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Abstract

We use a cross-sectional valuation model that distinguishes between the operating and financial activities of the firm to examine the repercussions of three main alternative measures of pension expense. The *GAAP Method* recognizes a smoothed net pension expense, the *NETCOST Method* includes the excess of interest cost over the actual return on pension plan assets, if and only if this number is positive, and the *FV Method* substitutes the fair value in place of the smoothed pension expense. Three alternative fair value estimates of pension expense are examined: the first includes the expected return on plan assets and fair value other costs; the second includes the actual return on plan assets and net fair value other costs; the third includes the expected and the unexpected return on plan assets, along with net fair value other costs. Results from OLS regressions are consistent with the *GAAP Method* being superior while the market appears to value the unexpected return included in the *FV Method*. Additional analyses from jack-knife (out-of-sample) regressions confirm the OLS findings. Further, we show that the multiples assigned to the alternative measures of pension expense differ based on the funding status of pension plans. The results are robust to various sensitivity checks.

Keywords: Pension Expense, Value Relevance, Defined Benefit Pension Plans

JEL Classifications: M41, G23, J32

1 Introduction

SFAS Nos. 87 and 132, the pension accounting standards governing the measurement, recognition and disclosure requirements during the time period of this study, incorporate a number of smoothing provisions to negate the earnings volatility that would otherwise arise. When characterizing the cost of sponsoring defined benefit pension plans to capital markets, SFAS Nos. 87 and 132 allow firms to use an expected rather than the actual return on pension plan assets in measuring net pension cost.[1,2] Differences between expected and actual returns, as well as discrepancies originating from the actuarial assumptions employed and actual experience, are amortized over long time horizons (White et al., 2003; Revsine et al., 2005; Chadwick, 1986; Gerson Lehrman, 2006; Schultz and Francis, 2003; Henry, 2001; Henry et al., 2002; Norris, 2001; Jones and Walker, 2003). Over the years, various commentators have expressed concerns regarding the smoothing mechanisms embedded in SFAS Nos. 87 and 132 and suggested alternative ways of accounting for pensions.[3] For example, S&P introduced its S&P Core Earnings concept in May 2002. This involves an alternative way of measuring pension expense that includes service cost and the excess of interest cost over the actual return on pension plan assets, but excludes pension earnings and other pension costs. Additionally, the FASB is currently reassessing the smoothing provisions inherent in SFAS Nos. 87 and 132. The above demonstrate that pension cost computation is important to the FASB's agenda, as well as to that of other constituents.

This study addresses how the market prices pension accruals. It does so by examining the value relevance of SFAS Nos. 87 and 132 pension expense *(GAAP Method),* an alternative measure of pension expense originally suggested by S&P *(NETCOST Method)* and a method that substitutes fair value pension expense for the smoothed pension expense reported under the *GAAP Method (FV Method).*

Advocates of SFAS Nos. 87 and 132 appreciate the smoothing provisions embedded in the standard primarily because they reduce the pension cost and income volatility that would otherwise arise should the actual return on pension assets have been

[1] The terms pension cost and pension expense will be used interchangeably.
[2] Hereinafter, the expected and the actual return on pension plan assets refer to the dollar expected and the dollar actual return on pension plan assets.
[3] Pension comprises one of FEI's top 10 financial reporting issues (Deloitte, 2006).

used instead (Byrnes and Welsch, 2006; Wozniak and Chittim, 2006). Opponents of current practice, on the other hand, argue that pension earnings which reduce pension cost are misleading because they are based on expected returns and smoothed asset values rather than on actual pension asset returns. On top of that, actuarial gains or losses are amortized only if they exceed the 10% corridor threshold which results in deferred recognition of pension costs (Fortune, 2005; Norris, 2001). Other parties, such as S&P argue that pension earnings should not be considered in the calculation of pension expense because they do not belong to the firm.

Pension expense computed under the *GAAP Method* is likely to result in a smoothed number. On the other hand, the pension expense computed according to the *NETCOST* method is likely to be more volatile primarily because of its consideration of actual pension asset returns when computing the interest cost, if any, to be charged against corporate income. In addition, the computation of interest cost under the *NETCOST Method* and the actual return on pension plan assets under the *FV Method* are likely to be less persistent because of the consideration of volatile market returns. These predictions are consistent with prior research discussing the merits and shortcomings of smoothed versus unsmoothed pension expense numbers (Hann et al., 2007a). The implications are clear: income under the *NETCOST* and *FV* methods will include transitory components which may reduce its persistence. Zion and Carcache (2002, p. 45) nevertheless note that the volatility is real and that "it's not a bad thing unless it is hidden". They argue that the provisions of SFAS Nos. 87 and 132 designed to remove the volatility associated with firm pension plans result in misleading financial statement numbers. Investors will thus uncover the real volatility inherent in the pension plan only when reading the footnotes (Zion and Carcache, 2002; Wiedman and Weir, 2005). The aforementioned discussion implies that it is not straightforward which pension cost measure is more value relevant. Rather this is an empirical question which this paper aims to shed more light on.

We employ an adaptation of the cross-sectional valuation model originally used by Landsman (1986) which includes earnings in the spirit of Ohlson (1995), and which distinguishes between the operating and financial activities of the firm. In addition, we

use out-of-sample jack-knife regressions to identify which method of computing pension expense is associated with the lowest prediction errors.

Our results show that the market behaves as if GAAP pension expense components are relevant while the unexpected return on plan assets included in *FV* pension expense is also significant. More specifically, disaggregated *FV* pension expense component regressions indicate that the alternative pension cost components are economically and statistically significant and the unexpected return on plan assets appears to be relevant. In contrast, the actual return on plan assets and fair value other pension costs included in two alternative *FV Method* specifications do not appear to be valued by the market. The disaggregated *NETCOST Method* regressions indicate that the valuation weight in the interest cost measure is not significantly different from zero. Findings from jack-knife regressions reinforce these results. Finally, we document different valuation effects for underfunded and overfunded pension plans.

This study extends the existing body of literature and contributes to regulatory debate in several respects. This is the first study to examine the value relevance of the novel pension expense measure originally suggested by S&P. Second, the FASB has embarked on a comprehensive project to overhaul pension accounting which might result in the elimination of the smoothing provisions allowed under SFAS Nos. 87 and 132 (Byrnes and Welsch, 2006; Wozniak and Chittim, 2006; Katz, 2006a, 2006b, 2006c). In examining the value relevance of alternative pension expense measures, this study is therefore also relevant to this regulatory debate. Third, further research on pension cost accruals is justified considering that earlier research findings identified pension expense as an unequivocally relevant measure (Daley, 1984). Fourth, the existing body of literature examining the multiples assigned to pension expense has so far treated all defined benefit pension plans similarly. We extend the existing body of literature by examining the multiples assigned to overfunded versus underfunded pension plans. Fifth, our study contributes to the existing body of literature concerned with the multiples assigned to pension and non-pension components, as well as to the alternative pension cost components (Barth et al., 1992, 1993).

The rest of the paper is organized as follows. Section 2 discusses the regulatory background and prior literature relevant to this study. Section 3 presents the research

design and section 4 discusses the sample selection and descriptive statistics. Section 5 analyzes the empirical findings, section 6 discusses the sensitivity analysis and section 7 concludes the paper.

2 The Regulatory Background and Prior Research

2.1 A Firm's Pension Assets and Liabilities

A firm sponsoring a defined benefit plan has an obligation to retirees and current employees which is equal to the present discounted value of the future obligation. In effect, the firm has committed to a stream of future payments and it contributes money to a fund for that purpose. The regulatory position is that the firm's contributions, along with the investment returns on this fund, should be adequate to meet the firm's future obligation. From a legal viewpoint, this is equal to the accumulated benefit obligation. In practice, however, a firm's pension obligation is more likely to be equal to the projected benefit obligation which includes an allowance for salary growth. The method used to compute a firm's pension obligation, along with the actuarial assumptions made regarding mortality rates and discount rates, are likely to have a major impact on the determination of a firm's pension obligation. This implies that a firm's pension obligation is not rigidly determined, but rather depends on how this future obligation is defined and measured.

In addition, the use of pension assets is restricted to meeting outstanding pension obligations and these are measured using fair values. This gives rise to two further, interrelated points regarding pension assets which form the basis for the present study. First, a firm's rights over pension assets are not the same as over corporate assets. Second, a firm cannot easily recover excess pension assets. In fact, a going-concern firm has no legal entitlement to pension assets and Employee Retirement Income Security Act (ERISA hereinafter) requirements dictate that the pension assets should be held for the benefit of current and future retirees.[4] In addition, court challenges to reversions and attempts in Congress to disable excess asset reversals indicate that claiming excess pension assets is not straightforward. This is consistent with the separation hypothesis which views pension assets as distinct from corporate assets (House of Representatives

[4] SFAS Nos. 87 and 132 do not require firms to recognize an asset when pension assets exceed liabilities whereas firms are obliged to record an additional minimum liability when the accumulated benefit obligation exceeds pension plan assets (FASB, 1985; Revsine et al., 2005).

Report, 1999; Welsh, 1991). Considering that the firm cannot easily recover excess pension assets directly, it therefore has to rely on the indirect benefits which may be achieved through reduced contributions or by taking contribution holidays. This is what brings the computation of pension costs and its associated conceptual issues to the forefront and it is also why the computation of pension cost is fiercely debated. The following sub-section outlines the rationale underlying the computation of pension expense as espoused by the current accounting standards governing pensions, the logic of the S&P and alternative *FV* approaches as well as more recent regulatory developments.

