values, obtained from Compustat, for market values.

The variables for research and development, advertising, growth, and risk are defined in a manner similar to prior studies using the Tobin's q methodology. Research and development is defined as the five-year sum of research and development expense divided by the five-year sum of sales. Advertising is measured as the five-year sum of advertising expense divided by the five-year sum of sales. Growth is defined as the fifth root of the ratio of the current year's sales to sales five years prior to the current year, less 1. In many articles, risk is proxied using the equity beta. However, because beta has been insignificant in many of these studies, risk is measured here as the inverse of the coefficient of variation of the change in earnings per share. Specifically, risk is the five-year standard deviation of the change in annual earnings per share divided by the five-year mean of the change in annual earnings per share. The inverse of the coefficient of variation is used to avoid large values caused by mean earnings per share changes close to zero. All the q variables are obtained from Compustat.

Most pension plans of publicly traded firms have assets in excess of benefit obligations (see Warshawsky, 1989). Thus, instead of defining the pension variable as a net liability, it is defined as a net asset. Net pension assets is defined as pension assets less the accumulated benefit obligation less (plus) prepaid (accrued) pension cost on the balance sheet.[7] This information is disclosed in financial statement footnotes under the *Statement of Financial*

---

[6] Supplemental price-level-adjusted asset disclosures in financial statements were discontinued after 1985 because of concerns regarding the reliability and usefulness of the data.

[7] The accumulated benefit obligation is the actuarial present value of benefits based on employee service and compensation to date. The projected benefit obligation is based on the accumulated benefit obligation with the additional consideration for increases in future compensation levels. Although it may be the more relevant variable, the projected obligation is not used for the reported results because it was not *required* disclosure until 1987. When the projected benefit obligation is used for the 1987 and 1988 sample firms, and the 1986 sample firms that early-adopted Statement No. 87, the results are qualitatively similar to those reported in subsequent tables.

The prepaid/accrued pension cost was not required disclosure until 1987. However, prior to the adoption of Statement No. 87, the prepaid/accrued pension cost normally would have been zero or near zero because expense and funding were equal for most firms. Therefore, for 1986 firms still reporting under Statement No. 36, the prepaid/accrued pension cost is assumed to equal zero.

Accounting Standards No. 36: Disclosure of Pension Information (FASB, 1980) and Statement No. 87 (FASB, 1985) and is obtained from Compustat.

The market value of retiree health liabilities is defined as the product of the pay-as-you-go cost and the model-derived ratio explained above. This measure has two main advantages over the reported cost. First, the reported cost does not take into account the demographics of the participants covered by the plan. For example, two firms that report the same pay-as-you-go cost have very different liabilities if one firm has a low proportion of retirees and the other has a high proportion of retirees. Second, defining the market value of retiree health obligations as a liability instead of an expense is consistent with the valuation model, thereby making interpretation of the coefficient more straightforward. Reported retiree health cost is hand-gathered using Standard & Poor's Corporate Text data base.[8]

Given the above variable definitions, the coefficients γ_1, γ_2, γ_3, γ_4, and γ_6 are expected to be positive, while γ_5 and γ_7 are expected to be negative. In addition, the Miller (1977) model of market equilibrium predicts that $\gamma_5 = \gamma_7 = -1$. Tests of these predictions are reported below.

Sample Selection

The sample comprises both firms that sponsor health plans and firms that do not sponsor health plans. Firms are identified as sponsoring or not sponsoring plans on the basis of keyword searches in the May 1990 edition of Corporate Text. Careful examinations of retiree benefit footnotes to annual financial statements for the period 1986 to 1988 identify 676 firms that sponsor retiree health plans and 1,540 firms that do not sponsor retiree health plans.[9]

Earlier studies that examined the relation between stock prices and pension liabilities were limited to firms that sponsor defined benefit pension plans. Following this tradition, we present separate results for the sample of firms that sponsor retiree health plans. However, we believe that excluding firms that do not sponsor such plans may discard data unnecessarily. If a firm does not sponsor a retiree health plan, then the retiree health liability is zero and should be valued as such by the market. Therefore, results also are presented for a combined sample of firms that do and firms that do not sponsor retiree health plans.

Because Compustat does not report pension information for the utility and banking industries and research and development is associated primarily with manufacturing firms, the sample for this study is restricted to firms with

[8] Approximately 19 percent of the sample firms sponsoring retiree health plans indicated that pay-as-you-go costs were immaterial and therefore did not report an amount. The results reported in this study set the ratio of reported retiree health cost to tangible asset equal to the ratio for the lowest decile of firms reporting the pay-as-you-go cost in a given year. The ratios are 0.000803, 0.000795, and 0.000797 for 1986, 1987, and 1988, respectively. Regression results are similar when firms indicating immaterial retiree health costs are omitted or have retiree health costs set equal to zero.

