Fair-value pension accounting

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FAIR-VALUE PENSION ACCOUNTING

Abstract

We compare the value and credit relevance of financial statements under fair-value and smoothing (SFAS-87) models of pension accounting. The fair-value model does not improve the value relevance of the balance sheet and may impair that of income and the combined financial statements, unless transitory unrealized gains and losses (G&L) are disaggregated from more persistent income components. Further, the fair-value model improves the credit relevance of the balance sheet but impairs that of income and the combined financial statements, unless G&L is separated from other income components. Overall, our results suggest there are no informational benefits to adopting a fair-value pension accounting model.

FAIR-VALUE PENSION ACCOUNTING

1. Introduction

Current pension accounting recognition and measurement rules (Statement of Financial Accounting Standards 87, hereafter SFAS-87, Financial Accounting Standards Board, 1985) emphasize the attribution of pension costs to periods of employee service. Accordingly, changes in the fair value of pension assets and liabilities are amortized over expected remaining employee service through an elaborate smoothing mechanism. While such a "smoothing" model generates a stable pension expense, the balance sheet recognizes merely an accrued or prepaid pension cost (i.e., the accumulated pension expense net of contributions), rather than the fair value of net pension assets. The smoothing provisions of SFAS-87 have therefore come under unprecedented attack from various quarters. As a result, an alternative fair-value pension accounting model has been adopted or is under active consideration by the world's standard-setting bodies. Under this method, the balance sheet reflects the fair value of net pension assets and all changes in the fair value of net pension assets flow through income.

We provide evidence on the properties of financial statement numbers under two alternative approaches to pension accounting—the current smoothing model (largely consistent with SFAS-87) and the proposed fair-value model. Proponents of the fair-value model maintain it will improve the informativeness of the balance sheet by incorporating the most current values of pension assets and liabilities rather than a historical measure of accrued pension cost. However, income under the fair-value model includes transitory changes in net pension assets, which could increase its volatility and reduce its persistence. Thus, whether adopting a fair-value pension accounting model will improve or impair the value and credit relevance of the *combined* financial statements is essentially an empirical question.

We use footnote information to generate income statement and balance sheet numbers under the fair-value pension accounting model. We then compare the time-series properties, value relevance, and credit relevance of financial statement numbers generated under these two alternative pension accounting models. We define value (credit) relevance as the association between financial statement measures and

equity investors' (creditors') future cash flow expectations, which we proxy through stock prices (credit ratings). We conduct our primary analyses on a large sample of firms over the 1991-2002 period.

Our evidence is consistent with concerns voiced during the SFAS-87 deliberations: fair-value pension accounting introduces considerable volatility in net income, reducing its persistence and partially obscuring the underlying information in operating (non-pension) income. Because of its lower persistence, fair-value income is less value relevant than smoothing income. However, contrary to expectation, fair-value book values are no more value relevant than those based on smoothing. Consequently, the value relevance of book value and income combined is significantly higher under smoothing than under fair-value models. The inferior value relevance of income under the fair-value model can be attributed to the fair-value model's aggregation of highly transitory unrealized gains and losses on net pension assets (henceforth G&L) with more persistent income components. After separating G&L from other income components, we find no economically meaningful difference between the value relevance of the fair-value and the smoothing models.

Turning to credit relevance, our analyses compare the relative ability of various financial ratios, measured alternatively under the smoothing and the fair-value models, to explain default probability. We proxy for default probability using Standard & Poor's (S&P) long-term issuer credit ratings and model credit ratings following Kaplan and Urwitz (1979). Data requirements restrict our credit relevance analyses to the 1995-2002 period. We find that the fair-value model improves (impairs) the credit relevance of balance sheet (income statement) numbers vis-à-vis the smoothing model. However, consistent with our value relevance results, we find that the combined balance sheet and income statement numbers are more credit relevant under the smoothing model. Also consistent with our value relevance results, there is no statistical difference in the combined credit relevance of the fair-value and smoothing models after G&L is separated from other income components.

The primary contribution of our study is that we directly address a current and contentious standard-setting issue. The recent decline in U.S. corporate pension funding has provoked various constituents to severely criticize the smoothing provisions of SFAS-87 and to advocate the fair-value

model. However, the fair-value model also has its share of detractors who worry primarily about increased income volatility and susceptibility to manipulation. Nevertheless, the Financial Accounting Standards Board (FASB) and other standard-setting bodies have taken steps to adopt the fair-value pension accounting model, ostensibly with the objective of improving financial reporting quality. Our results have important implications for such standard-setting efforts. For example, we show that fair-value pension accounting does not improve the value or credit relevance of the financial statements, and indeed may impair their informativeness unless the transitory G&L is separated from other income components.

Our results also have broader implications for fundamental issues under consideration by standard setters. The FASB has recently signaled a fundamental conceptual shift towards the broad-based adoption of fair-value accounting. Our results suggest the existence of important trade-offs in moving toward fair-value accounting: while one could argue that the fair-value accounting model improves the relevance of asset and liability measurements (although our evidence is not entirely consistent with this claim), it significantly impairs the persistence, and in turn the relevance, of income. Therefore, there are unlikely any informational advantages to adopting the fair-value accounting model. Our results also highlight the importance of separating transitory G&L from more persistent income components when adopting the fair-value accounting model. Such a separation is difficult if fair-value measurements are incorporated at the transaction level, as currently contemplated by standard setters (FASB, 2004).[1]

Finally, our study is arguably the first to examine *credit relevance*, i.e., standard-setting implications from the creditors' perspective. Holthausen and Watts (2001) question the generality of the value relevance literature's findings because of its exclusive focus on equity investors. Consistent with their criticism, we find differences in the information needs of investors versus creditors, that is, an accounting alternative that is preferable from the equity investors' perspective (value relevant) need not

[1] For example, the FASB is working on a project that, if adopted, will base revenue recognition on changes in the fair values of assets and liabilities, rather than on completing an earnings process. (See the FASB web site at http://www.fasb.org/project/revenue_recognition.shtml for details.) If fair-value accounting were implemented at the transaction level without matching costs and revenues (as contemplated by the revenue recognition project), then it would be difficult to separate out the transitory G&L from more persistent cost (or revenue) components, since information necessary for such separation would probably not be recorded by the accounting system.

necessarily be preferable from a creditors' perspective (credit relevant). Our results highlight the importance of studying both equity investors' and creditors' information needs when evaluating standard setting issues.

A few caveats are in order. First, our paper examines the likely *direct* effects of adopting fair-value pension accounting on the usefulness of information recognized in financial statements to equity investors and creditors. We do not examine *indirect* or unintended consequences of changing pension rules on preparer behavior, e.g., changes in pension funding levels or asset allocation. Second, because all information regarding both smoothing and fair-value pension accounting is currently available in financial statements and their footnotes, our study does not examine which model of pension accounting *discloses* better information. Rather, our paper seeks to compare two alternative models of *recognition and measurement*. Third, by using stock prices and credit ratings as proxies for future cash flows, we implicitly assume that investors and credit raters correctly use all available information, including that in the financial statements and footnotes. Although additional analyses suggest otherwise, our inferences could be contaminated if, for example, investors overweight the currently *recognized* SFAS-87 (smoothing) measures vis-à-vis the *disclosed* fair-value measures.

The rest of the paper is organized as follows. Section 2 motivates the study. Section 3 describes salient design features and Section 4 discusses our results. Section 5 concludes.

2. Motivation

Current pension accounting (under SFAS-87) uses an elaborate smoothing mechanism that amortizes changes to the fair value of pension assets and liabilities over remaining employee service. As a consequence, SFAS-87 records a stable pension expense but recognizes merely an accrued or prepaid pension cost (i.e., accumulated pension expense net of contributions) on the balance sheet. SFAS-87 therefore neither recognizes the fair value of net pension assets on the balance sheet nor flows changes in the fair values of net pension assets through income.

Advocates of SFAS-87's smoothing model focus primarily on earnings. Their concern regarding the fair-value model relates to "illusory" pension expense volatility arising from transitory changes in potentially mean-reverting fair values of net pension assets.[2] Specifically, corporate managers and actuaries are concerned that aggregating such transitory changes in net pension assets with more permanent income components will obscure not only the permanent pension expense components but also the firm's underlying operating income (see Nyberg, 2005).

SFAS-87's critics point out that accrued/prepaid pension cost can deviate significantly from fair value—or the true economic value—of net pension assets. Additionally, they criticize SFAS-87's delayed income recognition of changes in the fair value of pension assets and obligations, and in particular SFAS-87's use of expected rather than actual returns on plan assets (see the October 13, 2003 UBS analyst report and Buffet and Loomis, 2002). The CFA Institute adds that SFAS-87 "imposes a huge and costly burden" on analysts and other users (SEC 2005). Particularly disturbing to some are recent cases in which the fair value of a company's net pension assets declines, yet the company reports pension "income."[3] Much of this criticism has been fueled by recent market conditions resulting in an unprecedented decrease in pension funding levels and high-profile pension collapses (such as that of United Airlines). Overall, critics argue that SFAS-87 is potentially misleading because financial statements hide both the true economic position and the income effects of pension plans.

Accordingly, legislators, the Securities and Exchange Commission (SEC), and other standard-setting bodies have recently exerted pressure on the FASB to reform pension accounting. For example, during the recent U.S. Senate Finance Committee's investigation of United Airlines' pension default,

[2] At least three factors could contribute to net pension asset mean reversion. First, interest rates and equity prices mean-revert (e.g., DeBondt and Thaler, 1985). Second, tax deductions for pension contributions are unavailable at high funding levels and various regulations provide incentives for firms to increase contributions at low funding levels. Third, firms sometimes retroactively change pension benefits. Retroactive benefit grants may be more likely when funding levels are high, and pension concessions from employees may be more likely when funding levels are low.

[3] This is the chief subject of comment letters to the FASB by the House Committee on Education and the Workforce, by House Ways and Means Committee member Robert Matsui, and of recent comments by Senate Finance Committee Chairman, Charles Grassley, and well-known investor Warren Buffet. See Barlas (2005), Buffet and Loomis (2002) and comment letters to FASB (www.fasb.org).

Senator Charles Grassley threatened to introduce legislation prohibiting the smoothing mechanisms of SFAS-87 (Barlas, 2005). Also, in an unusual move, the SEC recently directed the FASB to reform pension accounting after concluding that current balance sheets are "often not transparent as to the true funded status of pension plans" (SEC, 2005). Accounting standard bodies outside the U.S. have also moved to reform pension accounting. The U.K. Accounting Standards Board (ASB) issued a pension accounting standard (Financial Reporting Standard 17; hereafter FRS-17) in November of 2000 (ASB, 2000) and the International Accounting Standards Board (IASB) is working on a pension accounting project (see www.iasb.org). Both are based on some form of fair-value pension accounting.

