EARNINGS MANIPULATION, PENSION ASSUMPTIONS, AND MANAGERIAL INVESTMENT DECISIONS*

DANIEL BERGSTRESSER
MIHIR DESAI
JOSHUA RAUH

Managers appear to manipulate firm earnings through their characterizations of pension assets to capital markets and alter investment decisions to justify, and capitalize on, these manipulations. Managers are more aggressive with assumed long-term rates of return when their assumptions have a greater impact on reported earnings. Firms use higher assumed rates of return when they prepare to acquire other firms, when they are near critical earnings thresholds, and when their managers exercise stock options. Changes in assumed returns, in turn, influence pension plan asset allocations. Instrumental variables analysis indicates that 25 basis point increases in assumed rates are associated with 5 percent increases in equity allocations.

I. INTRODUCTION

This paper identifies a simple mechanism for earnings manipulation, examines how manipulation through this channel is linked to CEO incentives, and demonstrates that managers change investment decisions in order to justify, and capitalize on, this type of earnings manipulation. Specifically, managers opportunistically choose assumed long-term rates of return on defined-benefit pension plan assets. These distorted reporting decisions interact with acquisition activity, financial policy, managerial option exercises, and pension fund asset allocation decisions.

The size of defined benefit pension plans and managers' wide latitude in characterizing them to capital markets make pension accounting a fertile area for earnings manipulation. Capital market observers have viewed the actions of IBM, under CEO Louis Gerstner, Jr., as a prime example of this behavior (see McLean [2002]). IBM sponsors a large defined benefit pension plan, with over $57 billion in assets at the end of 2002. Table I outlines the

* A previous version of this paper circulated under the title "Earnings Manipulation and Managerial Investment Decisions: Evidence from Sponsored Pension Plans." The authors thank Shlomo Benartzi, David Cutler, Edward Glaeser, David Hawkins, Caroline Hoxby, Dirk Jenter, Lawrence Katz, André Perold, James Poterba, Norman Schuerhoff, Andrei Shleifer, Jeremy Stein, an anonymous referee, and various seminar participants for helpful comments. Conversations and email exchanges with Ronald Gebhardtsbauer of the American Academy of Actuaries, James Marple of Watson Wyatt, and Jerrold Levy of Mercer Consulting were particularly helpful. The Division of Research at Harvard Business School provided generous financial support.

The Quarterly Journal of Economics, February 2006

TABLE I
PENSION DECISION MAKING AT IBM

	IBM corporate performance		IBM pension plan reporting and impact on IBM corporate reporting				CEO option activity	
Year	Revenue annual growth rate	Income before taxes annual growth rate	IBM's assumed return on DB assets	Annual average of 10-year U. S. Treasury Bond yields	IBM's actual return on DB assets	Share of income before taxes resulting from deviation from 9.25%	Stock options granted to Gerstner (000)	Stock options exercised by Gerstner (000)
1993	−2.80%	na	9.50%	5.87%	na		500	0
1994	2.13%	na	9.50%	7.09%	−1.16%		225	0
1995	12.31%	51.56%	9.25%	6.57%	20.54%		100	3
1996	5.57%	9.91%	9.25%	6.44%	15.54%		300	51
1997	3.37%	5.12%	9.50%	6.35%	18.07%	1.53%	2200	101
1998	4.02%	0.14%	9.50%	5.26%	13.62%	1.66%	0	301
1999	7.20%	30.06%	9.50%	5.65%	15.38%	1.42%	0	803
2000	0.97%	−1.90%	10.00%	6.03%	3.06%	4.77%	650	703
2001	−2.86%	−5.04%	10.00%	5.02%	−5.39%	4.75%	0	1253

The three panels of this table provide descriptive data on the performance of IBM, IBM's worldwide pension plans, and option activity by IBM's CEO Louis Gerstner, Jr. All data on IBM corporate performance and pension plan accounting are calculated from data from 10-K filings, data on option activity are taken from the Compustat Executive Compensation database, and U. S. Treasury Bond yields come from the Federal Reserve Board Statistical Release H-15. Reported earnings are affected by the rate of return assumption because assumed returns on pension assets can be deducted from costs, with differences between assumed and actual returns amortized over long periods. The Share of income before taxes resulting from deviation from 9.25% is the product of the difference between annual assumed rates and 9.25 percent and worldwide pension assets, divided by annual income before taxes.

operating performance of IBM, the performance of its defined benefit pension plan, and the CEO's option grants and exercises. IBM changed its assumed long-term rate of return on pension assets four times during this period, and the company's assumed returns throughout the period exceeded those used by most firms. While IBM reacted to poor actual performance in its pension plan in the mid-1990s by reducing the assumed return, the opposite occurred in 2000, and the higher rate was maintained in 2001. Despite poor equity market returns and declining bond yields during that year, IBM raised its assumed return by 50 basis points. The direction of changes in this forward-looking measure of assumed returns is particularly striking given the generally declining bond yields during the period between 1993 and 2001. Nearly 5 percent of IBM's income before tax in 2000 and 2001 resulted from the increase in their assumed return from 9.25 percent to 10.00 percent. IBM's reported pretax income grew at a compound annual rate of 6.7 percent from 1995 to 2001; without these changes, income would have grown at only a 5.6 percent rate. As Table I shows, these changes in pension assumptions coincided with deteriorating operating performance.

This example suggests that senior managers can use pension accounting to boost reported corporate profits. These actions also appear to influence stock prices. Coronado and Sharpe [2003] present evidence that investors did not "pierce the veil" of pension accounting during the 1990s: earnings associated with changed pension assumptions were capitalized into prices to the same degree as operating earnings, in spite of the often arbitrary nature of these pension assumptions and the transitory nature of their impact on reported income.[1] In a related vein, Franzoni and Marin [2006] conclude that firms with underfunded pension plans are overvalued by the market.

The paper's focus on the assumed return on pension assets as a tool for earnings manipulation relates to the existing literature on earnings management, which typically employs measures of the difference between cash flow and reported earnings, or accounting accruals, as an indication of earnings management. An investigation that focuses on pension assumptions has several advantages. The pension assumptions are fully observable, reflect conscious managerial choices and are plausibly unrelated to other dimensions of a firm's performance, particularly its growth tra-

1. Picconi [2004] concludes that even analysts appear to misinterpret readily available information about firms' pension earnings and funding status.

jectory, which can complicate analyses of accounting accruals. In addition, alternative explanations for results that appear to identify opportunistic changes in assumed returns are testable in clean ways.

To identify the relative incentive to use this lever of earnings manipulation, alternative measures of the sensitivity of a firm's reported profits to the assumed return on pension assets are developed. The different sensitivity measures have different distributional properties, but they all are greater for firms whose pension assets are large relative to operating income or operating assets. These sensitivity measures are shown to be important determinants of cross-sectional patterns in assumed returns, controlling for realized returns on pension assets. For example, a firm in the ninetieth percentile of the main sensitivity measure has on average an assumed return that is 50 basis points higher than a firm in the tenth percentile. These differences in return assumptions can have an economically meaningful impact on reported earnings: at the ninetieth percentile of pension sensitivity, a 50 basis point increase in the assumed return raises a firm's reported earnings by 1.5 percent. As discussed below, such changes can be particularly useful when the firm is near critical earnings thresholds.

In addition to being systematically related to their impact on a firm's earnings, these pension assumptions also relate to investment and financing decisions made by firms and their managers. Firms make particularly high return assumptions in periods leading up to the acquisition of other firms and when undertaking secondary equity offerings (SEOs). Assumed returns are approximately 30 basis points higher for firm-year observations in which other firms are acquired, relative to other firms in the same industry and year. This relationship between merger activity and pension assumptions is robust (though smaller in magnitude) when estimated using firm-level fixed effects. The boost in the assumed return near mergers is even higher at firms whose earnings are more sensitive to the assumed return. Similar patterns emerge in analyses of CEO option activity.

These results employ interaction terms of the sensitivity of earnings with measures of times when earnings manipulation is particularly valuable. Opportunism by managers is also evident by examining the relationship between changes in assumed returns and the degree to which managers are near critical earnings thresholds, such as the announcement of an EPS decline,

falling below industry average earnings growth rates, or a statement of negative net income. Changes to assumed returns are more likely in situations where increases to the assumed returns can be pivotal in helping firms cross these critical earnings thresholds. Taken together, the evidence indicates that managers employ assumed returns opportunistically, and this opportunism interacts significantly with major individual and firm financial and investment decisions.

These opportunistic changes in assumed returns also appear to influence asset allocations within firm pension plans. Indeed, the large equity allocation in most firm pension plans is not consistent with much of the financial literature on the optimal allocation of defined-benefit pension plan assets.[2] The interaction of managerial opportunism and pension accounting may help explain this phenomenon if managers increase equity allocations to justify aggressive return assumptions. In order to examine this possibility, equity allocations are regressed on assumed returns, using acquisition variables as instruments for the assumed return. The results suggest that changes in assumed returns lead to changes in asset allocation decisions. Specifically, a 25 basis point increase in assumed returns is associated with a 5 percentage-point increase in equity allocation. This result seems reasonable given that it is consistent with an assumed market risk premium of 5 percent.

The paper also explores whether this type of earnings manipulation harms or benefits the current shareholders of the firms employing such devices. Managers who are the least constrained by their shareholders—as measured by an index of corporate governance—appear to be the most aggressive with their return assumptions. This evidence suggests that the earnings manipulation investigated here is not likely to reflect the best interests of current shareholders.

This work relates closely to the large literatures on earnings management, incentive compensation, and pension plans. The earnings management literature, reviewed in Healy and Whalen [1999], has emphasized accruals, which are changes in earnings not associated with underlying cash flows. Sloan [1996] finds

2. The analyses of Black [1980] and Tepper [1981] first showed that the value of after-tax cash flows to shareholders is higher if the pension plan is funded with debt. Bodie [1990] demonstrates that any increase in the risk of pension assets reduces shareholder value if the shareholders own less than 100 percent of the pension fund assets.

evidence that the market misprices accruals components of earnings, since periods where accruals make up a large part of earnings are followed by low returns. Xie [2001] finds evidence that this result comes largely from discretionary components of earnings, suggesting that Sloan's result is related to managerial manipulation of earnings.[3] Teoh, Welch, and Wong [1998a, 1998b] focus on discretionary accruals at times when firms sell shares, and find additional evidence consistent with opportunistic managerial manipulation of accruals components of earnings. As detailed in Hall and Murphy [2003], the growth of incentive compensation is one of the most notable developments in corporate practices through the 1990s. Recently, more attention has been paid to the less beneficial effects of such practices, as in Bebchuk, Fried, and Walker [2002]. The evidence presented in this paper links the earnings management literature to managerial incentives by emphasizing a setting where a precise measure of earnings manipulation is available and alternative explanations for the links between managerial motives and this manipulation are more easily addressed.