2.2 Regulatory Background and Alternative Ways of Accounting for Pension Expense

SFAS Nos. 87 and 132 govern measurement and disclosure requirements during the time period of this study. Under these accounting standards, pension expense is computed as the sum of service cost, interest cost and other pension costs reduced by the expected return on pension plan assets *(GAAP Method)*.[5] A central concern with regard to pensions appears to be the treatment of pension gains, calculated by multiplying the fair or smoothed pension asset value by the expected rate of return (FASB, 1985, 1998, 2003, 2006a; Fore, 2004). Indeed, the expected rate of return might be a reasonable assumption in view of the long-term nature of pension obligations (Gerson Lehrman, 2006; Pulliam, 1993). Using an expected return was strongly lobbied for by chief financial officers who have an aversion to the volatility that would ensue should the actual return on plan assets be used instead. However, the utilization of the expected rate of return has not been accepted without dispute. This is for the following reasons. First, using an expected return on assets, with the difference between actual and expected returns being recorded in other comprehensive income or recognized in the income statement according to the corridor method, has been heavily criticized. In particular, it is contended that such an approach using a hypothetical expected rate of return produces highly misleading income statement and balance sheet numbers (Cooper et al., 2007; Nashwa, 2003). Second, the Securities and Exchange Commission (SEC hereinafter) has scrutinized the expected rates of return used by US firms (SEC, 2003) and anecdotal as well as prior empirical evidence suggest

[5] Other pension costs include, for example, the amortization of unrecognized prior service cost, the amortization of unrecognized assets/liabilities, the changes in the projected benefit obligation, gains or losses and one-off charges for plan amendments.

that firms utilize unrealistically high expected rates of return with a view to boosting reported income (Wiedman and Goldberg, 2002; Bergstresser et al., 2006; Amir and Benartzi, 1997; Milliman Consultants and Actuaries, 2006). Finally, some market participants suggest that pension earnings should not be regarded as corporate earnings (Standard and Poor's, 2002a; Katz, 2002).

Dissatisfaction with the prevailing way of measuring pension expense has resulted in alternative suggestions about how to compute it (Buffett and Loomis, 2001; Ciesielski, 2001; Zion and Carcache, 2002; Coy, 2002; Standard and Poor's, 2002a; Goff and Reason, 2002). In May 2002, S&P released its "Measures of Corporate Earnings" white paper and pioneered the introduction of S&P Core Earnings which involves an alternative way of measuring pension costs. S&P's alternative measure was introduced in the context of a proliferation of alternative earnings constructs as many firms responded to both a belief that GAAP net income did not provide an adequate representation of their operations, and to Wall Street pressure to meet earnings expectations. The latter proliferation rendered the comparability of earnings across firms and even at the firm level through time either difficult or impossible (Anonymous, 2003a; Blitzer, 2004; Blitzer et al., 2002; FASB, 1985; Jagannathan, 2002; Standard and Poor's, 2002a). [6,7]

In determining the pension cost components to be included in the S&P pension expense measure, S&P views the pension plan as distinct from the firm and thus attempts to separate the components of pension expense that represent pension costs, and that should therefore be included in S&P Core Earnings, from the pension gains which belong to the pension plan and which should not be considered when calculating pension costs. This approach to calculating pension cost contrasts sharply with the one currently advocated by the FASB which does not view the pension plan and the firm as distinct entities (Standard and Poor's, 2002c). More specifically, S&P considers service cost,

[6] Companies seem to adopt three different earnings measures in characterizing the results of operations to the investment community: reported earnings, operating earnings and *pro forma* earnings. For a detailed discussion, refer to Blitzer et al., (2002).

[7] S&P's approach to measuring earnings focuses on a firm's ongoing operations and includes stock option expenses, restructuring charges, write-downs of depreciable or amortizable operating assets, pension costs, purchased research and development expenses, merger and acquisition-related expenses and unrealized gains or losses from hedging activities as part of S&P Core Earnings. On the other hand, goodwill impairment charges, gains and losses from asset sales, pension gains, litigation or insurance settlements and proceeds and reversal of prior-year charges and provisions are excluded from Core Earnings (Blitzer et al., 2002; Anonymous, 2003a; Jagannathan, 2002).

which represents deferred compensation, to be part of pension costs charged against corporate income. Even though S&P's treatment of service cost is similar to that adopted under SFAS Nos. 87 and 132, S&P adopts a fundamentally different approach when determining the interest cost pertinent to defined benefit plans. S&P views interest cost as a financing cost and notes that pension gains on a well-funded plan should be adequate to pay the interest cost. In determining the interest cost to be charged against corporate income, S&P compares the reported interest cost to the actual return on pension plan assets. If the actual return on pension plan assets exceeds the interest cost, there is no charge against corporate income. This is equivalent to pension cost consisting of service cost only.[8] However, the excess of interest cost over the actual return on pension plan assets will be borne by the firm. Hence, in a bear market, or where a pension fund is not well managed, pension cost will incorporate an interest cost charge which could be indicative of a potentially underfunded plan (Standard and Poor's, 2002a, 2002b, 2002c). The consideration of actual market returns in the computation of pension cost represents a move towards fair value accounting.

S&P argues that returns on plan assets should not be included as part of corporate income because they do not represent funds readily available to the firm or its shareholders, a view corroborated by other market commentators (Bryan-Low, 2003).[9] In addition, the expected rather than the actual return is used in computing pension cost such that, as is quite emphatically argued, "not only is net pension income not the company's money, the money itself may not even be there" (Blitzer, 2004, p. 195). In summary, the S&P pension expense includes service cost and the excess of interest cost over the actual return on pension plan assets, if any *(NETCOST Method)*.[10] Examining the relevance of the *NETCOST Method* pension expense measure is interesting for the following reasons: first, S&P is an important user. Second, S&P's pension cost computation, by viewing pension fund assets as belonging solely to retirees addresses one important aspect of the

[8] An alternative measure of pension cost consisting of service cost only has also been proposed by other market participants on the basis that it comprises the only operating component of pension costs (Zion and Carcache, 2002; Ciesieski, 2001).

[9] The firm can only claim pension assets in special cases such as plan terminations (Blitzer et al., 2002). Even in those cases, it is not straightforward.

[10] It should be noted that in this paper we focus on examining only the pension cost adjustments made by S&P. The results presented do not therefore have any implications for S&P Core Earnings which include a number of additional adjustments as discussed in footnote 7.

underlying economics of pension accounting that is not explicitly addressed in the authoritative literature.[11] Finally, the calculation of pension costs under the *NETCOST Method* represents a fair value-based approach and highlights the importance of actual pension asset returns. The S&P approach to calculating pension costs has nevertheless been criticized on the grounds that it introduces volatility in reported numbers (FEI, 2002; Standard and Poors, 2002c). Additionally, it is interesting to note that according to S&P, the determination of the interest cost component is based on the financial performance of the pension plan. This suggests that the net cost to the sponsor caused by poor returns on the pension portfolio is relevant in the determination of pension expense. The controversial aspect, however, is that operating surpluses on the pension fund are not perceived to belong to the firm, which introduces an asymmetry.

Opponents of SFAS No. 87 have also suggested that accounting for pensions within a fair value framework may be legitimate, especially because if overoptimistic expected rates of return are used firms will be able to report pension income rather than pension expense, even when not warranted by prevailing market conditions and portfolio returns (Alix, 2005; Amlie, 2004; Kwan, 2003; Henry et al., 2002; Shaw, 2005). In this case, fair value pension expense would include the sum of service cost, interest cost, expected return on pension plan assets and fair value other pension costs arising out of unexpected returns and differences between the actuarial assumptions employed and actual experience. An alternative measure of fair value pension expense would include the service cost, the interest cost, the actual instead of the expected return on pension plan assets and net fair value other pension costs (which include all fair value other pension costs apart from differences between the actual and the expected return on plan assets). The two aforementioned measures of fair value pension expense differ only in terms of the underlying disclosure requirements. Fair value net pension assets would be computed as the difference between the fair value of pension plan assets and projected benefit obligations *(FV Method)*. The *FV Method* of accounting for pension expense has also been heavily criticized because although it is 'real' and realized, it is also likely to introduce considerable volatility into the computation of pension cost as it fluctuates from

[11] GAAP appears to adopt a mixed approach by recognizing a smoothed net pension asset in the balance sheet whereas under fair value, the fair value of net pension assets would be recognized in the balance sheet of the plan sponsor, implying that pension rights lie fully with the firm.

year-end to year-end (Fore, 2004). Additionally, aggregating permanent and transitory components, which is the case when either fair value other pension costs or actual returns on plan assets are used, is likely to hinder the value relevance of income statement numbers. Indeed, reporting the actual return on pension plan assets is not necessarily regarded as helpful for forecasting future returns on the pension portfolio and is not an appropriate measure to use when evaluating the overall business performance (e.g. Cooper et al., 2007).[12,13] In this respect, disaggregating the permanent from the transitory pension cost components while recognizing changes in actuarial assumptions and unexpected returns represents an alternative fair value pension expense measure. Hence, a fair value pension expense alternative which includes both the expected return on plan assets and the difference between the actual and the expected return as an additional component along with net fair value other pension costs, and which also recognizes the fair value of net pension assets, is likely to provide more relevant information to investors by keeping them aware of the true change in pension assets (Cooper et al., 2007).

2.3 Prior Research

The prior literature focuses on the multiples assigned to the alternative pension cost components during the SFAS Nos. 87 and 132 periods as well as the value relevance of off-balance sheet pension assets and liabilities. In examining the value relevance of pension and non-pension cost components, Barth et al., (1992, 1993) find that the various components of pension expense are correctly priced. More recently, Liebana and Vincent

[12] SFAS No. 158 issued in September 2006, which amends the previous accounting standards, moves towards a fair value framework by requiring recognition of the funding status of the pension plan in the balance sheet even though actuarial gains or losses are recognized as part of other comprehensive income. This is in sharp contrast to SFAS No. 87 according to which firms start with the funding status of the pension plan and are then allowed to make smoothing adjustments that often significantly reduce the amount reported in the balance sheet. The off-balance sheet assets and liabilities often concealed the funding status of defined benefit pension plans. In addition, actuarial gains or losses are only reported in the pension footnote.

[13] The second phase of the FASB's comprehensive project to overhaul pension accounting addresses issues relating to the measurement and recognition of pension costs in the income statement and is therefore directly relevant to this study (FASB, 2006b). It is speculated that the FASB might remove the smoothing mechanisms underlying the calculation of pension costs by requiring firms to use the actual instead of the expected return on pension plan assets, a move which would involve immediate recognition of gains and losses in reported income. Alternatively, the amortization period over which discrepancies between actual and expected returns, as well as differences between actuarial assumptions and actual experience, are recognized, may be reduced (Amlie, 2004; Moran and Cohen, 2005; Shaw, 2005; Yoon, 2005).