Responding to this pressure, in November 2005 the FASB announced plans to reform U.S. pension accounting. Phase I of the project requires balance sheet recognition of the fair-value of net pension assets. The current smoothing provisions of SFAS-87 remain unchanged, with G&L recognized in other comprehensive income. Phase I is now a standard (SFAS 158) that becomes effective for fiscal years ending after December 15, 2006 (FASB, 2006). In Phase II of the project, the FASB will consider a more comprehensive revision of pension accounting, including the possible elimination of some or all of SFAS-87's smoothing provisions. In particular, the FASB may eliminate the use of expected return on plan assets and amortization of actuarial gains and losses, which would potentially result in recognizing G&L components in net income (Moran and Cohen, 2005).

Our paper directly addresses this standard-setting debate by examining the usefulness of recognized information under the two alternative pension accounting models (smoothing and fair-value) through its association with stock prices and credit ratings. The scope of our analysis is limited. For example, we do not examine the effect of changing pension accounting on preparer behavior or contractual negotiations. Also, since all the information we use is already disclosed in footnotes, we do not address which pension accounting model *discloses* better information. Nevertheless, our empirical investigation is useful for the following reasons.

First, the primary motivation for reforming pension accounting arises from its potential *direct* effects on the usefulness of the information recognized in financial statements. For example, much of the

recent criticism of SFAS-87 pertains to its impairing the transparency and quality of financial information. Perhaps more importantly, the FASB explicitly states that the objective of reforming pension accounting is improving the quality of accounting information so as to make it more useful in decision making (FASB, 2006). We maintain that the *indirect* or unintended consequences of changing pension accounting rules on preparer behavior or other contracting considerations (e.g., changes in funding levels or asset allocation decisions) are of less importance in the pension accounting debate.[4] For example, the FASB explicitly disavows any intention to change preparer or user behavior through pension accounting reform (FASB, 2006). Nevertheless, certain constituents worry that adopting fair-value pension accounting—in particular, reporting underfunded plans at fair value—could alter preparer behavior. We acknowledge that such concerns may have indirectly influenced the FASB's decision to reform pension accounting.[5]

Second, the intense standard-setting debate has occurred even though fair-value pension accounting information has been disclosed in footnotes under SFAS-87 for almost twenty years. The current regulatory controversy, therefore, is not about the nature or the amount of information *disclosed* by alternative pension accounting models. Rather, it is about the manner in which pension plan information should be *recognized, measured,* and *aggregated* in the balance sheet and the income statement. Evidently, recognition and aggregation are important to regulators (and other constituents). The importance attached to recognition and aggregation may have arisen because regulators believe users respond differently to recognized (and aggregated) versus disclosed information.[6]

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[4] We note that an alternative set of pension accounting numbers are generated under the Employee Retirement Income Security Act (ERISA) and filed with the Department of Labor. It is not unreasonable to assume that such statutory numbers (rather than financial reporting numbers) are used for certain contracting purposes such as union negotiations.

[5] For example, the American Academy of Actuaries, the Pensions Benefit Guarantee Corporation (PBGC) and Congressman Robert Matsui have all expressed to the FASB their belief that smoothed numbers encourage risky pension fund investment strategies and that the increased income volatility of fair-value accounting may cause firms to shift pension fund assets toward bonds and away from riskier equity investments. See comment letters to FASB (www.fasb.org).

[6] Of course, recognition versus disclosure matters if stock prices respond differently to recognized versus disclosed information. For example, Piconi (2006) documents that the stock market underreacts to pension footnote disclosures but not to recognized information on the balance sheet and income statement. Moreover, recognition and

Finally, while the current debate is about recognition, we note that the information necessary for financial statement readers to construct the current smoothing numbers may not even be disclosed after the FASB completes Phase II of the pension project. Under such a scenario, comparing the usefulness of smoothed and fair-value information is useful even if recognition versus disclosure were not important.

3. Sample and variable measurement

3.1 Fair-value and smoothing pension measures

Our tests require that we compute fair-value and smoothing versions of net pension assets and net pension expense. We measure the fair-value model's net pension assets as the fair value of plan assets less the projected benefit obligation (PBO). We measure the smoothing model's net pension assets as SFAS–87 prepaid pension cost (accrued pension cost is treated as negative net assets) plus SFAS–87 additional minimum pension liability, if any. We add back SFAS-87 minimum pension liabiliy when determining smoothing net pension assets because conceptually it is a fair-value adjustment. Fair-value pension expense includes all changes in fair-value net pension assets due to reasons other than employer contributions (see Appendix-A for computational details).[7] The smoothing model's net pension expense is the net periodic pension cost firms report under SFAS-87. We measure book value and income under the alternative models by substituting the SFAS-87 net pension assets and pension expense with our corresponding smoothing and fair-value measurements. For income adjustments, we obtain after-tax measures by multiplying pre-tax measures by 0.65.

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disclosure are important even when the stock market is efficient. For example, unsophisticated investors may be unable to recast financial statements according to footnote disclosures, which may lead them to erroneous decisions and put them at a disadvantage versus sophisticated investors (see, e.g., Balsam, Bartov, and Marquardt, 2002; Bartov, Radhakrishnan, and Krinsky, 2000). Aggregation is also relevant to prices if investors bear costs to interpret disclosures (Hirshliefer and Teoh, 2003; Barth, Clinch, and Shibano, 2003; Dye and Sridhar, 2004). Finally, improving the value relevance of financial statement summary measures can lower investors' information processing costs.

[7] Our measures of fair-value pension expense may be contaminated by merger and acquisition activity. Accordingly, as a sensitivity analysis we also exclude firm-years with 25% or more increase in total assets and find qualitatively similar results.

We decompose pension expense into recurring and G&L components.[8] We categorize as recurring those pension expense components that directly relate to pension operations. These expense items are identical under both the fair-value and the smoothing models and include service cost, interest cost, and the expected return on plan assets. We categorize all remaining pension expense components in the G&L category. For the fair-value model, these include (1) actuarial changes in the projected benefit obligation (PBO), (2) prior service costs and plan amendments, and (3) the difference between actual and expected returns on plan assets. For the smoothing model, these include the amortization of (1) prior service costs, (2) unrecognized net gains or losses, and (3) transition assets or liabilities.

3.2 Sample and descriptive statistics

Our sample consists of firms with necessary pension, stock price, and credit rating data available from Compustat's annual industrial, full coverage, and research files. Net pension expense is only available in Compustat as of 1990, thus our data span 1991 through 2002. As a result of the disclosure changes required under SFAS 132 (FASB, 2003), companies no longer disclose their minimum pension liability adjustment (MINPEN) in a consistent manner. Specifically, while some companies include MINPEN in the reconciliation between funded status and prepaid/accrued pension cost in the pension footnote, others disclose MINPEN in a separate table below the reconciliation. We find that Compustat codes these disclosures inconsistently, sometimes including MINPEN in data item #290 and sometimes not. We therefore hand collect prepaid/accrued pension cost numbers from 10-Ks for the post-SFAS-132 period (1998-2002). Our value-relevance sample comprises 13,601 firm-years representing 2,258 unique firms, with fewer observations in tests that have more restrictive data requirements. Specifically, because of certain data requirements, our credit relevance sample is limited to the 1995-2002 period and comprises 3,284 firm-years representing 536 unique firms.

We present descriptive statistics for our value and credit relevance samples in Panels A and B of Table 1. Mean fair-value net pension assets is positive (indicating overfunding, on average) for our

[8] Our classification is largely consistent with the U.K. ASB's FRS-17 (ASB, 2000), although FRS-17 further breaks the recurring component into operating (service cost) and net financing costs (interest cost less expected return on plan assets).

sample period and almost five times as large as its smoothing counterpart. This reflects the large excess of fair-value over smoothing net pension assets from 1996 through 2000 (see Figure 1). The higher volatility of fair-value net pension assets relative to smoothing is reflected in their significantly larger standard deviation. Our sample's mean smoothing net pension expense is slightly lower than the equivalent net periodic pension costs reported by Barth et al. (1992) for 1987-1990, likely due to the higher stock returns and lower interest rates associated with much of our sample period. Average fair-value pension expense is nearly three times that under smoothing, reflecting the large spike in fair-value pension expenses in 2000-2002 (see Figure 2) caused by the rapid decline in fair-value net pension assets during that period. The difference between fair-value and smoothing net pension expenses is attributable to the G&L component, which is positive (suggesting, on average, more fair-value losses than gains) and almost three times as large as its smoothing counterpart.

4. Results

4.1 Time-series properties

During the SFAS–87 deliberations, many constituents expressed concerns about the significant income volatility that fair-value pension accounting might induce (FASB, 1985). Fair-value opponents argue that pension gains and losses offset each other over time and hence that the income volatility they cause is illusory. These arguments eventually motivated the FASB to introduce smoothing provisions in SFAS-87. Despite this debate, to date no evidence exists concerning the impact of fair-value pension accounting on income volatility.

Figure 1 displays the time series of cross-sectional mean net pension assets under the fair-value and smoothing models and depicts the S&P 500 index for comparison. Fair-value net pension assets appear to be positively correlated with the index, consistent with the equity component of pension fund assets representing over 50 percent of total pension fund assets (Amir and Benartzi, 1998). Fair-value net pension assets also clearly exhibit significantly more time-series volatility than the smoothing model's net pension assets. In addition, smoothing net pension assets reflect changes with a lag, as evidenced by their gradual increase even after the sharp decline in the S&P 500 index during 2000-2001. We also find (not

tabulated) that the time series of fair-value net pension assets are significantly more (less) volatile (persistent) than their smoothing counterparts.

Figure 2 displays the time series of cross-sectional mean annual pension expense under the fair-value and smoothing models, and for comparison the change in the S&P 500 index. The apparent negative correlation between the index and fair-value pension expense reflects the influence of equity returns on fair-value pension expense. The higher volatility of fair-value pension expense is evident in Figure 2 and confirmed by Table 2, Panel A, which reports that the average firm-specific standard deviation of fair-value pension expense is over eight times that of the smoothing model's pension expense. Figure 2 also suggests greater mean reversion in fair-value than in smoothing pension expense, which is confirmed by Table 2, Panel B. Specifically, while the mean of the persistence coefficients (estimated from first-order autocorrelations) for the smoothing model's pension expense is 0.51, it is just 0.16 for fair-value pension expense.

The differences in pension expense volatility and persistence drive significant differences in income volatility and persistence, as reflected in Figure 3, which displays patterns in smoothing and fair-value net income. Table 2, Panel A reports that the standard deviation of net income is approximately 20 percent higher under fair-value than smoothing pension accounting. Also, fair-value net income is less persistent than net income under smoothing (Table 2, Panel B).

Finally, Figure 3 shows that while net income under the smoothing model is closely aligned to net income before pension expense (i.e., non-pension income), net income under the fair-value model often deviates significantly from non-pension income. Table 2, Panel C confirms that net income under the smoothing model is more highly correlated with non-pension income than net income under the fair-value model. This suggests that relative to smoothing, fair-value pension expense is so volatile that it partially obscures underlying operating income.

Overall, our examination of pension net asset and expense time-series data suggests that relative to smoothing, (1) fair-value net pension assets and expense are more volatile, (2) fair-value pension

expense induces significantly more income volatility, and 3) the volatility in fair-value pension expense can obscure non-pension (operating) income.