Analyses of defined benefit pension plans have focused on whether or not firms incorporate pension plans into their own capital structure (as in Friedman [1983] and Bodie, Light, Mørck, and Taggart [1985]), how unfunded pension liabilities are priced by the market (see, for example, Feldstein and Seligman [1981] and Feldstein and Mørck [1983]), and how firms react to the guarantee of pension liabilities provided through the Pension Benefit Guarantee Corporation (PBGC). Several studies have examined asset allocation decisions and their relationship to tax incentives, as in Papke [1992] and Frank [2002]. Amir and Benartzi [1998] examine assumed returns on pension assets and find them weakly related to equity shares and unrelated to future performance of pension fund assets. Gold [2003] conjectures that high equity allocations in defined benefit pension plans reflect managerial incentives created by accounting rules. This paper investigates and confirms this conjecture.

3. Chan, Chan, Jegadeesh, and Lakonishok [2001] focus on market evaluation of accruals components. Their evidence suggests that, even without earnings manipulation, the market misjudges the importance of key accruals components. For instance, reductions in accounts payable (which *reduce* accruals) forecast positive returns. Dechow, Sloan, and Sweeney [1996] emphasize accrual manipulations and their relationship to SEC enforcement actions, and Richardson, Sloan, Soliman, and Tuna [2005] investigate the relevance of broader measures of accruals for these phenomena.

Section II motivates the subsequent analysis with an example that illustrates how the assumed return on pension assets can affect reported income and with a discussion of the methodology employed to explore if such assumptions are opportunistic. Section III reviews the data employed in the subsequent analysis. Section IV analyzes the determinants of assumed returns, placing particular emphasis on the role of merger activity, SEO activity, earnings thresholds, and incentive compensation. Section V relates these decisions on assumed returns to equity allocation decisions, applying instrumental variables analysis. Section VI discusses the consequences of these results for the debate on how opportunistic managerial behavior reallocates value among current shareholders, potential shareholders, and managers. Section VII concludes.

II. Pension Assumptions and Empirical Methodology

A firm sponsoring a defined benefit (DB) pension plan has a liability equal to the present value of all future payments due its employees. The firm funds this liability with devoted pension assets, which are to be managed in the interest of the employee-beneficiaries. These assets and obligations are accounted for on the firm's financial statements, and the costs of sponsoring the plan enter the firm's income statements on an annual basis.

In order to characterize the annual cost of DB plans, three primary calculations are required: a service cost, an interest cost, and an offsetting assumed return on pension plan assets. The service cost is the present value of benefits earned by the firm's employees during the current period.[4] The interest cost is the change in the present discounted value of the pension obligations arising from the approach of the time when these obligations come due. Holding constant the nominal value of the obligations, bringing these obligations a year closer increases their present discounted value. The interest cost would also include the change in the present discounted value of pension obligations due to changing interest rates. Industry observers suggest that individ-

4. When an employee's wages grow with tenure, and when the promised benefits of the DB plan are a function of wages in the final years of employment, the reported service cost captures the cost arising from an additional year of wage growth for covered employees.

ual firms have relatively limited discretion over their reported service and interest costs.[5]

The final component of pension expense, the assumed return on plan assets, offsets the interest and service costs. This return is an *assumed* return rather than the *realized* rate of return on the plan's assets. A desire to insulate annual earnings from year-to-year fluctuations in the market performance of pension assets motivates the use of an assumption rather than realized returns. Managers enjoy significant discretion in setting the assumed return used for the calculation of pension cost on the income statement. The reconciliation between the assumed and actual rates of return happens over time, with potentially very long amortization periods.[6]

The assumed return merits emphasis given the extreme latitude afforded managers in setting it and the impact it has on reported net income. Other dimensions of pension reporting feature considerably less latitude. Explicit rules dictate the rates and assumptions used for contribution and funding decisions, such as deficit reduction contributions for underfunded plans and restrictions designed to prevent substantial overfunding of plans. While firms once had significant leeway over the discount rates used to compute liabilities for its balance sheets, this freedom was curtailed by rulings in the late 1980s and early 1990s.[7] These

5. For a detailed discussion of these accounting rules, see Hawkins [2001] and Zion and Carcache [2002]. For a broader discussion of the legal rules surrounding DB plans, see Langbein and Wolk [2000].

6. Any deviation between actual realized returns and the actuarial assumption enters an off-balance sheet item titled *unrecognized gain or loss*. The rules for amortization of this unrecognized component are based on a "corridor" approach; as long as the unrecognized component is less than 10 percent of the projected benefit obligation (PBO), there is no need to amortize any part of the difference. When the unrecognized component is beyond 10 percent of the PBO, a firm is required to amortize a share of the difference between their position and the 10 percent "corridor" boundary. The required share is based on the expected future service of the plan participants.

7. Between 1987 and 2003, for the purpose of calculating a firm's required Deficit Reduction Contribution (DRC) for an underfunded plan, discount rates tied to the 30-year U. S. Treasury Bond yield were used to value pension liabilities. Legislation approved in April 2004 allows certain companies to use a discount rate that is a blend of long-term corporate bonds. See Rauh [2006] for a further discussion of the evolution of the pension funding status and related issues. The discount rate for calculating the value of pension liabilities reported in firms' financial statements is sometimes confusingly referred to as a long-term return assumption, although it has nothing to do with the return assumption that is the focus of this paper. A ruling by the SEC's Chief Accountant in 1993 explicitly stated that the discount rate for calculating the value of pension liabilities as reported in firms' financial statements should be based on the Moody's Aa interest rate index. Some small discretion remains: differences in the age structure of pension plan participants give pension liabilities different effective durations across firms.

discount rates have converged significantly. Furthermore, the setting of discount rate assumptions is the domain of plan actuaries, whereas firm managers set the assumed return on plan assets.

As a simple example of how the return assumption can be used to affect current reported earnings, consider a firm with $100 of operating assets, a 4 percent ($4) return on these operating assets, and $20 of pension assets. If this firm changes the assumed return from 10 percent to 11 percent, it can immediately increase net income by 5 percent (or $0.20). A manager of a firm with pension assets that are large relative to operating earnings has an economically meaningful opportunity to manipulate reported earnings.[8] Accordingly, the primary measure of pension sensitivity is the log ratio of pension plan assets to operating earnings which effectively captures the elasticity of reported earnings with respect to the assumed rate of return.

This measure of pension sensitivity determines managerial incentives to raise assumed returns opportunistically. In the sample used in this paper, at the tenth percentile of pension sensitivity, where plan assets amount to 5.8 percent of operating income, changing the assumed return from 7.0 percent to 10.0 percent would boost reported income by only 0.2 percent. However, at the median pension sensitivity (where plan assets are equal to 29.9 percent of operating income), the same increase in the assumed return would increase reported income by over 2.0 percent. At the ninetieth percentile of pension sensitivity (where plan assets amount to 304.2 percent of operating income), firm income would rise by almost 9 percent if the assumed return were increased from 7 to 10 percent.

This wide variation in the payoff to manipulating earnings through the return assumption motivates the initial empirical strategy of assessing whether assumed returns are higher for

8. Previous work on earnings manipulation has focused on accruals, which can be conceptualized as the difference between earnings and cash flow. The impact of the pension plan on accruals depends on the measure used. Many papers, such as Sloan [1996], build up accruals from the bottom—from the changes in current assets, current liabilities, cash, short-term debt, and income taxes payable and depreciation. The pension measure of earnings manipulation would not be included in the typical bottom-up measure of earnings manipulation. Researchers including Richardson, Sloan, Soliman, and Tuna [2005] have also constructed top-down measures of accrual-based earnings manipulation, based on the difference between aggregate income and cash flows. Pension earnings would be included in aggregate earnings, and the cash flows reported by the firm would include cash contributions to pension plans, so pension assumptions would be an element of these broad measures.

firms with earnings that are more sensitive to pension assumptions.[9] Such an analysis may mischaracterize higher assumed returns as earnings manipulation if firms with large defined benefit plans assume high rates of return because they can earn higher actual returns net of management fees. Fortunately, this analysis can be extended to control for firm-year specific variation in current and lagged realized returns to address the concern of returns to scale in the management of pension assets.

This cross-sectional analysis is followed by analyses of situations when changing the assumed rate of return is particularly advantageous to managers—in anticipation of an acquisition, a secondary equity offering, or the exercise of stock options. This empirical approach examines whether managers in such situations make more aggressive return assumptions after controlling for common industry-year conditions. This analysis also employs interaction terms with the pension sensitivity measure to investigate whether these effects are particularly pronounced at firms where the incentives to use the return assumption to manipulate earnings are greatest. Finally, it is possible to examine whether these effects persist with firm-level fixed effects. This approach has the advantage of controlling for the full range of unobservable firm characteristics but has the disadvantage of only emphasizing within-firm variation in the pension sensitivity measure which, by construction, is limited. Accordingly, results of specifications that include industry-year fixed effects and results that include both industry-year and firm-level fixed effects are presented.

These analyses rely in part on the measure of pension sensitivity described above. Several issues may complicate this baseline measure of pension sensitivity. First, past realized returns on pension assets influence the numerator of this measure. Any observed relationship between pension sensitivity and assumed returns may be attributable to firms with abnormally high past returns using these realized returns as a basis for increasing assumed future returns. Second, the log measure is used to prevent observations with very small levels of operating income from causing large and outlying values of the sensitivity measure. This procedure collapses the influence of outlying observations and gives the sensitivity variable a more symmetric distribution but is not theoretically moti-

9. Not all firms with large pension plans actively change their assumed returns. Appendix 1 details the assumed returns for the ten largest defined benefit plan sponsors, other than IBM, as provided in their 10-Ks. This Appendix demonstrates that several of these large firms never change their assumed returns and others change their assumed returns often.

vated. Finally, this measure excludes observations with zero or negative operating income, which may be the firms with the strongest incentives for earnings manipulation.

Alternative measures of the incentive to use pension assumptions opportunistically serve to address these concerns. The first alternative measure is designed to eliminate the impact of pension asset returns on the sensitivity measure by removing potential mechanical feedback from the size of the pension fund to the assumed return. This measure substitutes annual pension liabilities for annual pension assets. The second alternative allows the inclusion of observations with negative income in the current year by employing the log ratio of pension assets to the average operating income over the past three years. A third alternative considers the ratio of pension assets to operating assets. Employing this alternative ensures that no observations at all are lost due to income measurement. Table II describes these variables as well as the others used in the empirical analysis.

