Earnings Manipulation, Pension Assumptions and Managerial Investment Decisions

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ABSTRACT

Managers appear to manipulate firm earnings when they characterize 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. Managers also increase assumed rates of return as they prepare to acquire other firms and as they exercise stock options, further confirming the opportunistic nature of these increases. Decisions about assumed returns, in turn, influence asset allocation within pension plans. Instrumental variables results suggest that a 25 basis point increase in the assumed return is associated with a 5% increase in equity allocation. Taken together, these results suggest that opportunistic earnings manipulation influences significant managerial investment decisions.

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1. Introduction

Manipulation of reported earnings can be a powerful tool for managers to inflate their stock prices. Studies of earnings manipulation typically emphasize aggregate measures such as accounting accruals, and consequently struggle to link earnings manipulation to investment decisions. 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 pension assets. These distorted reporting decisions interact with managerial option exercises, merger activity and asset allocation decisions within pension plans.

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. Some capital market observers have viewed the actions of IBM, under CEO Louis Gerstner, Jr., as a paradigmatic example of this behavior.[1] IBM sponsors a large defined benefit pension plan, with over $57 billion in assets at the end of 2002. Table 1 outlines the 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. IBM's assumed returns throughout this period exceeded those used by most firms and the frequent changes are also notable given the long run nature of these assets and assumptions. 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. Despite poor equity market returns and declining bond yields during that year, IBM raised its assumed return by fifty basis points. Nearly five percent of IBM's income before tax in 2000 and 2001 resulted from the increase in their assumed return from 9.25% to 10.00%. IBM's reported pretax income grew at a compound annual growth rate of 6.7% from 1995 to 2001; without these changes, income would have grown at only a 5.6% rate. As Table 1 shows, these changes in pension assumptions coincided with deteriorating operating performance.

[1] See Maclean (2002).

This example illustrates how senior managers can use pension accounting to boost their reported 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.[2]

While anecdotes about earnings manipulation are common, it has proven more difficult to isolate systematically the determinants and real consequences of earnings manipulation. Empirical analyses of earnings management often use aggregate measures of earnings manipulation, based on firm-wide accruals, and various alternative explanations for changes in those measures are often available. In particular, aggregate measures of earnings management are often related to firm growth trajectories. An investigation that focuses on pension assumptions has several advantages in this regard. These assumptions, while buried in financial footnotes, are observable and are plausibly unrelated to other dimensions of a firm's performance. As argued below, available alternative hypotheses for results based on pension assumptions are testable in relatively clean ways.

In order to identify the relative incentive to use this lever of earnings manipulation, a measure of the sensitivity of a firm's overall profits to the assumed return is constructed. This sensitivity measure is an important determinant of the levels of, and changes in, assumed returns. Specifically, a firm in the 90th percentile of sensitivity has on average an assumed return that is 46 basis points higher than a firm in the 10th percentile. These differences in return assumptions can have an economically meaningful impact on reported earnings: at the 90th percentile of pension sensitivity, a 46 basis point increase in the assumed return raises a firm's reported earnings by 1.4%.

In addition to being systematically related to their impact on a firm's earnings, these assumptions also relate to investment decisions made by firms and their managers. Firms make particularly high return assumptions in periods leading up to the acquisition of other firms.

[2] In a related vein, Franzoni and Marin (2003) conclude that firms with underfunded plans are overvalued by the market. Picconi (2004) concludes that even analysts appear to misinterpret readily available information about firms' pension earnings and funding status.

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 is robust (though smaller in magnitude) to the inclusion of firm and year fixed effects. In addition, this pre-acquisition boost in the assumed return on pension assets is even higher at firms whose earnings are more sensitive to this assumption. Finally, years in which CEOs choose to exercise options are also characterized by higher assumed returns. Managers appear to increase their assumed pension returns as they approach major personal and firm financial investment decisions.

These opportunistic changes in assumed returns may also influence asset allocations within firm pension plans. Allocations to equity vary considerably across organizational form and across firms, with equity allocations in firm-sponsored pension funds exceeding those in public and union-sponsored funds. Indeed, the large equity allocation in most firm pension plans has been viewed as a persistent puzzle. The interaction of managerial opportunism and pension accounting may help explain this phenomenon as managers may increase equity allocations to justify aggressive return assumptions. In order to examine this possibility, equity allocations are regressed on assumed returns, using acquisition activity as an instrument for the assumed return. This method addresses the concern that assumed returns and asset allocation decisions may be correlated for reasons unrelated to managerial opportunism. As it is unlikely that the variation in pension fund equity allocations is independently correlated with firm acquisition activity, this empirical approach provides a useful source of identification. The results from this IV analysis indicate 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% increase in equity allocation. This result seems reasonable given that it is consistent with an assumed market risk premium of 5%.

This analysis of managerial opportunism concludes with more preliminary work on whether this type of earnings manipulation harms or benefits firms' current shareholders. 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 concerns of current shareholders.

Several alternative explanations for the evidence provided here are considered. As discussed in Amir and Benartzi (1998), assumed returns might simply reflect the composition of pension plan assets, with higher assumed returns reflecting higher allocations to equity. However, Amir and Benartzi (1998) show that this explanation for the reported values of assumed returns is incomplete, and robustness checks presented in this paper confirm that such a relationship is not driving these results. A second possibility is that managers adjust the assumed return in response to recent actual returns on pension assets, following a form of excessive extrapolation based on recent history (Benartzi (2001)). While lagged actual pension returns are positively correlated with the assumed return, the effects of acquisitions and earnings sensitivity are not attenuated in the presence of controls for this extrapolation effect. Third, it is possible that variation in assumed returns partly reflects heterogeneity in managerial optimism, with more optimistic managers and firms making higher return assumptions. While it is not possible to reject completely the hypothesis that heterogeneous disposition might influence the distribution of assumed returns, the sensitivity and acquisition results are robust to plausible controls for this factor — particularly pension fund asset allocations and the extent to which CEO compensation comes from option grants. Finally, the results on the opportunistic setting of rates are robust to controls for the extent of under- or over-funding of firm pension plans, which has also been hypothesized to be related to firms' assumed return on pension assets.[3]

This work relates closely to the large literatures on earnings management, incentive compensation and pension plans. These literatures are selectively reviewed here. The earnings management literature, reviewed in Healy and Whalen (1999), has emphasized accruals – changes in earnings not associated with underlying cash flows. Sloan (1996) finds evidence that the market 'misprices' accruals components of earnings, meaning that 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

[3] The mechanism for this hypothesized alternative relationship is as follows. Firms with underfunded plans may try to reduce the apparent magnitude of their pension liabilities by choosing a high pension *discount* rate. It should be noted that the assumed *return on pension assets* analyzed here is an entirely separate assumption from this pension discount rate. While firms had significant leeway in choosing pension discount rates in the 1980s, this leeway was substantially curtailed by the early 1990s. As discussed below, the choice of the assumed rate of return is relatively unconstrained. Although the assumed return on pension assets is not the only accounting assumption made by firms about their pension assets and liabilities, conversations with various industry practitioners strongly suggest that it is the margin where firms have the most latitude.

related to managerial manipulation of earnings.[4] 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.

Academic work on defined-benefit pension plans has typically focused on whether or not firms incorporate pension plans into their own capital structure and investment decisions (as in Friedman (1983) and Bodie et al. (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. 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 the puzzle of high equity allocations in defined-benefit pension plans reflects managerial incentives created by accounting rules and this paper investigates and confirms this conjecture.

Section 2 motivates the subsequent analysis with an example that illustrates how the assumed return on pension assets can affect reported income. Section 3 describes recent patterns of assumed returns and asset allocations and reviews the data employed in the subsequent analysis. Section 4 analyzes the determinants of assumed returns, placing particular emphasis on the role of merger activity and incentive compensation. Section 5 relates these decisions on assumed returns to equity allocation decisions, applying instrumental variables analysis. Section 6 discusses the consequences of these results for the debate on how this opportunistic managerial

[4] 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

behavior reallocates value amongst current shareholders, potential shareholders and managers. Section 7 concludes.

2. The assumed return on pension assets: a motivating example

A firm sponsoring a defined benefit (DB) pension plan creates 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. This cost is the change in the value of the firm's promises to its employees that comes from an additional year of employment.[5] The interest cost is the change in the present discounted value of the pension obligations arising from the approach of the discharging of these obligations. 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 individual firms have relatively limited discretion over their reported service and interest costs.[6]

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

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components. For instance, reductions in accounts payable (which *reduce* accruals) forecast positive returns.

[5] 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.

and actual rates of return happens over time, with potentially very long amortization periods.[7] Thus, a manager faced with large pension fund assets relative to operating earnings has a powerful lever to manipulate reported earnings.

The assumed return is a critical ingredient of the pension cost calculation and merits emphasis given the extreme latitude afforded managers in setting it. 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.[8] 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.[9] Indeed, these discount rates have converged significantly. It is also important to note that 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% ($4) return on these operating assets, and $20 of pension assets. If this firm changes the assumed return from 10% to 11%, it can immediately increase net income by 5% (or $0.20). As this example illustrates, the scope for

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[6] 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).

[7] 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.

[8] Between 1987 and 2003, a firm was required for the purpose of deficit reduction contributions to use a discount rate tied to the 30-year US Treasury bond yield. Recent steep declines in these rates have raised liabilities while asset values of equity-heavy pension funds have fallen, a situation industry insiders label the "Perfect Storm". In April 2004, new legislation was approved that allows companies to use a discount rate that is a blend of long term corporate bonds.