4.2 Value relevance

We estimate value relevance by the explained proportion of variation in stock prices. Consistent with prior pension research (Landsman, 1986; Barth, 1991; Barth et al., 1992) we use a levels (price) rather than changes (returns) specification.[9] Our first set of tests examines the value relevance of accounting's two primary summary measures, book value and income, both separately and in combination. Specifically, we estimate various versions of the following model:

$$P_{i,t} = a_0 + \sum_{t=1992}^{2002} \gamma_t I_t + \beta_1 BV_{i,t} + \beta_2 NI_{i,t} + \beta_3 EMP_{i,t} + \beta_4 R\&D_{i,t} + e_{i,t}, \quad (1)$$

where $P_{i,t}$, $BV_{i,t}$, $NI_{i,t}$, $EMP_{i,t}$, and $R\&D_{i,t}$ are stock price, book value of equity, income from continuing operations, number of employees, and R&D expenses per share, respectively (subscripts i and t identify the firm and year). We estimate two versions of equation (1), measuring $BV_{i,t}$ and $NI_{i,t}$ using fair-value pension accounting in one version and smoothing in the other. We include $EMP_{i,t}$ and $R\&D_{i,t}$ as control variables in all models since their inclusion ameliorates the anomalous positive relation between service costs and stock price first documented by Barth et al. (1992) (see Appendix B). Finally, we include separate intercepts for each year.

Consistent with prior research (e.g., Barth, 1991; Landsman, 1986), we begin by estimating a book value-only version of equation (1). Theoretically, measuring assets and liabilities at fair value should improve the ability of book value in explaining market value of equity. However, empirically it is not evident whether stating net pension assets at their fair value will improve book value's ability to explain market values for the following reasons. First, aggregating net pension assets measured at market

[9] While the price specification is economically better specified, it suffers from econometric problems, particularly heteroskedasticity (Kothari and Zimmerman, 1995). Brown et al. (1999) suggest that scale bias can affect inferences from R^2s when using the price specification. While we base our reported results on per-share amounts, scaling by total-assets and sales produces qualitatively similar results. Also, annual regressions—with tests on the means of the annual coefficients and R-squares—produce inferences largely similar to our full sample analysis.

value with other assets and liabilities measured at historical cost potentially impairs book value's explanatory power because it forces identical pricing weights on components that would otherwise differ. Second, errors in measuring the fair value of net pension assets may reduce book value's explanatory power. These fair-value estimates may contain errors because (1) managers must estimate discount rates, expected rates of compensation increases, and prices of non-traded pension assets, and (2) net pension assets may not follow a martingale process (see footnote 3). Indeed, as reported in Table 3, Panel A, our empirical results suggest that book values are not necessarily more value relevant under fair-value pension accounting than under smoothing. The explanatory powers of the two models are virtually identical (we evaluate differences in explanatory power using the Vuong 1989 test).

As in prior research (e.g., Barth et al., 1992), we also estimate an income-only version of equation (1). Income under the smoothing model has a larger permanent component since it amortizes transitory G&L over the employee's remaining service and therefore should correlate better with stock prices. In addition, aggregation of transitory G&L with more permanent components of income is likely to impair fair-value income's value relevance more than that of smoothing. However, errors in measuring the permanent component of net pension expense—for example, because managers err in estimating amortization periods or expected rates of return on pension assets—can impair the value relevance of smoothing income. Therefore, whether smoothing or fair-value income is more value relevant is an empirical question. Results reported in Table 3, Panel B show that the smoothing model's R^2s and income coefficients are both economically and statistically higher than their fair-value counterparts—specifically, the R^2 (coefficient) for the smoothing model is 47.6% (5.77) compared to 43.4% (4.90) for the fair-value model. These results suggest that smoothing income is more value relevant.

Finally, we estimate the full version of equation (1). Results in Table 3, Panel C show that, relative to Panels A and B, the R^2s of both the fair-value and smoothing models improve. More importantly, the combined explanatory power of book value and income based on smoothing is significantly greater than that based on fair value (57.3% for smoothing versus 55.1% for fair-value). Under the fair-value model, the coefficient on income is significantly lower (3.14 for fair-value versus

3.92 for smoothing) while that on book value is higher (0.74 for fair-value versus 0.70 for smoothing), suggesting that income under fair-value pension accounting is significantly less persistent (Ohlson, 1995), consistent with the evidence in Table 2. Overall, our results suggest that the smoothing model, which is similar to SFAS-87, produces more value relevant financial statement summary measures than the fair-value model and that this result is largely driven by fair-value's lower income persistence.

As noted earlier, the value relevance of summary measures such as book value or income is reduced because these measures aggregate financial statement components with different pricing weights. For example, aggregating assets and liabilities measured at market value with those measured at historical cost (into book value) or aggregating permanent and transitory earnings' components (into income) forces these disparate components to assume equal pricing weights. Allowing these weights to differ can potentially improve the explanatory powers of the models we estimate. To assess the effect of aggregation, we estimate various versions of the following model:

$$P_{i,t} = a_0 + \sum_{t=1992}^{2002} \gamma_t I_t + \beta_1(BV\text{-}X_{i,t}) + \beta_2(NI\text{-}X_{i,t}) + \beta_3 NPA_{i,t} + \beta_4 PPX_{i,t} + \beta_5 G\&L_{i,t}$$
$$+ \beta_6 EMP_{i,t} + \beta_7 R\&D_{i,t} + e_{i,t}, \qquad (2)$$

where $BV\text{-}X_{i,t}$ and $NI\text{-}X_{i,t}$ are book value and income purged of their respective pension components, $NPA_{i,t}$ is net pension assets, and $PPX_{i,t}$ and $G\&L_{i,t}$ are the recurring and gain/loss components of pension expenses as defined in Section 3. Finally, we include separate intercepts for each year.

In Table 4, we present results from estimating various versions of equation (2). We first estimate a balance sheet-only version by excluding $NI\text{-}X_{i,t}$, $PPX_{i,t}$, and $G\&L_{i,t}$. If the failure of the fair-value model to dominate smoothing in Table 4, Panel A is caused by aggregating pension and non-net pension assets, removing this restriction should improve the explanatory power of the fair-value model. Table 4, Panel A reveals a slight improvement in the fair-value model's explanatory power after disaggregation. In particular, the disaggregated fair-value model's explanatory power is now statistically higher than the smoothing model's, although the difference is miniscule. Thus, aggregation appears to have a marginal impact on the value relevance of book values under fair-value pension accounting.

Table 4, Panel B contains results from estimating the income statement-only version of equation (2), which excludes $BV\text{-}X_{i,t}$ and $NPA_{i,t}$. We expect that aggregating G&L with other income components affects the fair-value model more than the smoothing model because fair value likely produces more transitory G&L than does smoothing. Consistent with this conjecture we find that, after disaggregation, the explanatory power of the fair-value model improves markedly and becomes indistinguishable from its smoothing counterpart. The aggregation problem for the fair-value model is highlighted by the opposing signs of the permanent and G&L pension expense coefficients; the fair-value G&L coefficient is anomalously positive, although small in magnitude. Also, the permanent pension expense coefficients are not significantly different from zero under either the fair-value or smoothing models. We caution that exclusion of balance sheet variables could cause correlated omitted variables bias, which may explain some of these results.

Finally, we report results from estimating the full version of equation (2) in Table 4, Panel C. Disaggregating the pension and non-pension components improves the fair-value model's explanatory power more than that of the smoothing model (refer also to Table 3, Panel C). After disaggregation, the difference in explanatory power between the two models is both statistically and economically insignificant. The fair-value G&L coefficient (0.02) is now statistically indistinguishable from zero, reflecting its highly transitory nature (Ohlson, 1995). In contrast, the smoothing G&L coefficient (-6.94) is negative, statistically significant, and similar in magnitude to the permanent pension expense component coefficient.[10] Overall, the difference in R^2 between the fair-value and smoothing models in the aggregate specification (Table 3, Panel C) appears to be driven primarily by aggregation of fair value's highly transitory G&L component with more permanent income components.

[10] Gains or losses accumulating to the point they require amortization under smoothing are potentially more permanent than those that offset and stay within the corridor. Thus, the smoothing G&L coefficients in Table 4 potentially reflect amortization of relatively permanent gains and losses (producing a high magnitude coefficient) while the fair-value G&L coefficients reflect all gains and losses, including more transitory ones (producing a low magnitude coefficient).

4.3 Credit relevance

Statement of Financial Accounting Concepts No. 1 (FASB, 1978) states that a primary objective of financial reporting is to provide information that is useful to both equity investors *and* creditors. Holthausen and Watts (2001) observe that the exclusive focus on equity investors' information needs is a major limitation of value relevance studies. Accordingly, we also compare the *credit relevance* of financial statements under fair-value and smoothing pension accounting. We define credit relevance as usefulness in predicting creditors' future cash flows. Since creditors' payoffs are contractually fixed, the only factor that affects their expected future (nominal) cash flows is the probability of default. Therefore, we assess credit relevance via the fair-value and smoothing models' abilities to explain default probabilities. Following prior research (e.g., Ahmed et al., 2002, Francis et al., 2005), we use Standard and Poor's long-term issuer credit rating as a proxy for default probability. Standard and Poor's (2003) defines this as the "opinion of an issuer's overall credit worthiness, apart from its ability to repay individual obligations."

Kaplan and Urwitz (1979) identify several variables that explain debt ratings. Prior research employs their model to explain Standard and Poor's credit ratings (e.g., Ahmed et al., 2002). We modify Kaplan and Urwitz and estimate various versions of the following model:

$$RATE_{i,t} = a_0 + \sum_{t=1996}^{2002} \gamma_t I_t + \beta_1 LEV_{i,t} + \beta_2 ROA_{i,t} + \beta_3 SDROA_{i,t} + \beta_4 COV_{i,t} + e_{i,t}, \quad (3)$$

where $RATE_{i,t}$ equals one through 19 for the 19 distinct S&P rating categories in our sample, ranging from CCC- (not likely to make interest or principal payments) through AAA (extremely strong capacity to pay interest and principal); higher values represent better credit ratings. $LEV_{i,t}$ is leverage (long-term liabilities divided by total assets), $ROA_{i,t}$ is return on assets (income before extraordinary items divided by total assets), and $SDROA_{i,t}$ is the standard deviation of return on assets over the current and preceding four

years. $COV_{i,t}$ represents interest coverage and is cash flow from operations plus cash interest paid divided by cash interest paid.[11] Finally, we include separate intercepts for each year.

We estimate equation (3) with $LEV_{i,t}$, $ROA_{i,t}$, and $SDROA_{i,t}$ computed alternatively under the fair-value and smoothing pension accounting measurements, that is, with the balance sheet and income statement variables embedded in these ratios computed with alternative measurements for net pension assets and net pension expenses. We assume net pension assets are reported as offsets to long-term liabilities. Many companies provide little or no information about where in the balance sheet they record their net pension asset or obligation. Our assumption is consistent with the view that overfunding reduces future cash outflows but does not create future cash inflows.[12] We do not compute fair-value and smoothing versions of interest coverage because our definition of $COV_{i,t}$ is unaffected by pension accounting choices. Since we wish to compare fair-value and smoothing pension accounting, we exclude non-accounting variables such as market model betas and residuals employed in some applications of Kaplan and Urwitz (1979). We assess differences in explanatory power via ordinary least squares (OLS) R^2s and Vuong's (1989) test statistic. We also report pseudo-R^2s from ordered logit regressions for comparison.[13] Note that the need for four prior years' of data to compute $SDROA_{i,t}$ restricts our sample period in this section to 1995-2002.