In addition to these alternative measures of pension sensitivity, settings where the firm is in the neighborhood of critical EPS thresholds provide the opportunity to assess whether changes in assumed returns are motivated by the desire to meet targets without employing any measure of the sensitivity of earnings to pension assumptions. Such tests effectively substitute the proximity of earnings thresholds for the measure of pension sensitivity. These tests also allow for an examination of changes in assumed returns to demonstrate that the setting of assumed returns is indeed opportunistic.

III. Data and Descriptive Statistics

Several data sources are employed in the analysis that follows. Firm nonpension income, nonpension assets, pension fund size, pension liability size, and the assumed return on pension assets are drawn from the Compustat data set for the years 1991–2002. The sample of Compustat firms with defined benefit pension plans over this time period consists of 24,604 observations on 3,661 firms.[10] The assumed return is only available for

10. The universe of Compustat firms with defined benefit pension plans represents 25–30 percent of Compustat firms, but the book assets of Compustat firms with defined benefit plans represent approximately 50 percent of total Compustat book assets. Firms that sponsor defined benefit plans tend to be older and larger than firms that do not.

TABLE II
SUMMARY STATISTICS

Variable	Mean	Median	Standard deviation	Observations
Pension return assumptions and actual returns				
Assumed return on pension assets (%)	8.729	9.00	1.074	20,598
Change in assumed return on pension assets (%)	−0.045	0.000	0.477	16,888
Actual return on pension assets (%)	8.131	9.293	18.672	12,719
Share of pension fund allocated to equity (%)	48.73	56.35	24.73	3,524
Financial and pension variables				
Pension assets ($m)	631.0	60.2	2,578.8	20,598
Pension liabilities ($m)	603.4	61.9	2,315.5	20,598
Operating assets (Book value, $m)	7,273.0	863.9	32,114.2	20,598
Operating income ($m)	552.0	94.8	1870.8	20,598
Earnings sensitivity to pension return assumption				
Log ratio of pension assets to operating income	−0.440	−0.334	1.395	19,319
Log ratio of pension liabilities to operating income	−0.383	−0.322	1.287	19,257
Log ratio of pension assets to 3-year average operating income	−1.420	−1.332	1.300	17,655
Ratio of pension assets to operating assets	0.141	0.084	0.196	20,598
Earnings variables				
Indicator if possible to prevent EPS decline with 50 basis point increase in assumed return	0.007	0.000	0.382	20,598
Indicator if possible to prevent falling below median industry earnings growth with 50 basis point increase in assumed return	0.014	0.000	0.435	20,598
Indicator if possible to prevent negative net income announcement with 50 basis point increase in assumed return	0.001	0.000	0.022	20,598
Other variables				
Acquirer indicator	0.254	0.000	0.435	20,598
Secondary equity offering (SEO) indicator	0.037	0.000	0.188	20,598
CEO option exercise/firm equity market value (%)	0.292	0.000	1.766	7,302
CEO option grants/firm equity market value (%)	0.200	0.018	3.514	7,302
CEO # options exercised/# options held	0.104	0.000	0.547	6,146
CEO # options granted/# options held	0.265	0.200	0.350	6,146

Data on operating performance, pension assets, and pension assumptions are drawn from Compustat. The main sample consists of all firms whose assumed returns on pension assets are reported in Compustat. Pension assets consist of all assets dedicated to fund defined benefit pension liabilities, and pension liabilities are measured on a projected benefit obligation (PBO) basis, meaning that projected salary increases are included in the firm's calculation. The assumed return on pension assets is the primary dependent variable of interest. The acquisition indicator and secondary equity offering indicator are constructed form the Securities Data Company (SDC) database. CEO option data are drawn from the Compustat Executive Compensation database. Pension fund asset allocation data are compiled from *Pensions and Investments* annual reports and IRS 5500 filings (excluding firms with assets in opaque trusts). The actual return on pension assets is collected from Compustat for 1990–1997 and augmented with IRS 5500 filings from 1990–2002.

20,598 of those observations, representing 3,350 firms, and this is the primary sample for this paper.

Data on the actual return on pension assets enable controls for any confounding effects of realized returns on assumed returns. Actual returns are available in Compustat in dollar terms through 1997.[11] These data are augmented with realized returns from IRS Form 5500 filings.[12] Taken together, these sources allow for consideration of 12,719 observations on 2,442 firms. If lagged returns are also analyzed, the sample size falls to 10,013 observations on 2,172 firms. Two distinct sources are also employed for pension fund asset allocation data. First, an annual survey conducted by *Pensions and Investments* covers the asset allocations of the largest U. S. pension funds from 1991–2002.[13] These data can also be augmented with data from the IRS 5500 filings as these forms also contain asset allocation data. The combination of the *Pensions and Investments* and IRS 5500 sources provides equity allocation information for 3,524 firm-year observations.[14]

Firm acquisition and SEO data are drawn from the Securities Data Company (SDC) database; these data are available for the entire sample period. A dummy variable is employed to capture acquisition activity and the corresponding incentive to inflate earnings as acquisitions approach. Acquirer firm-years comprise 25.4 percent of the firm-year observations. The timing convention is to identify a firm-year observation as an acquirer if that firm reports the acquisition of another firm in that year. This

11. The actual return on pension plan assets is assigned to data item 333. Cross-checking with the 10-Ks of firms in the sample revealed that this measure is valid through 1997, but is miscoded from 1998 onwards as the assumed return on pension assets times pension assets, not the actual return.

12. All firms sponsoring pension plans with more than 100 employees must file this form. For firms with multiple plans, the plan-year IRS 5500 filings are aggregated to form firm-year observations. The full set of these forms is publicly available in electronic form through 1998 from the Department of Labor, and for 1999–2002 a subset of several hundred of large firm filings was collected from a private clearinghouse of Form 5500 data.

13. The *Pensions and Investments* survey data begin in 1988, but the years 1988–1990 are not used in this study as the Compustat coverage of the requisite pension variables does not begin until 1991.

14. Approximately equal numbers of firm-year observations of asset allocation come from each of the two sources. IRS 5500 filings provide more observations in the early part of the sample, and *Pensions and Investments* provide more observations in the later part of the sample. The initial size of the *Pensions and Investments* sample is 200 pension sponsors for each year 1990–1996 and 1000 sponsors for 1997–2002. Approximately 45 percent of the entities in each year of *Pensions and Investments* are corporate (as opposed to public, union, or nonprofit) sponsors of DB plans. The IRS 5500 filings add more observations during the period 1990–1998, for which the full sample is available, compared with 1999–2002 for which only the subsample is available.

timing convention is employed because return assumptions are set prior to the fiscal year, and will begin influencing reported earnings starting with the first quarter of the fiscal year.[15] The return assumption may begin impacting firms' prices even earlier through the earnings guidance that firms give to analysts throughout the year. The timing convention for the SEO variable is the same as for the acquisition variable.

Compustat Executive Compensation provides information on CEO option exercise for a subsample of Compustat firms from 1992–2002. CEO option exercise and option grants are studied using several different scalings. CEO option exercises have a mean of 29 basis points as a share of the firm's equity market value, and grants have a mean of 20 basis points. As a share of options held, CEO option exercises have a mean of 10 percent, and grants have a mean of 27 percent.[16] As discussed below, scaling exercise by the CEO's own option holdings provides an additional control for cross-firm heterogeneity in the use of option-based compensation.

The analysis that follows uses different samples depending on the availability of the variables employed. Specifically, the sample varies as a function of the availability of components of the measures of pension sensitivity and because of the reduced sample sizes available for consideration of option activity and pension asset allocation.

IV. The Determinants of Assumed Returns

The empirical work in this section assesses the determinants of assumed returns with particular emphasis on the sensitivity measure and on periods around mergers and secondary equity

15. FASB Statement 87 requires annual, but not interim, disclosure of the components of net periodic pension cost. Until the December 2003 revision to Statement 132, interim disclosure was limited to the aggregate net periodic pension cost, with no requirement to reveal the underlying components or assumptions. In the period prior to the recent revision, an increase in the assumed return would impact reported earnings starting in the first quarter of the year, though the annual report would be the first financial statement to reflect this change.

16. Among the observations that have nonzero values for option exercise, the mean exercise is 27 percent of options held. Among the observations that have nonzero values for option grants, the mean grant is 32 percent of options held. When option exercises are expressed as a share of options held, the twenty-fifth percentile, median, seventy-fifth, and ninetieth percentiles are at 4 percent, 10 percent, 25 percent, and 55 percent, respectively. For option grants as a share of options held, these divisions are at 16 percent, 24 percent, 39 percent, and 65 percent, respectively.

offerings, periods where the firm is near critical earnings thresholds, and periods when managers are exercising and being granted stock options.

IV.A. The Distribution of Assumed Returns

The cross-sectional distribution of assumed returns has been relatively constant during this period, even as bond yields have changed substantially. Figure I documents the median return assumption, by year, in the sample of firms sponsoring pensions. The median assumed return is constant at 9 percent until the last period of the sample, when it falls to 8.5 percent. This stable distribution of the assumed return is striking because yields on Treasury securities have been declining; the lowest line on Figure I shows the yield on ten-year government bonds over the period. Because firms generally hold a mix of equity and fixed-income securities, the fact that the median return assumption has remained constant implies increasing optimism about the contribution to total returns from the equity component of pension plans. The top line on Figure I plots the implied assumed return on the

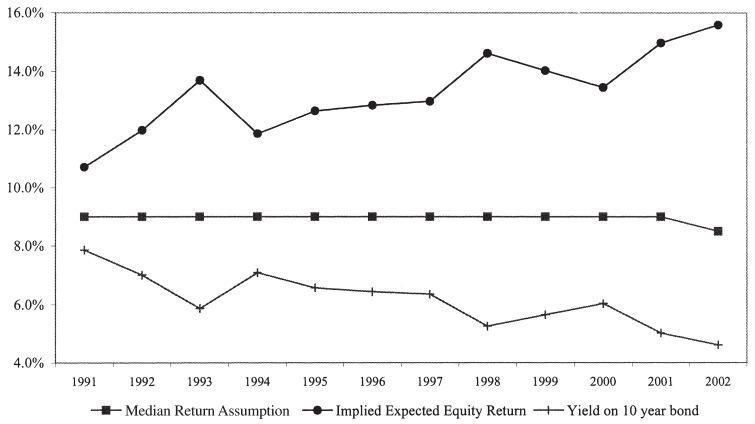

FIGURE I

Long-Term Rate of Return Assumptions and Implied Equity Returns

The figure plots the assumed rate of return on pension assets, ten-year bond yields, and implied expected equity returns. The median rate of return assumption is drawn from the sample of Compustat firms as described in the text. Yields on the ten-year bond are from the Federal Reserve. The implied expected equity return is the expected return on equities for a portfolio with 40 percent of assets allocated to equities, and 60 percent allocated to bonds with prevailing bond yields and a 9 percent assumed return on the portfolio.

equity securities held in a pension fund that allocates 40 percent of its assets to equities, 60 percent of its assets to bonds, and assumes an overall return of 9 percent. At this ratio, the implied assumed return on equity, based on actual bond yields, was approaching 16 percent by 2002.[17]

The constant cross-sectional distribution of assumed returns over this period does not mean that individual firm assumptions have been fixed. Table III documents the pattern of increases and decreases to the assumed return over the sample period. Increases in the assumed return are more common during the late 1990s, while decreases are more common in the early 1990s and 2001 and 2002. Nonetheless, significant fractions of increases and decreases are represented in all years, providing some indication of the latitude afforded managers in setting this rate. In aggregate, 37.2 percent of the firms in the sample increased the rate at least once, and 49.0 percent decreased at least once, although as Table III shows, the decreases were heavily concentrated in 2002. Even in the market environment of 2000–2002, a significant fraction of firms increased their assumed return.