[9] The number of firms varies somewhat for each year of the sample.

Standard Industrial Classification codes less than or equal to 3999. This restriction eliminated 45 percent of the firms that sponsor retiree health plans and 53 percent of the firms that do not sponsor such plans. In addition, to control for cross-temporal differences in security market and industrial factors, the sample for this study is limited to firms with fiscal years ending December 31. This criterion eliminated 14 percent of the firms that sponsor retiree health plans and 20 percent of the firms that do not. In addition, one percent of the firms that sponsor retiree health plans are eliminated because the firm already accrued a portion of the retiree health liability attributable to active workers.[10] Finally, missing data led to the elimination of 9 percent and 10 percent of the firms that do and do not sponsor retiree health plans, respectively. The final sample of firms sponsoring retiree health plans includes 203 firms for 1986, 207 firms for 1987, and 210 firms for 1988. The final combined sample of firms that sponsor and firms that do not sponsor retiree health plans includes 440 firms for 1986, 461 firms for 1987, and 484 firms for 1988.

Empirical Results

Descriptive Statistics

Descriptive statistics for firms sponsoring health plans and the combined sample of firms that sponsor and firms that do not sponsor retiree health plans are reported in Table 2.[11] The first three rows contain measures of firm size: market value of equity, book value of total assets, and number of employees. All three measures indicate that firms with retiree health plans are larger than firms that do not sponsor retiree health plans. In 1988, for the average retiree health plan firm in the sample, the market value of equity is $4.02 billion, the book value of total assets is $6.82 billion, and the number of employees is 32,700. The values for the combined sample are approximately half of these amounts. This may be because most retiree health plans are not prefunded, and, hence, only larger, more stable and publicly prominent companies have been trusted by employees to make good on retiree health promises.

For the health plan sample, the average pay-as-you-go cost increases from $13.2 million in 1986 to $22.2 million in 1988, and the average retiree health liability increases from $376 million in 1986 to $586 million in 1988. The aggregate off-balance sheet retiree health liability for the 1988 sample is

[10] Firms that already have an accrual on their balance sheets for retiree health benefits related to active workers are eliminated as the primary purpose of this study is to ascertain the market's assessment of retiree health benefits that do not appear on the balance sheet. In addition, because the reported expense represents an accrual and not the pay-as-you-go cost, multiplying the reported cost by the liability-to-cost ratio would result in an overstatement of the firm's retiree health liability.

[11] Standard procedures are used to identify extreme observations for potential errors. Values are checked by examining actual financial statements or stock price data and are corrected when errors are found. In this article, extreme values that appear to be measured correctly are neither deleted nor changed to the value of the nearest observation not viewed as extreme. However, when such procedures are used, results are similar.

Table 2
Descriptive Statistics for Health Plan and Combined Samples

Variable		Health Plan Sample			Combined Sample		
		1986	*1987*	*1988*	*1986*	*1987*	*1988*
Market Value of Equity (in billions of dollars)	Mean	4.10	3.82	4.02	2.24	2.03	2.10
	S.D.	9.36	7.81	7.88	6.71	5.61	5.67
Book Value of Total Assets (in billions of dollars)	Mean	4.55	5.23	6.82	2.55	2.85	3.69
	S.D.	8.94	11.10	18.81	7.29	8.80	14.8
Number of Employees (in thousands)	Mean	33.4	33.3	32.7	18.3	17.8	17.1
	S.D.	55.5	52.6	52.5	41.3	39.1	38.6
Retiree Health Cost (in millions of dollars)	Mean	13.2	19.6	22.2	6.09	8.80	9.62
	S.D.	32.9	76.7	88.5	23.3	52.2	59.3
Retiree Health Liability (in millions of dollars)	Mean	376.2	522.6	585.7	173.6	234.7	254.1
	S.D.	959	1749	2008	677	1199	1353
Market Value of Equity/Tangible Assets	Mean	1.004	0.876	0.871	1.076	0.900	0.901
	S.D.	0.767	0.602	0.622	0.878	0.690	0.707
Research and Development/Sales	Mean	0.021	0.022	0.021	0.019	0.021	0.021
	S.D.	0.026	0.027	0.027	0.029	0.035	0.033
Advertising/Sales	Mean	0.012	0.013	0.013	0.013	0.013	0.013
	S.D.	0.029	0.030	0.030	0.027	0.028	0.029
Growth	Mean	0.026	0.057	0.077	0.044	0.073	0.088
	S.D.	0.126	0.131	0.117	0.146	0.169	0.169
Risk	Mean	0.313	0.347	0.365	0.328	0.314	0.321
	S.D.	0.451	0.471	0.509	0.386	0.378	0.408
Book Liabilities/ Tangible Assets	Mean	0.597	0.605	0.632	0.568	0.582	0.607
	S.D.	0.191	0.190	0.222	0.214	0.246	0.289
Net Pension Assets/Tangible Assets	Mean	0.059	0.058	0.052	0.040	0.040	0.034
	S.D.	0.072	0.068	0.060	0.060	0.057	0.049
Retiree Health Cost/Tangible Assets	Mean	0.003	0.003	0.004	0.001	0.002	0.002
	S.D.	0.004	0.004	0.004	0.003	0.003	0.003
Accrued Retiree Health Liability/Tangible Assets	Mean	0.086	0.096	0.099	0.040	0.043	0.043
	S.D.	0.099	0.107	0.116	0.080	0.086	0.091
Number of Observations		203	207	210	440	461	484