We begin by estimating a pure balance sheet version of equation (3), that is, excluding $ROA_{i,t}$ and $SDROA_{i,t}$. Extant research (Martin and Henderson, 1983; Maher, 1987; Carroll and Niehaus, 1998) and anecdotal evidence (e.g., Porretto, 2003) suggests creditors use footnote information about the fair-value

[11] Our cash-based measure of interest coverage captures whether cash flows are sufficient to meet interest payments. Replicating this section's analyses using (EBITDA)/(interest expense) produces qualitatively similar results.

[12] To the extent that companies' actual classifications differ from these assumptions, there is measurement error in our computations. Nevertheless, when we replicate all our analyses assuming that positive net pension assets are included in total assets (instead of being classified as a negative liability), we find similar results.

[13] $RATE_{i,t}$ is an ordered categorical variable. However, it has many (19) categories and its distribution (not reported), although unimodal and regular, is somewhat positively skewed. Therefore, whether a categorical response model, such as an ordered logit, or ordinary least squares better suits the data is unclear. Kaplan and Urwitz (1979) estimate their model separately with ordered logit and OLS, finding that the two are equally well specified and produce equivalent predictive power. Our objective is to assess differences in explanatory power between fair-value and smoothing models. Although OLS can generate downward-biased R^2s when the dependent variable is categorical, we find nearly identical ordered logit pseudo-R^2s and OLS R^2s with our data.

of net pension assets in assessing credit worthiness. Additionally, creditors are likely more interested in liquidation values, which are arguably better measured by the fair-value model, than equity investors and hence are likely to place greater weight on the balance sheet than equity investors (Watts, 2003; Epstein and Palepu, 1999). For these reasons, pension balance sheet numbers measured under the fair-value model are likely to be more important to creditors than to equity investors. Consistent with our conjecture, Table 5, Panel A shows that the fair-value model better explains credit ratings than the smoothing model (R^2 of 27.4% for the fair-value model versus 24.7% for the smoothing model), suggesting fair-value pension accounting produces more credit relevant balance sheet information.

In Panel B, we report results from a pure income statement version of equation (3), that is, excluding $LEV_{i,t}$. Credit rating manuals indicate the importance of "sustainable earnings power," i.e., permanent income (Standard and Poor's, 1986). The smoothing model of pension accounting measures permanent income to a greater degree than the fair-value model by excluding the highly transitory G&L from pension expense. Therefore, we predict that income under the smoothing model will be more credit relevant than under the fair-value model. Consistent with our conjecture, and contrary to our balance sheet results, the smoothing model generates statistically and economically higher explanatory power than the fair-value model for the income statement-only specification (R^2 of 36.2% for the smoothing model versus 32.6% for the fair-value model).

Finally, in Table 5, Panel C we report results from estimating the full version of equation (3). Overall, combined balance sheet and income statement data explains credit ratings better under the smoothing model than under the fair-value model of pension accounting (R^2 of 44.2% for the smoothing model versus 42.9% for the fair-value model). This suggests that the improved credit relevance of balance sheet ratios that the fair-value model achieves is more than offset by the inferior credit relevance of income statement ratios under the fair-value model.

Equation (3) imposes coefficient-equality on the explanatory variables' pension and non-pension components, reducing the explanatory power of the model if credit raters assign different weights to these

components. Accordingly, we disaggregate the pension and non-pension components of assets/liabilities and income used in the ratios in equation (3) and estimate the following model:

$$RATE_{i,t} = a_0 + \sum_{t=1996}^{2002} \gamma_t I_t + \beta_1(LEV\text{-}X_{i,t}) + \beta_2(LEV\text{-}NPA_{i,t}) + \beta_3(ROA\text{-}X_{i,t}) + \beta_4(ROA\text{-}PPX_{i,t}) + \beta_5(ROA\text{-}G\&L_{i,t}) + \beta_6 SDROA_{i,t} + \beta_7 COV_{i,t} + e_{i,t}, \quad (4)$$

where $LEV\text{-}X_{i,t}$ is $LEV_{i,t}$ excluding net pension assets, $LEV\text{-}NPA_{i,t}$ is the pension component of $LEV_{i,t}$ (i.e., negative net pension assets divided by total assets), $ROA\text{-}X_{i,t}$ is non-pension return on assets, $ROA\text{-}PPX_{i,t}$ is the recurring pension expense component of ROA (i.e., recurring pension expense divided by total assets), and $ROA\text{-}G\&L_{i,t}$ is the G&L component of ROA (i.e., G&L divided by total assets).[14] As in the aggregate specification, we separately estimate a balance sheet-only (where all ROA-related variables are excluded), an income statement-only (where all *LEV*-related variables are excluded), and a combined (full) version of equation (3). Again, we include separate intercepts for each estimation year.

Results of the disaggregate specifications are reported in Table 6. As in the aggregate specification, the fair-value model produces a statistically greater R^2 for the balance sheet-only specification while smoothing produces a statistically greater R^2 for the income statement-only specification. However, there is no significant difference in R^2s for the combined model. Relative to the aggregate model (Table 5, Panel C), disaggregating the pension components produces greater gains in explanatory power for the fair-value model. As with the value relevance analyses, the differential results under the disaggregate specification are driven by the G&L component. Specifically, the coefficient on $ROA\text{-}G\&L_{i,t}$ is close to zero under fair-value but significantly negative under smoothing.[15] These results

[14] The standard deviation of *ROA* decomposed into pre-pension and pension expense components is $\sqrt{Var[ROA-X]+Var[ROA-PX]-2Cov[ROA-X, ROA-PX]}$ and we cannot obtain separate coefficients for the terms under the radical. We could use the variance of *ROA* instead, but no anecdotal, survey, or other empirical evidence suggests credit raters use covariance terms in producing credit ratings. Therefore, we do not decompose $SDROA_{i,t}$ into its pension and non-pension components.

[15] Note that the coefficient on $ROA\text{-}G\&L_{i,t}$ for the fair-value model is 16.82. However, $ROA\text{-}G\&L_{i,t}$ enters equation (4) twice: once on its own and once as a component of $LEV\text{-}NPA_{i,t}$ (Note $LEV\text{-}NPA_{i,t} = LEV\text{-}NPA_{i,t-1} + ROA\text{-}PPX_{i,t} + ROA\text{-}G\&L_{i,t} - CONT_{i,t}$, where $CONT_{i,t}$ is the firm's pension contributions and *LEV-NPA* is defined as *negative* net pension assets over total assets). Therefore, the full effect of $ROA\text{-}G\&L_{i,t}$ on $RATE_{i,t}$ in the fair-value model is the

suggest the fair-value G&L component is credit irrelevant. Therefore, as in the case of value relevance, allowing separate coefficients for the G&L component significantly improves the credit relevance of the fair-value model until it is no different from that of the smoothing model.

4.4 Sub-period analysis

Because of an unusual combination of a declining stock market and low interest rates, the 2000-2002 period witnessed a substantial decrease in pension funding levels. This decrease had the following significant effects on fair-value pension accounting numbers: (1) average net pension assets turned negative over the 2000-2002 period, after being positive prior to 2000, and (2) the magnitude of G&L was substantially larger during 2000-2002 than prior to 2000.[16] However, this decline did not significantly affect either net pension assets or pension expenses under the smoothing model. Because the 2000-2002 period is associated with a disproportionately larger effect on the fair-value numbers, it is possible that our results could differ across the pre-2000 and 2000-2002 periods. Accordingly, we replicate our analyses separately for these two sub-periods. For brevity, we do not tabulate the results of the sub-period analyses.

We find no significant differences across the two sub-periods in our value relevance results—results of both sub-periods are similar to those of our full sample tests. Our credit relevance results, however, differ significantly across the two sub-periods. In particular, consistent with our full sample results, fair-value generates more credit relevant balance sheets during 1995-1999. However, during this period (and in contrast to our full sample results) fair value produces income statement ratios that are just as credit relevant as smoothing. Consequently, the combined financial statements are more credit relevant under the fair-value model over 1995-1999, unlike our full sample results that suggest no significant difference between the fair-value and smoothing models. In contrast, smoothing generally dominates fair

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sum of the $LEV\text{-}NPA_{i,t}$ and $ROA\text{-}G\&L_{i,t}$ coefficients, or -17.59 + 16.82 = -0.77, which is statistically indistinguishable from zero.

[16] For example, the mean (total) funded status (i.e. net pension assets under the fair-value model) in our sample declined from around $100 million ($145 billion) overfunded at the beginning of 2000 to around $110 million ($113 billion) underfunded at the end of 2002. The severe decline in net pension assets over the 2000-2002 period also resulted in large *G&L*—for example, the mean absolute (signed) *G&L* during 2000-2002 in our sample was $207 ($188) million compared to $46 (-$16) million during 1991-1999.

value over 2000-2002. Specifically, the smoothing and fair-value models generate equally credit relevant balance sheets, but smoothing generates more credit relevant income and combined financial statements.

The sub-period analyses provide insight into why the fair-value model does not generate more credit relevant financial statements in our full sample. Financial statements under the fair-value model are more credit relevant than those under the smoothing model during 1995-1999. However, during the 2000-2002 period, which was characterized by negative net pension assets and large magnitude G&L, the fair-value model impairs credit relevance. Accordingly, the lower credit relevance of the fair-value model can be attributed to the following two factors. First, large G&L reduce income persistence and make it more difficult for creditors to determine the future earnings power of the firm. Second, negative net pension assets appear to be less predictive of the liquidating value of the firm, probably because they are expected to reverse quickly.

Finally, the differential results relating to value relevance and credit relevance during 1995-1999 highlight the differential information requirements of equity investors and creditors. That the fair-value financial statements are more credit relevant during the stable 1995-1999 period while smoothing generates more value relevant financial statements is likely because (1) equity investors place more weight on income statement information than balance sheet information, and (2) creditors have more interest in liquidation values while equity investors have more interest in value-in-use.

4.5 Controlling for market mispricing

A maintained assumption in our value-relevance analyses is market efficiency. However, Picconi (2006) finds that the stock market underweights fair-value pension information disclosed in the footnotes, although correctly pricing smoothing information recognized in the financial statements. These results suggest that our value relevance tests may be potentially biased against the fair-value model. Of course, long-horizon tests of market efficiency, such Picconi's, are notoriously problematic and should be

interpreted with caution.[17] Nevertheless, we conduct sensitivity tests that control for the type of potential mispricing identified by Picconi.

Specifically, we replace contemporaneous market prices (the dependent variable in our value relevance analyses) with estimated *ex post* intrinsic value measures. As in Aboody, Hughes, and Liu (2001) and Subramanyam and Venkatachalam (2007), we estimate intrinsic value by discounting future dividends per share and end-of-period stock prices. For example, we estimate three- (five-) year horizon intrinsic values as the present value of dividends paid during years t+1 through t+3 (t+5) plus the stock price at the end of year t+3 (t+5), using a constant 10 percent discount rate. Our *ex post* intrinsic values are immune to delay in investors' pricing of pension information, if any, as long as such mispricing is reversed within three or five years. We replicate all our value relevance analyses using *ex post* intrinsic values and find results that are qualitatively and statistically similar to those in our main value relevance analyses.