IV.B. Pension Sensitivities and Assumed Returns in the Cross Section

Table IV reports the results of linear regressions of firm-year assumed returns on various pension sensitivity measures. All specifications include industry-by-year fixed effects, with a separate control variable for each of 48 industry classifications in each year. Standard errors are corrected for clustering at the firm level. The regressions in the upper panel contain no covariate controls other than the industry-by-year fixed effects. The lower panel regressions contain controls for the contemporaneous and lagged actual return on plan assets, to examine whether firms respond to actual returns in setting assumed returns and to control for the possibility that firms with larger pension plans are able to earn higher actual returns.

With no other covariates, the coefficient on the first pension

17. A forward-looking expected return of 16 percent on an equity portfolio is optimistic by most measures. In Welch's [2001] survey of finance and economics academics, the expected 30-year stock market returns averaged 9.1 percent, and estimates were concentrated between 8.0 and 10.5 percent. Similarly, survey results from institutional investors during this period, collected by Robert J. Shiller, Fumiko Kon-Ya, and Yoshiro Tsutsui and posted at http://www.econ.yale.edu/%7Eshiller/data/investor.html are also not consistent with such high expected returns during this period.

TABLE III
CHANGES IN ASSUMED RETURNS ON PENSION ASSETS (1992–2002)

Year (1)	Mean change (2)	Number of increases (3)	Number no change (4)	Number of decreases (5)	Total count (6)	% of Firms increasing (3)/(6)	% of Firms decreasing (5)/(6)
1992	−0.051	96	1,383	216	1,695	5.7%	12.7%
1993	−0.153	93	1,240	383	1,716	5.4%	22.3%
1994	−0.050	147	1,323	267	1,737	8.5%	15.4%
1995	0.015	190	1,333	149	1,672	11.4%	8.9%
1996	0.021	178	1,359	123	1,660	10.7%	7.4%
1997	−0.003	172	1,305	120	1,597	10.8%	7.5%
1998	−0.023	155	1,162	164	1,481	10.5%	11.1%
1999	0.015	164	1,138	145	1,447	11.3%	10.0%
2000	0.035	184	1,107	109	1,400	13.1%	7.8%
2001	−0.037	103	1,018	162	1,283	8.0%	12.6%
2002	−0.311	37	642	521	1,200	3.1%	43.4%

The table shows the mean change in the assumed return and the number of increases, nonchanges, and decreases for all firms in the sample reporting current and lagged assumed returns in Compustat. Mean changes are in percentage points.

sensitivity measure (the log ratio of annual pension assets to operating income) is 0.126 and is statistically significant. This implies that a movement from the tenth percentile of log pension sensitivity (−2.85) to the ninetieth percentile (1.11) would be associated with a 50 basis point increase in the assumed return.[18] At the ninetieth percentile of pension sensitivity, a 50 basis point increase in the assumed return raises a firm's reported earnings by 1.5 percent.[19] The effect is approximately 20 percent smaller in the lower panel in which lagged and current actual returns are used as control variables. This reduced magnitude appears to be the result of the substantially reduced sample size as results are similar to the lower panel when the specification with no covariates is run on the smaller sample. Realized returns do appear to be correlated with assumed returns but the effect is very small. A one percentage point increase in actual returns is associated with an assumed return that is only 0.5 basis points higher.

The remaining columns of Table IV explore the alternative

18. The difference in log pension sensitivity between the ninetieth and tenth percentiles is $1.11 - (-2.85) = 3.96$. The effect of moving from the tenth to the ninetieth percentile is therefore $0.126 * 3.96 = 0.50$ percent.

19. A log pension sensitivity of 1.11 corresponds to a pension sensitivity of 3.04, and 1.5 percent is 50 basis points times 3.04.

TABLE IV
ASSUMED RETURNS AND PENSION SENSITIVITY MEASURES

	Dependent variable: assumed return on pension assets (%)			
	(1)	(2)	(3)	(4)
Pension sensitivity measure	Log ratio of pension assets to operating income	Log ratio of annual liabilities to operating income	Log ratio of pension assets to 3-year average operating income	Ratio of pension assets to operating assets
Panel A: Industry-by-year controls				
Pension sensitivity	0.126***	0.117***	0.124***	0.568***
	(0.014)	(0.014)	(0.014)	(0.110)
Observations	19,319	19,257	17,655	20,598
Firms	3,246	3,237	2,853	3,350
Adjusted R^2	0.078	0.072	0.076	0.065
Panel B: Industry-by-year and actual return controls				
Pension sensitivity	0.098***	0.093***	0.103***	0.443***
	(0.016)	(0.017)	(0.017)	(0.129)
Actual return on pension assets (%)	0.003***	0.004***	0.003***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Lagged actual return on pension assets (%)	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	9,500	9,490	9,507	10,013
Firms	2,096	2,090	2,090	2,172
Adjusted R^2	0.065	0.062	0.065	0.056

The dependent variable is the assumed rate of return on pension assets. Standard errors, reported in parentheses, are corrected for firm-level clustering. The sample for column (1) in Panel A is conditional on the firm reporting pension asset size and positive operating income. The sample for column (2) in Panel A is conditional on the firm reporting pension liabilities and positive operating income. The sample for column (3) in Panel A consists of firms with a three-year history of operating income. The sample for column (4) in Panel A consists of all firms with nonzero pension assets and operating assets. The samples for Panel B are the subsets of the samples for Panel A for which actual returns and lagged returns on plan assets are also available.

*** indicates significance at the 1 percent level.

measures of pension sensitivity. The measure of pension sensitivity in column (2) uses annual pension liabilities in the numerator, rather than annual pension assets. These results are not statistically distinguishable from the results using the main sensitivity measure, suggesting that the effect observed is not merely the result of managers adjusting the assumed return to correspond with recent actual investment returns. Column (3) uses the log ratio of pension assets to the three-year backward-looking moving average of operating income. This specification allows the inclusion of a set of firms that have negative operating income in

the current year. Again, the results are not statistically distinguishable from the main results in column (1) indicating that the treatment of observations with negative operating income is not driving the results. Finally, column (4) uses the ratio of pension assets to operating assets as the measure of pension sensitivity. This measure abstracts from earnings and so avoids a variety of selection issues but, consequently, provides only a crude measure of the power of manipulating earnings through pension assumptions. The scaling of this variable and the coefficient of 0.568 implies that moving from the tenth percentile (in which pension assets are 0.9 percent of operating assets) to the ninetieth (in which they are 33 percent of operating assets) would be correlated with an 18 basis point increase in the assumed return. A number of other sensitivity measures were also explored, including the log ratio of within-firm sample average pension assets to operating income, and the winsorized level ratio of pension assets to average operating income. The results were of similar significance and magnitude to the results documented in Table IV. As the measure of pension sensitivity in column (1) is the most direct measure of the ability of managers to influence reported income with changes in assumed returns, the remainder of the paper focuses on this measure but also discuss the robustness of results to the choice of sensitivity measure.

IV.C. Acquisition Activity and the Effect on Assumed Returns

If managerial opportunism is important in determining assumed returns, then assumed returns should be higher when managers are most interested in inflating reported profits. Additionally, firms that are able to inflate profits with assumed returns more easily, identified through the measure of pension sensitivity, would be expected to react more to these situations. One circumstance in which managers may want to raise reported earnings is in preparation for the acquisition of other firms, both to boost the price of stock that might be used as currency in such transactions and to generate greater bargaining power in the bidding process.

Figure II presents one view of the relationship between takeover activity and the assumed returns, describing the pattern of assumed returns around periods which firms undertake mergers. Each point on the figure corresponds to a separate regression (with 2-standard error bands on either side); these regressions fit firm-year return assumptions on indicator variables for calendar

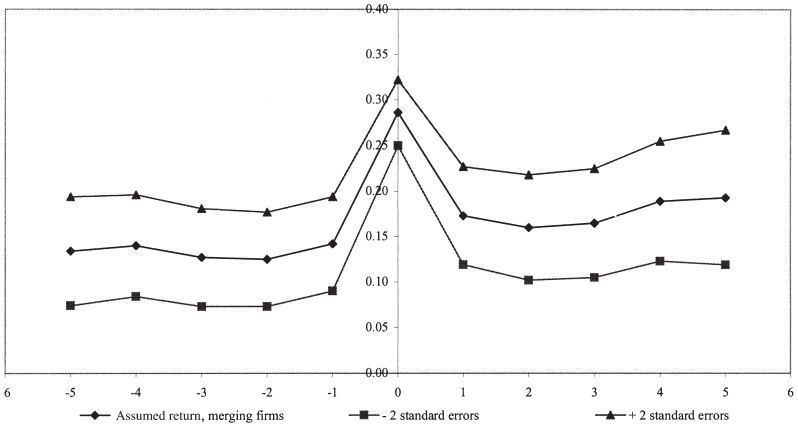

FIGURE II
Long-Term Rate of Return Assumption around Mergers

The figure shows long-term rate of return assumptions reported by firms in periods around mergers. These averages are regression-adjusted for calendar-year effects. The estimate of period 0 is the average assumption for firms reporting acquisitions of another firm in that year. The estimate for period 1, for example, is the average assumption for firms reporting acquisition of another firm in the previous year, but not in the current year. Similarly, the estimate for period −1 is the average LTROR assumption for firms reporting acquisitions of another firm in the next year, but not in the current year. Long-term rate of return assumption data are from Compustat, and acquisition data are from the Securities Data Company (SDC).

year as well as an additional indicator variable capturing takeover activity. Each date on the graph corresponds to a separate regression with a different indicator variable; the −5 year point in the figure is the coefficient on the indicator variable from a regression with an indicator variable set equal to 1 if the firm is not making an acquisition in this year but will acquire another firm in five years. The year 0 point on the graph presents the results of a regression where the indicator variable is equal to one for all firms that acquire other firms in that year.