[9] Confusingly, this discount rate is also sometimes referred to as a long-term return assumption. In addition to the 30-year Treasury rate, it plays a role in determining compliance with minimum funding requirements under federal law. It is not reported to financial markets and has no impact on a firm's reported earnings. Since SFAS 87 was implemented in 1990, a firm has to choose pension discount rates with reference to a market rate. A ruling by the SEC's Chief Accountant in 1993 explicitly stated that the discount rate for pension liabilities as revealed in firms' financial statements should be based on the Moody's Aa interest rate index. Some little discretion remains based, for instance, on the interaction between the slope of the yield curve and demographic differences across firms (differences in the age structure of pension plan participants give pension liabilities different effective durations across firms).

increasing profits in this manner is a function of the size of pension assets relative to operating income.

Table 2 gives the income arising from the assumed return on pension assets, as a share of non-pension operating income, by different levels of pension sensitivity (across the columns) and different assumed returns (down the rows). The measure of pension sensitivity is the ratio of pension assets to firm operating income, and the assumed return is the one reported in the firm's financial statements. Rows correspond to the distribution of assumed returns in the Compustat-based sample used in the empirical work that follows; the fifth percentile is 7 percent, while the median is 9 percent and the 95th percentile is 10 percent. The columns reflect the distribution of pension sensitivity; at the median firm in the sample, pension assets amount to 71.6 percent of firm operating income.

For a firm with a small plan relative to operating profits, even a large change in the assumed return makes only a small difference in net earnings. For example, at the 10th 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, the same increase in the assumed return would increase reported income by over 2.0 percent. At the 90th percentile of pension sensitivity, firm income would rise by almost 9 percent. A firm with a large pension plan can significantly change their reported performance by adjusting this assumed return.[10]

3. Data and descriptive statistics

To examine the links among managers' motivations and pension reporting and asset allocation decisions, several data sources are used. Firm non-pension income, non-pension assets, pension fund size, pension liability size, and the assumed return on pension assets come from the Compustat dataset for the years 1991-2002. Compustat Executive Compensation provides information on CEO option exercise for a subsample of Compustat firms from 1992-

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

2002. Firm acquisition data come from the Securities Data Company (SDC) database of mergers and acquisitions; these data are available for the entire sample period.

Two distinct sources are employed for pension fund asset allocation data. First, an annual survey conducted by *Pensions and Investments* covers the asset allocations of the largest US pension funds from 1991-2002.[11] Second, firms sponsoring pension plans with more than 100 employees must file an IRS Form 5500 for each plan on an annual basis; the full set of these forms is publicly available in electronic form through 1998 and contains asset allocation data. For firms with multiple plans, the plan-year IRS 5500 filings are aggregated to form firm-year observations. Asset allocation data from a firm's 5500 filings are not used if that pension fund's assets are held in trusts or other opaque investment vehicles; for these observations it is impossible to precisely identify equity allocations. The combination of the *Pensions and Investments* and IRS 5500 sources provides equity allocation information for approximately 3,200 firm-year observations. Approximately equal numbers of firm-year observations of asset allocation come from each of the two sources.[12]

The analysis that follows uses three different samples; the second and third are subsets of the first. The primary sample includes all Compustat firms for which pension assets, operating income, and assumed returns on pension assets are available.[13] This sample has 19,325 observations for 3,247 defined-benefit plan sponsors during this period. This sample is used to investigate the relationships among pension sensitivity, firm acquisitions, and assumed returns. The second sample includes the 7,075 firm-year observations from the first sample that can be linked to the Compustat Executive Compensation database. This smaller sample is used to investigate the role of executive option exercises. The third sample includes the 3,202 firm-year observations from the first sample for which pension fund asset allocations are available, either

[11] The *Pensions and Investments* survey data begins 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.

[12] The initial size of the *Pensions and Investments* sample is 200 pension sponsors for each year 1988-1996 and 1000 sponsors for 1997-2002. Approximately 45% of the entities in each year of the *Pensions and Investments* are corporate (as opposed to public, union, or nonprofit) sponsors of DB plans. The requisite data from Compustat (in particular the assumed return) are available for approximately two-thirds of those observations, leaving about 1,700 P&I observations at the firm-year level. The IRS 5500 filings add the remaining 1,500 observations during the period 1990-1998, which is also the period for which the *Pensions & Investments* sample is smaller.

[13] This sample includes only those firms for which the log ratio of pension fund size to firm operating income can be computed.

from the *Pensions and Investments* data or from the IRS 5500 filings. This sample is employed to investigate the relationship between assumed returns and pension fund asset allocations.

Defined benefit pension plans are quite large in aggregate, and represent a significant part of overall assets for the companies that sponsor them. These assets also represent a large share of the liquid financial assets in the economy. Table 3 describes the sizes of these plans among the firms in the sample. The aggregate ratio of pension assets to operating assets peaked at 10.31% in 1997, when pension assets totaled $1.156 trillion for the 1,630 firms in the sample. The mean firm in the sample, in that year, had $709.4 million in pension assets. The distribution is highly skewed, however; the median in 1997 was $77 million and the 95th percentile was $414.6 million. The market value of pension fund assets declined during the early 2000s along with broader equity markets. In 2002, pension fund assets for the 1,502 sample firms totaled $1.094 trillion, an amount equal to 5.7 percent of balance sheet assets. This reduction in the value of pension assets coincided with increasing plan liability values due to falling bond yields, a situation that has caused a deterioration in the funding status for defined benefit pension plan sponsors.[14]

Among firms for which data are available, asset allocations have shifted considerably over time. Figure 1 plots the allocations to equity among the firms in our sample, as well as in additional samples of union-sponsored and public-sponsored pension plans covered by the *Pensions and Investments* annual surveys. Two distinct patterns emerge. First, the mean allocation to equity in each of the three types of pension funds increased fairly dramatically over the period. Among the corporate-sponsored plans in the sample, the mean allocation to equity rises from 35 percent to approximately 65 percent between 1991 and 2000, before retreating in 2001 and 2002. The second pattern is that the increase in equity allocations at corporate-sponsored pension plans has been particularly dramatic relative to union or public plans. This sharp shift toward equity investment in corporate pension plans has been particularly remarkable given the fixed nature of defined-benefit pension commitments, and given that tax considerations dictate holding relatively highly-taxed assets such as bonds within pension plans.[15]

[14] See Rauh (2004) for a further discussion of the evolution of the pension funding status and related issues.
[15] See Black (1980) and Tepper (1981) for further discussion. Given that asset returns cumulate tax-free within a firm's pension plan, the optimal investment strategy is to invest in the highly-taxed asset (bonds) within the pension

The cross-sectional distribution of assumed returns has been relatively constant during this period of changing yields and shifting equity returns. Figure 2 documents the median return assumption 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. The mean, 25th percentile, and 75th percentiles of the distribution have also been roughly constant through the period. This stable distribution of the assumed return is striking because yields on Treasury securities have been declining; the lowest line on Figure 2 shows the yield on 10-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 2 gives the implied assumed return on the equity securities held in a pension fund that is 40 percent equity 60 percent bonds and that assumes an aggregate return of 9 percent. At this ratio, the implied assumed return on equity, based on actual bond yields, was approaching 16 percent by 2002.[16]

The constant cross-sectional distribution of assumed returns over this period does not mean that individual firms' assumptions have been fixed. Table 4 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% of the firms in the sample increased the rate at least once, and 49.0% decreased at least once, although as Table 4 shows, the decreases were heavily concentrated in 2002. Even in the difficult market environment of 2000-2002, a significant fraction of firms increased their assumed return.

Several variants of the measure of pension sensitivity developed earlier are employed in order to assess the role of managerial opportunism. The baseline measure is the logarithm of the ratio of pension assets to operating income for a firm in a given year. This measure excludes

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plan. Any impact of this pension investment strategy on the firm's overall leverage can be undone through the capital structure decision.

observations with negative operating income. Employing the log of the ratio collapses the influence of outlying observations and brings the distribution of pension sensitivity closer to that of a normally distributed random variable. While this measure captures the variation across firm-year observations in the incentive to manipulate the assumed return on pension assets, past realized returns to pension assets affect the numerator of this measure. As a consequence, this measure may be linked mechanically to assumed returns if firms with abnormally high returns use these realized returns as a basis for increasing assumed returns.

Given that this feedback mechanism need not be a reflection of managerial opportunism, two alternative measures of pension sensitivity that are not susceptible to this bias are also employed. The first alternative substitutes average pension assets over the period for annual pension assets, and the second measure substitutes annual pension liabilities for annual pension assets. In the former case, annual observations will not be driven by differences in the actual return on pension assets across years. The latter measure goes further and completely removes the impact of pension asset returns on the sensitivity measure. This measure addresses the concern regarding potential feedback from the size of the pension fund to assumed return. Table 5 describes these variables as well as the others used in the empirical analysis.

Two sets of variables in Table 5 that further identify managerial opportunism and investment decisions merit some elaboration. First, a dummy variable is employed to capture acquisition activity and the corresponding incentive to inflate earnings as acquisitions approach. 'Acquirer' firm-years comprise 26.1 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 timing convention is employed as return assumptions are set prior to the fiscal year, and will begin influencing reported earnings starting with the first quarter of the fiscal year.[17] In addition, the return assumption may begin impacting

[16] 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.

[17] 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.

firms' prices even earlier through the earnings 'guidance' that firms give to analysts throughout the year.