Note: The health plan sample contains only firms that sponsor retiree health plans. The combined sample contains firms that sponsor and firms that do not sponsor retiree health plans. Values are obtained from Compustat, the Center for Research in Security Prices, and Corporate Text. S.D. = standard deviation. Market value of equity = price of common stock three and one-half months after the fiscal year end times number of common shares outstanding. Book value of total assets = total assets reported on the balance sheet. Employees = number of company workers as reported to shareholders. Retiree health cost = pay-as-you-go retiree health cost reported in financial statement footnotes. Retiree health liability = retiree health cost times model-derived index. Research and development/sales = five-year sum of research and development expense divided by five-year sum of sales. Advertising/sales = five-year sum of advertising expense divided by five-year sum of sales. Growth = (current year sales divided by sales for the year five years prior)$^{1/5}$ minus 1. Risk = the mean annual change in earnings per share for five years divided by the standard deviation of annual change in earning per share for five years. Tangible assets = tangible assets reported on the balance sheet. Book liabilities = total liabilities reported on the balance sheet. Net pension assets = pension assets reported in footnotes minus accumulated benefit obligation reported in footnotes minus prepaid pension asset on the balance sheet.

estimated to be $123 billion, approximately 15 percent of the market value of common stock for these companies. This is comparable to the 17.5 percent ratio obtained by Warshawsky (1992a, p. 115) for a 676-firm sample.

Most of the remaining variables shown in Table 2 are similar for the two samples. However, the combined sample appears to show higher growth, lower net pension assets, and, of course, lower measures of retiree health liabilities. The lower net pension assets arises from two factors. First, of the 274 firms not sponsoring retiree health plans in 1988, 108 (39 percent) also did not sponsor defined benefit pension plans, and, as a result, the net pension asset variable is set to zero for these firms. All firms that sponsor retiree health plans also sponsor defined benefit plans. Second, for the 166 firms sponsoring defined benefit pension plans but not sponsoring retiree health plans, the mean net pension asset is 0.034, compared with 0.052 for the firms sponsoring health plans.

Econometric Issues

Bernard (1987) and Froot (1989) suggest that while ordinary least squares (OLS) parameter estimates are consistent, OLS standard errors in studies using annual stock returns or stock price levels, as in this study, are biased because of heteroscedasticity and cross-sectional dependence (contemporaneous correlation). To control for these problems, the procedure introduced in Froot (1989) is used to compute standard errors. The Froot method extends White's (1980) approach, which first addressed heteroscedasticity by allowing for contemporaneous correlation within industries. The Froot method computes standard errors using an average covariance matrix formed from industry covariance matrices. In our study, firms are assigned to 25 different industries following the classification scheme of Biddle and Seow (1991).

Another econometric issue concerns important explanatory variables, such as union presence, that may be omitted from the models as a result of data constraints. To control for industry specific variables that may be omitted, a covariance analysis is performed by adding industry intercept dummy variables. Adding the dummy variables to equation (5), substituting the book value of balance sheet tangible assets (BVT) for the replacement cost of the tangible assets (MVT), and substituting the book value of balance sheet liabilities (BVBL) for the market value of balance sheet liabilities (MVBL) yields

$$\frac{MVE_i}{BVT_i} = \gamma_0 + \gamma_1 RD_i + \gamma_2 ADV_i + \gamma_3 GROW_i + \gamma_4 RISK_i + \gamma_5 \frac{BVBL_i}{BVT_i} + \gamma_6 \frac{NPA_i}{BVT_i} + \gamma_7 \frac{RHL_i}{BVT_i} + \sum_{n=1}^{24} \delta_n D_{ni} + \varepsilon_i, \quad (6)$$

where D_{ni} = an industry dummy variable coded one if the firm is in industry n and zero otherwise,

δ_n = the coefficient for D_n, and other variables are defined as above.

A final econometric problem is the potential measurement error in the retiree health liability variable introduced by the numerous assumptions that must be made to derive a liability measure. As a consequence of this problem, the coefficients in equation (6), especially γ_7, could be upward or downward biased. In particular, the market may be using different discount and medical inflation rates than we have employed in our estimates. Short of doing complete actuarial studies for each firm in our sample—proprietary studies that the firms themselves reportedly have not done until recently—we believe that our method best replicates what a sophisticated financial analyst would do to estimate the retiree health liability of a corporation.