This marks only a preliminary exploration of the data, but the results are revealing. Firms that will eventually engage in merger activity do appear different from other firms. Conditional only on takeover activity in five years and none in the current year, assumed returns are almost 15 basis points higher than their unconditional expectation in the complementary group of firms. However, firm return assumptions are almost 30 basis points higher during merger years than during other years.

Table V pursues this line of investigation more rigorously. An

TABLE V
ASSUMED RETURNS AND ACQUISITION ACTIVITY

	Dependent variable: Assumed return on pension assets		
	(1)	(2)	(3)
Acquirer indicator	0.336***	0.041***	0.038***
	(0.029)	(0.013)	(0.014)
Acquirer indicator interacted with pension sensitivity	0.064***	0.032***	0.031***
	(0.020)	(0.011)	(0.011)
Pension sensitivity	0.113***	0.005	−0.004
	(0.015)	(0.013)	(0.014)
Industry-by-year controls	Yes	No	Yes
Year only controls	No	Yes	No
Firm fixed effects	No	Yes	Yes
Observations	19,319	19,319	19,319
Adjusted R^2	0.094	0.748	0.754
Firms	3,246	3,246	3,246

The dependent variable is the assumed rate of return on pension assets. The acquirer indicator variable is a dummy variable equal to one if the firm undertakes an acquisition in that year. Pension sensitivity is the log ratio of pension assets to operating income. Standard errors, reported in parentheses, are corrected for firm-level clustering. Financial and pension data are from Compustat, and SEO data are from the SDC database.

*** indicates significance at the 1 percent level.

indicator variable is set equal to one when the firm makes an acquisition of another firm in that year. This indicator variable is meant to capture the motivation to inflate reported earnings in order to boost a company's share price prior to acquisition activity. The regressions in these columns include the acquirer indicator as well as its interaction with the pension sensitivity measures. The interaction term allows the effect of this incentive to vary based on the sensitivity of earnings to the assumed return.[20] Column (1) contains industry-by-year fixed effects, column (2) contains firm and year fixed effects, and column (3) contains both firm and industry-by-year fixed effects. The results suggest that firms make more aggressive return assumptions as they prepare

20. It is possible that stock-financed mergers would be more closely associated with increases in assumed returns. The results do not indicate a distinctive pattern of assumed returns for stock-financed mergers, but the investigation was clouded by empirical and conceptual difficulties. The SDC data have only coarse groupings on the type of financing, and manual inspection of the data for several companies relative to their 10-Ks suggests only a crude mapping between the two sources. Furthermore, Fama and French [2004] show that equity issuance through mergers is isomorphic with other forms of equity issuance and may be associated with additional monitoring costs.

to acquire other firms. Furthermore, the significant coefficients on the interaction effect show that when pension sensitivity is higher, the marginal impact of the acquisition effect is also greater.

Considering the coefficients in column (1), the coefficient on the acquirer indicator implies a baseline effect of 33.6 basis points at a log sensitivity of zero.[21] This means that firms making acquisitions assume a return that is 33.6 basis points higher than firms in the same industry-year that are not making acquisitions. The interaction effect shows that for each additional point of log sensitivity, this effect is 6.4 basis points higher. A firm in the ninetieth percentile of sensitivity (1.11) therefore has a response that is 25 basis points larger than a firm in the tenth percentile of sensitivity (−2.85) in the same industry and year.[22] An acquiring firm with median sensitivity (−0.33) has an assumed return that is approximately 30 basis points higher relative to nonacquiring firms in the same industry and year.

Similar calculations can be made for specification with firm fixed effects. The evidence here is based strictly on within-firm variation. The coefficient on the acquirer indicator in column (3) shows a smaller but still robust response of 3.8 basis points at a log sensitivity of zero. The interaction effect in this specification shows that for each point of additional log sensitivity, the assumed return is 3.1 basis points higher, holding all other characteristics fixed. These point estimates imply that for a firm at the tenth percentile of pension sensitivity, assumed returns are negligibly higher (0.5 basis points) during acquisition years. For a firm at the ninetieth percentile of pension sensitivity, the estimated increase in the assumed return during an acquisition year would be 7.2 basis points. This is consistent with a 25 basis point increase for one out of every three acquisitions.[23]

The results in Table V are robust to the use of alternative

21. A firm with log sensitivity of zero falls approximately into the sixty-second percentile of sensitivity values and has pension assets equal to operating income.

22. Twenty-five basis points is the product of the interaction coefficient (0.064) with the sensitivity differential 3.96 (which is 1.11 − (−2.85)).

23. This calculation, since it is based on fixed effects, essentially assumes that all cross-sectional variation in acquisitions is the result of unobserved heterogeneity, and as a result may understate the true effect. If one makes the other extreme assumption that none of the cross-sectional variation in acquisitions is the result of unobserved heterogeneity, then column (1) implies an effect of approximately 40 basis points for the firm in the ninetieth percentile of sensitivity.

specifications of earnings sensitivity and display generally similar magnitudes for both the uninteracted and interacted acquirer effect. Using the log ratio of annual pension assets to three-year average operating income yields a statistically significant coefficient on the acquirer in the specification with firm and industry-by-year fixed effects that is twice as large and an interaction effect that is about 25 percent larger. Using the log ratio of annual pension assets to operating assets in a similar specification generates a baseline coefficient on the acquisition variable that is not statistically significant and a large and very significant interaction coefficient. Together, these coefficients imply a 25 basis point increase for one in every two acquisitions by a firm at the ninetieth percentile of earnings sensitivity.

The robustness of these results to alternative explanations was explored in a variety of additional specifications presented in Bergstresser, Desai, and Rauh [2004]. In particular, specifications that include additional controls were considered, including the share of pension assets invested in equity, the actual return on pension assets, CEO option grants as a share of total compensation, and the pension funding status. Controlling for the share of pension assets invested in equity and for the actual return on pension assets helps reject alternative hypotheses for the long-term rate of return assumption. In particular, these specifications allow the rejection of the hypothesis that the results presented here can be explained by feedback from actual past returns to assumed forward-looking returns. Controlling for CEO option grants helps reject the alternative hypothesis that both assumed returns and acquisitions reflect general CEO optimism. Controlling for the pension funding status helps reject the alternative hypothesis that firms with underfunded plans raise the assumed rate of return. Controlling for each one of these variables requires a rather severe restriction of the sample size, but the results are robust to a specification that includes all of these additional controls with indicator variables for whether each control variable is available.

IV.D. Return Assumptions and SEOs

In order to further assess the relationship between opportunistic firm activity and the setting of assumed returns, this section focuses on SEOs given the incentive to increase earnings prior to equity issuance. SEOs are considerably less common than acquisitions, with 25.4 percent of the sample firm-year observa-

tions featuring an acquisition and 3.7 percent of the sample observations featuring an SEO. Consequently, there is substantially less variation to exploit, but the results nonetheless complement the findings on acquisitions. Table VI provides specifications similar to those explored in Table V, and the results can be interpreted similarly. Again, given the importance of industry and year factors in dictating SEO activity, the specification in column (1) includes industry-by-year controls. The coefficients from this specification implies that a firm with a sensitivity value of zero would have an assumed return that is 12.6 basis points higher in an SEO year, whereas a firm with ninetieth percentile sensitivity (1.11) would have an assumed return that is 22 basis points higher in an SEO year.[24] Controlling for the industry and year conditions that have been shown to play a large role in SEO activity, this analysis indicates that assumed rates of return are higher for equity issuers and for those issuers with the greatest ability to increase profits through assumed returns.

Unlike the results on acquisition activity, the results on the opportunistic use of assumed returns around SEOs are more sensitive to the set of controls employed. Specifically, the inclusion of firm fixed effects and industry-by-year controls does not provide consistent results as is clear by comparing the specifications provided in columns (1) and (2). Employing the alternative sensitivity measures described above produces mixed results with some measures providing significant results in specifications with all controls and others only producing significant coefficients on the variables of interest in specifications with particular controls. This difference in robustness may reflect the infrequency of SEOs relative to acquisitions. Given the dominant importance of industry and year factors in determining SEO activity, the results on assumed returns complement the analysis on acquisitions presented above.

IV.E. Return Assumptions and Option Activity

In order to further assess the role that opportunistic managerial behavior plays in setting assumed returns, this section focuses on CEO option activity. Table VII shifts to a smaller sample of firms for which executive compensation data are available in addition to data on pension assets and assumed returns. This analysis employs a similar empirical framework as in Tables

24. Twenty-two basis points or 0.22 percent equals 0.126 plus 0.083 $*$ 1.11.

TABLE VI
ASSUMED RETURNS AND SECONDARY EQUITY OFFERINGS (SEOS)

	Dependent variable: Assumed return on pension assets	
	(1)	(2)
SEO indicator	0.126**	−0.032
	(0.049)	(0.027)
SEO indicator interacted with pension sensitivity	0.083**	−0.021
	(0.034)	(0.030)
Pension sensitivity	0.123***	0.002
	(0.014)	(0.014)
Industry-by-year controls	Yes	Yes
Firm fixed effects	No	Yes
Observations	19,319	19,319
Adjusted R^2	0.078	0.754
Firms	3,246	3,246

The dependent variable is the assumed rate of return on pension assets. The SEO indicator variable is a dummy variable equal to one if the firm conducts an SEO in that year. Pension sensitivity is the log ratio of pension assets to operating income. Standard errors, reported in parentheses, are corrected for firm-level clustering. Financial and pension data are from Compustat, and SEO data are from the SDC database.
*** indicates significance at the 1 percent level, and ** indicates significance at the 5 percent level.

V and VI and investigates both CEO option exercise and grants. The first two columns in Table VII scale option exercises and grants by firm equity market value as is typical in the literature. To interpret the magnitudes in this table, it is useful to consider the distribution of CEO option exercises and grants as a share of firm value. For 68 percent of the firm-year observations for which CEO compensation data are available, CEO option exercises are reported to be zero. For those observations with exercise activity, the tenth percentile of exercise amounts to 0.03 percent of firm value, and the ninetieth percentile of exercise amounts to 2.09 percent of firm value. CEO option grants are nonzero for a larger share of the sample (67 percent), but the conditional distribution is smaller than exercises with grants amounting to 0.31 percent of firm value at the ninetieth percentile.