5. Conclusion

We compare the value and credit relevance of financial statements alternatively measured under the smoothing (largely SFAS-87) and fair-value pension accounting models. Our results suggest the following. First, fair-value pension accounting does not improve the value relevance of the balance sheet, although it does improve its credit relevance. Second, fair-value pension accounting can impair both the value and credit relevance of income. This result arises largely because of aggregating the highly transitory unrealized gains and losses on net pension assets (G&L) with more persistent income components. Finally, fair-value pension accounting does not improve either the value or credit relevance of the combined balance sheet and income statement. On the contrary, the fair-value model impairs value and credit relevance unless the G&L component is separated from other income components.

[17] Existing research identifies several biases plaguing long-horizon tests of market efficiency (see Barber and Lyon, 1997; Kothari and Warner 1997; Kothari, Sabino, and Zach, 2005). First, long-horizon cumulative returns are right-skewed, which biases toward rejection of the null of market efficiency. Second, long-horizon market efficiency tests are biased because sample firms often have long return histories (as would most firms with defined benefit pension plans). Third, benchmark portfolios are typically rebalanced periodically while sample-firm portfolios are not. Fourth, sample and data restrictions designed to eliminate extreme data (such as very high or low prices or returns) can introduce substantial biases.

Our evidence has direct implications for standard setters who are currently contemplating adopting the fair-value model of pension accounting. For example, we suggest that the FASB's recent proposal to adopt the fair-value pension accounting model is unlikely to improve the value or credit relevance of the financial statements, and may even impair relevance unless transitory G&L is separated from more persistent income components. Phase I of FASB's pension project (which is codified in the recently issued SFAS 158) envisages such a separation by including G&L in other comprehensive income. However, G&L is likely to be included along with net-income components upon completion of Phase II of the project (Moran and Cohen, 2005). Our evidence suggests that while Phase I, at best, would not impair the informativeness of the financial statements, any move to embed G&L into net income—as envisaged under Phase II—would significantly impair the value and credit relevance of the financial statements.

Our evidence also has broader implications for the current debate about the merits and demerits of fair-value accounting in general. The world's standard-setting bodies are currently committed to a broad-based adoption of the fair-value model, ostensibly with the objective of improving the informativeness of the financial statements. The move toward broad-based adoption of the fair-value model has come under intense criticism from several quarters. Critics suggest that fair-value accounting involves considerable estimation and judgment, which could introduce intentional or unintentional errors into the fair-value numbers (e.g., Watts, 2003; Ramana and Watts, 2006) and thereby impair the informativeness of the financial statements. While we cannot discriminate between these alternative sources of impairment, our evidence is consistent with fair-value accounting not improving the informativeness of the financial statements and even impairing its informativeness if G&L is not separated from other income components. Overall our evidence suggests that the rationale for advocating the fair-value model cannot be better communication of firm value or default risk.

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Appendix A
Derivation of Smoothing and Fair-Value Net Pension Assets and Pension Expense

Table A1 provides excerpts from AMR Corp's 2002 pension footnote. We use AMR's pension footnote to illustrate the derivation of net pension assets and net pension expense under the smoothing and fair-value models. We provide Compustat data item numbers, when available, in parentheses.

Smoothing Net Pension Assets (Smoothing NPA)

Smoothing NPA is not always the same as SFAS-87 prepaid or accrued pension cost (SFAS-87 NPA) because of the minimum pension liability requirement. In particular, FASB requires companies to recognize a minimum pension liability (MINPL) when the accumulated benefit obligation (ABO) exceeds the fair value of plan assets. We therefore add back minimum pension liability to arrive at a "pure" smoothing NPA figure that is purged of any fair-value component. AMR recognizes $1,623 of minimum pension liability in 2002. Therefore, AMR's smoothing NPA is equal to:

Smoothing NPA = SFAS-87 NPA + MINPL
= -2,022 + 1,623
= -399.

where:

SFAS-87 NPA: SFAS-87 net pension assets
(#287 + #296: 1991-1997; hand collected: 1998-2002)
MINPL : Minimum pension liability (#298: 1991-1997; hand collected: 1998-2002)

Fair-Value Net Pension Assets (Fair-Value NPA)

Fair-value NPA is simply the funded status of the pension plan, that is, the fair value of pension fund assets (FVPA) (#287 + #296) minus the projected benefit obligation (PBO) (#286 + #294).

Fair-value NPA = FVPA - PBO
= 5,323 – 8,757
= -3,434.

Smoothing Net Pension Expense (Smoothing PX)

Smoothing PX is available in Compustat (#295) as of 1991 and is comprised of the following components (see information from Table A1):

Smoothing PX
= SC + IC – EROPA + Amortization of gains and losses
= 522 ,

where:

SC: Service Cost (#331) = $352
IC: Interest Cost (#332) = $569
EROPA: Expected return on plan assets (-#333 after SFAS-132) = 501
Amortization of gains and losses = -1 + 21 + 49 + 33 = 102.

Fair-Value Net Pension Expense (Fair-Value PX)

Fair-value pension expense is derived indirectly from other pension data. Fair-value PX consists of the following components:

Fair-Value PX (not directly available from Compustat)
= SC + IC – AROPA +(–) Actuarial losses (gains) + Plan amendments
= 352 + 569 – (-16) + 820 + 65
= 1,822.

AROPA (actual return on plan assets), actuarial gains/losses (actuarial G&L), and plan amendments (or prior service costs) are taken from the footnote in Table A1. However, because these data items are not available in Compustat, we cannot derive fair-value PX using the above formula. There are two alternative ways to compute fair-value PX.

Alternative 1:

ΔPBO = SC + IC +(-) Actuarial losses (gains) + Plan amendments (or Prior service costs)
– Benefits paid + Plan participants' contributions

ΔFVPA = AROPA + Employer contributions – Benefits paid + Plan participants' contributions

ΔFVPA - ΔPBO (i.e., ΔFair-value NPA)
= Employer contributions – [SC + IC – AROPA +(-) Actuarial losses (gains) + Plan amendments]
= Employer contributions – Fair-value PX.

Therefore: Fair-value PX = Employer contributions – (ΔFVPA - ΔPBO)
= Employer contributions – ΔFair-value NPA
= 328 – [(-3,434) – (-1,940)]
= 1,822.

We hand collect data on employer contributions for 1998-2002.

Alternative 2:

Fair-value PX = Smoothing PX + Δ Unrecognized G&L,

where:
Δ Unrecognized G&L = + Δ SFAS-87 NPA + Δ MINPL – Δ Fair-value NPA.

Therefore: Fair-value PX = Smoothing PX + Δ SFAS-87 NPA + Δ MINPL – Δ Fair-value NPA
= 522 + [(-2022) – (-540)] + [1,623 – 335] – [(-3,434) – (-1,940)]
= 522 + (-1,482) + 1,288 – (-1,494)
= 1,822,

where:
Smoothing PX: Net pension expense (#295)
SFAS-87 NPA: SFAS-87 net pension assets
(#287 + #296: 1991-1997; hand collected: 1998-2002)
MINPL : Minimum pension liability (#298: 1991-1997; hand collected: 1998-2002)
Fair-value NPA: Fair-value net pension assets = FVPA – PBO ((#287 + #296) – (#286 + #294)).

Table A1

AMR's Pension Footnote

The following table provides the components of net periodic benefit cost for the years ended December 31, 2002 and 2001 for AMR Corporation, a reconciliation of the changes in the plans' benefit obligations and fair value of assets for the years ended December 31, 2002 and 2001, and a statement of funded status as of December 31, 2002 and 2001 (in millions):

	Pension Benefits		Other Benefits	
	2002	2001	2002	2001
Reconciliation of benefit obligation				
Obligation at January 1	$ 7,422	$ 6,434	$ 2,759	$ 1,708
Service cost	352	260	77	66
Interest cost	569	515	207	175
Actuarial loss	820	416	391	205
Plan amendments	65	168	-	(12)
Acquisition of TWA	-	-	-	734
Benefit payments	(394)	(371)	(135)	(117)
Settlements	(77)	-	-	-
Obligation at December 31	$ 8,757	$ 7,422	$ 3,299	$ 2,759
Reconciliation of fair value of plan assets				
Fair value of plan assets at January 1	$ 5,482	$ 5,731	$ 95	$ 88
Actual return on plan assets	(16)	1	(13)	(5)
Employer contributions	328	121	153	129
Benefit payments	(394)	(371)	(135)	(117)
Settlements	(77)	-	-	-
Fair value of plan assets at December 31	$ 5,323	$ 5,482	$ 100	$ 95
Funded status				
Accumulated benefit obligation (ABO)	$ 7,344	$ 6,041	$ -	$ -
Projected benefit obligation (PBO)	8,757	7,422	-	-
Accumulated postretirement benefit obligation (APBO)	-	-	3,299	2,759
Fair value of assets	5,323	5,482	100	95
Funded status at December 31	(3,434)	(1,940)	(3,199)	(2,664)
Unrecognized loss (gain)	2,709	1,454	581	168
Unrecognized prior service cost	330	286	(36)	(42)
Unrecognized transition asset	(4)	(5)	-	-
Net amount recognized	$ (399)	$ (205)	$ (2,654)	$ (2,538)

The following table provides the amounts recognized in the consolidated balance sheets as of December 31, 2002 and 2001 (in millions):

	Pension Benefits		Other Benefits	
	2002	2001	2002	2001
Prepaid benefit cost	$ 54	$ 123	$ -	$ -
Accrued benefit liability	(453)	(328)	(2,654)	(2,538)
Additional minimum liability	(1,623)	(335)	-	-
Intangible asset	330	163	-	-
Accumulated other comprehensive loss	1,293	172	-	-
Net amount recognized	$ (399)	$ (205)	$ (2,654)	$ (2,538)

Appendix B
The Service Cost Anomaly

Service cost is an important component of net periodic pension expenses. The service cost anomaly, first reported by Barth et al. (1992), refers to the anomalous positive relation between service cost (an expense) and stock price. . In Table B1, we confirm the presence of this anomaly in our sample. Models 1 and 2 regress prices on book value, income, and service cost, without and with net pension assets as additional explanatory variables. The coefficient on service cost is significantly positive. Note that variables such as book value and net pension assets are scale proxies and should control for scale-related explanations for this anomaly. Nevertheless, we also replicate our analysis after deflating by sales and find similar results.

In a subsequent paper, Barth et al. (1993) argue that the anomalous positive service cost coefficient may arise from spurious correlation between different pension expense components. They show that when service cost is regressed on stock price along with other pension expense coefficients the positive coefficient on service cost disappears, although there is still no significant negative relation between service cost and price, as expected. Model 3 in Table B1 replicates their model and finds that the service cost coefficient is positive and significant in our sample, even after the addition of other pension expense components in the regression.