Still, to evaluate the possible effects of measurement error, a second set of results are produced using an instrumental variable approach. Judge et al. (1985) suggest that instrumental variable estimation will result in consistent estimates of γ_7 if we can identify variables that are correlated with the true value of the retiree health liability but uncorrelated with the error in the observed measure of the retiree health liability. Greene (1990) indicates that the variance of this estimator can be large if the instrumental variables are not highly correlated with the true retiree health liability. Because of this limitation with respect to the ability of the instrumental variables approach to "solve" the measurement error problem, we view the approach as a robustness check.

Following the procedures outlined in Judge et al. (1985) and Brown et al. (1987), the following two equations are estimated sequentially:

$$\frac{RHL_i}{BVT_i} = \beta_0 + \beta_1 \frac{ABO_i}{BVT_i} + \beta_2 LNEMP + \beta_3 RHLDUM + \varepsilon_{1i}, \quad (7)$$

$$\frac{MVE_i}{BVT_i} = \gamma_0 + \gamma_1 RD_i + \gamma_2 ADV_i + \gamma_3 GROW_i + \gamma_4 RISK_i + \gamma_5 \frac{BVBL_i}{BVT_i} + \gamma_6 \frac{NPA_i}{BVT_i} + \gamma_7 \frac{\hat{RHL}_i}{BVT_i} + \sum_{n=1}^{24} \delta_n D_{ni} + \varepsilon_{2i}, \quad (8)$$

where ABO = the accumulated benefit obligation,
LNEMP = the natural log of the number of employees, and
RHLDUM = a dummy variable that is coded 1 if a firm has a retiree health plan.

RHLDUM is used in the combined sample regressions but not the health plan sample regressions. We could not specify additional instruments due to the data limitations mentioned above in conjunction with the model-derived estimate of the retiree health liability. The reported pay-as-you-go cost was not used as an instrumental variable because it was used in constructing the model-derived estimate of the retiree health liability and, as a consequence, could be correlated with the error in our estimate. When equation (7) is estimated, the coefficients for the accumulated benefit obligation and the dummy variable for

regressions for the combined sample are significantly positive, while the coefficient for the natural logarithm of the number of employees is negative. Adjusted R^2s for equation (7) across the three years are approximately 0.23 and 0.41 for the health plan sample and the combined sample, respectively.

Estimation of Equation (6)

The left side of Table 3 shows the results of estimating equation (6) for firms with retiree health plans. The main coefficients of interest, those for retiree health liability, are significantly negative for all three years. At the 5 percent significance level, γ_7 is significantly different (lower in absolute magnitude) than the theoretical value of -1 in both 1987 and 1988. However, we fail to reject the null hypothesis that $\gamma_5 = \gamma_7$ for any of the years.

The results for the other variables in the model are, in general, consistent with the theory. The coefficients for advertising, growth, and research and development are consistently positive and significant, and the book value of liabilities is consistently negative and significant, as hypothesized. The risk variable, however, is significant only in 1988. The net pension asset variable is significantly positive in two of the three sample years; its coefficient is around the theoretically appropriate value of -1. This result is largely consistent with prior findings (see, for example, Feldstein and Seligman, 1981; Feldstein and Morck, 1983; and Landsman, 1986) despite differences in funding levels during the time periods studied. In addition, tests indicate that the industry dummy coefficients are significantly different from zero. Thus, the covariate analysis increases the explanatory power of the model and provides some control for omitted variables.

The regression results for the combined sample (right side of Table 3) are broadly similar to those reported for the health plan sample. The retiree health coefficients are still significant but are somewhat smaller (in absolute value). However, in contrast to the results for the health plan sample, we are able to reject the hypothesis that $\gamma_5 = \gamma_7$ in all three years. This result arises, in part, because γ_5 is much closer to its theoretical value, with a tighter distribution, when the combined sample is used. To the extent that the combined sample models are viewed as being better specified because coefficients other than γ_7 are more consistent with theoretical values and a larger sample is being employed, there is some indication that the market is not pricing the full Statement No. 106 liability.[12]

---

[12] It is difficult to compare the results of our study to that of Grant (1991) because of the many significant differences in design. First, Grant utilizes smaller samples (ranging from 57 to 132 firms depending on the regression) of large companies for the years 1984 through 1986. Second, Grant's samples include only firms that offer retiree health benefit plans. Third, Grant defines several variables differently. In particular, Grant does not estimate the accrued liability for retiree benefits, instead focusing on reported pay-as-you-go cost as the variable of interest. Finally, Grant's t-statistics are based on OLS standard errors, and regressions exclude industry dummies. In an earlier version of this article, in which we presented results for our retiree health liability measure and results using the pay-as-you-go cost, our findings were generally consistent with