Consider a CEO whose option exercise amounts to 2 percent of the firm's equity market value, compared with one where the CEO exercises no options. The coefficients in column (1) imply that CEO option exercise has a baseline effect of 5.4 basis points (2 times 0.027 percentage points) at a log sensitivity of zero. The interaction effect shows that for each additional point of log

TABLE VII
ASSUMED RETURNS AND CEO OPTION ACTIVITY

	Dependent variable: Assumed return on pension assets			
Scaling of option variables:	*Firm equity market value*		*Options held by CEO*	
	(1)	(2)	(3)	(4)
CEO option exercise	0.027***	0.011*	0.040*	0.016
	(0.010)	(0.006)	(0.023)	(0.015)
CEO option grants	−0.004	−0.006**	−0.068	0.019
	(0.008)	(0.003)	(0.045)	(0.034)
CEO option exercise interacted with pension sensitivity	0.012**	0.005	0.012	0.005
	(0.006)	(0.003)	(0.012)	(0.012)
CEO option grants interacted with pension sensitivity	0.000	0.000	−0.085***	−0.007
	(0.002)	(0.001)	(0.029)	(0.024)
Pension sensitivity	0.156***	0.024	0.189***	0.024
	(0.022)	(0.022)	(0.023)	(0.028)
Industry-by-year controls	Yes	Yes	Yes	Yes
Firm fixed effects	No	Yes	No	Yes
Observations	7,075	7,075	5,951	5,951
Adjusted R^2	0.157	0.755	0.113	0.733
Firms	1,131	1,131	1,069	1,069

The dependent variable is the assumed rate of return on pension assets. CEO option activity is scaled by firm equity market value in columns (1) and (2) and by number of options held in columns (3) and (4). Pension sensitivity is the log ratio of pension assets to operating income. Standard errors, reported in parentheses, are corrected for firm-level clustering. Financial and pension data are from Compustat; option grant and exercise data are from ExecuComp.

*** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level.

sensitivity, this effect is 2.4 basis points (2 times 0.012 percentage points) greater. A firm in the ninetieth percentile of pension sensitivity has a response to CEO option exercise that is 9.5 basis points larger than the response to CEO option exercise at a firm in the tenth percentile of sensitivity in the same industry and year.[25] As indicated by the results reported in column (2), this effect is reduced significantly when firm fixed effects are used in addition to industry-by-year controls but is still significant at the 10 percent level. CEO option grants now enter with a negative and statistically significant coefficient, although the magnitude is

25. Nine point five basis points is the product of twice the interaction coefficient ($2 * 0.012$), with the sensitivity differential 3.96 (the difference between the tenth and ninetieth percentile sensitivity), where the factor of two represents the fact that this calculation is done for an option exercise of 2 percent of firm value.

small. The results suggests that while assumed returns are unusually high at firm-year observations where the CEO is exercising large amounts of options relative to firm value, they may be lower in periods of large option grants. This would be consistent with gaming behavior in two directions: manipulating earnings upward in periods of option exercise, and manipulating earnings downward in periods when options are granted. The use of other pension sensitivity measures in these specifications was also explored. Results are similar when pension liabilities are substituted for pension assets, or when operating assets are substituted for operating income, but are weaker when three-year average operating income is substituted for annual operating income.

It is possible that the link between option activity and assumed returns may only reflect unobserved heterogeneity in the optimism of managers. The specifications reported in columns (3) and (4) normalize option activity by the number of options held by the CEO. This alternative scaling is explored to control for potentially spurious correlation between the propensity to compensate executives through options and optimism about assumed returns. In column (3) the coefficient on normalized option exercise is positive and statistically significant at the 10 percent level, the coefficient on option grants is negative with a *t*-statistic of 1.54, and the options grant coefficient interacted with sensitivity has a large, negative, and strongly significant coefficient. The interaction coefficient on grants implies that comparing a firm at the tenth percentile of sensitivity and the ninetieth percentile of sensitivity yields a difference of 34 basis points for a CEO being granted options that double the number of options held and a difference of 6.8 basis points for a CEO being granted the unconditional median number of options (20 percent of options already owned).[26] For the CEO receiving the median option grant, the assumed return is 6.8 basis points lower than at the firm of a CEO in the same industry who does not receive an option grant in the same year. As indicated by the results in column (4), these results are not robust to the inclusion of firm-level fixed effects.

26. Thirty-four basis points is calculated as the difference between the tenth and ninetieth percentile sensitivities (3.96) times the interaction coefficient of 0.085.

IV.F. Return Assumptions and Dynamics of Reported Earnings

The analysis in Tables V, VI, and VII demonstrates that managers use high assumed returns if high returns are particularly efficient ways of managing earnings and as they approach critical financial and investment decisions. Such opportunistic behavior may also be pronounced when changes in return assumptions can produce earnings that would help managers meet critical earnings thresholds. The analysis in Table VIII tests whether managers are more likely to raise the assumed return on

TABLE VIII
ASSUMED RETURNS AND DYNAMICS OF REPORTED EARNINGS

	Change in assumed return on pension assets (%)					
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Indicator if possible to prevent EPS decline with 50 basis point increase in assumed return	0.069**	0.049				
	(0.034)	(0.035)				
Indicator if possible to prevent falling below median industry earnings growth with 50 basis point increase in assumed return			0.080***	0.059***		
			(0.021)	(0.022)		
Indicator if possible to prevent negative net income announcement with 50 basis point increase in assumed return					0.257***	0.234**
					(0.094)	(0.094)
Industry-by-year controls	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	—	Yes	—	Yes	—
Observations	16,888	16,888	16,888	16,888	16,888	16,888
Adjusted R^2	0.036	0.049	0.035	0.049	0.039	0.053
Firms	2,809	2,809	2,809	2,809	2,809	2,809

The dependent variable is the change in the assumed rate of return on pension assets. The sample is all firms for which the assumed return on pension assets is reported in the current and previous year. Standard errors, reported in parentheses, are corrected for firm-level clustering. Earnings per share and net income exclude extraordinary items and are taken from Compustat.

*** indicates significance at the 1 percent level, and ** indicates significance at the 5 percent level.

pension assets when their firms would otherwise have reported lower earnings relative to the previous year, lower earnings growth relative to the growth rates of firms in their industry, or negative earnings. Since the analysis uses first differences (changes in assumed returns), firm fixed effects are not employed. This analysis does not require any measure of pension sensitivity as it effectively substitutes the proximity to these thresholds for the pension sensitivity measure. In specifications that include industry-by-year fixed effects, the coefficients represent variation within firms over time that is not related to general intertemporal variation within industries.

The first two columns consider whether firms use higher return assumptions when it would be possible to prevent a decline in reported earnings per share (EPS) with a 50-basis-point increase in assumed returns. This is modeled using an explanatory variable set equal to one if EPS would have declined in the absence of a change in the assumed return, but would have stayed the same or risen in the presence of such an increase. This possibility arises for 0.7 percent of firm-year observations, i.e., on 142 occasions. The coefficient in the first column shows that the change in assumed returns is seven basis points higher among the firms in this situation, and the effect is statistically significant at the 5 percent level. Column (2) adds industry-by-year fixed effects to this analysis. Adding these fixed effects reduces the coefficient by about 30 percent and leaves the standard error unchanged. The weakening of the result in the presence of industry-by-year effects suggests that there is some clustering of this behavior within industries.

Managers may also want to avoid reporting slower earnings growth than the rest of the firms in their industry in a given year. Table VII evaluates whether managers that can avoid this situation with a 50-basis-point increase in assumed returns (1.4 percent of observations or 281 firm-years) tend to increase the assumed return. Columns (3) and (4) show that these observations have larger changes in assumed returns by a margin of eight and six basis points, respectively, in specifications with year and industry-by-year controls.

Columns (5) and (6) examine the changes at firms for which a 50 basis point increase in the assumed return would constitute the marginal difference between positive and negative net income. There are only 28 such observations in the sample, but these firms on average increase assumed returns by approxi-

mately 25 basis points. A variety of additional specification checks point to the robustness of this result. In particular, specifications where the dependent variable is the level of assumed returns, both with and without firm fixed effects, are consistent with the results in Table VIII. Adding controls for contemporaneous and lagged actual pension returns similarly does not affect these basic results. Finally, a falsification exercise was run. This exercise reproduced Table VIII with a slightly different independent variable, set equal to one if the firm, in the absence of a change to the assumed return, was just above a critical earnings hurdle. These results suggest that firms that are just above critical hurdles make no changes to their assumed returns. These robustness checks confirm that the measured effects are driven by the proximity to earnings thresholds, not simply by correlations between earnings dynamics and the dynamics of realized pension fund asset returns.

The results in Tables V through VIII paint a reasonably consistent picture: managerial opportunism is a factor in determining assumed returns. In settings where the return assumption has a larger impact on earnings, managers make more aggressive assumptions. This finding is consistent with firms balancing the costs of reporting aggressive return assumptions with the benefits that come from increased reported earnings. Managers are more aggressive with their assumptions as they acquire other firms, as they issue equity, and as they exercise stock options indicating a link between managerial reporting decisions and managerial investment decisions. Managers are aggressive with assumed returns if they face a possible earnings decline, if their earnings growth would be below the industry average, or if they would have to report negative earnings. The acquisition and earnings threshold results are robust to a variety of controls and alternative measures while the results involving SEOs and CEO option activity are somewhat weaker, reflecting, in part, the infrequency of SEOs and the smaller sample available for investigating CEO option activity.

V. The Determinants of Asset Allocation Decisions

Higher assumed returns on pension plans may be easier to rationalize if the underlying pension asset allocations emphasize equities. If so, the managerial incentives identified above may influence not only financial reporting and investment decisions

but also pension plan asset allocations. Using the sample that can be merged with DB pension plan equity allocation data, this section investigates the possibility that managers shift pension assets toward equity in order to justify the higher assumed returns they report in periods around mergers. This analysis addresses the conjectures of practitioners such as Gold [2003] who hypothesize that the income statement effects of high assumed returns may explain asset allocations. Company statements also have linked reported assumed returns and their pension plan asset allocations.[27] Conversations with industry insiders suggest that the main constraint that auditors put on assumed returns is that they reflect the risk of the pension fund assets. While auditors may be willing to accept a 10 percent assumed return based on a pension fund invested in equities, auditors are more likely to reject that assumed return for a pension plan invested in Treasury bills yielding 4 percent. In order to investigate this possibility, the analysis in Table IX employs two-stage least squares regressions of the pension equity allocation share on the assumed pension return, with the assumed return instrumented with the acquirer indicator variable.[28] The identifying assumption in each regression is that the instrumental variable is correlated with pension fund asset allocation choice only through its effect on the assumed return.