(2004) report mixed results regarding the value relevance of alternative pension cost components. To identify whether stock prices reflect the fair value of net pension assets as reported in the pension footnote, or pension cost accruals included in the pension expense reported in the income statement, Coronado and Sharpe (2003) and Coronado et al., (2006) test the transparent against the opaque view of pension accounting originally articulated by Gold (2005). They find that stock prices reflect information included in the pension cost accruals, consistent with the opaque view of pension accounting.[14] The prior literature also examines the value relevance of postretirement benefit liability and cost components (Amir, 1993, 1996; Choi et al., 1997; Davis-Friday et al., 1999, 2004; Mittelstaedt and Warhawsky, 1993). While there is evidence that postretirement benefit obligations are significant but are capitalized at a lower rate compared to pension obligations (e.g. Choi et al., 1997), Davis-Friday et al., (2004) show that recognized postretirement benefit obligations do not appear to be less reliable compared to pension obligations.[15]

SFAS No. 158, effective after fiscal year ending December 15 2006, requires recognition of the fair value of net pension assets in the balance sheet. The prior literature has examined the value relevance of the off-balance sheet pension assets and liabilities that will now have to be recognized and showed that the market treats pension assets and liabilities as corporate assets and liabilities[16] (Barth, 1991; Barth et al., 1993; Landsman, 1986; Landsman and Ohlson, 1990; Gopalakrishnan and Sugrue, 1993). Hence, with some exceptions (e.g. Coronado and Sharpe, 2003; Liebana and Vincent, 2004), research findings provide evidence regarding the recognition of pension assets and liabilities in the balance sheet consistent with the requirements of SFAS No. 158.

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[14] Picconi (2006) finds that analysts do not consider the information disclosed in the pension footnote but there is evidence to suggest that investors take into account pension amounts that have already been recognized in income. Further, Brown (2004) concludes that analysts discount firms' aggressive actuarial assumptions and Asthana (2001) shows that the market does not value the discretionary component of the postretirement benefit obligation. Finally, while Feldstein and Morck (1983) find that the market adjusts pension obligations using a standard interest rate, Hann et al., (2007b) conclude that the flexibility that firms enjoy in setting the actuarial assumptions does not impair the value relevance of the projected benefit obligation. On the contrary, the results suggest that the discretionary component of pension obligations is incrementally value relevant.

[15] Around the time that the Exposure Draft on non-pension benefits was issued Espahbodi et al., (1991) documented negative abnormal returns, especially for small firms with few retirees and high debt ratios. In contrast, Khurana and Loudder (1994) did not find similar evidence for rate-regulated firms.

[16] Feldstein and Seligman (1981) conclude that share prices reflect the value of unfunded pension liabilities.

More recently, Hann et al., (2007a) compare the value and credit relevance of smoothed versus fair income statement and balance sheet pension values. Overall, they find that fair values hinder the value and credit relevance of the income statement and balance sheet combined. This is largely attributed to transitory unrealized gains and losses.

3 Research Design

3.1 Valuation Model and Variable Measurement

This study addresses the following question: *How does the market price pension accruals?* It does so by examining the contemporaneous association between stock prices and alternative pension expense measures using a cross-sectional valuation model originally used by Landsman (1986), which includes earnings following Ohlson (1995) and which distinguishes between the operating and financial activities of a firm. More specifically, we examine the GAAP pension expense versus the *NETCOST* alternative pension cost measurement as well as three alternative measures of fair value pension expense. The first includes the expected return on plan assets and fair value other pension costs including the currently off-balance sheet actuarial gains or losses, the second substitutes the actual for the expected return on plan assets and the third decomposes the actual return on plan assets into its expected and unexpected return components.[17]

We initially estimate an aggregate regression of the market value of equity on net income and book value of common equity, as follows:

$$MVE_{jt} = \beta_0 + \beta_1 NI_{jt} + \beta_2 BVE_{jt} + \varepsilon_{jt} \qquad (1)$$

where *MVE* is equity market value at fiscal year-end, *NI* is income and *BVE* is the book value of common equity.[18] *GAAP Method NI* is GAAP net income before extraordinary items and discontinued operations and *NETCOST Method NI* is GAAP net income before

[17] The last two measures of fair value pension expense also include net fair value other pension costs. The latter include the impact of differences between actuarial assumptions and actual experience but do not include unexpected returns.

[18] All variables are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends.

extraordinary items and discontinued operations plus the after-tax SFAS Nos. 87 and 132 pension expense minus the after-tax *NETCOST Method* pension expense.[19] The *NETCOST Method* pension expense consists of the sum of service cost $(SERVCOST)$ and the adjusted interest cost defined as the excess of the reported interest cost over the actual return on pension plan assets $\{ADJINT = \max[(INTCOST - \$ACTUAL\_RETURN), 0]\}$. We subsequently disaggregate Eq. (1) into its pension and non-pension components, as follows:

$$MVE_{jt} = \beta_0 + \{\beta_1 ADJNI_{jt} + \beta_2 PENSEXP_{jt}\} + \{\beta_3 BVEADJ_{jt} + \beta_4 NPA_{jt}\} + \varepsilon_{jt} \quad (2)$$

where *ADJNI* is income before pension expense and *PENSEXP* is pension expense (income) calculated according to the various alternative methods outlined previously. GAAP pension expense is pension expense as reported under SFAS Nos. 87 and 132 and *NETCOST Method* pension expense is as defined above. *BVEADJ* is the book value of equity excluding the book value of net pension assets and *NPA* is the book value of net pension assets.[20] According to the *NETCOST Method*, firms' net pension deficits will only be recognized in the balance sheet, which is consistent with a labor economics perspective (Klumpes, 2001; Wiedman and Weir, 2004; Kemp, 1985). We therefore include the fair value of plan assets *(FAIRNPA)* and an interaction variable equal to the fair value of net pension assets multiplied by a dummy variable, *SURPLUS_DUM,* equal to 1 if the pension plan is overfunded, and 0 otherwise *(FAIRNPA*SURPLUS_DUM)*. *FAIRNPA* will capture net pension deficits.

To examine whether the market assigns different multiples to the various *GAAP Method* pension expense components, we disaggregate GAAP pension expense as follows:

[19] A 35% statutory tax rate is used to calculate the after-tax values.

[20] The prior literature has generally assumed that the book value of net pension assets is zero and did not adjust the book value of equity for recognized net pension assets (e.g. Barth, 1991). According to GAAP, firms have to recognize prepaid pension assets and/or accrued pension liabilities in the consolidated balance sheet (Revsine et al., 2005). We therefore adjust the book value of common equity for the book value of recognized net pension assets.

GAAP Method:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 OTHER\_COST_{jt} + \beta_5 \$EXP\_RETURN_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 NPA_{jt} + \varepsilon_{jt} \quad (3)$$

where *SERV_COST* is service cost, *INTCOST* is interest cost and *OTHER_COST* includes all the other components comprising pension cost other than service cost, interest cost and the expected return on pension plan assets. In essence, *OTHER_COST* includes the amortization of differences between the actual and expected return on plan assets as well as differences between actuarial assumptions and actual experience. $*EXP_RETURN* is the expected return on pension plan assets. We expect $\beta 1 > 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$, $\beta_5 > 0$, $\beta_6 > 0$ and $\beta_7 > 0$. To the extent that β_2 proxies for any omitted human capital aspect, we deal empirically with this issue in Section 5. We have no strong expectations regarding the magnitude of the coefficients because the determinants of the coefficients will depend on a range of issues. For example, in the case of income statement variables, persistence and risk are expected to be important.

To examine whether fair value pension expense is used instead of the reported smoothed pension expense, we adjust Eq. (3) and replace *OTHER_COST* with *OTHER_FAIRCOST* and *NPA* with *FAIRNPA* as follows:

FV1 Method:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 OTHER\_FAIRCOST_{jt} + \beta_5 \$EXP\_RETURN_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \varepsilon_{jt} \quad (4)$$

where *OTHER_FAIRCOST* is defined as other pension costs under fair value accounting and will basically include actuarial gains and losses originating from differences between actuarial assumptions and actual experience, and differences between actual and expected returns on pension assets. Considering that data on actuarial gains and losses are not available in Compustat, we exploit the following relationship to estimate *OTHER_FAIRCOST*.

$$OTHER\_FAIRCOST = FVPE - SERVCOST - INTCOST - \$EXP\_RETURN \quad (5)$$

where *FVPE* is fair value pension cost. Pension cost under fair value accounting would consist of service cost, interest cost, the expected return on pension plan assets and fair value other pension costs. Hence, estimating *OTHER_FAIRCOST* is straightforward using Eq. (5) by subtracting service cost, interest cost and the expected return on pension plan assets from fair value pension cost. Because we do not observe fair value pension cost, we estimate it following Hann et al., (2007a) as follows:

$$FVPE = CONTRIB - \Delta FAIRNPA$$

where *CONTRIB* is employer contributions and $\Delta FAIRNPA$ is the change in the fair value of net pension plan assets adjusted for employee contributions and the payment of benefits to pensioners. To the extent that *OTHER_FAIRCOST* is measured with error because of the estimates involved, this would reduce the power of our tests.[21] To satisfy the clean surplus condition, net pension asset is defined as the difference between the fair value of pension plan assets and the projected benefit obligations reported in the pension footnote *(FAIRNPA=PENSASSET-PENSLIAB)*. *PENSASSET* is the fair value of pension plan assets and *PENSLIAB* is the projected benefit obligation.

The inclusion of \$*EXP_RETURN* in Eq. (4) may seem like a violation of fair value accounting. However, \$*EXP_RETURN* captures revisions in expected return estimates, whereas *OTHER_FAIRCOST* captures actuarial gains or losses and unexpected asset returns. Hence, the sum of *SERVCOST, INTCOST,* \$*EXP_RETURN* and *OTHER_FAIRCOST* represents a fair value estimate of pension expenses.

We subsequently replace \$*EXP_RETURN* and *OTHER_FAIRCOST* with \$*ACTUAL_RETURN* as follows:

[21] As a sensitivity check, we also use another approach to estimate fair value pension expense and hence *OTHER_FAIRCOST* following Hann et al., (2007a). More specifically, we calculate fair value pension expense as the sum of SFAS Nos. 87 and 132 pension expense plus the change in the SFAS Nos. 87 and 132 net pension assets minus the change in the fair value of net pension assets. Using this alternative pension expense to estimate *OTHER_FAIRCOST* yields substantially similar results.