Subramanyam and Zhang (2001) argue that the positive relation between service cost and stock price occurs because service cost proxies for value created by human capital. They control for this effect by adding number of employees (size of workforce) and research and development expense (intangible value created by the workforce) in the regression and show that the coefficient on service cost switches signs. Model 4 in Table B1 replicates their analyses and finds that the service cost coefficient is indeed negative and significant after including these controls.

Accordingly, we include R&D expense and number of employees as additional control variables in all our price regressions.

Table B1
Price Regressions with Service Cost and Other Variables (N=12,656)

Model	INTER -CEPT	BV-X	NI-X	SC	NPA	IC	G&L	R&D	EMP	Adj. R^2
1	8.52 (0.00)	0.64 (0.00)	4.32 (0.00)	10.53 (0.00)						51.3%
2	8.55 (0.00)	0.66 (0.00)	4.29 (0.00)	8.66 (0.00)	1.12 (0.00)					51.6%
3	8.69 (0.00)	0.65 (0.00)	4.31 (0.00)	6.41 (0.00)	0.51 (0.00)	-4.71 (0.00)	-4.10 (0.00)			51.8%
4	7.17 (0.00)	0.72 (0.00)	3.93 (0.00)	-4.58 (0.00)	0.94 (0.00)			3.21 (0.00)	0.19 (0.00)	58.3%
5	7.22 (0.00)	0.72 (0.00)	3.95 (0.00)	-5.74 (0.00)	0.49 (0.00)	-3.26 (0.00)	-4.92 (0.00)	3.15 (0.00)	0.19 (0.00)	58.4%

The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002. N is the number of firm-year observations. The dependent variable is price per share. *BV-X* is reported book value minus SFAS-87 net pension assets. *NI-X* is reported income less SFAS-87 net pension expenses. SC is service costs. *NPA* is matching-model NPA, which is equal to SFAS-87 net pension assets plus any SFAS-87 additional minimum pension liability. IC is interest cost. G&L is matching-model *G&L*, which is equal to the amortization of prior service costs, unrecognized net gain/loss, and transition asset/liability. *R&D* is research and development expense. *EMP* is number of employees. All variables are deflated by the number of shares outstanding three months after the end of the fiscal year.

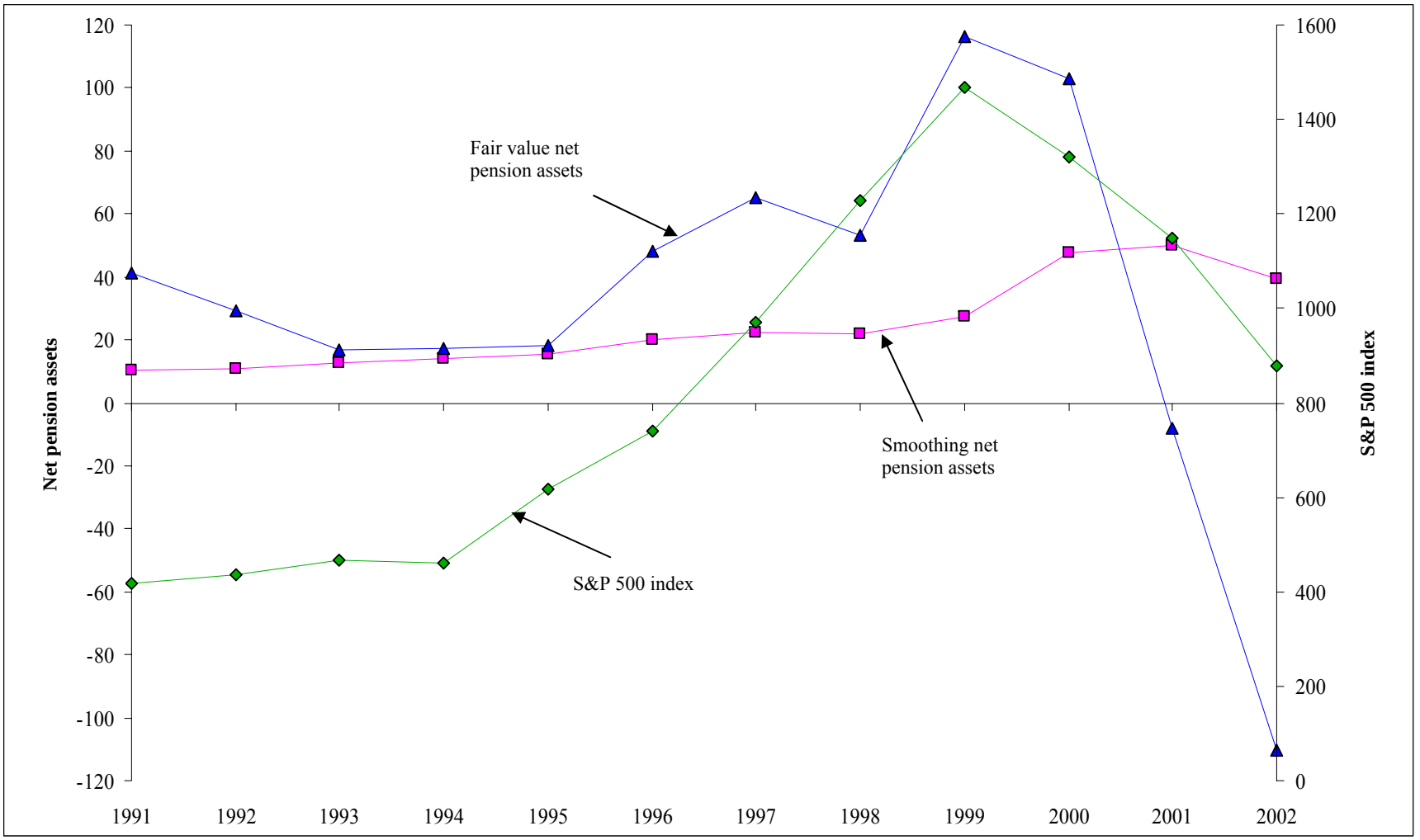

Fig. 1. Mean net pension assets, in millions of dollars, over time: smoothing versus fair-value models. Smoothing net pension assets are net pension assets as reported under SFAS-87 plus any additional minimum liability. Fair-value net pension assets are the fair value of plan assets minus the projected benefit obligation. The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002.

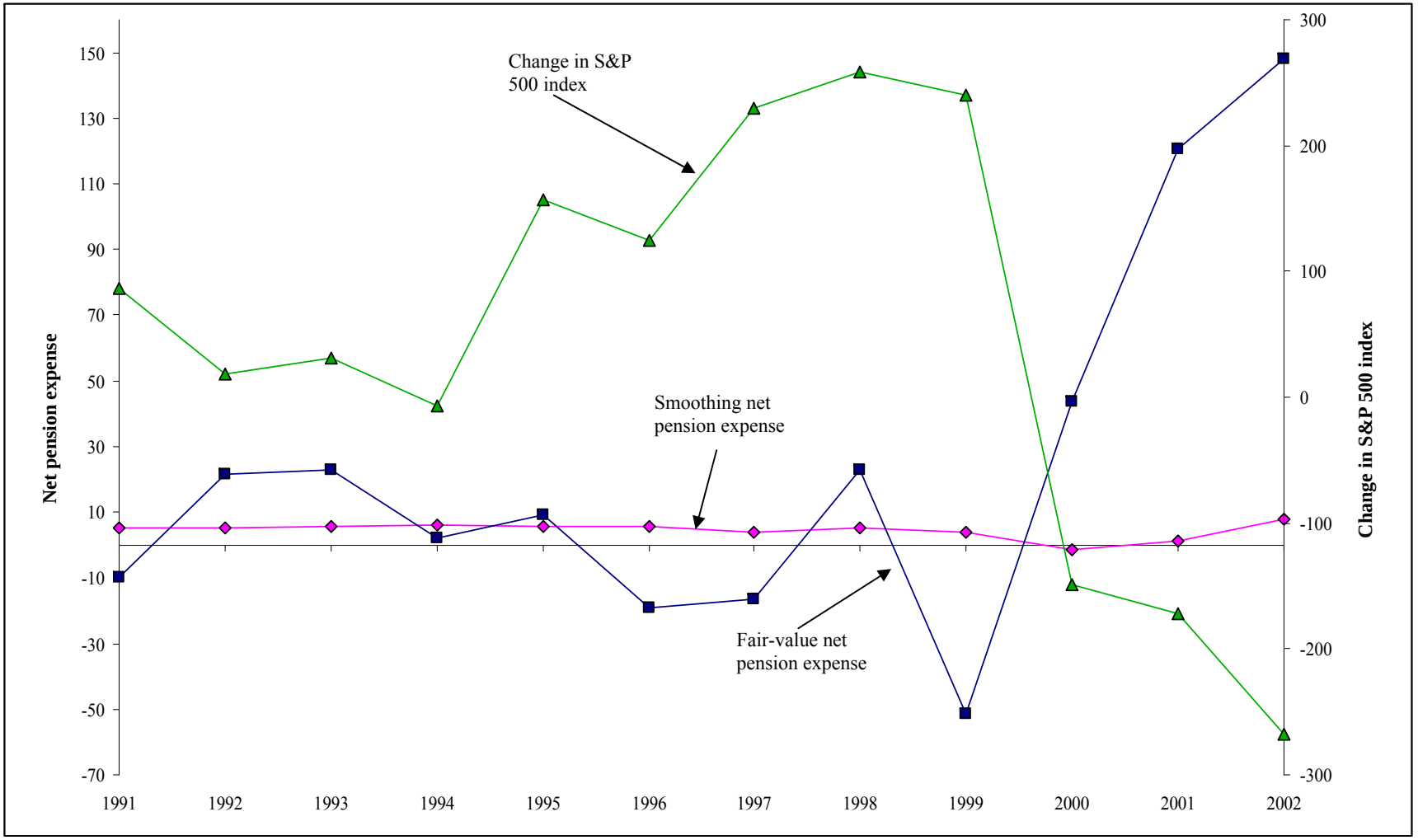

Fig. 2. Mean net pension expense, in millions of dollars, over time: smoothing versus fair-value models. Smoothing-model net pension expenses are pension expenses as reported under SFAS-87. Fair-value-model net pension expenses are the change in fair-value-model net pension assets for all reasons other than employer contributions (See Appendix A for details). Fair-value-model net pension assets are the fair value of plan assets minus the projected benefit obligation. The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002.