Table 3
Regression Results Using the Model-Derived Health Liability Measure

$$\frac{MVE_i}{BVT_i} = \gamma_0 + \gamma_1 RD_i + \gamma_2 ADV_i + \gamma_3 GROW_i + \gamma_4 RISK_i + \gamma_5 \frac{BVBL_i}{BVT_i} + \gamma_6 \frac{NPA_i}{BVT_i} + \gamma_7 \frac{RHL_i}{BVT_i} + \sum_{n=1}^{24} \delta_n D_{ni} + \epsilon_i \,.^{a}$$

		Health Plan Sample			*Combined Sample*		
Variable		*1986*	*1987*	*1988*	*1986*	*1987*	*1988*
Intercept	Coefficient	1.27	0.74	0.62	1.58	1.09	1.18
	t-ratio[b]	4.36	3.62	3.34	9.68	11.51	9.35
RD	Coefficient	4.84	4.29	4.05	3.78	4.42	1.30
	t-ratio[b]	1.47	2.04	2.16	1.69	4.05	1.23
ADV	Coefficient	4.80	4.96	5.03	3.63	3.64	3.42
	t-ratio[b]	3.48	3.64	3.58	1.81	2.21	2.11
GROW	Coefficient	1.32	0.86	0.65	1.29	0.90	0.34
	t-ratio[b]	3.24	3.16	3.09	3.78	5.03	2.16
RISK	Coefficient	-0.01	0.07	0.14	0.05	0.01	0.08
	t-ratio[b]	-0.09	1.09	2.87	0.63	0.18	2.37
BVBL/BVT	Coefficient	-1.27	-0.73	-0.55	-1.59	-1.08	-0.84
	t-ratio[b]	-3.52	-3.50	-2.79	-8.56	-11.14	-6.99
NPA/BVT	Coefficient	1.18	0.98	0.76	1.13	0.71	0.61
	t-ratio[b]	1.94	2.50	1.29	1.90	1.93	1.40
RHL/BVT	Coefficient	-0.62	-0.51	-0.46	-0.76	-0.39	-0.46
	t-ratio[b]	-1.93	-2.68	-3.53	-3.53	-3.18	-4.31
Number of Observations		203	207	210	440	461	484
Adjusted R^2		0.56	0.53	0.55	0.45	0.48	0.41
Coefficient Comparisons							
$\gamma_5 = -1$		-0.75[c]	1.27	2.25	-3.19	-.87	1.35
		(0.45)	(0.20)	(0.03)	(0.00)	(0.39)	(0.18)
$\gamma_7 = -1$		1.21[d]	2.63	4.18	1.12	4.88	4.99
		(0.23)	(0.01)	(0.00)	(0.26)	(0.00)	(0.00)
$\gamma_5 = \gamma_7$		-1.84[e]	-0.95	-0.51	-3.74	-4.11	-3.01
		(0.07)	(0.34)	(-0.61)	(0.00)	(0.00)	(0.00)

Note: MVE/BVT = market value of common stock measured three and one-half months after the fiscal year end, BVT = tangible assets reported on the balance sheet, RD = five-year sum of research and development expense divided by five-year sum of sales, ADV = five-year sum of advertising expense divided by five-year sum of sales, GROW = (current year sales divided by sales for the year five years prior)$^{1/5}$ minus 1, RISK = the mean annual change in earnings per share for five years divided by the standard deviation of annual change in earning per share for five years, BVBL = total liabilities reported on the balance sheet, NPA = off-balance sheet net pension assets, RHL = retiree health liability estimated by multiplying the pay-as-you-go cost by the appropriate pay-as-you-go cost/retiree health liability index, and D_n = unity if the firm is in industry n and zero otherwise (to account for industry specific omitted variables).

[a] A test of the null hypothesis that $\delta_1 = \delta_2 = \ldots = \delta_{24} = 0$ is rejected at an alpha level of less than 0.001. The industry dummy coefficients, δ_ns, are not reported since their purpose is to control for omitted variables.

[b] T-statistics are computed using the method developed in Froot (1989).

[c] Calculated as $(\gamma_5 - (-1)) / s_{\gamma 5}$, where $s_{\gamma 5}$ is the Froot (1989) standard error for γ_5.

[d] Calculated as $(\gamma_7 - (-1))/ s_{\gamma 7}$, where $s_{\gamma 7}$ is the Froot (1989) standard error for γ_7.

[e] Calculated as $(\gamma_5 - \gamma_7)/ [s^2_{\gamma 5} + s^2_{\gamma 7} - 2\ \mathrm{cov}(\gamma_5, \gamma_7)]^{1/2}$, using the Froot (1989) covariance matrix.

Grant's. Our significance levels and coefficients for most variables exhibited less variability than Grant's. Our coefficient for the pay-as-you-go cost version of the retiree health liability ranged from -13.9 to -22.8 with an average estimate of -18.1 over six regressions. Grant's estimates of the coefficient for pay-as-you-go retiree health cost range from -7.4 to -42.1 for the various samples and years, with an average estimate of -21.4 over 28 regression equations.