In addition to this acquisition variable, several variables are employed to measure managerial option activity to further investigate the role of managerial opportunism. First, the ratio of CEO option exercises to firm market value, a standard measure in the literature, averages 30 basis points. Approximately 32 percent of firm-year observations have nonzero values for this variable; among these observations, the mean option exercise value as a share of the firm value is 93 basis points. In addition to scaling the value of CEO option exercises by the market value of the firm's equity, results that scale CEO option exercise (and grants) by the CEO's own option holdings are also presented. CEO option exercises have a mean of 11 basis points as a share of options held. Among the observations that have nonzero values for this variable, the mean is 27 basis points as a share of CEO holdings. CEO option grants have a mean of 26 basis points as a share of options held. Among the observations that have nonzero values for this variable, the mean grant is 32 basis points as a share of CEO holdings.[18] 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.

4. The determinants of assumed returns

The empirical work in this section assesses the determinants of the return assumption with particular emphasis on the sensitivity measure and on periods around mergers and option exercises by managers.

4.1. Pension sensitivities, acquisition activity and assumed returns

The first three columns of Table 6 report the results of linear regressions of firm-year assumed returns on covariates, including pension sensitivity measures and year and industry controls. These regressions focus on assessing whether assumed returns are higher at those firms where reported earnings are more sensitive to assumed returns. Standard errors are corrected for

[18] For option exercises as a share of the firm's equity market value, the 25th percentile, median, 75th percentile and 90th percentile are 8 basis points, 25 basis points, 74 basis points, and 209 basis points respectively. When option exercises are expressed as a share of total CEO holdings, these quantile divisions are at 4 basis points, 10 basis

clustering at the firm level. The first column of Table 6 reports the results of an OLS regression of the assumed return on the first measure of pension sensitivity, the log ratio of annual pension fund assets to annual firm operating income, in the presence of industry-by-year fixed effects. Thus a separate indicator variable controls for each of 48 industry groups in each year. With no other covariates, the coefficient on the pension sensitivity measure is 0.117 and is statistically significant.[19] This implies that a movement from the 10th percentile of log pension sensitivity (–2.85) to the 90th percentile (1.11) would be associated with a 46 basis point increase in the assumed return.[20] Note that at the 90th percentile of pension sensitivity, a 46 basis point increase in the assumed return raises a firm's reported earnings by 1.4%.[21]

The next two columns of Table 6 explore the two other measures of pension sensitivity and provide for industry-by-year effects as in the first column. Column 2 uses the average of pension asset size over the period as a numerator in the measure of sensitivity, and provides a roughly similar coefficient. Column 3 uses the log ratio of pension liability size to firm operating income. The 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.

If managerial opportunism is important in determining assumed returns, this relationship should be heightened when managers are most interested in inflating profits and stock prices. Figure 3 presents a preliminary exploration of the relationship between takeover activity and the assumed return, describing the pattern of assumed returns around periods that 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 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

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points, 25 basis points, and 55 basis points respectively. For option grants as a share of CEO holdings, these divisions are at 16 basis points, 24 basis points, 39 basis points, and 65 basis points respectively.

[19] In the absence of industry-by-year effects, the OLS coefficient is 0.113 and has a standard error of 0.013.

[20] The difference in sensitivity between the 90th and 10th percentiles is 1.11–(–2.85) = 3.96. The effect of moving from the 10th to the 90th percentile is therefore 0.117*3.96 = 0.463, or 46 basis points.

[21] A log sensitivity of 1.11 corresponds to a level sensitivity of 3.04, and 1.4% is 39 basis points times 3.04.

another firm in 5 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 5 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.

The last three columns of Table 6 pursue this line of investigation more rigorously. An 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 their companies' share prices prior to acquisition activity. The regressions in these columns include the acquirer indicator as well as its interaction with pension sensitivity. The interaction term allows the effect of this incentive to vary based on the sensitivity of earnings to the assumed return.[22] The results suggest that firms make more aggressive return assumptions just before they 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 the specification with industry-year fixed effects (column 4), the coefficient on the acquirer indicator implies a baseline effect of 33.8 basis points at a log sensitivity of zero.[23] This means that firms making acquisitions assume a return that is 33.8 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 7.2 basis

[22] We further considered the possibility that particular types of mergers – stock financed mergers – would be more closely associated with increases in assumed returns. This investigation is clouded by empirical and conceptual difficulties. First, our source on merger data has coarse groupings on the type of financing and manual inspection of the data for one company, IBM, relative to their 10-K's suggests only a crude mapping between the two sources. Second, as Fama and French (2003) point out, equity issuance through mergers is isomorphic with other forms of equity issuance and may be associated with additional monitoring costs further clouding the predicted relationship between merger financing and pension decision-making. The results do not indicate a distinctive pattern of assumed returns for stock-financed mergers.

[23] A firm with log sensitivity of zero falls approximately into the 62nd percentile of sensitivity values and has pension assets equal to balance sheet book assets.

points higher. A firm in the 90th percentile of sensitivity (1.11) therefore has a response that is 28.5 basis points larger than a firm in the 10th percentile of sensitivity (–2.85) in the same industry and year.[24] An acquiring firm with median sensitivity (–0.33) has an assumed return that is approximately 30 basis points higher relative to non-acquiring firms in the same industry and year.

Similar calculations can be made for the specification with firm and year fixed effects (column 6). The evidence here is based strictly on within-firm variation. The coefficient on the acquirer indicator shows a smaller but still robust response of 4.6 basis points for a log sensitivity of zero. The interaction effect in this specification shows that for each point of additional log sensitivity, the assumed return is 3.4 basis points higher, holding all other characteristics fixed. These point estimates imply that for a firm at the 90th percentile of pension sensitivity, the estimated increase in the assumed return during an acquisition year would be 8.4 basis points, while at the 10th percentile of pension sensitivity assumed returns are several basis points *lower* during acquisition years.

While the point estimates in the specifications with firm-level fixed effects may appear small in magnitude, these estimates are consistent with opportunistic adjustments to the assumed return that are economically meaningful. First, the magnitude of estimated coefficients in specifications with firm fixed effects should be compared to the within-firm rather than the cross-sectional standard deviation of the assumed return. While the standard deviation of the assumed return in the entire sample is 111 basis points, the within-firm standard deviation is only 63 basis points. Also, increases in the assumed return most commonly occur in 25 basis point increments. Consider a firm at the 90th percentile of log sensitivity (1.11). A point estimate of 4.6 basis points with an interaction effect of 3.4 basis points implies an overall acquisition effect of 8.4 basis points. This is consistent with a 25 basis point increase for one in every three acquisitions.[25]

[24] 28.5 basis points is the product of the interaction coefficient (0.072) with the sensitivity differential 3.96 (which is 1.11–(–2.85)).

[25] Note also that specifications with firm fixed effects effectively remove all cross-firm variation and consider only the effect of within firm variation in the acquisition indicator on the assumed return. Specifications that include industry-by-year effects instead of firm-fixed effects allow some inference in the within-industry cross section.

Table 7 presents specifications designed to test the robustness of these results, with particular attention to alternative explanations of these results. There are four pairs of specifications for four sets of additional controls: 1) the equity share in the pension fund; 2) lagged actual pension plan returns; 3) CEO option grants as a share of CEO total salary; and 4) pension funding status. Each of these controls corresponds to alternative explanations of the results presented in Table 6. The fifth pair of specifications incorporates all of the controls. Within each pair of specifications, the first specification includes industry-year fixed effects and second specification includes firm and year fixed effects.

The specifications in columns (1) and (2) assess the robustness of the acquisition results to the possibility that assumed returns might simply reflect the composition of pension plan assets, with higher assumed returns corresponding to riskier allocations. These specifications include as a control the share of the pension fund assets allocated to equity. An indicator variable, set equal to one if the equity share variable is unavailable for that observation, is also included in this specification, as well as an interaction between this indicator and the sensitivity variable (coefficients not shown). The results provide some evidence that the assumed return varies with allocation to riskier assets. For every additional ten percentage points of pension fund assets allocated to equity, the assumed return is 8.5 basis points higher in the specification that controls for industry-by-year effects. However, in the within-firm specification, the coefficient on the equity share is not significantly different from zero. Furthermore, the coefficients on the acquisitions variables are essentially unchanged relative to the comparable results from Table 6 (columns (4) and (6)).

The specifications in columns (3) and (4) of Table 7 are designed to test the alternative hypothesis that managers adjust the assumed return in response to recent actual returns on pension assets, following a form of excessive extrapolation based on recent history (Benartzi (2001)). The specifications incorporate the lagged 12-month actual returns on pension assets. A procedure similar to columns (1) and (2) is used, with an indicator variable included if the data item is missing.[26] In column (3) an additional ten percentage points of lagged actual return is correlated with an assumed return that is 10 basis points higher. However, this effect is not

present in the within-firm specification. In both specifications the point estimates on the acquisitions variables are very close to the comparable results from Table 6.

It is also possible that both high assumed returns and acquisition activity reflect the optimism of managers. The specifications presented in columns (5) and (6) of Table 7 examine the robustness of our results to a control for the optimism, or aggressiveness, of firm management. Specifically, these specifications include CEO option grants as a share of the CEO's total salary. While an obviously imprecise measure of optimism, the intuition for this control variable is that a higher weight on options in a CEO compensation package may be correlated with aggressive or optimistic managerial disposition. There is in fact a small positive correlation between this measure and the assumed return, although this disappears in the presence of firm fixed effects. While the size of the acquirer coefficient is smaller in column (5) than in columns (1) and (3), the coefficient is still positive and significant and the relevant coefficients in the fixed-effects specification are statistically indistinguishable from those presented in columns (2) and (4).[27]

A final potential alternative explanation for our results would be that firms with underfunded pension plans choose a higher assumed return on pension assets in order to justify using a higher discount rate for the presentation of their pension liabilities in their financial statements. Columns (7) and (8) of Table 7 investigate this hypothesis by including the pension funding status and the one-year change in pension funding status as independent variables. Including these control variables does not affect the acquirer and pension sensitivity results discussed above.[28]

Columns (9) and (10) present the results of regressions that include the full set of additional controls discussed above. The specification in column (9) shows that all of the

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[26] This variable is present in Compustat (data item 333) for most observations in our sample, but is incorrect starting in 1998 and therefore must be assumed missing for 1998-2003. Starting in 1998, data item 333 represents the *expected* earnings on plan assets, not the actual.