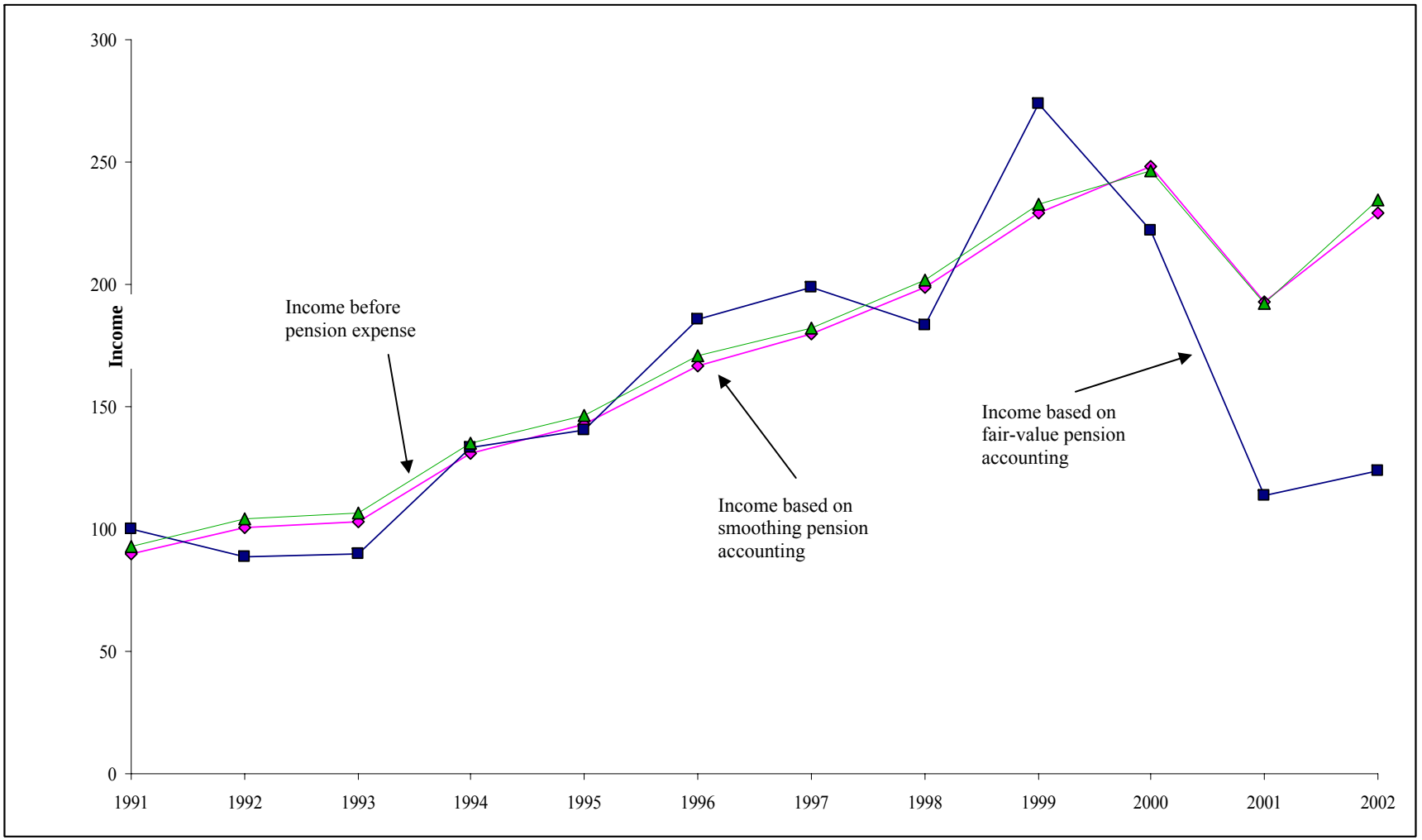

Fig. 3. Income, in millions of dollars, over time: smoothing versus fair-value models. Income based on smoothing-model pension accounting is income as reported under SFAS-87. Income based on fair-value-model pension accounting is reported income plus after-tax SFAS-87 net pension expense minus after-tax fair-value-model net pension expense. Fair-value-model net pension expense is the change in fair-value-model net pension assets for all reasons other than employer contributions. Fair-value-model net pension assets are the fair-value of plan assets minus the projected benefit obligation. Income before pension expense is reported income plus after-tax SFAS-87 pension expense. The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002.

Table 1
Descriptive statistics

Panel A. Measures of Value Relevance Regressions (N= 13,610)

	Mean	Std Dev	25th Percentile	Median	75th Percentile
BV-X	14.211	10.292	7.206	11.982	18.572
NI-X	1.441	1.938	0.497	1.401	2.373
NPA: *Smoothing*	0.068	1.170	-0.249	-0.023	0.217
NPA: *Fair-Value*	0.316	2.059	-0.302	-0.013	0.480
PX: *Smoothing*	0.071	0.236	0.003	0.049	0.129
PX: *Fair-Value*	0.209	1.038	-0.069	0.067	0.348
PPX	0.051	0.205	0.002	0.043	0.112
G&L: *Smoothing*	0.018	0.124	-0.012	0.003	0.029
G&L: *Fair-Value*	0.151	1.026	-0.126	0.022	0.263

Panel B. Measures of Credit Relevance Regressions (N=3,284)

	Mean	Std Dev	25th Percentile	Median	75th Percentile
LEV-X	0.273	0.143	0.169	0.275	0.360
LEV: *Smoothing*	0.267	0.141	0.165	0.267	0.351
LEV: *Fair-Value*	0.264	0.148	0.154	0.264	0.357
ROA-X	0.039	0.049	0.016	0.036	0.062
ROA: *Smoothing*	0.038	0.049	0.015	0.036	0.061
ROA: *Fair-Value*	0.035	0.055	0.010	0.035	0.062
STDROA: Smoothing	0.027	0.026	0.009	0.019	0.036
STDROA: Fair-Value	0.032	0.028	0.012	0.023	0.043

This table provides descriptive statistics on book value, net income, and our primary net pension expense and asset variables under the fair-value and smoothing models. The sample comprises all Compustat firms with non-missing pension and share price data from 1991 through 2002. Because we need four prior years of data to compute *SDROA*, our sample for Panel B is restricted to 1995-2002. *BV-X* is reported book value minus SFAS-87 net pension assets. *NI-X* is reported income plus after-tax SFAS-87 net pension expense. *PX: Smoothing* is net pension expenses as reported under SFAS-87. *PX: Fair-Value* is the change in fair-value-model net pension assets for all reasons other than employer contributions (see Appendix A for details). *NPA: Smoothing* is net pension assets as reported under SFAS-87 plus any additional minimum pension liability. *NPA: Fair-Value* is the fair value of plan assets minus the projected benefit obligation. *PPX* is the recurring component of net pension expense and is the sum of service and interest costs less the expected return on plan assets. *G&L: Smoothing* equals amortization of prior service costs, unrecognized net gain/loss, and transition asset/liability. *G&L: Fair-Value* equals changes in the projected benefit obligation due to actuarial changes and benefits granted for prior service, and differences between actual and expected rates of return. *LEV-X* is *LEV: Smoothing* excluding reported net pension assets, where *LEV: Smoothing* is reported long-term liabilities less any additional minimum pension liability divided by total assets. *LEV: Fair-Value* is reported long-term liabilities less SFAS-87 net pension assets plus fair-value net pension assets divided by reported total assets, where positive net pension assets are treated as negative liabilities. *ROA-X* is reported income from continuing operations plus after-tax SFAS-87 net pension expense divided by reported total assets. *ROA: Smoothing* is reported income from continuing operations divided by total assets. *ROA: Fair-Value* is reported income from continuing operations plus after-tax SFAS-87 pension expense minus after-tax fair-value-model net pension expense divided by reported total assets. *SDROA: Smoothing* is the standard deviation of smoothing-model ROA over the current and preceding four years. *SDROA: Fair-Value* is the standard deviation of fair-value-model ROA over the current and preceding four years. All Panel A variables are deflated by the number of shares outstanding three months after the end of the fiscal year.

Table 2
Time-series properties of income and pension expense under alternative pension accounting models

	NI-X	*PX*	*NI*	*N*
Panel A: Mean Firm-Specific Standard Deviation Over Time				
Smoothing	1.02	0.08	1.02	948
Fair Value	1.02	0.65	1.22	948
Difference	--	-0.57	-0.19	948
		(0.00)	(0.00)	
Panel B: Mean Firm-Specific Persistence Coefficients				
Smoothing	0.35	0.51	0.35	948
Fair Value	0.35	0.16	0.32	948
Difference	--	0.35	0.03	948
		(0.00)	(0.02)	

Panel C: Correlation Between Income and Pension Expense

	NI – Smoothing	NI - Fair Value	PX – Smoothing	PX – Fair Value
NI-X	0.99	0.90	0.11	-0.08
	(0.00)	(0.00)	(0.00)	(0.00)
NI – Smoothing		0.89	0.06	-0.08
		(0.00)	(0.00)	(0.00)
NI – Fair Value			0.10	-0.38
			(0.00)	(0.00)
PX – Smoothing				0.04
				(0.01)

Panels A and B report, respectively, the average firm-specific standard deviation and persistence coefficients (estimated from first-order autocorrelation regressions) of smoothing- and fair-value-model pension expense and net income. Panel C displays average time-series correlations. The sample is drawn from all Compustat firms with non-missing pension and share price data for at least six consecutive years from 1991 through 2002. *N* is the number of *unique firm* observations (with pension data available for at least six consecutive years). *NI-X* is reported income from continuing operations plus after-tax SFAS-87 net pension expense. *PX* is pension expense. Smoothing-model net pension expense is net pension expense as reported under SFAS-87. Fair-value-model pension expense is the change in fair-value-model net pension assets for all reasons other than employer contributions (See Appendix A for details). *NI* is income from continuing operations. Smoothing-model income is income as reported under SFAS-87. Fair-value-model income is reported income plus after-tax SFAS-87 net pension expense minus after-tax fair-value-model net pension expense. All *p*-values are two sided.

Table 3
Alternative pension accounting models and value relevance: Summary measures

	(N= 13,610)		
	Coefficients		Adj
	BV	*NI*	R^2%
Panel A: Balance Sheet-Only Data			
Smoothing	1.06		46.8%
	(0.00)		
Fair Value	1.03		46.8%
	(0.00)		
Difference	0.03		0.0%
	(0.25)		(0.82)
Panel B: Income Statement–Only Data			
Smoothing		5.77	47.6%
		(0.00)	
Fair Value		4.90	43.4%
		(0.00)	
Difference		0.87	4.2%
		(0.00)	(0.00)
Panel C: Balance Sheet and Income Statement Data			
Smoothing	0.70	3.92	57.3%
	(0.00)	(0.00)	
Fair Value	0.74	3.14	55.1%
	(0.00)	(0.00)	
Difference	-0.03	0.74	2.3%
	(0.12)	(0.00)	(0.00)

This table shows results from fair-value- and smoothing-model estimations of various versions of $P_{i,t} = \beta_1 BV_{i,t} + \beta_2 NI_{i,t} + \beta_3 EMP_{i,t} + \beta_4 R\&D_{i,t} + e_{i,t}$. All estimations also include intercepts for each year. The estimates of the intercept and the $EMP_{i,t}$ and $R\&D_{i,t}$ coefficients (not reported) are positive and significant in all estimations. The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002. *N* is the number of firm-year observations. *BV* is book value and *NI* is income. Smoothing-model book value is reported book value plus any SFAS-87 additional minimum pension liability. Fair-value-model book value is reported book value minus SFAS-87 net pension assets plus fair-value-model net pension assets. Fair-value-model net pension assets are the fair-value of plan assets minus the projected benefit obligation. Smoothing-model income is income as reported under SFAS-87. Fair-value-model net income is reported income plus after-tax SFAS-87 net pension expense minus after-tax fair-value-model net pension expense. *EMP* is number of employees. *R&D* is research and development expense. All variables (except *EMP*) are deflated by the number of shares outstanding three months after the end of the fiscal year. *p*-values for coefficient estimates and their differences are two sided and White (1980) adjusted. *p*-values for R^2 differences are based on Vuong's (1989) test statistic.