FV2 Method:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$ACTUAL\_RETURN_{jt} + \beta_5 NETOTHER\_FAIRCOST_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \varepsilon_{jt} \quad (6)$$

where \$*ACTUAL_RETURN* is the actual return on pension plan assets. \$*ACTUAL_RETURN* is not, however, equal to \$*EXP_RETURN* plus *OTHER_FAIRCOST*; rather it is the sum of \$*EXP_RETURN* plus \$*UNEXP_RETURN*. \$*UNEXP_RETURN* is the difference between the actual and the expected return on pension plan assets. The latter is only one of the components included in *OTHER_FAIRCOST*. In this model specification, we therefore include net fair value other pension costs which include differences between actuarial assumptions and actual experience, but do not include unexpected returns. We estimate the fair value net other pension costs by subtracting the unexpected return from the fair value of other pension costs $\left(NETOTHER\_FAIRCOST = OTHER\_FAIRCOST - \$UNEXP\_RETURN\right)$.

To examine whether the market assigns different multiples to the components comprising \$*ACTUAL_RETURN* in Eq. (6) and shed more light on the key issue of expected versus actual plan asset returns, we augment Eq. (6) by decomposing \$*ACTUAL_RETURN* into its expected *(*\$*EXP_RETURN)* and unexpected components *(*\$*UNEXP_RETURN)* as follows:

FV3 Method:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$EXP\_RETURN_{jt} + \beta_5 \$UNEXP\_RETURN_{jt} + \beta_6 NETOTHER\_FAIRCOST_{jt} + \beta_7 BVEADJ_{jt} + \beta_8 FAIRNPA_{jt} + \varepsilon_{jt} \quad (7)$$

We expect the unexpected return to have a smaller coefficient than the expected return because of its transitory nature.

To assess the multiples assigned to the *NETCOST Method* pension expense, we estimate the following regression:

NETCOST Method:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 ADJINT_{jt} + \beta_4 BVEADJ_{jt} + \beta_5 FAIRNPA_{jt} + \beta_6 FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (8)$$

The interest cost component of the *NETCOST Method* of pension expense is bounded because it is clustered around zero values since no interest cost is charged against corporate income if the actual return on pension plan assets covers the interest cost component of pension expense. The following sub-section presents a more general method to examine the value relevance of the *NETCOST Method* pension expense measure.

3.2 Estimating Disaggregated NETCOST Method Pension Expense Component Regressions

To assess the multiples assigned to the alternative *NETCOST Method* pension expense components, we estimate the following regression:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST - \$ACTUAL\_RETURN_{jt} + \beta_4 (INTCOST - \$ACTUAL\_RETURN) * FIN\_DUM_{jt} + \beta_5 FIN\_DUM_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \beta_8 FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (9)$$

where $FIN\_DUM = 1$ *if* $INTCOST < \$ACTUAL\_RETURN$, and *0* otherwise. β_3 captures cases where $INTCOST > \$ACTUAL\_RETURN$, i.e. the *NETCOST Method.* β_4 is also interesting because it tells us whether the *NETCOST Method* omits value relevant information from the interest cost measure. Presumably, proponents of the *NETCOST Method* believe that $\beta_4 \approx 0$.

To examine the multiples assigned to the expected versus the unexpected returns on plan assets, we decompose \$*ACTUAL_RETURN* into its permanent *(*\$*EXP_RETURN)* and transitory components *(*\$*UNEXP_RETURN)* and include interaction variables for the interest cost, expected and unexpected return conditioned on whether the interest cost is less than the actual return on pension plan assets as follows:

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$EXP\_RETURN_{jt} + \beta_5 \$UNEXP\_RETURN_{jt} + \beta_6 INTCOST * FIN\_DUM_{jt} + \beta_7 \$EXP\_RETURN * FIN\_DUM_{jt} + \beta_8 \$UNEXP\_RETURN * FIN\_DUM_{jt} + \beta_9 BVEADJ_{jt} + \beta_{10} FAIRNPA_{jt} + \beta_{11} FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (10)$$

4 Sample and Descriptive Analysis

The initial sample consists of 5,155 firm-year observations drawn from the Compustat Industrial, Full Coverage, Research and Coreann files. Data on the smoothed and fair value net pension assets are hand-collected. We subsequently eliminate firms that do not sponsor a defined benefit plan by deleting observations for which the projected benefit obligations, pension plan assets, service cost, interest cost, expected return on pension plan assets and actual return on pension plan assets are all equal to zero. Secondly, there are a number of observations for which the actual return is equal to the expected return on pension plan assets. The likelihood of such an occurrence is fairly low, considering that this entails perfect foresight on the part of plan sponsors: the expected return is merely based on a long-term assumption, whereas the actual return reflects how the portfolio of pension assets actually performed. After manually checking those observations against company 10-Ks and annual reports, 186 firm-year observations for which Compustat has incorrectly coded the expected return on pension plan assets are deleted.[22] Thirdly, we delete 147 firm-year observations because these firms offer Supplemental Executive Retirement (SERP) plans. The latter are excluded because they are generally unqualified, unfunded plans subject to different tax and benefit security advantages compared to qualified defined benefit plans. Fourthly, we eliminate 50 firm-year observations which include a zero value for either the expected or the actual return on pension plan assets as these plans represent special cases. [23] This results in 4,403 firm-

[22] Before SFAS No. 132, firms were required under SFAS No. 87 to report the actual instead of the expected return on pension plan assets and to include differences between actual and expected returns on pension assets in a deferred account. A few companies continued to report the actual return in the pension cost table post-SFAS No. 132. Compustat, however, incorrectly codes this item as the expected return on pension plan assets.

[23] For example, Comdial has frozen its pension plan and does not report a value for the expected return on pension plan assets despite the fact that the pension plan maintains a portfolio of assets and for which it reports an investment gain. House2home Inc. and West Marine Inc. report a zero expected return on pension plan assets because the defined benefit plans have been frozen and Natco Group and Multi Color

year observations (Table 1, Panel A). Finally, we delete the top and bottom 1% of actual asset returns and firm-year observations with negative book value of equity. The final sample contains 3,388 observations.[24]

The pension footnote from CTS Corp's 2005 annual report, a manufacturer of electronic components and sensors, and a supplier of electronics manufacturing services, is used to illustrate the variables employed in the empirical analysis (Appendix 1). Table 1, Panel B presents the components included in *GAAP, NETCOST* and *FV* pension expense. The numbers in parentheses correspond to numbered items in the tables included in Appendix 1. CTS Corp's pension expense under GAAP is equal to -$7 million which represents pension income (item 11). This consists of the sum of service cost equal to $5.2 million (item 7), interest cost, $11.3 million (item 8), amortization equal to $2.1 million (item 10) reduced by the expected return on pension plan assets, –$25.7 million (item 9). The estimated pension expense figure of $7.8 million under the *NETCOST Method* contrasts sharply with the $7 million reported pension income under the *GAAP Method.* The *NETCOST Method* pension cost is equal to the sum of service cost, $5.2 million (item 7), and the excess of the interest cost over the actual return on pension plan assets, $2.6 million (items 8-4). Lastly, using the actual return instead of the expected return results in an even higher pension cost figure ($13.5 million) compared to the *NETCOST Method.* This is calculated by subtracting the actual return on pension plan assets and plan amendments from the sum of service cost, interest cost and other pension costs including actuarial losses (items 7+8+2-1-4).[25] This example from CTS Corp. highlights the dramatic differences in computed pension cost that can occur under the different accounting methods. The recognized net pension asset under SFAS Nos. 87 and 132 is equal to $147.8 million (item 6). The fair value of pension plan assets is equal to $277 million (item 5) and the projected benefit obligation is equal to $208.6 million (item 3), resulting in a fair value net pension asset equal to $68.4 million.

Corp. terminated their plans. Some of these observations appear to be recording errors in the database and some others are foreign firms.

[24] The top and bottom 1% of all other variables used in the empirical analysis are winsorized.

[25] Pension expense including service and interest cost plus (a) the expected return on pension plan assets and fair value other pension costs, (b) the actual instead of the expected return on pension plan assets together with net fair value other pension costs and (c) the expected along with the unexpected return and net fair value other pension costs, will be similar.

Table 2 presents sample descriptive statistics. GAAP income before extraordinary items is higher compared to *NETCOST Method* adjusted income. As expected, *NETCOST Method* pension expense is more volatile compared to GAAP pension expense because pension expense under SFAS Nos. 87 and 132 is designed to provide a smoothed estimate of long-term pension costs. The *NETCOST Method's* pension expense volatility stems mainly from the consideration of actual pension asset returns when determining the interest cost to be charged against corporate income. Excluding pension earnings from the computation of *NETCOST Method* pension expense also means that the *NETCOST Method* pension cost will on average be higher. Indeed, pension earnings which are included in GAAP but not in the *NETCOST Method* pension expense are on average $0.48 per share. Interestingly, the median expected return on pension plan assets is on average markedly higher than the actual return on pension plan assets for the sample, consistent with concerns that have been raised about the apparently overoptimistic estimates of expected rates of return on plan assets reported by firms.

Yearly descriptive analysis of *GAAP* and *NETCOST Method* pension expense indicates that the average *NETCOST Method* pension expense was higher than GAAP pension expense in the years 1998 to 2002. This pattern reversed after 2002, although the differences are not as remarkable as pre-2002 (see Table 3, Panels A and B). Additional untabulated analyses of the components comprising GAAP pension expense over time show that lower average expected returns on plan assets and higher other pension costs were the main contributors to the reported increase in GAAP pension expense from 2003 onwards. The decrease in *NETCOST Method* pension expense, on the other hand, is the result of higher average actual market returns on pension portfolios which dramatically reduced the *NETCOST Method* interest cost component. In fact, untabulated results suggest that there is a higher frequency of zero *NETCOST Method* interest cost values post-2002 (1,144) as opposed to pre-2002 (650).[26]

[26] Untabulated results suggest that pension expense is a significant component of income before extraordinary items adjusted for pension expense. The ratio of average *NETCOST* pension expense to income adjusted for pension expense is more significant from 1998 to 2002 while the ratio of GAAP pension expense to income adjusted for pension expense is higher post-2002, consistent with the previous analysis.