[27] The results are similarly robust when the magnitude of CEO share ownership in millions of dollars is used as a control.

[28] It is useful to consider the economic magnitude of these coefficients. Consider the coefficient on the 12-month change in the funding status in the column 7. The value on this coefficient implies that following a drop of ten percentage points in the pension funding status over a 12-month period, the assumed return will rise by only 1.15 basis points. The coefficient on the level of the pension funding status implies that when the pension funding status is 10 percentage points *higher* than its within-firm mean value, the assumed return is 1.28 basis points higher.

relevant acquirer effects remain statistically significant, though there magnitudes are reduced. Still, firms that are in an acquisition year on average have an assumed return that is around 19 basis points higher than other firms in their industry and year. In the firm fixed effects specification, both the main effect and the interaction effect are still statistically significant and of the same order of economic magnitude as in previous specifications. These investigations of available alternative explanations for the link between acquisition activity and assumed pension returns do not appear to cloud the basic underlying result.

4.2. Changes in assumed returns

As changes in assumed returns occur in discrete amounts, it useful to employ discrete dependent variables in a parallel analysis to Table 6. Table 8 reports results of ordered probit regressions, where categorical dependent variables reflect changes in the assumed return. In the first two columns, the specification of the dependent variable is coarse: (–1) if the firm decreases the assumed return in that year, (0) if it is unchanged, and (1) if the firm increases its assumed return. The results in column 1 suggest that firms are more likely to increase their assumed return in periods where the pension sensitivity measure is highest; the results in column 2 suggest that firms are likely to increase their assumed return when they are making acquisitions. In particular, the acquirer coefficients can be translated into marginal effects for the probability of each action (increase, decrease, and no change). Firms are 1.2 percentage points less likely to reduce their assumed the year before an acquisition; 0.3 percentage points more likely to keep it the same; and 0.9 percentage points more likely to raise the rate. In the context of an overall 9.2% probability of a rate increase and a 14.1% probability of a rate decrease, these magnitudes are economically significant. Unlike the specifications documented in Table 6 and Table 7, the coefficient on the interaction between the acquisition dummy and the pension sensitivity is not statistically significant.

The specifications presented in columns 3 and 4 of Table 8 use a more nuanced, but still discrete, dependent variable. The variable takes on one of 11 different categories, ranging from large decreases to large increases in the assumed return. The categories are defined in 25 basis point increments. This is a more appropriate specification for changes given that changes in the assumed return tend to happen in units that are multiples of 25 basis points. The results are

consistent with those in the first two columns: firms are more likely to increase their return assumption when the pension sensitivity is high and when acquiring other firms. Again, the standard errors for these results are clustered at the firm-level. The results in columns 5 and 6 of Table 8 use the measure of pension sensitivity based on average pension assets (see column 2 of Table 6), and the final two columns use the measure based on pension liabilities (see column 3 of Table 6). The magnitude and the significance of the acquirer effect and the marginal effects are roughly constant across the specifications using different measures of the sensitivity. Unlike in the other specifications, however, the coefficients on the alternative pension sensitivity measures are no longer statistically significant.

4.3. Return Assumptions and Option Activity

In order to further assess the role that opportunistic managerial behavior plays in how assumed returns are set, this section focuses on CEO option exercises. Table 9 and Figure 4 shift to a smaller sample of firms for which executive compensation data are available in addition to data on pension assets and assumed returns. As with the analysis of merger activity, a graphical depiction of the underlying patterns motivates the subsequent analysis and is presented in Figure 4. This figure, like Figure 3, presents the coefficients from regressions of the assumed return on a dummy variable for CEO option exercises as well as calendar year dummy variables. The CEO option exercise dummy variables are set equal to 0 or 1 depending on whether options will be exercised at the appropriate lead or lag. While not as pronounced as Figure 3, the results do suggest a spike in the assumed return around periods of option exercise; at firms where the CEO is exercising options in the current year, assumed returns are 12 basis points higher than at other firms.

The first columns of Table 9 refine this analysis by estimating equations that allow for the incorporation of different sets of control variables. The reported standard errors are corrected for clustering at the firm level. The results suggest that firms make aggressive return assumptions during periods when CEOs are exercising large amounts of stock options. Column (1) presents results with industry-year effects, column (2) results with firm fixed effects, and column (3) results with firm and year fixed effects. The specification with firm fixed effects is designed to address the potential critique that the firms that use substantial option compensation

are different from other firms in a way that is correlated with reported optimism about assumed returns.

The coefficient estimates in Table 9 range from 0.011 in the specification with firm and year fixed effects to 0.028 in the specification with industry-year effects. Again, the marginal effect is larger at firms where pension sensitivity is larger, with an interaction effect ranging from 0.005 in the specifications with firm fixed effects to 0.013 in the specification with industry-year effects only. To interpret these magnitudes, it is useful to consider the distribution of CEO option exercises as a share of firm value. At sixty-eight percent of the firm-year observations for which CEO compensation data are available, CEO option exercises are reported to be zero. Among the 32 percent of observations for which a positive exercise is observed, the 10th percentile of exercise amounts to 0.03% of firm value, the 90th percentile of exercise amounts to 2.09 percent of firm value, and the 99th percentile of exercise amounts to 10.7 percent of firm value.

Consider a CEO whose option exercise amounts to 2% of the firm's equity market value, an amount close to the 90th percentile among the firms whose CEOs exercise in that year and at the 97th percentile for the entire sample. In particular, compare this observation to one where the CEO exercises no options. In the specification with industry-year fixed effects (column 1), the coefficients imply that CEO option exercise has a baseline effect of 5.6 basis points (2 times 0.028 percentage points) at a log sensitivity of zero. The interaction effect shows that for each additional point of log sensitivity, this effect is 2.6 basis points (2 times 0.013 percentage points) greater. A firm in the 90th percentile of pension sensitivity has a response that is 10.3 basis points larger than a firm in the 10th percentile of sensitivity in the same industry and year.[29] Based on the coefficients in the specification with firm and year fixed effects (column 3), the baseline effect at zero sensitivity would be 2.2 basis points (2 times 0.011 percentage points) and the interaction effect would mean that for each additional point of log sensitivity this effect is 1 basis point (2 times 0.005 percentage points) larger. A firm in the 90th percentile of sensitivity would have a response of 4.0 basis points in the specification with firm and year fixed effects.

[29] 10.3 basis points is the product of twice the interaction coefficient (2*0.013), with the sensitivity differential 3.96 (which is 1.11–(–2.85)). The factor of two represents the fact that this calculation is done for an option exercise of 2% of firm value.

The remaining three columns of Table 9 explore a different way to control for potential spurious correlation between firms' propensity to compensate executives through options and firms' optimism about assumed returns. These columns use measures of CEO option exercise and grants that are normalized by the number of options held by the CEO. The goal is to control for cross-sectional differences in firms' use of option compensation.

Column (4) uses these independent variables in a specification with industry-year effects. In this specification the coefficient on normalized option exercise, 0.041, is positive and statistically significant, the coefficient on option grants is negative with a t-statistic of 1.55, and the options grant coefficient interacted with sensitivity has a large and negative coefficient. This suggests that assumed returns are unusually high at firm-year observations where the CEO is exercising a large share of his options, and may be low in periods of large option grants. The specifications presented in columns (6) and (7) add firm and year fixed effects. The result on normalized CEO option exercise is weaker in these specifications, though the coefficient remains significant at the 10 percent level. Based on the distributions of the variables when scaled by options held, the magnitude of the option exercise effect is comparable in columns (4)-(6) to the magnitude in columns (1)-(3).

Taken together, the results in Tables 6 through 9 and Figures 3 and 4 paint a consistent picture: managerial opportunism is a factor in determining assumed returns. Managers in settings where the return assumption has a larger impact on earnings 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. In addition, managers are more aggressive with their assumptions as they acquire other firms and as they exercise stock options indicating a link between managerial reporting decisions and managerial investment decisions.

5. The determinants of asset allocation decisions

The managerial incentives identified above may affect 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 towards equity in order to justify the higher assumed returns they

report in periods around mergers. The empirical approach is to fit two stage least squares regressions of the pension equity allocation share on the assumed pension return, with the assumed return instrumented with the acquisition dummy variable used in the previous section.[30]

The first two columns of Table 10 show the results of an OLS regression of equity shares on the assumed return. In the first column, for each percentage point increase in the assumed return, the pension fund allocation to equity is 6 percentage points higher. The second column adds a full set of industry-by-year controls and this effect becomes 4.5 percentage points. It is difficult to ascribe a causal interpretation to these results, however, since a number of potential factors might cause a correlation between these two variables. One is that mangers increase the allocation of risky assets in their pension funds to justify increases in assumed returns, but there are several alternatives. Most plausibly, assumed returns might be set partly in response to the pension fund asset allocation choice.