The first three columns of Table IX show the results of OLS regressions of equity shares on the assumed return. Column (1) shows the specification with year effects only, column (2) adds industry-by-year effects and a control for the actual return on pension plan assets, and column (3) replace industry and year effects with industry-by-year effects. In column (1), for each percentage point increase in the assumed return, the pension fund

27. One such example of these links is provided by the statements made in press releases by General Motors (GM) in late 2003 regarding their pension plans. Under pressure to respond to concerns about their pension funding situation and their 9 percent assumed return, GM made a large contribution to their pension and also assured investors that projected returns would be achieved as a result of "increased allocation to asset classes such as emerging market debt, high-yield bonds, real estate, and other asset classes."

28. Regressions using CEO option exercise as an instrument for the assumed return were also explored. The joint requirement of Compustat Executive Compensation data and data on the equity share in pension assets leads to a sample size of about 1,500. Results using this smaller sample are not statistically significant. The other earnings dynamics indicators were also explored as instruments. These generate results that are consistent with the results presented in Table IX, although these alternatives do not have as strong first stages.

TABLE IX
EQUITY ALLOCATIONS AND THE ASSUMED RETURN ON PENSION ASSETS

	Dependent variable: Percentage of pension fund allocated to equity					
	(1)	(2)	(3)	(4)	(5)	(6)
Assumed return on pension assets (%)	5.35*** (0.84)	5.93*** (1.08)	5.73*** (1.24)	15.77*** (4.44)	24.60*** (7.78)	23.44*** (8.76)
Log ratio of pension assets to operating income	2.63*** (0.60)	3.19*** (0.78)	3.25*** (0.87)	1.62** (0.73)	1.21 (1.22)	1.32 (1.40)
Actual return on pension assets (%)		0.14*** (0.03)	0.14*** (0.03)		0.11*** (0.04)	0.10*** (0.04)
Industry-by-year effects	No	No	Yes	No	No	Yes
Industry effects	No	Yes	—	No	Yes	—
Year effects	Yes	Yes	—	Yes	Yes	—
Model	OLS	OLS	OLS	2SLS	2SLS	2SLS
Observations	3,290	2,302	2,302	3,290	2,302	2,302
Excluded instrument		None			Acquisition indicator	

The dependent variable is the percentage of the pension fund assets allocated to equities. The specifications in columns (1)–(3) are OLS, and the specifications in columns (3)–(6) are 2SLS estimates using acquisition activity as an instrument for assumed returns. Pension fund asset allocation data are compiled from Pensions and Investments annual reports and IRS 5500 filings. The actual return on pension assets is collected from Compustat for 1990–1997 and augmented with IRS 5500 filings from 1990–2002. The sample consists of all firm-year observations for which these variables are available.

*** indicates significance at the 1 percent level, and ** indicates significance at the 5 percent level.

allocation to equity is 5.4 percentage points higher. This modest correlation between asset allocations and return assumptions, described in Amir and Benartzi [1998], has been something of a puzzle. In addition, a causal interpretation cannot be ascribed here, since a number of potential factors might cause a correlation between these two variables. One possibility is that managers increase the allocation of risky assets in their pension funds to justify increases in assumed returns, but there are several alternatives. Assumed returns might be set partly in response to the pension fund asset allocation choice. Alternatively, an optimistic or pessimistic disposition of executives might drive both assumed returns and pension fund asset allocation.

Columns (4)–(6) address these concerns using the instrumental variables approach, and demonstrate that these results are robust to the inclusion of controls for realized actual pension fund returns.[29] Estimates based on this approach suggest an increase of 16–25 percentage points of equity allocation for a one percentage point difference in the assumed return. While these magnitudes seem large, it is useful to remember that most one-time changes in assumed returns are more modest than a one percentage point change. The economic magnitude of this relationship is also highly plausible given reasonable estimates of the equity premium. An interpretation of a coefficient of 20 on the assumed return variable is that a firm seeking to raise its return assumption by 25 basis points to increase earnings is expected to rationalize this assumed return increase with a 5 percentage point ($0.20 * 0.25$) increase in the fund's equity allocation.[30] If a 5 percentage point increase in the fund's equity allocation justifies a 25 basis point increase in the expected return on fund assets, then a single percentage point increase in equity allocation would justify a 5 basis point increase in expected returns. This is consistent with a 5 percent market risk premium, since a portfolio invested 100 percent in equities would have an expected return 5 percentage points higher than a portfolio invested entirely in bonds. Higher assumed returns appear to influence equity allocations within pension plans and the estimated effects are consistent with plausible measures of the market risk premium.

VI. Managerial Opportunism and Shareholder Interests

The results on earnings manipulation and pension decision-making illustrate how managerial actions can redistribute value

29. One challenge to this assumption is that an optimistic disposition of managers might jointly affect assumed returns, acquisition behavior, and equity allocation. Given controls in these regressions for actual returns on pension assets, such optimism would have to be independent of actual cross-sectional differences in pension fund performance to invalidate this strategy. Pension overfunding and underfunding were also explored as controls and do not affect the results.

30. An additional interpretation of this result, unrelated to issues of causation and endogeneity, is also available. The instrumental variables approach effectively averages the assumed returns and asset allocations within two samples: the sample of firms pursuing acquisitions and the sample of firms that do not pursue acquisitions. The estimated IV coefficient is based on the slope of the means of the variables within these two samples; this approach averages away measurement error in the underlying data. In doing so, the results in this paper uncover a strong underlying relationship between asset allocations and required returns.

among current shareholders, managers, and potential shareholders. If managers inflate profits and stock prices and then use this inflated stock as currency in the acquisition of other firms, then current shareholders could benefit from a redistribution of wealth to them from future shareholders. This would be consistent with the view of optimal incentive contracts of Bolton, Scheinkman, and Xiong [2003] and the view of stock-financed mergers in Shleifer and Vishny [2003].[31] If, instead, managers are inflating profits to enable empire-building and self-enrichment through option exercises, then value is likely being transferred from current shareholders toward managers. This view would be consistent with the managerial power view of Bebchuk, Fried, and Walker [2002] and others.[32]

In order to explore how value is being redistributed through pension assumptions, it is possible to relate pension assumptions with measures of the corporate governance environment. Specifically, if current shareholders are the beneficiaries of managerial opportunism in setting pension return assumptions, then aggressive assumptions will be more prevalent in firms where managers are more constrained to behave in the interest of shareholders. Alternatively, if firms where managers are least constrained by shareholder interests indulge in aggressive return assumptions, this would support the rent-extraction view.

Figure III provides evidence that assumed returns on pension assets are substantially higher at firms where current shareholders have weaker control over managers. Firm-year observations are sorted on the basis of the nearest preceding measure of the Gompers, Ishii, and Metrick [2003] corporate governance index. This index aggregates 24 different dummy variables representing mechanisms that firms can employ to insulate managers from shareholders. These include devices like staggered board elections, which impose delays on any contestant seeking to take over board seats. Observations are divided into six categories

31. An earlier literature similarly suggested that managerial manipulation of earnings can benefit current shareholders. In Stein [1988, 1989], myopic managerial actions arise in markets that are rational but imperfectly informed. Managers, averse to even temporarily undervalued equity, inflate reported earnings, and the market's conjectured relationship between reported and true earnings holds in equilibrium. Shleifer and Vishny [1990] similarly suggest that costly arbitrage can also lead to a short-term bias in the absence of an agency problem.

32. Yermack [1997] and Bertrand and Mullainathan [2001] note that various aspects of compensation arrangements do not correspond to incentive needs, suggesting that managers use incentive compensation to extract these rents.

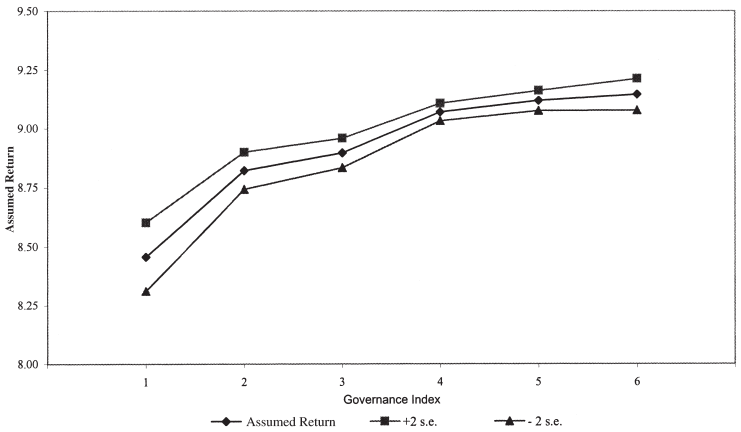

FIGURE III
Rate of Return Assumptions by Quality of Corporate Governance

The figure shows long-term rate of return assumptions plotted against a corporate governance index based on Gompers, Ishii, and Metrick [2003]. The best governed firms (group 1) scored 1–5 on their index, group 2 scored 6–7, group 3 scored 8–9, group 4 scored 10–11, group 5 scored 12–13, and the worst governed firms (group 6) scored 14 or above. Long-term rate of return assumption data are drawn from Compustat.

ranging from category 1, where shareholders have the most control over managers, to category 6, where managers are the most insulated from shareholders. There is a substantial increase in assumed returns as managers become more insulated from current shareholders. At the most democratic firms, assumed returns are on average below 8.5 percent, while at the most dictatorial, they are above 9 percent. This difference in assumed returns between the most dictatorial and democratic firms is statistically significant at the 1 percent level after controlling for year fixed effects and correcting for firm-level clustering of observations. This analysis suggests that managerial opportunism in pension decision-making does not appear to be guided by shareholder interests.

VII. CONCLUSION

In a setting where managers have considerable discretion and where manipulated earnings are capitalized into stock prices,

managers appear to exploit their discretion and alter investment decisions to justify, and capitalize on, manipulated earnings. The latitude managers enjoy in pension accounting and the inability of the market to fully distinguish between inflated pension earnings and operating earnings combine to provide managers with a powerful incentive to characterize the performance of pension assets opportunistically. Managers facing large incentives to manipulate earnings through pension decisions—either because of the sensitivity of firm earnings to changed assumptions, impending merger activity, declining operating performance, or large incentive compensation contracts—appear to alter their assumed returns significantly in response to these incentives. The evidence on merger activity and option exercises confirms the role of earnings manipulation but also makes clear that reporting distortions induced by managerial motivations can alter manager and firm investment decisions.