5 Empirical Results

5.1 OLS Aggregate Regressions

Table 4 presents the findings. Panel A reports the results of the aggregate *GAAP* and *NETCOST Method* regressions. All regression models include fixed-year and industry effects, and consistent with the prior literature (Subramanyam and Zhang, 2001; Hann et al., 2007a), control for the size of the workforce and research and development expense.[27]

The magnitude of the net income coefficient under the *GAAP Method* is higher than that of the *NETCOST Method.* A possible reason could be that the items included in the *NETCOST Method* are transitory. The explanatory power of the *GAAP Method* is slightly higher compared to the *NETCOST Method* but the differences are negligible (R^2 of 51.05 versus 50.45). The book value of common equity and the coefficients on the control variables – number of employees and research and development expense – are positively signed and statistically significant, consistent with expectations.

5.2 OLS Disaggregated Pension Expense Regressions

Table 4, Panel B, decomposes income and book value of equity into the respective pension and non-pension components. Consistent with expectations, *GAAP Method* pension expense is negatively signed and statistically significant. The *GAAP Method* net income coefficient is similar in magnitude to that in the aggregate model while the pension expense coefficient is larger in absolute value (9.42) compared to net income before pension expense (7.63). This might reflect the lower risk investors assign to the smoothed pension expense. Additionally, this finding is consistent with the lower level of uncertainty surrounding the pension expense component compared with alternative non-pension income statement items. This finding appears to provide indirect justification for

[27] The prior literature documents a positive relationship between service cost and stock prices (Barth et al., 1992), suggesting that service cost is also proxying for omitted human capital variables. Consistent with Subramanyam and Zhang (2001) and Hann et al., (2007a), we include the number of employees and research and development expense as control variables. Subramanyan and Zhang (2001) assert that service cost might reflect the value created by the workforce. Including the number of employees and research and development expense as control variables is intended to correct the unexpected positive relationship between service cost and stock prices. The number of employees captures the size of the workforce, while research and development expense captures the value created by employees. Even though service cost is not included as a separate variable in Eqs. (1) and (2), it is nevertheless included in the computation of net pension expense and hence we include the aforementioned control variables to enhance model specification. This is also consistent with the prior literature (Hann et al., 2007a). Replicating the analysis after excluding these two control variables results in a positive and insignificant service cost coefficient.

the FASB's decision to require firms to use the expected return on pension plan assets when computing pension expense. We address this issue in the next sub-section.

When compared with the *NETCOST Method* pension expense, the results show that the smoothed pension expense reported under the *GAAP Method* is more economically and statistically significant, reflecting the lower risk and higher predictability of the smoothed pension expense measure. Additionally, the coefficient on the *NETCOST Method* pension expense is lower than that of income before pension expense. Acknowledging that the *NETCOST Method* interest cost includes a string of zero values (no interest cost is charged against income if the actual return on pension plan covers the interest cost), we delete firm-year observations with zero *NETCOST Method* interest cost values and the coefficient on pension expense is then insignificant. Indeed, these findings are consistent with the view that a smoothed pension expense is likely to reflect long-term pension costs more accurately. Moreover, the consideration of actual market returns when determining the interest cost charge under the *NETCOST Method* contributes to the volatility inherent in the *NETCOST Method* pension expense measure, something which is signified by the larger standard deviation of the *NETCOST* pension expense (0.39) compared to the standard deviation of GAAP pension expense (0.29), reducing its persistence (Table 2). In addition, this finding raises possible questions about the exclusion of pension earnings from the *NETCOST Method* computation of pension expense. This issue is further examined in the next sub-section when pension expense is decomposed into its various components.

Finally, the coefficients on book value of equity before net pension assets and net pension assets are consistent with expectations for all model specifications. Like the aggregate specification, the control variables – number of employees and research and development expense – are, as expected, positively signed and statistically significant.

5.3 OLS Disaggregated Pension Expense Component Regressions

Table 5 presents the results of the disaggregated pension expense component regressions. This allows an examination of the multiples assigned to alternative pension cost components as well as a comparison of the multiples assigned to pension and non-pension components. The pension cost components pertinent to the *GAAP Method* – the

service cost, interest cost, and other pension costs – are, according to expectations, all negatively signed and statistically significant.

The interest cost coefficient is larger in absolute value than net income before pension expense, which is indicative of the low risk or uncertainty surrounding the interest cost component of pension expense when compared to the more risky components included in income before pension expense. This is consistent with Barth et al., (1993) who note that investors seem to apply a debt rate rather than an equity discount rate to the interest cost. The coefficient on other pension costs is similar in magnitude to the service cost coefficient, reflecting the relative predictability of the amortization components (which are included in other pension costs). This is consistent with the ease of forecasting this component using information available in the pension footnote. The fact that unrecognized actuarial gains (losses) are amortized only when they exceed the 10% of the fair value of pension plan assets or projected benefit obligations ensures that other pension costs do not include transitory components and they are therefore valued by the market. This finding contrasts with that reported by Barth et al., (1993) who find that the amortization component of pension expense is not significantly different from zero. These divergent findings can be explained by the fact that the sample period studied by Barth et al., (1993) covered the early years following the adoption of SFAS No. 87. The amortization variable used by Barth et al., (1993) therefore mainly includes the amortization of the excess of plan assets over plan obligations at the time SFAS No. 87 was adopted, a variable which Barth et al., (1993) argue might be measured with error. In contrast, the other pension cost variable used in our study includes the amortization of unrecognized prior service cost, the amortization of unrecognized assets/liabilities, the changes in the projected benefit obligation and gains or losses. The market appears to regard this information as value relevant.

The relationship with expected return on pension plan assets is, according to expectations, positive and statistically significant with a larger coefficient than net income before pension expense. This finding may be attributed to the lower risk assigned to the expected return on pension plan assets which, according to SFAS Nos. 87 and 132, is based on the expected long-term rate of return and a smoothed or fair net pension asset value. In addition, the larger coefficient reflects the higher predictability and persistence

of the expected return on plan assets which is based on a long-term assumption, a result which justifies the FASB's position. The positive coefficient on expected return on pension plan assets suggests that the market regards returns on the pension fund portfolio as corporate funds and hence their inclusion in the calculation of pension expense is warranted. Finally, the coefficient on book value of equity before net pension assets, net pension assets and the control variables are correctly signed and statistically significant.

The next columns in Table 5 present the results of the alternative fair value specifications. The coefficients on service cost and interest cost are higher compared to income before pension expense, consistent with the *GAAP Method* with the exception of the coefficient on interest cost included in *FV2* which is unexpectedly positive. Consistent with our expectations and reflecting their transitory nature (Ohlson, 1995), the coefficients on fair value other pension costs included in *FV1* and on the actual return on pension plan assets included in *FV2* are not statistically distinguishable from zero. More importantly, when the actual return is disaggregated into its expected and unexpected components, the findings suggest that the market also perceives the unexpected return to be relevant *(FV3).* Additionally, including the unexpected return appears to increase the magnitude of the expected return coefficient. The coefficient on net fair value other pension costs is negative and significant suggesting that differences between actuarial assumptions and actual experience are relevant. Overall, the results suggest that distinguishing between permanent and transitory pension expense components may be worthwhile in a fair value framework. All the other variables are consistent with expectations.[28]

Both net income before pension expense and service cost under the *NETCOST Method* are correctly signed and statistically significant, consistent with expectations. However, interest cost is statistically insignificant, suggesting that the market does not behave as if the *NETCOST Method* net interest cost measure is value relevant, and that the weak significance of the *NETCOST Method* pension cost reported in Table 4, Panel B, is largely driven by the permanent service cost component. The results are very similar when deleting zero interest cost values (final column). All the other variables are

[28] The coefficient on the fair value of net pension assets is not significant under *FV1*, contrary to expectations. Including an interaction variable equal to *FAIRNPA*SURPLUS_DUM*, results in a positive and significant *FAIRNPA* coefficient.

consistent with expectations. Taken together, the results appear to suggest that the aggregation of permanent and transitory components in the computation of pension costs reduces the value relevance of reported numbers (*FV1, FV2* and *NETCOST Methods)*.

As a more powerful method of evaluating the *NETCOST Method* measure of pension expense, we estimate Eq. (9). This specification not only allows us to evaluate the *NETCOST Method* pension expense but also the information excluded from the *NETCOST Method* pension expense measure. The coefficient on the interaction variable, *(INTCOST-*$*ACTUAL_RETURN)*FIN_DUM*, is significant indicating that the *NETCOST Method* potentially omits value relevant information from the computation of pension cost. More specifically, the asymmetric treatment of financing costs does not appear to be appropriate since the (incremental) excess of the actual return over the interest cost appears to be significant (Table 6). Finally, we estimate Eq. (10), which captures the potentially different valuation effects of the various pension cost components conditioned on whether the interest cost is greater or less than the actual return on plan assets. The results show that the unexpected return on plan assets excluded from the *NETCOST Method* is relevant (Table 6).

Overall, the empirical findings are consistent with the notion that even though the calculation and recognition of pension expense as currently mandated under SFAS Nos. 87 and 132 *(GAAP Method)* enhances the value relevance of financial statement numbers, the unexpected return on plan assets, which is not currently recognized in pension expense, is relevant. Nevertheless, pension expense components calculated under the fair value framework appear to impair the value relevance of the income statement unless permanent pension expense components are distinguished from the transitory ones. Additionally, the market does not appear to behave as if the *NETCOST* interest cost computation is relevant while the information excluded from the *NETCOST* pension expense measure, namely the excess of actual pension asset returns over the interest cost, appears to be informative.

5.4 Does a Pension Plan's Funding Status Really Matter?

A defined benefit pension plan is regarded as fully funded when the pension assets are adequate to meet the pension obligations. ERISA stipulates a complex set of rules that

govern funding requirements for defined benefit plans which oblige plan sponsors to make additional contributions if funding levels fall below a threshold.[29] Despite the proliferation of overfunded plans in the 1990s, the US stock market crash in the early 2000 and low interest rates have recently contributed to the underfunding levels witnessed by many US defined benefit pension plans. Indeed, sample yearly descriptive statistics show that the defined benefit plans included in the sample used in the empirical analysis were consistently underfunded post-2000 (Table 7, Panel A, Figure 1). The underfunding levels of the weakest US plans reached $353.7 billion at the end of 2004 and in 2005 United Airlines terminated its heavily underfunded plan (Gallagher, 2005; Kirchoff et al., 2005). Coca Cola Co's defined benefit pension plans were on aggregate underfunded by $414 million in 2002 (Faherty, 2002) and Ford Motor Corp's plan was underfunded by $7.3 billion in the same year (Anonymous, 2003b). High profile pension plan terminations and the underfunding levels witnessed by many US defined benefit plans have led various market commentators to speculate about a looming pension fund crisis. The previous literature has not considered the impact of funding levels on the valuation implications of pension expense (Barth et al., 1992, 1993; Coronado and Sharpe, 2003; Coronado et al., 2006; Hann et al., 2007a). Motivated by the unprecedented attention paid to the underfunding levels of US pension plans in the finance literature (for example Cooper and Ross, 2002), we examine whether investors value the pension cost of underfunded versus overfunded plans differently.