The third and fourth columns address these endogeneity concerns by using an instrumental variables approach to estimate the relationship between the equity allocation and the assumed return.[31] The final two columns show that the results are robust to controls for the leverage of the pension plan, another plausible factor that might affect equity allocation.[32] The identifying assumption behind the IV specifications is that the merger decision affects pension fund equity shares only through the merger decision's impact on the assumed return. Estimates based on this approach suggest a much larger effect of the assumed return on the equity share. The specification in column 3 suggests that one percentage point difference in the assumed return (such as from 8.00% at the 25th percentile to 9.00% at the 75th percentile) is associated with an increase of 28 percentage points in the equity allocation. The inclusion of industry-year effects only modestly reduces this effect to a 20 percentage point increase in response to a one percentage point increase in assumed returns.

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[30] 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, and results using this smaller sample are not statistically significant. A similar situation arises when using the actual 12-month past pension returns (as in Table 7) as controls. The results are robust when dummies are included for the missing observations, but the tests do not have sufficient statistical power when the number of sample observations is so vastly reduced.

[31] Due to the fact that our equity allocation data is compiled from two separate sources which each have different samples over different time periods, we do not move to the full firm-fixed effects specification.

While these magnitudes seem large, it useful to remember that most one-time changes in assumed returns are considerably 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 the 0.202 coefficient on the assumed return variable in the IV specification (column 4) is that a firm seeking to raise its return assumption by 25 basis points to boost earnings during the year of an acquisition is expected to rationalize this assumed return increase with a 5 percentage point (0.20*0.25) increase in the fund's equity allocation. 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 five percent equity premium, since a portfolio invested 100% in equities would have an expected return 5 percentage points higher than a portfolio invested entirely in bonds.

6. Managerial Opportunism and Shareholder Interests

The results on earnings manipulation and pension decision-making illustrate how managerial actions can redistribute value 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).[33] 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.[34]

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[32] It would be desirable to control here for all of the factors in Table 7, but this would make the sample size excessively small.

[33] 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.

[34] For example, Yermack (1997) and Bertrand and Mullainathan (2001) note that various aspects of compensation arrangements do not correspond purely to incentive purposes, suggesting that managers use incentive compensation to extract these rents.

This discussion of managerial opportunism and pension decision-making is framed with an investigation of the relationship between assumed returns and the corporate governance environment of the firm. Specifically, if current shareholders are the beneficiaries of managerial opportunism in setting pension return assumptions, then high 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 of the rent-extraction view.

Figure 5 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 ranging from category 1, where shareholders have the most control over mangers, 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 below 8.5 percent, while at the most dictatorial, they are above 9 percent. While the analysis of Figure 5 is only suggestive, it does indicate that managerial opportunism in pension decision-making does not appear to be guided by shareholder interests.

7. 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 opportunistically characterize the performance of pension assets. Managers facing large incentives to manipulate earnings through pension decisions — either because of the sensitivity of firm earnings to changed assumptions, impending merger activity, 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. Furthermore, rationalizing these higher assumed returns is easier in the context of higher equity allocations and the IV analysis, which 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 Erikson, Hanlon and Maydew's (2003) analysis of earnings fraud, or more aggregated measures of misreporting through accrual accounting, as in Bergstresser and Philippon (2003). 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.

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Table 1: Pension Decision Making at IBM, 1993-2001

	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	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%	na		500	0
1994	2.13%	na	9.50%	-1.16%		225	0
1995	12.31%	51.56%	9.25%	20.54%		100	3
1996	5.57%	9.91%	9.25%	15.54%		300	51
1997	3.37%	5.12%	9.50%	18.07%	1.53%	2200	101
1998	4.02%	0.14%	9.50%	13.62%	1.66%	0	301
1999	7.20%	30.06%	9.50%	15.38%	1.42%	0	803
2000	0.97%	-1.90%	10.00%	-3.06%	4.77%	650	703
2001	-2.86%	-5.04%	10.00%	5.39%	4.75%	0	1253

Note: 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, and data on option activity are taken from the Compustat Executive Compensation database. 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% and worldwide pension assets, divided by annual income before taxes.

Table 2: Contribution of Assumed Returns to Operating Income, by Assumed Return and Pension Sensitivity

Pension sensitivity	percentile	5th	10th	25th	Mean	50th	75th	90th	95th
	level	0.013	0.058	0.112	0.299	0.716	1.494	3.042	5.150
	log	-4.370	-2.847	-2.193	-1.209	-0.334	0.401	1.113	1.639
Assumed Return on Pension Assets	percentile	return							
	5th	7.00	0.09%	0.41%	0.78%	2.09%	5.01%	10.46%	21.29%	36.05%
	10th	7.50	0.09%	0.44%	0.84%	2.24%	5.37%	11.21%	22.82%	38.63%
	25th	8.00	0.10%	0.46%	0.89%	2.39%	5.73%	11.95%	24.34%	41.20%
	Mean	8.61	0.11%	0.50%	0.96%	2.57%	6.17%	12.86%	26.19%	44.34%
	50th	9.00	0.11%	0.52%	1.00%	2.69%	6.45%	13.45%	27.38%	46.35%
	75th	9.40	0.12%	0.55%	1.05%	2.81%	6.73%	14.04%	28.59%	48.41%
	90th	10.00	0.13%	0.58%	1.12%	2.99%	7.16%	14.94%	30.42%	51.50%
	95th	10.00	0.13%	0.58%	1.12%	2.99%	7.16%	14.94%	30.42%	51.50%

Note: This table shows the percentage of operating income attributable to assumed returns on pension assets, as the product of pension sensitivity (in columns) and assumed long term rate of return assumptions (in rows). Pension sensitivity is the ratio of pension assets to operating income, and the long term rate of return assumption is the assumed rate of return on pension assets in corporate financial reports. Reported earnings are affected by the rate of return assumption because assumed returns on pension plan assets can be deducted from costs, with differences between assumed and actual returns amortized over long periods of time. The columns show how higher rate assumptions generate higher reported earnings for a firm with a given ratio of pension assets to operating income.

Table 3: The Magnitude of Pension Assets, 1991-2002

Year	Sample Count	Balance Sheet Assets of Firms in (2) ($bn)	Pension Assets of Firms in (2) ($bn)	DB Pension Assets / Total Assets	DB Pension Assets ($m)			
					Mean	25th Percentile	Median	75th Percentile
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1991	1645	7,061.80	735.1	10.41%	446.9	10.2	46.5	210.1
1992	1725	7,723.50	764.9	9.90%	443.4	10.7	46.7	211.4
1993	1755	8,770.60	879.2	10.02%	501.0	10.9	50.4	236.3
1994	1779	9,798.70	830.6	8.48%	466.9	10.6	48.7	218.5
1995	1741	10,189.70	962.7	9.45%	552.9	11.6	53.5	247.9
1996	1704	10,603.20	1,034.30	9.75%	607.0	13.3	63.1	283.4
1997	1630	11,214.60	1,156.20	10.31%	709.4	16.6	76.6	331.8
1998	1589	12,492.80	1,276.60	10.22%	803.4	17.4	86.0	414.6
1999	1544	14,319.00	1,404.40	9.81%	909.6	19.7	101.1	454.0
2000	1453	14,739.10	1,413.50	9.59%	972.8	20.0	100	482.3
2001	1258	14,957.50	1,067.50	7.14%	848.6	21.5	94.9	443.5
2002	1502	19,249.60	1,093.60	5.68%	728.1	14.9	68.2	333.6

Note: This table characterizes the magnitude of firm operating and pension assets for firms in Compustat that report long term rates of return, pension asset size, and positive operating income. The data are from Compustat. The left panel shows aggregate pension assets relative to operating assets for the firms sample, and the right panel shows the distribution of pension fund size for the same firms.

Table 4: 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	-0.05	90	1288	198	1576	5.7%	12.6%
1993	-0.15	87	1161	358	1606	5.4%	22.3%
1994	-0.05	136	1257	257	1650	8.2%	15.6%
1995	0.06	186	1277	140	1603	11.6%	8.7%
1996	-0.04	172	1288	128	1588	10.8%	8.1%
1997	0.02	172	1239	112	1523	11.3%	7.4%
1998	-0.03	150	1101	159	1410	10.6%	11.3%
1999	0.02	157	1079	140	1376	11.4%	10.2%
2000	0.04	177	1049	107	1333	13.3%	8.0%
2001	-0.03	98	948	152	1198	8.2%	12.7%
2002	-0.31	42	591	508	1141	3.7%	44.5%

Note: The table provides the mean change in the assumed return and the number of increases, non-changes and decreases for the sample of firms. The data are from Compustat and the sample is those firms reporting pension asset size, positive operating income, and assumed returns in the current and previous year. The mean change is in percentage points.