Table 4
Alternative pension accounting models and value relevance: Disaggregated components

	(N=13,610)					
	Coefficients					Adj
	BV-X	*NI-X*	*NPA*	*PPX*	*G&L*	R^2%
Panel A: Balance Sheet-Only Data						
Smoothing	1.05		1.20			46.7%
	(0.00)		(0.00)			
Fair Value	1.04		0.93			47.1%
	(0.00)		(0.00)			
Difference	0.01		0.28			-0.4%
	(0.68)		(0.10)			(0.00)
Panel B: Income Statement-Only Data						
Smoothing		5.79		-1.33	-4.21	47.8%
		(0.00)		(0.14)	(0.01)	
Fair Value		5.79		-1.04	0.39	47.8%
		(0.00)		(0.25)	(0.05)	
Difference		0.00		-0.29	-4.61	0.0%
		(0.98)		(0.82)	(0.00)	(0.58)
Panel C: Balance Sheet and Income Statement Data						
Smoothing	0.71	3.91	0.31	-5.54	-6.94	57.5%
	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	
Fair Value	0.70	3.89	0.44	-3.35	0.02	57.4%
	(0.01)	(0.00)	(0.00)	(0.00)	(0.93)	
Difference	0.01	0.02	-0.13	-2.19	-6.96	0.1%
	(0.59)	(0.89)	(0.50)	(0.13)	(0.00)	(0.11)

Panels A and B show results from fair-value and smoothing-model estimations of various versions of $P_{i,t} = \beta_1(BV\text{-}X_{i,t}) + \beta a_2(NI\text{-}X_{i,t}) + \beta_3 NPA_{i,t} + \beta_4 PPX_{i,t} + \beta_5 G\&L_{i,t} + \beta_6 EMP_{i,t} + \beta_7 R\&D_{i,t} + e_{i,t}$. All estimations also include intercepts for each year. The estimates of the intercept and the $EMP_{i,t}$ and $R\&D_{i,t}$ coefficients (not reported) are positive and significant in all estimations. The sample is drawn from all Compustat firms with non-missing pension and share price data from 1991 through 2002. *N* is the number of firm-year observations. *NI-X* is reported income plus after-tax SFAS-87 net pension expense. *BV-X* is reported book value minus SFAS-87 net pension assets. Smoothing-model *PX* is net pension expense as reported under SFAS-87. Fair-value-model *PX* is the change in fair-value-model net pension assets for all reasons other than employer contributions. Smoothing-model *NPA* is SFAS-87 net pension assets plus any SFAS-87 additional minimum pension liability. Fair-value-model *NPA* is the fair-value of plan assets minus the projected benefit obligation. *PPX* is the sum of service and interest costs less the expected return on plan assets. Smoothing-model *G&L* equals amortization of prior service costs, unrecognized net gain/loss, and transition asset/liability. Fair-value-model *G&L* equals the change in the projected benefit obligation due to actuarial changes, benefits granted for prior service, and differences between actual and expected rates of return. *EMP* is number of employees. *R&D* is research and development expense. All variables (except *EMP*) are deflated by the number of shares outstanding three months after the end of the fiscal year. *p*-values for coefficient estimates and their differences are two sided and White (1980) adjusted. *p*-values for R^2 differences are based on Vuong's (1989) test statistic.

Table 5
Alternative pension accounting models and credit ratings: Summary measures

	(N=3,284)				
	Coefficients			Adj	Pseudo
	LEV	*ROA*	*SDROA*	R^2%	R^2%
Panel A: Balance Sheet-Only Data					
Smoothing	-11.01			24.7%	24.6%
	(0.00)				
Fair Value	-11.12			27.4%	27.3%
	(0.00)				
Difference	0.11			-2.6%	-2.7%
	(0.82)			(0.00)	
Panel B: Income Statement-Only Data					
Smoothing		16.79	-44.64	36.2%	36.2%
		(0.00)	(0.00)		
Fair Value		14.21	-38.38	32.6%	32.4%
		(0.00)	(0.00)		
Difference		2.55	-6.35	3.6%	3.8%
		(0.12)	(0.02)	(0.00)	
Panel C: Balance Sheet and Income Statement Data					
Smoothing	-7.30	15.51	-39.21	44.2%	43.4%
	(0.00)	(0.00)	(0.00)		
Fair Value	-7.91	11.95	-33.70	42.9%	42.0%
	(0.00)	(0.00)	(0.00)		
Difference	0.61	3.56	-5.51	1.8%	1.4%
	(0.21)	(0.02)	(0.03)	(0.04)	

This table reports fair-value- and smoothing-model estimations of various versions of $RATE_{i,t} = \beta_1 LEV_{i,t} + \beta_2 ROA_{i,t} + \beta_3 SDROA_{i,t} + \beta_4 COV_{i,t} + e_{i,t}$. All estimations also include intercepts for each year. The initial sample is drawn from all Compustat firms with non-missing pension and S&P credit rating data from 1991 through 2002. Because we need four prior years of data to compute $SDROA_{i,t}$, our final sample is restricted to 1995-2002. *N* is the number of firm-year observations. Smoothing-model *LEV* is reported long-term liabilities less any additional minimum pension liability divided by total assets. Fair-value-model *LEV* is reported long-term liabilities less SFAS-87 net-pension assets plus fair-value net-pension assets divided by reported total assets, where positive net pension assets are treated as negative liabilities. Smoothing-model *ROA* is reported income from continuing operations divided by total assets. Fair-value-model *ROA* is reported income from continuing operations plus after-tax SFAS-87 pension expense minus after-tax fair-value-model net pension expense divided by reported total assets. Smoothing-model *SDROA* is the standard deviation of smoothing-model *ROA* over the current and preceding four years. Fair-value-model *SDROA* is the standard deviation of fair-value-model *ROA* over the current and preceding four years. *COV* is cash flow from operations plus cash interest paid divided by cash interest paid. *p*-values for coefficient estimates and their differences are two sided and White (1980) adjusted. *p*-values for R^2 differences are based on Vuong's (1989) test statistic. The Pseudo R^2 of the corresponding ordered logit regression is computed as: $1 - \exp[-2(\ln L_r - \ln L)/\text{No. of obs.}]$, where L_r and L are the log-likelihood functions evaluated at the restricted (slopes=0) and unrestricted estimates, respectively.

Table 6
Alternative pension accounting models and credit ratings: Disaggregated components

	(N=3,284)							
	Coefficients							
	LEV-X	LEV- NPA	ROA -X	ROA -PPX	ROA- G&L	STD ROA	Adj R^2%	Pseudo R^2%
Panel A: Balance Sheet Data Only								
Smoothing	-11.05	-21.60					25.8%	25.7%
	(0.00)	(0.00)						
Fair Value	-10.71	-14.69					27.5%	27.6%
	(0.00)	(0.00)						
Difference	-0.34	-6.91					-1.7%	-1.9%
	(0.47)	(0.00)					(0.01)	
Panel B: Income Statement Data Only								
Smoothing			17.02	-64.17	-80.98	-43.34	37.1%	37.1%
			(0.00)	(0.00)	(0.00)	(0.00)		
Fair Value			17.53	-74.00	4.09	-40.53	35.2%	35.4%
			(0.00)	(0.00)	(0.00)	(0.00)		
Difference			-0.51	9.83	-85.07	-2.81	1.9%	1.7%
			(0.77)	(0.47)	(0.00)	(0.27)	(0.00)	
Panel C: Balance Sheet and Income Statement Data								
Smoothing	-7.55	-10.49	15.53	-52.38	-100.91	-37.59	45.6%	44.7%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
Fair Value	-7.32	-17.59	14.80	30.10	16.82	-36.96	45.8%	45.0%
	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)		
Difference	-0.24	7.09	0.73	-82.47	-117.73	-0.63	-0.2%	-0.3%
	(0.63)	(0.01)	(0.65)	(0.00)	(0.00)	(0.80)	(0.69)	

Panels A and B report fair-value- and smoothing-model estimations of various versions of $RATE_{i,t} = \beta_1(LEV\text{-}X_{i,t}) + \beta_2(LEV\text{-}NPA_{i,t}) + \beta_3(ROA\text{-}X_{i,t}) + \beta_{41}(ROA\text{-}PPX_{i,t}) + \beta_{42}(ROA\text{-}G\&L_{i,t}) + \beta_5 SDROA_{i,t} + \beta_6 COV_{i,t} + e_{i,t}$. All estimations include separate intercepts for each year. The initial sample is drawn from all Compustat firms with non-missing pension and S&P credit rating data from 1991 through 2002. Because we need four prior years of data to compute $SDROA_{i,t}$, our final sample is restricted to 1995-2002. *N* is the number of firm-year observations. *LEV-X* is *LEV* excluding reported net pension assets. Smoothing-model *LEV-NPA* is *negativ*e smoothing-model *NPA* divided by reported total assets, where smoothing-model *NPA* is SFAS-87 net pension assets plus any additional minimum pension liability. Fair-value-model *LEV-NPA* is *negative* fair-value-model *NPA* divided by reported total assets, where fair-value *NPA* is the fair-value of plan assets minus the projected benefit obligation. *ROA-X* is reported income from continuing operations plus after-tax SFAS-87 net pension expense divided by reported total assets. Smoothing-model *ROA-PX* is SFAS-87 net pension expense divided by reported total assets. Fair-value-model *ROA-PX* is fair-value-model net pension expense divided by reported total assets. Fair-value-model *PX* is the change in fair-value-model net pension assets for all reasons other than employer contributions. Smoothing-model (fair-value-model) *SDROA* is the standard deviation of smoothing-model (fair-value-model) *ROA* over the current and preceding four years. Smoothing-model *ROA* is reported income from continuing operations divided by total assets. Fair-value-model *ROA* is reported income from continuing operations plus after-tax SFAS-87 pension expense minus after-tax fair-value-model net pension expense divided by reported total assets. *ROA-PPX* is *PPX* divided by total assets, where *PPX* is the sum of service and interest costs less the expected return on plan assets. *ROA-G&L* is *G&L* divided by total assets. Smoothing-model *G&L* equals amortization of prior service costs, unrecognized net gain/loss, and transition asset/liability. Fair-value-model *G&L* equals the change in the projected benefit obligation due to actuarial changes, benefits granted for prior service, and differences between actual and expected rates of return. *COV* is cash flow from operations plus cash interest paid divided by cash interest paid. *p*-values for coefficient

estimates and their differences are two sided and White (1980) adjusted. *p*-values for R^2 differences are based on Vuong's (1989) test statistic. The Pseudo R^2 of the corresponding ordered logit regression is computed as: 1 – exp[-2(ln L_r – ln L)/No. of obs.], where L_r and L are the log-likelihood functions evaluated at the restricted (slopes=0) and unrestricted estimates, respectively.