A plan is considered overfunded if the fair value of pension plan assets exceeds the projected benefit obligations and underfunded if the projected benefit obligations exceed the fair value of pension plan assets. Table 7, Panel B, presents descriptive statistics for each sub-sample. As expected, pension plan assets are on average lower than pension liabilities for the sub-sample of firms sponsoring underfunded plans, and the smoothed net pension asset recognized in the balance sheet is lower for those plans compared to the overfunded group. Firms with overfunded pension plans on average report pension income rather than pension expense under GAAP and the average expected return on pension plan assets is very similar to actual returns, suggesting that

[29] Plan sponsors are required to make additional contributions if the funding ratio falls below 80% or 90%: ERISA rules allow firms 3 to 5 years and 7 years to attain the 80% and 90% thresholds respectively.

pension income is unlikely to be the result of overoptimistic expected rates of return on pension plan assets. This result should, however, be cautiously interpreted because the median expected return on assets is greater than the actual. Interestingly, while firms with underfunded plans on average report pension expense under the *GAAP Method*, the expected return on pension plan assets is greater than the actual – which is indicative of underfunded plans using overoptimistic expected rates of return when computing pension expense. Finally, profitability and leverage ratios are similar for the two groups of firms.

We employ a pooled disaggregated pension expense regression with an interaction variable designed to capture the incremental valuation effects pertinent to overfunded plans *(PENSEXP*SURPLUS_DUM).* The results presented in Table 8 suggest that the market assigns a higher multiple to the GAAP pension expense of underfunded plans (GAAP Underfunded coef., p-value: -11.52, 0.00, Overfunded coef., p-value: -4.54, 0.05). On the contrary, pension expense under the *NETCOST Method* is insignificant for underfunded plans. Excluding zero *NETCOST Method* interest cost values results in an insignificant pension cost coefficient for overfunded plans as well. Untabulated results from pooled disaggregated pension expense component regressions reinforce the aforementioned findings. More specifically, GAAP pension expense components are more significant for underfunded than overfunded plans. In fact, *OTHER_COST* is not significant for overfunded plans. Interestingly, the *NETCOST Method* interest cost component of pension expense is insignificant for both underfunded and overfunded plans, reinforcing the findings reported in Table 5.

5.5 Jack-knife Regressions

The results discussed in the previous sections mainly pertain to the in-sample evaluation of the multiples assigned to various pension expense measures as well as to alternative pension expense components. This sub-section complements the analysis above by addressing an overriding question: *Which model has the greatest predictive value?* We address this question using jack-knife out-of-sample regressions introduced by Quenouille (1956) according to which the information in the sample is recycled to obtain the sampling distributions of the required statistics (Maddala, 2001). Jack-knife regression models are built for each pension expense accounting method and out-of-

sample equity market value predictions are sought for each firm after excluding the observation in question.

We estimate 3,388 jack-knife regressions for each accounting method. Following Landsman et al., (2006) and Barth et al., (2005), we set any equity market values that are predicted to be negative equal to zero. The prediction errors generated are used to compute the absolute percentage error metric (AE):

$$AE = abs\left(MVE_{kt} - PRED\_MVE_{kt}\right) / MVE_{kt}$$

where $PRED\_MVE_{kt}$ is the predicted market value of equity for firm *k* in year *t* obtained after excluding that firm-year observation. We subsequently rank each method based on the AE for each observation in the sample by assigning a value of 1 to the method with the lowest AE, 2 to the method with the next higher AE, etc. We then count how many times each pension cost accounting method comes first, i.e. has a ranking of 1.

The analysis is conducted by comparing the alternative methods using the aggregate regressions, disaggregated pension expense regressions and disaggregated pension expense component regressions. Table 9, Panel A, presents the findings for the aggregate jack-knife regressions, Panel B, for the disaggregated pension expense jack-knife regressions and Panel C, for the disaggregated pension expense component jack-knife regressions.[30] The *GAAP Method* is the one that generates the lowest AE most of the times for both the aggregate and the disaggregated pension expense regressions. The *GAAP Method* also generates the lowest AE when compared to the *NETCOST Method* using disaggregated pension expense component regressions. When comparing the three alternative fair value models, at first sight *FV2* including the actual return on plan assets appears to generate the lowest AE, even though marginally. More importantly however, when assessing the cumulative percent of each method terminating first or second in terms of the lowest AE, *FV3* generally does best. Overall, the findings from the jack-knife regression procedure appear to suggest that while *GAAP Method* pension expense

[30] It is not possible to compare all the models simultaneously because of the different number of observations available to estimate each model.

components are relevant, the unexpected return included in *FV3* is also informative, hence confirming the OLS findings.

6 Sensitivity Analysis

A battery of sensitivity checks were conducted to ensure the robustness of the main findings. The reported findings pertain to the 1998 to 2005 period. Because S&P introduced S&P Core Earnings in May 2002 it is conceivable that the market started taking account of this alternative measure of pension expense only in 2002, even though the information necessary to compute it was previously available in the pension footnote. If this is the case, we would expect the *NETCOST Method* pension expense measure to be more value relevant post-2002 and the interest cost component to be significant. We run the *NETCOST Method* regressions using firm-year observations from 2002 onwards and find no evidence to suggest this is the case.

Heteroscedasticity-adjusted standard errors following White (1980) have been reported in the main analysis. The unbiasedness of the reported White standard errors, however, rests on the residuals being independent and identically distributed. Because of the employment of a panel data set in this study (observations on multiple firms across time), it is likely that the residuals are correlated across observations at the firm level and this would lead to White standard errors being biased (Petersen, 2007). To account for within-cluster dependence, We compute firm-clustered errors and the untabulated results are broadly similar.

Heteroscedasticity issues constitute one of the major shortcomings of price level models (Kothari and Zimmerman, 1995) and the choice of deflators may affect the inferences drawn (Ye, 2005). Reported findings use the number of shares outstanding adjusted for stock splits and dividends as a deflator. The findings are robust to alternative deflators.

In evaluating the association between market equity values and alternative pension expense measures, we compute market value of equity at fiscal year-end consistent with prior studies (Barth et al., 1992; Collins and Kothari, 1989). Detailed pension cost information is, however, only available in the notes to the financial statements. As a sensitivity check, we estimate the main regressions using the market value of equity three

months after the fiscal year-end to ensure that pension cost information is impounded in market equity values. Untabulated findings are similar to those reported.

7 Conclusion

This study has examined the value relevance of alternative measures of pension expense by employing an adaptation of the cross-sectional valuation model originally used by Landsman (1986) which distinguishes between the operating and financial activities of the firm, and which we have revised to include earnings following Ohlson (1995). The main focus was on examining how the market prices pension cost accruals by comparing pension cost as currently reported under SFAS Nos. 87 and 132 and the proposed *NETCOST Method* alternative. In addition, we examined the association between the market value of equity and the disaggregated pension expense components of GAAP and *NETCOST* pension expense, as well as three alternative fair value pension expense measures. Research on the value relevance of alternative pension expense measures to be included in the income statement is important in light of the impact that pension expense has on firm profitability. In addition, such a study is timely in view of the FASB's project to overhaul pension accounting, the second phase of which focuses on the income statement and the smoothing provisions embedded in SFAS Nos. 87 and 132 (FASB, 2006a, 2006b).

The empirical analysis showed that pension expense as currently reported under SFAS Nos. 87 and 132 better captured the market's aggregate valuation of pension costs as signified by the economically higher pension expense coefficient when compared to the *NETCOST Method.* When pension cost was disaggregated into its individual components, the alternative GAAP pension expense components were significant while the unexpected return on pension plan assets included in *FV3* was also significant, suggesting that the market perceives this component to be relevant. In contrast, the insignificance of *NETCOST Method* interest cost suggests that the market behaves as if the interest cost component of the *NETCOST Method* pension cost is not relevant. Additionally, fair value pension expense measures, which aggregate permanent with transitory components, appear to impair the value relevance of income statement numbers. The out-of-sample jack-knife regressions confirmed the OLS findings in that

the *GAAP Method* and the fair value specification including the unexpected return are more likely to provide the most accurate estimates of equity value. In view of the severe underfunding experienced by defined benefit pension plans in recent years, we examined the potentially different valuation effects associated with underfunded versus overfunded plans. The results show that pension expense is more relevant for underfunded plans.

Overall, the results suggest that retaining existing pension expense recognition requirements and mandating firms to recognize the unexpected return on plan assets along with the expected return is likely to provide an accurate description of perceived pension costs while also distinguishing between permanent and transitory pension cost components. The results are important in the context of the FASB's current review of the smoothing provisions of SFAS Nos. 87 and 132 as well as developments in the international arena.

The conclusions reached should, however, be interpreted cautiously bearing in mind that firms are currently required to report pension costs under SFAS Nos. 87 and 132. The empirical tests cannot capture the valuation effects on contemporaneous stock prices if any of the alternative methods of pension cost computation were mandated because enforcement of one of these would be likely to affect managerial actions. The finding that the market appears to behave as if the *NETCOST Method* interest cost component is not relevant should also be interpreted carefully as the primary interest of S&P, who originally suggested this alternative pension cost computation, is in measuring default rather than the valuation of equity. Future research can examine the credit relevance of the *NETCOST Method* pension expense and its components.