Table 5: Summary Statistics

Variable	Mean	Median	Standard Deviation	Observations
Pension Assets ($m)	653.0	65.5	2631.2	19,325
Operating Assets (Book Value, $m)	7302.5	911.7	32577.9	19,325
Pension Assets / Operating Income	4.460	0.716	226.8	19,325
Pension Assets / Operating Assets	0.142	0.086	0.255	19,324
Pension Liabilities ($m)	621.3	67.0	2353.2	19,325
Pension Funding Status (Assets/Liabilities – 1)	0.004	-0.021	0.335	19,263
Log Ratio of Annual Pension Assets to Operating Income	-0.440	-0.334	1.398	19,325
Log Ratio of Average Pension Assets to Operating Income	-0.446	-0.375	1.357	19,325
Log Ratio of Annual Pension Liabilities to Operating Income	-0.382	-0.322	1.289	19,263
Assumed Return on Pension Assets (%)	8.746	9.000	1.115	19,325
Change in Assumed Return on Pension Assets (%)	-0.044	0.000	0.703	16,004
Acquirer Indicator	0.261	0.000	0.439	19,325
CEO option exercise / Equity market value (%)	0.296	0.000	1.780	7,075
CEO # options exercised / # Options held	0.105	0.000	0.554	5,951
CEO # options granted / # Options held	0.264	0.200	0.346	5,951
CEO option grant value / non-option compensation	1.450	0.670	2.763	6,526
Share of Pension Fund Allocated to Equity	0.498	0.575	0.247	3,202

Note: This table presents summary statistics. All data on operating performance, pension assets, and pension assumptions are drawn from Compustat. The main sample consists of firms that report pension asset size, positive operating income, and an assumed return on pension assets. 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 log ratios of pension assets to operating income reflect the sensitivity of firm earnings to changes in the long-term rate of return assumption (see Table 2). The assumed return and the change in the assumed return are the primary dependent variables of interest. The acquisition indicator is drawn from the Securities Data Company (SDC) database of mergers and acquisitions. CEO option data are drawn from the Compustat Executive Compensation database. Equity allocation data are drawn from both the Pensions and Investments Survey and IRS 5500 filings. The equity allocation sample excludes firms with assets in opaque trusts.

Table 6: Assumed Returns, Pension Sensitivities, and Acquisitions

	Dependent Variable: Assumed Return on Pension Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
Log Ratio of Annual Pension Assets to Annual Operating Income	0.117 ***			0.103 ***	0.004	0.003
	(0.015)			(0.016)	(0.014)	(0.014)
Log Ratio of Average Pension Assets to Annual Operating Income		0.114 ***				
		(0.015)				
Log Ratio of Annual Pension Liabilities to Annual Operating Income			0.109 ***			
			(0.015)			
Acquirer Indicator				0.338 ***	0.035 **	0.046 ***
				(0.029)	(0.014)	(0.014)
Acquirer Indicator Interacted with Log Sensitivity				0.072 ***	0.037 ***	0.034 ***
				(0.021)	(0.011)	(0.011)
Industry*Year Effects?	Y	Y	Y	Y	N	N
Firm Fixed Effects	N	N	N	N	N	Y
Year Fixed Effects	N	N	N	N	Y	Y
Observations	19,325	19,325	19,325	19,325	19,325	19325
R-Squared	0.10	0.09	0.09	0.11	0.73	0.74
Firms	3,247	3,247	3,247	3,247	3,247	3247

Note: The dependent variable in these regressions is the assumed return on pension assets. These regressions test for a dependence of the assumed return on pension assets on the sensitivity of reported earnings and on acquisitions. Standard errors, reported in parentheses are corrected for firm-level clustering. The sample consists of firms that report pension asset size, positive operating income, and an assumed return on pension assets. Financial and pension data are from Compustat; acquisitions data are from the Securities Data Company (SDC) database. *** indicates significance at the 1% level and ** indicates significance at the 5% level.

Table 7: Robustness Checks on Relationship between Assumed Returns and Acquisitions

Additional Controls	*Dependent Variable: Assumed Return on Pension Assets*									
	Equity Share		*Actual Returns*		*CEO "optimism"*		*Pension Funding Status*		*All*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acquirer Indicator	0.313 ***	0.045 ***	0.326 ***	0.046 ***	0.207 ***	0.041 ***	0.320 ***	0.045 ***	0.185 ***	0.040 ***
	(0.028)	(0.014)	(0.029)	(0.014)	(0.026)	(0.014)	(0.029)	(0.014)	(0.026)	(0.014)
Log Ratio of Pension Assets to Operating	0.077 *	0.009	0.080 ***	-0.004	0.120 ***	0.049 ***	0.095 ***	0.006	0.087 *	0.054 **
	(0.040)	(0.024)	(0.023)	(0.016)	0.023	0.017	(0.017)	(0.012)	(0.047)	(0.027)
Acquirer Indicator Interacted with Log	0.062 ***	0.033 ***	0.069 ***	0.033 ***	0.051 ***	0.030 ***	0.072 ***	0.033 ***	0.047 **	0.028 **
	(0.021)	(0.011)	(0.021)	(0.011)	(0.020)	(0.011)	(0.021)	(0.011)	(0.020)	(0.011)
Share of Pension Assets Invested in Equity	0.846 ***	0.000							0.552 ***	-0.018
	(0.127)	(0.077)							(0.125)	(0.076)
12-month Actual Pension Return			2.376 ***	0.108					2.176 ***	0.114
			(0.281)	(0.162)					(0.271)	(0.170)
CEO option grants / non-option compensation					0.026 ***	-0.006			0.023 ***	-0.006
					(0.008)	(0.006)			(0.007)	(0.006)
Pension Funding Status							0.059	0.128 *	-0.015	0.109 *
							(0.067)	(0.065)	(0.064)	(0.065)
12-month Change in Funding Status							-0.158 **	-0.115 **	-0.225 ***	-0.110 **
							(0.069)	(0.054)	(0.071)	(0.055)
Year Effects?	N	Y	N	Y	N	Y	N	Y	N	Y
Industry*Year Effects?	Y	N	Y	N	Y	N	Y	N	Y	N
Firm Effects?	N	Y	N	Y	N	Y	N	Y	N	Y
Observations	19,325	19,325	19,325	19,325	19,325	19,325	19,325	19,325 #	19,263	19,263
R-Squared	0.117	0.743	0.118	0.743	0.137	0.743	0.116	0.743	0.149	0.7438
Firms	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,238	3,238

Note: The dependent variable in these regressions is the assumed return on pension assets. Standard errors, reported in parentheses are corrected for firm-level clustering. The sample consists of firms that report pension asset size, positive operating income, and an assumed return on pension assets. Financial and pension data are from Compustat; acquisitions data are from the Securities Data Company (SDC) database; compensation data are from Execucomp. Indicator variables are included for missing control variables, i.e. for missing asset allocation in the first two columns, for missing 12-month actual equity returns in the middle two columns, and for missing CEO data for the right two columns. 12-month actual pension returns for 1998-2002 are assumed missing due to incorrect Compustat data for this item during these years. Regressions also contain interaction effects between each control variable and the log ratio of pension assets to operating income (not shown). The equity share control is designed to test the extent to which firms respond to the share of pension assets invested in equity and whether the findings of managerial motives are robust to any such response. The 12-month actual pension return is similarly designed to test for a response of assumed returns to one-year lagged actual returns, and to examine the robustness of the managerial motives to that response. CEO option grants are designed to be a measure of CEO optimism about the company's prospects. ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Changes in Assumed Returns, Pension Sensitivity, and Acquisitions

	Dependent Variable: Categorical Variable for Change in Assumed Return							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Ratio of Annual Pension Assets to Annual Operating Income	0.018 **	0.015 *	0.019 ***	0.015 *				
	(0.007)	(0.008)	(0.007)	(0.008)				
Log Ratio of Average Pension Assets to Annual Operating Income					0.009	0.007		
					(0.007)	(0.008)		
Log Ratio of Annual Pension Liabilities to Annual Operating Income							-0.011	-0.013
							(0.008)	(0.009)
Acquirer Indicator		0.067 ***		0.070 ***		0.065 ***		0.062 ***
		(0.023)		(0.023)		(0.024)		(0.023)
Acquirer Indicator Interacted with Log Sensitivity		0.015		0.018		0.012		0.016
		(0.017)		(0.016)		(0.017)		(0.018)
Acquirer Indicator Marginal Effects								
Probability of Decrease		-1.2%		—		-1.2%		-1.2%
Probability of No Chg		0.3%		—		0.3%		0.3%
Probability of Increase		0.9%		—		1.0%		0.9%
Dependent Variable								
Coarse (3 categories)	Y	Y	N	N	Y	Y	Y	Y
Fine (11 categories)	N	N	Y	Y	N	N	N	N
Observations	16,004	16,004	16,004	16,004	16,004	16,004	16,004	16,004

Note: The model estimated is an ordered probit. In regressions with the coarse dependent variable, the dependent variable takes one of three values: -1 for decrease in assumed returns, 0 for no change, and 1 for an increase. In regressions with the fine dependent variable, the space of changes in assumed returns is divided into eleven bins of 25bp increments to reflect the fact that changes are usually made in such increments. Financial data are from Compustat; acquisitions data are from the Securities Data Company (SDC) database. The sample includes firms in Compustat which report pension plan asset size, positive operating income, and an assumed return in the current and previous period. Standard errors, reported in parentheses, are corrected for firm-level clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Assumed Returns, Sensitivity, and CEO Option Exercise

	Dependent Variable: Assumed Return on Pension Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
Log Ratio of Annual Pension Assets to Annual Operating Income	0.154 ***	0.058 ***	0.031	0.189 ***	0.069 ***	0.040
	(0.021)	(0.022)	(0.022)	(0.023)	(0.028)	(0.027)
CEO option exercise as share of firm equity market	0.028 ***	0.014 ***	0.011 ***			
	(0.011)	(0.004)	(0.004)			
CEO option exercise share interacted with log sensitivity	0.013 **	0.005 *	0.005 *			
	(0.006)	(0.003)	(0.003)			
CEO option exercise as share of options held				0.041 *	0.025 *	0.022 *
				(0.023)	(0.013)	(0.013)
CEO option exercise as share of held, interacted with log sensitivity				0.012	0.011	0.009
				(0.012)	(0.010)	(0.010)
CEO option grants as share of options held				-0.069	0.006	0.009
				(0.045)	(0.033)	(0.034)
CEO option grants as share of held, interacted with log sensitivity				-0.088 ***	-0.020	-0.014
				(0.030)	(0.024)	(0.024)
Industry Effects?	N	N	N	N	N	N
Year Effects?	N	N	Y	N	N	Y
Industry*Year Effects?	Y	N	N	Y	N	N
Firm Effects?	N	Y	Y	N	Y	Y
Observations	7,075	7,075	7,075	5,951	5,951	5,951
R-Squared	0.15	0.75	0.76	0.18	0.74	0.75
Firms	1,075	1,075	1,075	1,069	1,069	1069