Estimation of Equation (8)

Table 4 presents the results of using instrumental variables for the retiree health liability. The results for γ_0 to γ_6 are very similar to those reported in Table 3. However, the coefficients for the retiree health liability, γ_7, is much higher in absolute terms than those reported in Table 3. The coefficient γ_7 is less than -1 in four of six regressions. In addition, the null hypotheses of $\gamma_7 = -1$ and $\gamma_5 = \gamma_7$ cannot be rejected at conventional levels for either sample. Standard errors are also much higher, probably due to the limited availability of appropriate instruments. These results reinforce the finding that the market does value retiree health liabilities, but they also suggest that the less than dollar-for-dollar relationship between market value and retiree health liability found in Table 3 may be attributable to measurement error.

Conclusions

This study estimates the relationship between retiree health plan liabilities and the market valuation of corporate equity. The estimation of this relationship is especially important in view of the new accounting standard for retiree health benefits, Statement No. 106. We find that the market does value health liabilities but at an amount that may be less than dollar-for-dollar. This finding suggests that the market may be anticipating corporate or government actions that will reduce companies' liabilities for retiree health benefits. The instrumental variable results suggest that the less than dollar-for-dollar pricing also could be attributable to measurement error.

The scope of the current market recognition, if it is less than complete, is important for two reasons. First, rather obviously, if the market is not fully informed of the extent of corporate liabilities for retiree health benefits, the release of relevant information for 1993 under the new accounting standard will lead to changes in the prices of corporate securities with implications for the cost of capital of the affected corporations. Second, in the more likely event that the market is fully informed, if the market is also anticipating deep cuts by employers in retiree health plans, there is at least the possibility that the affected retired and active workers could turn to the political process to obtain stronger guarantees concerning the security of retiree health benefit plans, such as mandatory prefunding and vesting standards. Either reaction also will have important implications for the development of corporate and public policies toward the provision of health care benefits more generally, perhaps even extending to a demand for national health insurance.

Future research is needed to refine our tests of alternative hypotheses regarding retiree health benefits. If firms have more discretion to cut retiree health benefits promised to active workers than to cut benefits currently being paid to retirees, then better information about the demographic composition of the beneficiary pool to permit the separation of the liabilities for retired and active workers may improve the accuracy of the estimated model. Similarly, better information may allow identification of more appropriate instruments to control the errors-in-variables problem. Also, when all companies have

Table 4
Regression Results Using Instrumental Variables for Health Liability Measure

$$\frac{MVE_i}{BVT_i} = \gamma_0 + \gamma_1 RD_i + \gamma_2 ADV_i + \gamma_3 GROW_i + \gamma_4 RISK_i + \gamma_5 \frac{BVBL_i}{BVT_i} + \gamma_6 \frac{NPA_i}{BVT_i} + \gamma_7 \frac{\hat{RHL}_i}{BVT_i} + \sum_{n=1}^{24} \delta_n D_{ni} + \epsilon_{2i}.^{a}$$

		Health Plan Sample			*Combined Sample*		
Variable		*1986*	*1987*	*1988*	*1986*	*1987*	*1988*
Intercept	Coefficient	1.31	0.86	0.74	1.57	1.09	1.18
	OLS t	4.65	3.92	3.17	9.60	9.48	9.77
RD	Coefficient	4.60	4.16	4.02	3.71	4.45	1.38
	OLS t	2.15	2.43	2.31	2.45	4.80	1.34
ADV	Coefficient	4.67	4.83	4.89	3.55	3.61	3.20
	OLS t	2.88	3.90	3.96	2.66	3.66	3.16
GROW	Coefficient	1.30	0.85	0.64	1.26	0.89	0.31
	OLS t	3.72	3.25	2.15	5.26	5.84	1.95
RISK	Coefficient	-0.03	0.08	0.15	0.03	0.01	0.09
	OLS t	-0.33	1.17	2.34	0.39	0.10	1.47
BVBL/BVT	Coefficient	-1.22	-0.76	-0.60	-1.56	-1.08	-0.83
	OLS t	-5.66	-4.46	-3.93	-9.85	-10.68	-8.95
NPA/BVT	Coefficient	1.43	1.23	0.90	1.47	0.81	0.93
	OLS t	2.27	2.29	1.50	2.33	1.75	1.52
RHL/BVT	Coefficient	-1.23	-1.49	-1.28	-1.34	-0.58	-0.84
	OLS t	-1.23	-2.07	-1.89	-1.71	-1.16	-1.54
Number of Observations		203	207	210	440	461	484
Adjusted R^2		0.56	0.53	0.55	0.45	0.48	0.41
Coefficient Comparisons							
$\gamma_5 = -1$		-1.06[b]	1.44	2.67	-3.54	-0.80	1.86
		(0.29)	(0.15)	(0.01)	(0.00)	(0.42)	(0.06)
$\gamma_7 = -1$		-0.23[c]	-0.68	-0.41	-0.44	0.61	0.29
		(0.82)	(0.50)	(0.68)	(0.66)	(0.54)	(0.77)
$\gamma_5 = \gamma_7$		0.00[d]	1.01	1.04	-0.27	-0.75	0.02
		(0.99)	(0.31)	(0.31)	(0.79)	(0.46)	(0.98)