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Appendix 1 CTS Corp. Pension Footnote

Defined Benefit and Other Postretirement Benefit Plans

CTS has a number of noncontributory defined benefit pension plans (Pension Plans) covering approximately 23% of its employees. Plans covering salaried employees provide pension benefits that are based on the employees' compensation prior to retirement. Plans covering hourly employees generally provide benefits of stated amounts for each year of service. CTS provides postretirement life insurance benefits for certain retired employees. Domestic employees who were hired prior to 1982 and certain domestic union employees are eligible for life insurance benefits upon retirement. CTS funds life insurance benefits through term life insurance policies and intends to continue funding all of the premiums on a pay-as-you-go basis. The measurement date for the majority of the Pension Plans and other postretirement plan assets and benefit obligations was December 31, 2005 and 2004. The following table provides a reconciliation of benefit obligation, plan assets, and the funded status of the Pension Plans and other postretirement benefit plan at that measurement date.

		Pension Plans		Other Postretirement Benefit Plan	
	($ in thousands)	2005	2004	2005	2004
	Accumulated benefit obligation	$ 197,411	$ 185,302	$ 5,145	$ 5,433
	Change in projected benefit obligation:				
	Projected benefit obligation at January 1	$ 196,492	$ 186,950	$ 5,433	$ 5,100
	Service cost	5,236	5,292	29	31
	Interest cost	11,338	11,265	318	309
(1)	Plan amendment and other	(850)	954	R12;	R12;
(2)	Actuarial (gain) loss	6,616	1,231	(485)	140
	Benefits paid	(9,754)	(9,200)	(150)	(147)
	Curtailment	(499)	R12;		
(3)	Projected benefit obligation at December 31	$ 208,579	$ 196,492	$ 5,145	$ 5,433
	Change in plan assets:				
	Assets at fair value at January 1	$ 276,991	$ 259,764		
(4)	Actual return on assets	8,688	24,364		
	Company contributions	1,713	1,550	149	147
	Benefits paid	(9,754)	(9,200)	(149)	(147)
	Other	(603)	513		
(5)	Assets at fair value at December 31	$ 277,035	$ 276,991		
	Reconciliation of prepaid (accrued) cost:				
	Funded status (plan assets less projected benefit obligations)	$ 68,456	$ 80,499	$ (5,145)	$ (5,433)
	Amounts not recognized:				
	Actuarial (gains) losses	75,468	53,689	(62)	423
	Prior service cost	3,857	5,157	3	5
	Transition asset	R12;	(304)		
(6)	Prepaid (accrued) cost, net	$ 147,781	$ 139,041	$ (5,204)	$ (5,005)

The components of the prepaid (accrued) cost, net are classified in the following lines in the Consolidated Balance Sheets:

	Pension Plans		Other Postretirement Benefit Plan	
($ in thousands)	2005	2004	2005	2004
Prepaid pension asset	$ 152,483	$ 143,918		
Other accrued liabilities	(1,156)	(1,645)	(150)	(150)
Other long-term obligations	(7,648)	(6,073)	(5,054)	(4,855)
Accumulated other comprehensive loss	4,102	2,841		
	$ 147,781	$ 139,041	$ (5,204)	$ (5,005)

The projected benefit obligation, accumulated benefit obligation and fair value of plan assets for those Pension Plans with accumulated benefit obligation in excess of fair value of plan assets at December 31, 2005 and 2004 is shown below:

($ in thousands)	2005	2004
Projected benefit obligation	$ 17,830	$ 15,639
Accumulated benefit obligation	16,502	14,123
Fair value of plan assets	7,698	6,405

Net pension (income)/postretirement expense in 2005, 2004, and 2003 includes the following components:

		Pension Plans			Other Postretirement Benefit Plan		
	($ in thousands)	2005	2004	2003	2005	2004	2003
(7)	Service cost	$ 5,236	$ 5,292	$ 4,916	$ 29	$ 31	$ 39
(8)	Interest cost	11,338	11,265	10,910	318	310	317
(9)	Expected return on plan assets 1	(25,661)	(27,051)	(26,924)			
(10)	Amortization of unrecognized:						
	Transition obligation	(304)	(492)	(564)			
	Prior service cost	799	901	883			
	Recognized (gain) loss	1,125	658	(936)			
	Curtailment loss	475					
(11)	Net (income) expense	$ (6,992)	$ (9,427)	$ (11,715)	$ 347	$ 342	$ 357
	Weighted-average actuarial assumptions 2						
	Benefit obligation assumptions:						
	Discount rate	5.93%	5.94%	6.17%	6.00%	6.00%	6.25%
	Rate of compensation increase	4.70%	4.83%	4.84%			
	Pension income/postretirement expense assumptions:						
	Discount rate	5.94%	6.17%	6.67%	6.00%	6.25%	6.75%
	Expected return on plan assets	8.45%	8.70%	8.94%			
	Rate of compensation increase	4.83%	4.83%	4.84%			

1 Expected return on plan assets is net of expected investment expenses and certain administrative expenses.

2 During the fourth quarter of each year, CTS reviews its actuarial assumptions in light of current economic factors to determine if the assumptions need to be adjusted.

CTS utilizes a building block approach in determining the long-term rate of return for plan assets. Historical markets are reviewed and long-term relationships between equities and fixed-income are preserved consistent with the generally accepted capital market principle that assets with higher volatility generate a greater return over the long term. Current market factors such as inflation and interest rates are evaluated before long-term capital market assumptions are determined. The long-term portfolio return is established via a building block approach with proper consideration of diversification and rebalancing. Peer data and historical returns are reviewed to ensure for reasonableness

and appropriateness. 29 CTS' pension plan asset allocation at December 31, 2005 and 2004, and target allocation for 2006 by asset category are as follows:

	Target Allocations	Percentage of PlanAssets at December 31,	
Asset Category	2006	2005	2004
Equity securities ^1	65%	66%	58%
Debt securities	33%	32%	28%
Real estate			
Other	2%	2%	14 %
Total	100%	100%	100%

1. Equity securities include CTS common stock in the amounts of approximately $16 million (6% of total plan assets) at December 31, 2005 and approximately $19 million (7% of total plan assets) at December 31, 2004.
2. Included in the December 31, 2004 "Other" asset category is approximately $25 million of cash. This short-term increase in cash arose as CTS liquidated assets held by a few fund managers and transferred the cash to new fund managers at year-end. This change in fund managers was made to further diversify the pension asset portfolio, and improve overall return on assets by reducing administrative expenses. After December 31, 2004, the cash was re-invested by the new fund managers and the percentage of assets by category was as follows: Equity securities - 65%, Debt securities - 33%, and Other - 2%.

CTS employs a total return investment approach whereby a mix of equities and fixed income investments are used to maximize the long-term return of plan assets for a prudent level of risk. Risk tolerance is established through careful consideration of plan liabilities and funded status. The investment portfolio primarily contains a diversified mix of equity and fixed-income investments. The equity investments are diversified across U.S. and non-U.S. stocks, as well as growth, value, and small, and large capitalizations. Other assets such as private equity are used modestly to enhance long-term returns while improving portfolio diversification. Investment risk is measured and monitored on an ongoing basis through quarterly investment portfolio reviews, annual liability measurements, and asset/liability studies at regular intervals. The expected contributions to be made by CTS to the Pension Plans and the other postretirement benefit plan during 2006 are $1.2 million and $0.2 million, respectively. Estimated Future Benefit Payments The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

($ in thousands)	Pension Plans	Other Postretirement Benefit Plans
2006	$ 9,799	$ 362
2007	10,479	371
2008	11,691	378
2009	11,676	382
2010	12,402	385
Years 2011 - 2015	76,188	1,921

Figure 1 Funding Status of Defined Benefit Pension Plans 1998-2005

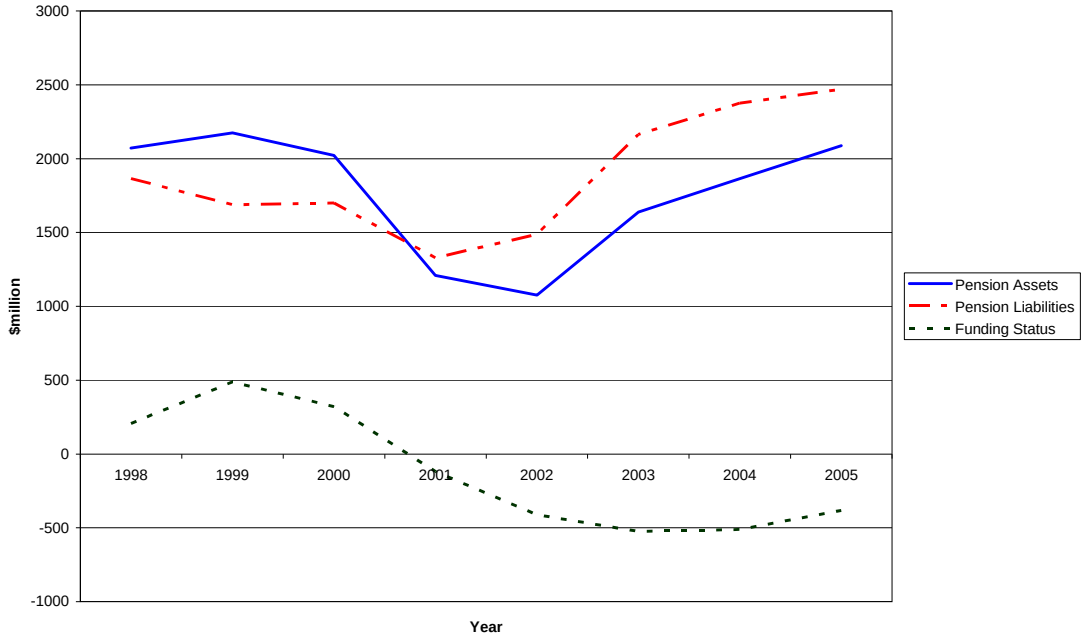

Figure 1 illustrates the magnitude of the fair value of pension assets and projected benefit obligations for the sample firms from 1998 to 2005. It also depicts pension plan funding status defined as the difference between the fair value of pension plan assets and projected benefit obligations.