Note: The dependent variable is the assumed rate on pension assets. Data are from Compustat and Compustat Executive Compensation. The sample consists of firms that report pension asset size, positive operating income, and an assumed return on pension assets, and have data on executive compensation. Standard errors, reported in parentheses, are corrected for firm-level clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Equity Allocation and Assumed Return on Pension Assets

	Dependent Variable: Equity Allocation Share					
Specification	*Ordinary Least Squares*		*Instrumental Variables*		*Instrumental Variables*	
	(1)	(2)	(3)	(4)	(5)	(6)
Assumed Return	0.060 ***	0.045 ***	0.280 ***	0.202 ***	0.264 ***	0.188 ***
on Pension Assets	(0.009)	(0.009)	(0.045)	(0.050)	(0.043)	(0.046)
Log ratio of annual	0.039 ***	0.034 ***	0.132 ***	0.018	0.007	0.008
pension assets to annual	(0.007)	(0.007)	(0.009)	(0.099)	(0.009)	(0.010)
operating income						
Pension Funding Status					0.128 ***	0.143 ***
					(0.045)	(0.050)
Industry*Year Effects	N	Y	N	Y	N	Y
LTROR Instrumented	N	N	Y	Y	Y	Y
Instrument set	None		Acquisition Variables		Acquisition Variables	
Observations	3202		3202		3202	

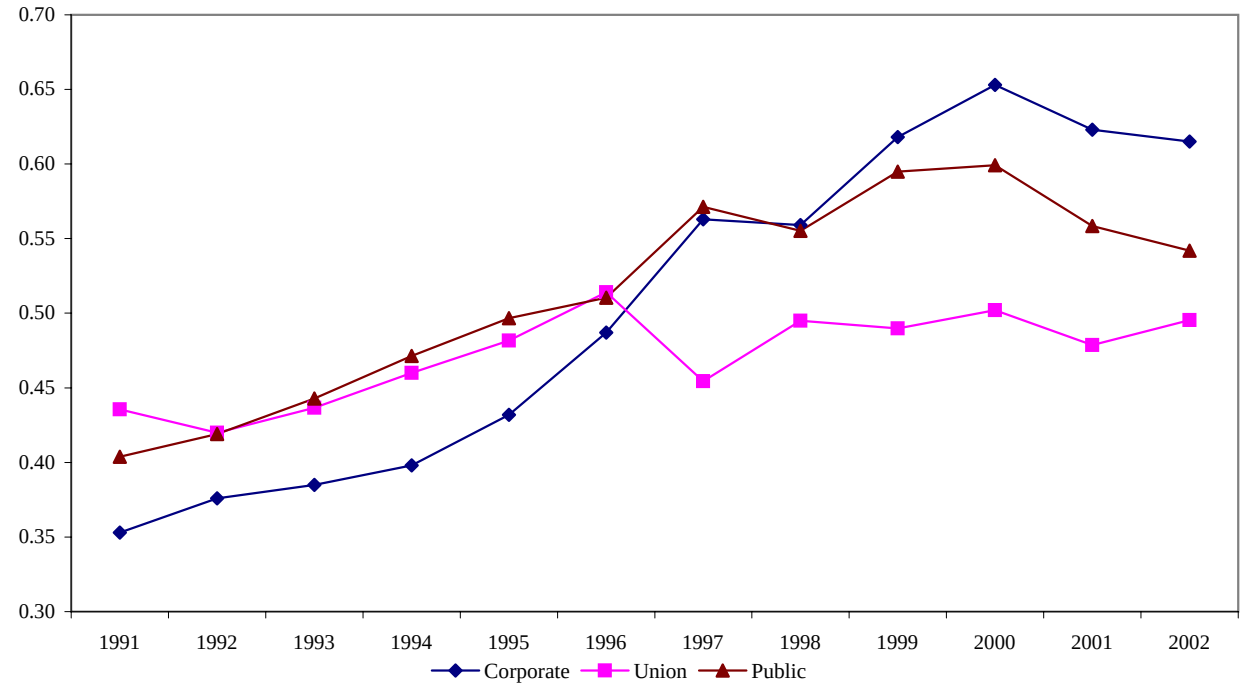
Note: This table presents the results of OLS and IV estimation of models for the pension fund's equity allocation share. Asset allocation compiled from Pensions and Investments annual reports and IRS 5500 filings. Firms with assets in opaque trusts are excluded from the sample. The first two columns report the results of linear regressions of equity allocation shares on assumed returns and pension sensitivity. The second two columns use a lagged acquirer indicator as an instrumental variable for the assumed return on pension assets. *** indicates significance at the 1% level.

Appendix Table 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

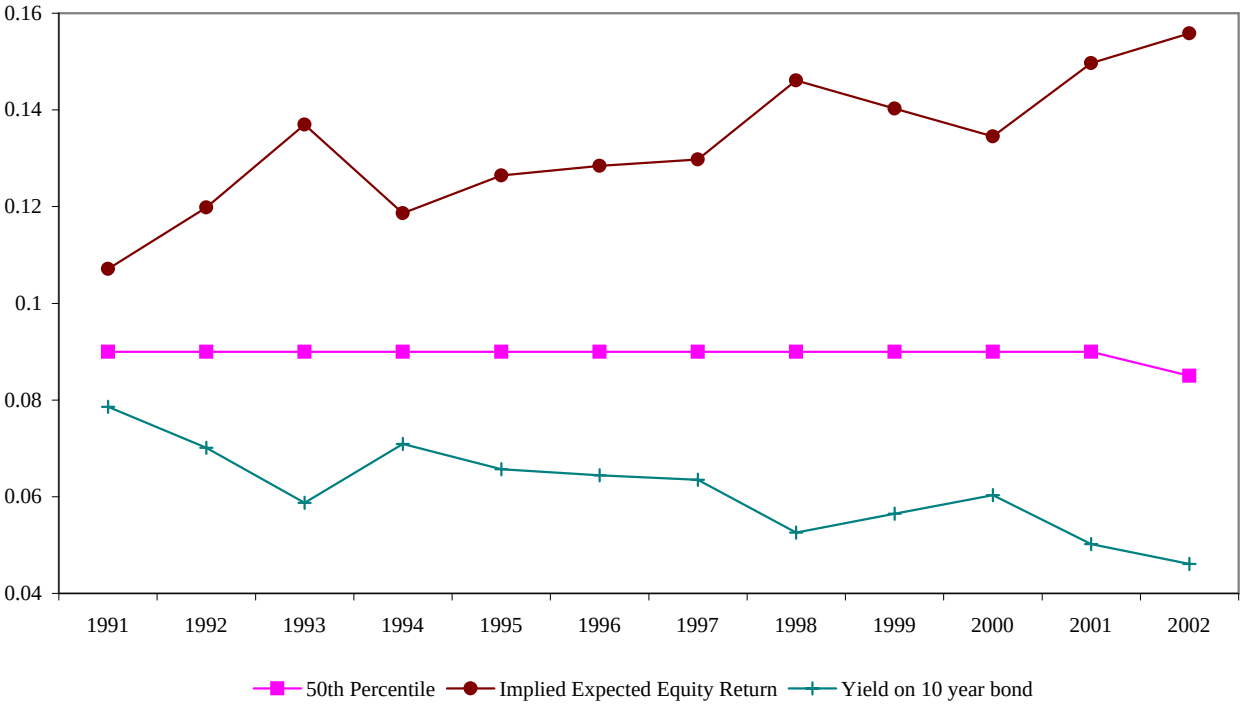
Note: The table provides details on the pension plans and accounting assumptions for the ten largest DB pension plan sponsors other than IBM. The size of the pension plan assets is from the Pensions and Investments 2002 Survey and is valid as of 30 September 2002. The median sensitivity is the within-firm 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.