Note: MVE/BVT = market value of common stock measured three and one-half months after the fiscal year end, BVT = tangible assets reported on the balance sheet, RD = five-year sum of research and development expense divided by five-year sum of sales, ADV = five-year sum of advertising expense divided by five-year sum of sales, GROW = (current year sales divided by sales for the year five years prior)$^{1/5}$ minus 1, RISK = the mean annual change in earnings per share for five years divided by the standard deviation of annual change in earning per share for five years, BVBL = total liabilities reported on the balance sheet, NPA = off-balance sheet net pension assets, RHL = retiree health liability estimated by multiplying the pay-as-you-go cost by the appropriate pay-as-you-go cost/retiree health liability index, and D_n = unity if the firm is in industry n and zero otherwise (to account for industry specific omitted variables).

[a] For the health plan sample, $\hat{RHL}_i$ / BVT_i is estimated using the following instrumental variable equation:

$$\frac{RHL_i}{BVT_i} = \beta_0 - \beta_1 \frac{ABO_i}{BVT_i} + \beta_2 LNEMP - \epsilon_{1i},$$

where ABO is the accumulated benefit obligation, and LNEMP is the natural logarithm of the number of employees. For the combined sample, the instrumental variable equation is:

$$\frac{RHL_i}{BVT_i} = \beta_0 + \beta_1 \frac{ABO_i}{BVT_i} + \beta_2 LNEMP - \beta_3 RHLDUM + \epsilon_{1i},$$

where RHLDUM is a dummy variable that is coded 1 if a firm has a retiree health plan. A test of the null hypothesis that $\delta_1 = \delta_2 = \ldots = \delta_{24} = 0$ is rejected at an alpha level of less than 0.001. The industry dummy coefficients, δ_ns, are not reported since their purpose is to control for omitted variables.

[b] Calculated as $(\gamma_5 - (-1)) / s_{\gamma 5}$, where $s_{\gamma 5}$ is the OLS standard error for γ_5.

[c] Calculated as $(\gamma_7 - (-1))/ s_{\gamma 7}$, where $s_{\gamma 7}$ is the OLS standard error for γ_7.

[d] Calculated as $(\gamma_5 - \gamma_7)/ [s^2_{\gamma 5} + s^2_{\gamma 7} - 2\ cov(\gamma_5, \gamma_7)]^{1/2}$, using the OLS covariance matrix.

disclosed their retiree health liabilities, an event study could be conducted to ascertain if the market was surprised, in any systematic way, by the disclosures. In particular, the company disclosures can be compared to our estimates to see if the companies with the greatest differences between disclosed and estimated liability also experienced the largest share price movements. Finally, an event study could be conducted to examine the impact of announcements of significant cuts in retiree health programs or major legislative initiatives in the health care sector.

References

American Academy of Actuaries Committee on Pension Actuarial Principles and Practices, 1985, *Pension Cost Method Analysis* (Washington, D.C.: American Academy of Actuaries).

Beaver, W., C. Eger, S. Ryan, and M. Wolfson, 1989, Financial Reporting, Supplemental Disclosures, and Bank Share Prices, *Journal of Accounting Research,* 27: 157-178.

Bernard, V., 1987, Cross-Sectional Dependence and Problems in Inference in Market-Based Accounting Research, *Journal of Accounting Research,* 25: 1-48.

Biddle, G. C. and G. S. Seow, 1991, The Estimation and Determinants of Associations Between Returns and Earnings: Evidence from Cross Industry Comparisons, *Journal of Accounting, Auditing, and Finance,* 6: 183-232.

Brown, L., R. Hagerman, P. Griffin, and M. Zmijewski, 1987, An Evaluation of Alternative Proxies for the Market's Assessment of Unexpected Earnings, *Journal of Accounting and Economics,* 9: 159-193.

Bureau of Labor Statistics, 1989, *Employee Benefits in Medium and Large Firms, 1988,* Bulletin 2336 (Washington, D.C.: U.S. Department of Labor).

Coopers & Lybrand, 1989, *Retiree Health Benefits: Field Test of the FASB Proposal* (Morristown, N.J.: Financial Executives Research Institute).

Employee Benefit Research Institute, 1988, Issues and Trends in Retiree Health Insurance Benefits, Issue Brief No. 84 (Washington, D.C.: Employee Benefit Research Institute).