Finally, rationalizing these higher assumed returns is easier in the context of higher equity allocations. Instrumental variables analysis indicates that higher assumed returns are, in fact, associated with higher equity allocations. Robustness checks demonstrate that alternative theories of how firms set return assumptions—e.g., that these choices reflect equity allocations, excessive extrapolation from past returns, or managerial optimism—cannot explain these results.

Previous studies of managerial opportunism and earnings manipulation have emphasized large indiscretions in small samples, as in Erickson, Hanlon, and Maydew's [2004] analysis of earnings fraud, or more aggregated measures of misreporting through accrual accounting, as in Bergstresser and Philippon [forthcoming]. In this paper a simple, transparent but influential reporting decision is investigated in a large sample and is linked to investment decisions. To the degree that pension earnings are capitalized into market prices, the opportunistic use of assumed returns may lead to aggregate levels of overvaluation, as suggested by Coronado and Sharpe [2003]. The results on asset allocation add another mechanism by which pension accounting could have contributed to market overvaluation as increased assumed returns also appear to be associated with higher equity allocations. While market participants were capitalizing pension earnings, firms were increasing equity exposures to justify those very pension earnings.

APPENDIX 1: ASSUMED RETURN ON PENSION ASSETS AT THE NINE LARGEST PENSION SPONSORS OTHER THAN IBM

	General Motors (1992–2002)	Verizon (1991–2002)	General Electric (1991–2002)	Boeing (1991–2002)	Ford (1992–2002)	Lucent (1994–2002)	SBC (1991–2002)	Lockheed (1992–2002)	AT&T (1992–2002)
2002 DB pension plan assets ($bn)	57.3	37.6	37.1	31.1	29.0	28.2	24.9	17.9	15.3
Median sensitivity	2.72	2.91	2.06	6.47	1.43	7.67	2.17	4.92	2.29
Mean sensitivity	4.00	2.75	2.14	6.09	1.57	11.93	2.24	6.77	2.24
Average assumed long-term rate of return	9.95%	8.67%	9.42%	8.63%	9.16%	9.00%	8.44%	8.98%	9.18%
Standard deviation of assumed LTROR	0.10%	0.54%	0.29%	0.43%	0.28%	0.00%	0.57%	0.67%	0.25%
Minimum	9.70%	7.50%	8.50%	8.00%	8.75%	9.00%	7.75%	8.00%	9.00%
Maximum	10.00%	9.25%	9.50%	9.25%	9.50%	9.00%	9.50%	9.50%	9.50%
Number of changes	2	6	1	7	3	—	4	3	2
Number of increases	2	6	—	4	1	—	3	3	1
Number of decreases	—	—	1	3	2	—	1	—	1

This appendix provides details on the pension plans and accounting assumptions for the ten largest DB pension plan sponsors other than IBM. The size of the pension plan assets is from the *Pensions and Investments* 2002 survey and is valid as of September 30, 2002. The median sensitivity is the within-firm median value of the ratio of median pension assets to operating income. The mean sensitivity is the within-firm mean value of the ratio of median pension assets to operating income. Details on assumed returns on pension plan assets are drawn from annual 10-Ks.

HARVARD BUSINESS SCHOOL
HARVARD BUSINESS SCHOOL AND NBER
UNIVERSITY OF CHICAGO GRADUATE SCHOOL OF BUSINESS

REFERENCES

Amir, Eli, and Shlomo Benartzi, "The Expected Rate of Return on Pension Funds and Asset Allocation as Predictors of Portfolio Performance," *Accounting Review,* LXXIII (1998), 335–352.
Bebchuck, Lucian A., Jesse M. Fried, and David I. Walker, "Managerial Power and Rent Extraction in the Design of Executive Compensation," *University of Chicago Law Review,* LXIX (2002), 751–846.
Bergstresser, Daniel, and Thomas Philippon, "CEO Incentives and Earnings Management: Evidence from the 1990s," *Journal of Financial Economics,* forthcoming.
Bergstresser, Daniel, Mihir Desai, and Joshua Rauh, "Earnings Manipulation and Managerial Investment Decisions: Evidence from Sponsored Pension Plans," NBER Working Paper No. 10543, 2004.
Bertrand, Marianne, and Sendhil Mullainathan, "Are CEOs Rewarded for Luck? The Ones without Principals Are," *Quarterly Journal of Economics,* CXVI (2001), 901–932.
Black, Fischer, "The Tax Consequences of Long-Run Pension Policy," *Financial Analysts Journal,* XXXVI (1980), 21–28.
Bodie, Zvi, "The ABO, the PBO and Pension Investment Policy," *Financial Analysts Journal,* XLVI (1990), 27–34.
Bodie, Zvi, Jay O. Light, Randall Mørck, and Robert A. Taggart, "Corporate Pension Policy: An Empirical Investigation," *Financial Analysts Journal,* XLI (1985), 10–16.
Bolton, Patrick, José Scheinkman, and Wei Xiong, "Executive Compensation and Short-Termist Behavior in Speculative Markets," Princeton University, 2003.
Chan, Konan, Louis K. C. Chan, Narasimhan Jegadeesh, and Josef Lakonishok, "Earnings Quality and Stock Returns," NBER Working Paper No. 8308, 2001.
Coronado, Julia Lynn, and Steven A. Sharpe, "Did Pension Plan Accounting Contribute to a Stock Market Bubble," *Brookings Papers on Economic Activity* (2003), 323–371.
Dechow, Patricia M., Richard G. Sloan, and Amy P. Sweeney, "Causes and Consequences of Earnings Manipulations: An Analysis of Firms Subject to Enforcement Actions by the SEC," *Contemporary Accounting Research* (1996), 1–36.
Erickson, M., M. Hanlon, and E. Maydew, "How Much Will Firms Pay for Earnings that Do Not Exist? Evidence of Taxes Paid on Allegedly Fraudulent Earnings," *Accounting Review,* LXXIX (2004), 387–408.
Fama, Eugene F., and Kenneth R. French, "Financing Decisions: Who Issues Equity?" Working Paper, University of Chicago, 2004.
Feldstein, Martin, and Randall Mørck, "Pension Funding Decisions, Interest Rate Assumptions and Share Prices," *Financial Aspects of the U. S. Pension System,* Zvi Bodie and John Shoven, eds. (Chicago: University of Chicago Press, 1983), pp. 177–210.
Feldstein, Martin, and Stephanie Seligman, "Pension Funding, Share Prices, and National Savings," *Journal of Finance,* XXXVI (1981), 801–824.
Frank, Mary Margaret, "The Impact of Taxes on Corporate Defined Benefit Pension Plan Asset Allocation," *Journal of Accounting Research,* XL (2002), 1163–1190.
Franzoni, Francesco A., and José M. Marin, "Pension Plan Funding and Stock Market Efficiency," *Journal of Finance,* LXI (2006).
Friedman, Benjamin M., "Pension Funding, Pension Asset Allocation, and Corporate Finance: Evidence from Individual Company Data," *Financial Aspects of the U. S. Pension System,* Zvi Bodie and John Shoven, eds. (Chicago: University of Chicago Press, 1983), pp. 107–147.
Gold, Jeremy, "Accounting/Actuarial Biases Enable Equity Investment by Defined Benefit Pension Plans," Working Paper, University of Pennsylvania, 2003.

Gompers, Paul, Joy Ishii, and Andrew Metrick, "Corporate Governance and Equity Prices," *Quarterly Journal of Economics,* CXVIII (2003), 107–155.
Hall, Brian J., and Kevin J. Murphy, "The Trouble with Executive Stock Options," *Journal of Economic Perspectives,* XVII (2003), 49–70.
Hawkins, David, "Retiree Benefits," Harvard Business School Case 9-197-021, 2001.
Healy, Paul M., and James Wahlen, "A Review of the Earnings Management Literature and its Implications for Standard Setting," *Accounting Horizons,* XIII (1999), 365–383.
Langbein, John H., and Bruce A. Wolk, *Pension and Employee Benefit Law* (New York, NY: Foundation Press, 2000).
McLean, Bethany, "That Old Financial Magic," *Fortune,* February 18, 2002.
Papke, Leslie E., *Trends in Pensions,* John Turner and Daniel Beller, eds. (Washington, DC: U. S. Department of Labor Pension and Welfare Benefits Administration, 1992).
Picconi, Marc, "The Perils of Pensions: Does Pension Accounting Lead Investors and Analysts Astray?" Working Paper, Cornell University, 2004.
Rauh, Joshua, "Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans," *Journal of Finance,* LXI (2006).
Richardson, Scott, Richard G. Sloan, Mark Soliman, and Irem Tuna, "Information in Accruals about the Quality of Earnings," *Journal of Accounting and Economics,* XLIV (2005), 437–485.
Shleifer, Andrei, and Robert Vishny, "Equilibrium Short Horizons of Investors and Firms," *American Economic Review,* LXXX (1990), 148–153.
Shleifer, Andrei, and Robert Vishny, "Stock Market Driven Acquisitions," *Journal of Financial Economics,* LXX (2003), 295–311.
Sloan, Richard G., "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?" *Accounting Review,* LXXI (1996), 89–315.
Stein, Jeremy C., "Takeover Threats and Managerial Myopia," *Journal of Political Economy,* XCVI (1988), 61–80.
Stein, Jeremy C., "Efficient Capital Markets, and Inefficient Firms: A Model of Myopic Corporate Behavior," *Quarterly Journal of Economics,* CIV (1989), 655–669.
Teoh, Siew Hong, Ivo Welch, and T. J. Wong, "Earnings Management and the Post-Issue Performance of Seasoned Equity Offerings," *Journal of Financial Economics,* L (1998a), 63–99.
Teoh, Siew Hong, Ivo Welch, and T. J. Wong, "Earnings Management and the Long-Term Market Performance of Initial Public Offerings," *Journal of Finance,* LIII (1998b), 1935–1974.
Tepper, Irwin, "Taxation and Corporate Pension Policy," *Journal of Finance,* XXXVI (1981), 1–13.
Welch, Ivo, "The Equity Premium Consensus Forecast Revisited," Cowles Foundation Discussion Paper No. 1325, 2001.
Xie, Hong, "The Mispricing of Abnormal Accruals," *Accounting Review,* LXXVI (2001), 357–373.
Yermack, David, "Good Timing: CEO Stock Option Awards and Company News Announcements," *Journal of Finance,* LII (1997), 449–476.
Zion, David, and Bill Carcache, *The Magic of Pension Accounting,* Credit Suisse First Boston, 2002.