Figure 1: Mean Share of Pension Fund Assets Invested in Equity



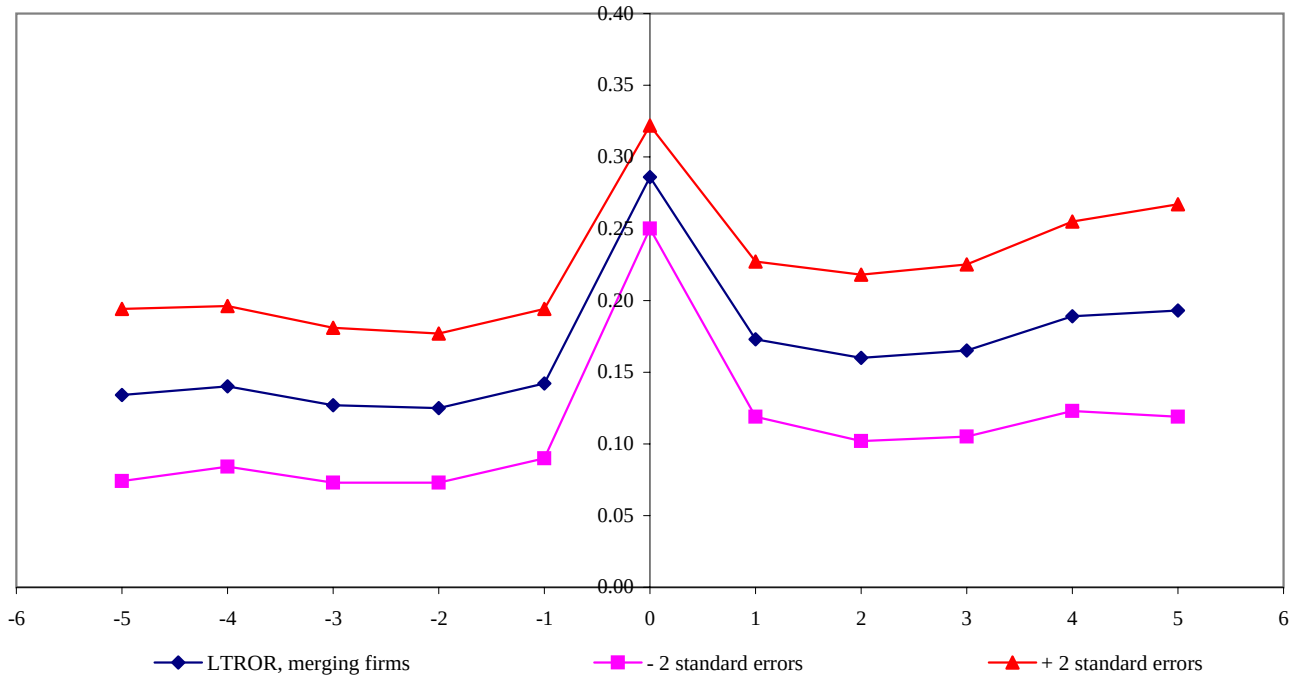
Note: The figure shows the percentage of pension fund assets invested in equity instruments for different types of pension sponsors. The sample of corporate sponsors consists of data from *Pensions and Investments* and IRS 5500 filings on publicly traded companies that appear in Compustat. Union and public data are from *Pensions and Investments* . *Pensions and Investments* covers pension fund asset allocation for the largest US pension sponsors each year. An IRS 5500 form must be filed by corporate sponsors on an annual basis, but due to data limitations (see text), only a subset is available. Equity includes domestic, international, and own-company equity; excludes investments in real estate and private equity.

Figure 2: Long Term Rate of Return Assumptions and Implied Equity Returns



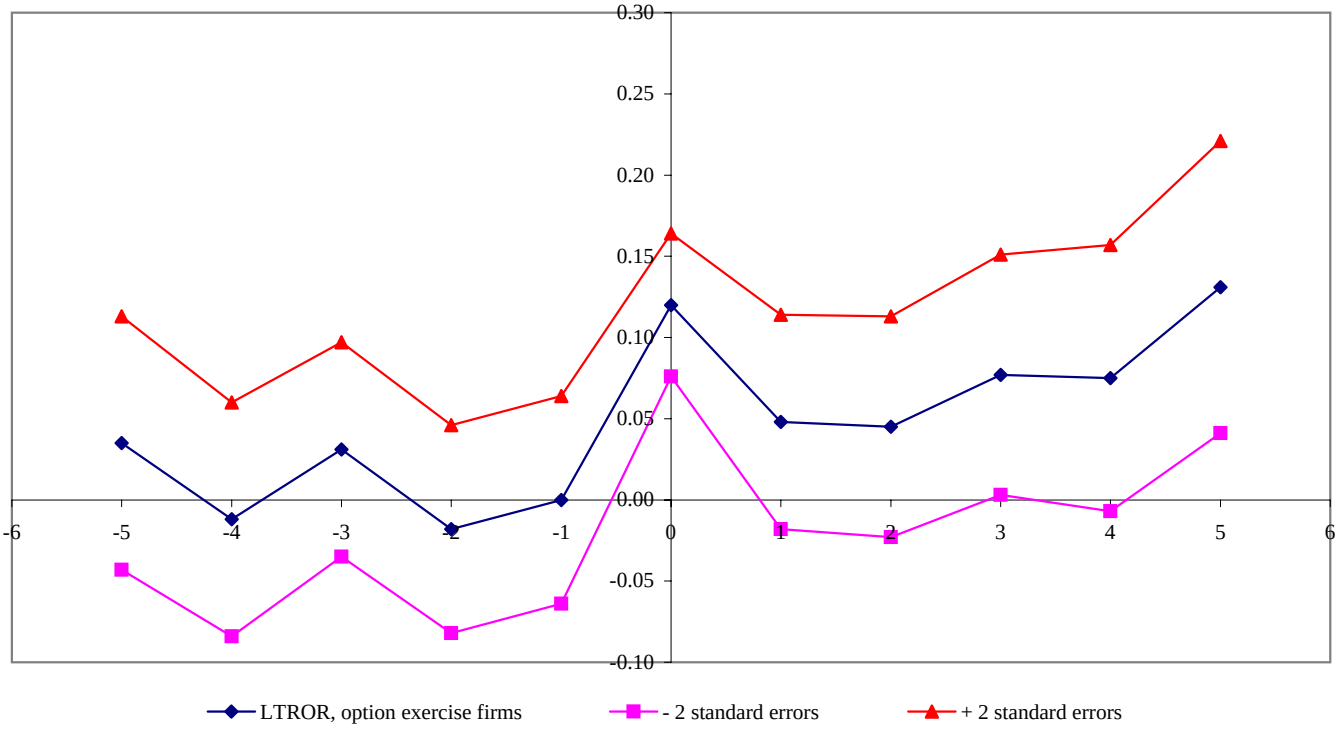
Note: The median long-term rate of return assumption is taken from the sample of firms in Compustat. Yields on 10-year bond are from Federal Reserve. The implied expected equity return is the expected return on equities given a portfolio of 40% equity and 60% bonds with prevailing bond yields and a 9% assumed return on the portfolio.

Figure 3: Long-Term Rate of Return Assumption Around Mergers, All Firms



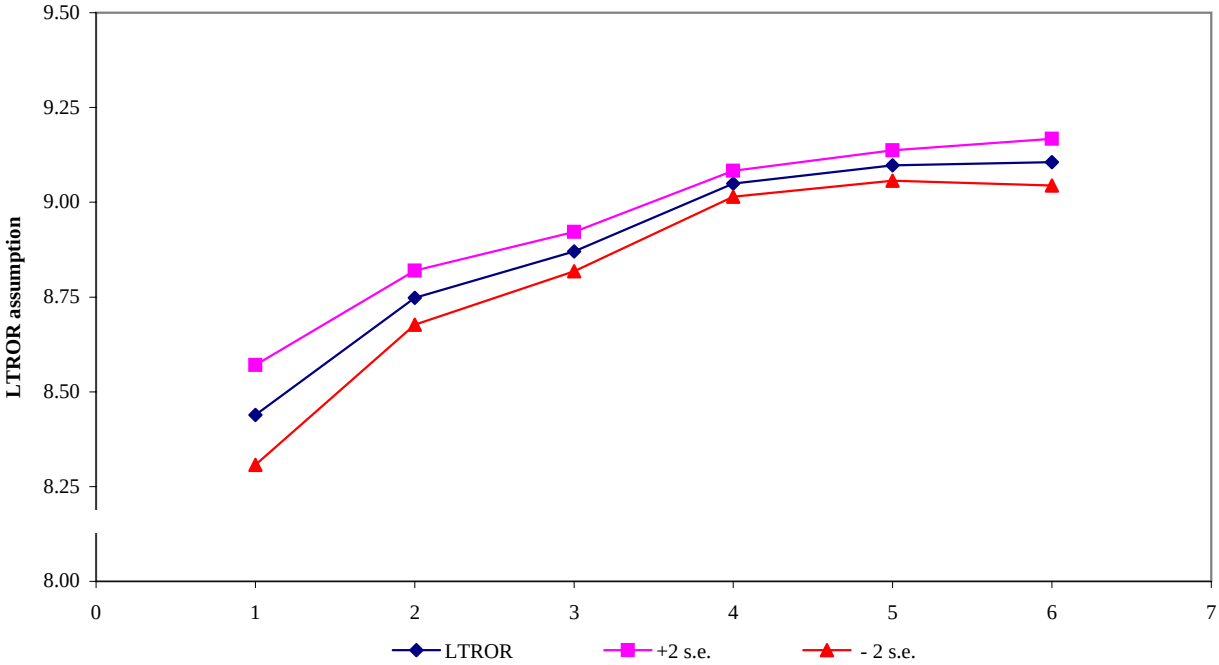
Note: The figure shows long-term rate of return assumptions reported by firms in periods around mergers. These averages are regression-adjusted for calendar-year effects. The estimate for period 0 is the average assumption for firms reporting acquisitions of another firm in that year. The estimate for period 1 is the average assumption for firms reporting acquisition of another firm in the previous year, but not in the current year. 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).

Figure 4: Long-Term Rate of Return Assumptions around CEO option exercise, All Firms



Note: The figure shows long-term rate of return assumptions reported by firms in periods around CEO option exercise. These averages are regression-adjusted for calendar year effects. At period 0 is average assumption for firms whose CEOs report option exercise in that year. At period 1 is average assumption for firms whose CEOs exercise options in previous year, but not current year. At period -1 is average LTROR assumption for firms whose CEOs exercise options in next year, but not current year. Long-term rate of return assumption data from Compustat.

Figure 5: Rate of Return Assumptions by Quality of Corporate Governance



Note: 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 the G-I-M index, group 2 scored 6-7, group 3 scored 8-9, group 4 scored 10-11, group 5 scored 12-13, and the words governed firms (group 6) scored 14 or above. Long-term rate of return assumption data from Compustat.