Espahbodi, H., E. Strock, and H. Tehranian, 1991, Impact on Equity Prices of Pronouncements Related to Nonpension Postretirement Benefits, *Journal of Accounting and Economics,* 14: 323-346.

Feldstein, M. and R. Morck, 1983, Pension Funding Decisions, Interest Rate Assumptions, and Share Prices, in: Z. Bodie and J. Shoven, eds., *Financial Aspects of the United States Pension System* (Chicago: University of Chicago Press), 177-207.

Feldstein, M. and S. Seligman, 1981, Pension Funding, Share Prices, and National Saving, *Journal of Finance,* 36: 801-824.

Financial Accounting Standards Board, 1980, *Statement of Financial Accounting Standards No. 36: Disclosure of Pension Information* (Stamford, Conn.: Financial Accounting Foundation).

Financial Accounting Standards Board, 1984, *Statement of Financial Accounting Standards No. 81: Disclosure of Postretirement Health Care and Life Insurance Benefits* (Stamford, Conn.: Financial Accounting Foundation).

Financial Accounting Standards Board, 1985, *Statement of Financial Accounting Standards No. 87: Employers' Accounting for Pensions* (Stamford, Conn.: Financial Accounting Foundation).

Financial Accounting Standards Board, 1990, *Statement of Financial Accounting Standards No. 106: Employers' Accounting for Postretirement Benefits Other Than Pensions* (Norwalk, Conn.: Financial Accounting Foundation).

Freudenheim, M., 1989, Costly Accounting Change Planned, *New York Times,* September 15, D1, D6.

Froot, K., 1989, Consistent Covariance Matrix Estimation with Cross-Sectional Dependence and Heteroskedasticity in Financial Data, *Journal of Financial and Quantitative Analysis,* 24: 333-355.

Grant, J., 1991, Liabilities for Non-Pension Retirement Benefits—Impact on Equity Valuation, Unpublished Working Paper, Case Western Reserve University, Cleveland, Ohio.

Greene, W., 1990, *Econometric Analysis* (New York: Macmillan).

Harris, T. and J. Ohlson, 1987, Accounting Disclosures and the Market's Valuation of Oil and Gas Properties, *Accounting Review,* 62: 651-670.

Henriques, D., 1989, Double Whammy—FASB Readies a Blow to Corporate Earnings and Balance Sheets, *Barron's,* April 17, 8-9, 28-29.

Hirschey, M. and J. Weygandt, 1985, Amortization Policy for Advertising and Research and Development Expenditures, *Journal of Accounting Research,* 23: 326-335.

Judge, G., R. Hill, W. Griffiths, H. Lutkepohl, and T. Lee, 1985, *The Theory and Practice of Econometrics,* Second Edition (New York: John Wiley).

Landsman, W., 1986, An Empirical Investigation of Pension Fund Property Rights, *Accounting Review,* 61: 662-691.

Martens, S. and K. Stevens, 1990, Business Reacts to FASB's Proposal for Nonpension Retirement Benefits, *Journal of Accountancy,* 169 (June): 21-23.

Miller, M., 1977, Debt and Taxes, *Journal of Finance,* 32: 261-275.

Modigliani, F. and M. Miller, 1963, Corporate Income Taxes and the Cost of Capital: A Correction, *American Economic Review,* 53: 433-443.

Pauly, M., 1991, Book Reserving for Retiree Health Benefits: Economic Issues, in: D. Bartlett, ed., *Corporate Book Reserving for Postretirement Health Care Benefits* (Homewood, Ill.: Irwin for the Pension Research Council), 72-85.

Standard & Poor's Corporation, 1989, *Credit Week,* September 11.

Tobin, J. and W. Brainard, 1977, Asset Markets and the Cost of Capital, in: R. Nelson and B. Balassa, eds., *Economic Progress, Private Values and Public Policy: Essays in Honor of William Fellner* (New York: Elsevier-North Holland), 235-262.

U.S. General Accounting Office, 1988, Future Security of Retirees' Health Benefits in Question, GAO/T-HRD-88-30, September 15.

Warshawsky, M., 1989, The Adequacy of Funding of Private Defined Benefit Pension Plans, in: J. Turner and D. Beller, eds., *Trends in Pensions* (Washington, D.C.: U.S. Department of Labor).

Warshawsky, M., 1992a, *The Uncertain Promise of Retiree Health Benefits: An Evaluation of Corporate Obligations* (Washington, D.C.: American Enterprise Institute for Public Policy Research).

Warshawsky, M., 1992b, Financial Accounting and the Funding Status of Pensions, in: J. Turner and D. Beller, eds., *Trends in Pensions 1992* (Washington, D.C.: U.S. Department of Labor), 497-508.

White, H., 1980, A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica,* 48: 817-838.