Table 1 Sample Selection and Pension Cost Calculation Example

Panel A: Sample Selection Procedure

Selection Criterion		Number of Observations
All Compustat firms with non-missing observations		5,155
Less:		
Firms without a DB plan	(369)	
Observations where actual is equal to expected return on pension plan assets	(186)	
Observations representing SERP plans	(147)	
Special cases	(50)	
Final Sample		4,403

Panel B: CTS Corp. Example

	GAAP Method	*NETCOST Method*	*FV Method*
Pension Cost Components ($ millions)			
Service Cost	5.2	5.2	5.2
Interest Cost	11.3	2.6	11.3
Expected Dollar Return on Pension Plan Assets	(25.7)		
Actual Dollar Return on Pension Plan Assets			(8.7)
Amortization of Actuarial Gains or Losses	2.1		
Actuarial Losses (Gains)			6.6
Plan Amendments			(0.9)
Pension Expense (Income)	(7.1)	7.8	13.5

Notes

Panel A presents the sample selection procedure and Panel B illustrates pension expense calculated according to the *GAAP, NETCOST* and *FV* Methods.

Table 2 Descriptive Statistics

	Mean	Median	Std Dev
MVE	29.07	25.14	17.94
NI	1.59	1.32	1.24
NETCOST NI	1.48	1.24	1.25
ADJNI	1.67	1.38	1.30
GAAP PENSEXP	0.13	0.07	0.29
NETCOST PENSEXP	0.28	0.15	0.39
SERVCOST	0.17	0.11	0.18
INTCOST	0.39	0.19	0.51
ADJINT	0.12	0.00	0.29
OTHER_COST	0.06	0.01	0.16
OTHER_FAIRCOST	0.60	0.14	1.51
$*EXP_RETURN*	0.48	0.21	0.69
$*ACTUAL_RETURN*	0.40	0.11	1.07
BVE	11.96	9.91	8.51
BVEADJ	11.63	9.68	8.37
NPA	0.29	0.01	1.54
EMPL	27.80	9.26	48.71
R&D	0.73	0.42	0.93

Notes

The table presents sample descriptive statistics for the pooled sample. *MVE* is the market value of equity at fiscal year-end. *NI* is GAAP net income before extraordinary items and discontinued operations. *NETCOST NI* is GAAP net income before extraordinary items and discontinued operations plus the after-tax reported pension expense minus the after-tax *NETCOST Method* expense. *ADJNI* is net income before extraordinary items and discontinued operations plus the after-tax reported pension expense. *GAAP PENSEXP* is pension expense as currently reported under SFAS Nos. 87 and 132. *NETCOST PENSEXP* is defined as service cost plus the excess of interest cost over the actual return on pension plan assets. *SERVCOST* is the service cost. *INTCOST* is the reported interest cost. *ADJINT* is the *NETCOST* Method interest cost defined as the excess of interest cost over actual return on pension plan assets. *OTHER_COST* represents all other pension costs associated with defined benefit pension plans that do not fall into any of the other categories. *OTHER_FAIRCOST* is fair value other pension costs including the actuarial gains and losses under fair value accounting. *$EXP_RETURN* is the expected dollar return on pension plan assets. *$ACTUAL_RETURN* is the actual dollar return on pension plan assets. *BVE* is the book value of common equity. *BVEADJ* is the book value of common equity excluding the recognized net pension asset. *NPA* is the recognized net pension asset. *EMPL* is the number of employees and *R&D* is research and development expense. All variables, except *EMPL*, are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends.

Table 3 *GAAP* versus *NETCOST* Pension Expense

Panel A: GAAP Pension Expense

	Mean	Median	Std Dev	Lower Quartile	Upper Quartile
1998 (N=273)	13.48	3.48	128.70	-0.07	11.74
1999 (N=332)	-2.46	2.86	128.09	-0.27	10.78
2000 (N=399)	-14.30	0.47	143.49	-2.73	5.29
2001 (N=400)	4.42	0.97	157.73	-0.19	7.27
2002 (N=449)	25.61	2.80	137.67	0.38	13.40
2003 (N=487)	81.05	7.21	322.23	1.74	34.20
2004 (N=557)	81.68	7.95	233.36	1.74	46.18
2005 (N=491)	67.82	9.11	199.35	2.05	42.40

Panel B: NETCOST Pension Expense

	Mean	Median	Std Dev	Lower Quartile	Upper Quartile
1998 (N=273)	52.04	11.90	138.49	3.48	39.00
1999 (N=332)	47.08	10.95	116.87	3.67	37.50
2000 (N=399)	96.14	9.80	399.65	2.88	44.37
2001 (N=400)	112.77	12.37	357.99	2.87	59.45
2002 (N=449)	122.25	15.42	349.49	4.29	66.51
2003 (N=487)	60.15	7.52	166.37	2.17	38.00
2004 (N=557)	61.65	7.33	164.38	1.80	36.86
2005 (N=491)	57.45	7.65	161.66	2.41	37.00

Notes

The table presents descriptive statistics of *GAAP* versus the *NETCOST* pension expense. Panel A presents descriptive statistics of the *GAAP* pension expense and Panel B of the *NETCOST* pension expense. *GAAP PENSEXP* is pension expense as currently reported under SFAS Nos. 87 and 132. *NETCOST PENSEXP* is defined as service cost plus the excess of interest cost over the actual return on pension plan assets. Positive (negative) numbers indicate pension expense (income).

Table 4 OLS Aggregate and Disaggregated Pension Expense Regressions

Panel A: Aggregate Regressions

	GAAP Method	*NETCOST Method*
INTERCEPT	11.42	9.92
	(0.00)	(0.00)
NI	7.56	7.21
	(0.00)	(0.00)
BVE	0.27	0.34
	(0.00)	(0.00)
EMPL	0.05	0.05
	(0.00)	(0.00)
R&D	2.01	2.25
	(0.00)	(0.00)
Summary Statistics		
Adj. R^2	51.05	50.45
N	3,388	3,388

Panel B: Disaggregated Pension Expense Regressions

	GAAP Method	*NETCOST Method*	*NETCOST Method (excluding 0 interest cost)*
INTERCEPT	12.10	11.96	8.64
	(0.00)	(0.00)	(0.02)
ADJNI	7.63	7.60	7.56
	(0.00)	(0.00)	(0.00)
PENSEXP	-9.42	-1.55	-0.81
	(0.00)	(0.09)	(0.47)
BVEADJ	0.29	0.30	0.24
	(0.00)	(0.00)	(0.00)
NPA	0.48	.	.
	(0.00)	.	.
FAIRNPA	.	1.44	1.62
	.	(0.00)	(0.00)
*FAIRNPA*SURPLUS_DUM*	.	-1.18	-1.75
	.	(0.00)	(0.01)
EMPL	0.05	0.05	0.06
	(0.00)	(0.00)	(0.00)
R&D	2.38	2.67	2.99
	(0.00)	(0.00)	(0.00)
Summary Statistics			
Adj. R^2	51.64	51.18	46.16
N	3,388	3,388	1,594

Notes

The table presents coefficient estimates and two-tailed probability values (in parentheses) of the aggregate (Panel A) and disaggregated pension expense OLS regressions (Panel B).

$$MVE_{jt} = \beta_0 + \beta_1 NI_{jt} + \beta_2 BVE_{jt} + \varepsilon_{jt} \quad (1)$$

$$MVE_{jt} = \beta_0 + \left\{\beta_1 ADJNI_{jt} + \beta_2 PENSEXP_{jt}\right\} + \left\{\beta_3 BVEADJ_{jt} + \beta_4 NPA_{jt}\right\} + \varepsilon_{jt} \quad (2)$$

NI is GAAP net income before extraordinary items and discontinued operations. *NETCOST NI* is GAAP net income before extraordinary items and discontinued operations plus the after-tax reported pension expense

minus the after-tax *NETCOST Method* pension expense. *BVE* is the book value of common equity. *ADJNI* is net income before extraordinary items and discontinued operations plus the after-tax reported pension expense. *GAAP PENSEXP* is pension expense as currently reported under SFAS Nos. 87 and 132. *NETCOST Method PENSEXP* is defined as service cost plus the excess of interest cost over the actual return on pension plan assets. *BVEADJ* is the book value of common equity excluding the recognized net pension asset. *NPA* is the recognized net pension asset. *FAIRNPA* is the fair value net pension asset. *FAIRNPA*SURPLUS_DUM* is an interaction variable equal to *FAIRNPA* multiplied by a dummy variable, *SURPLUS_DU*M, equal to 1 if the pension plan is overfunded, and 0 otherwise. *EMPL* and *R&D* are also included in all model specifications. *EMPL* is the number of employees and *R&D* is research and development expense. All variables, except *EMPL*, are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. Fixed-year and industry effects are included in all model specifications. P-values are White (1980) heteroscedasticity-consistent.

Table 5 Disaggregated Pension Expense Component Regressions

	GAAP Method	*FV1 Method*	*FV1 Method*	*FV2 Method*	*FV3 Method*	*NETCOST Method*	*NETCOST Method (excluding 0 interest cost)*
INTERCEPT	10.79	13.63	13.71	12.97	13.06	11.85	8.65
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)
ADJNI	7.71	8.50	8.46	8.50	8.48	7.66	7.67
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SERVCOST	-6.84	-11.02	-9.92	-10.44	-10.69	-4.26	-9.87
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.01)
INTCOST	-12.89	-20.43	-19.22	3.60	-20.13	.	.
	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	.	.
ADJINT	.	.	.	.	.	-0.61	2.22
	.	.	.	.	.	(0.58)	(0.14)
OTHER_COST	-6.79	.	.	.	.	.	.
	(0.00)	.	.	.	.	.	.
OTHER_FAIRCOST	.	-0.23	-0.23	.	.	.	.
	.	(0.53)	(0.53)	.	.	.	.
NETOTHER_FAIRCOST	.	.	.	-1.83	-1.95	.	.
	.	.	.	(0.00)	(0.00)	.	.
$*EXP_RETURN*	8.36	15.42	15.50	.	17.99	.	.
	(0.00)	(0.00)	(0.00)	.	(0.00)	.	.
$*UNEXP_RETURN*	.	.	.	.	1.07	.	.
	.	.	.	.	(0.02)	.	.
$*ACTUAL_RETURN*	.	.	.	0.53	.	.	.
	.	.	.	(0.22)	.	.	.
BVEADJ	0.34	0.25	0.27	0.22	0.25	0.30	0.26
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
NPA	0.95	.	.	.	.	.	.
	(0.00)	.	.	.	.	.	.
FAIRNPA	.	0.20	0.80	1.44	0.47	1.35	1.48
	.	(0.43)	(0.01)	(0.00)	(0.08)	(0.00)	(0.00)
*FAIRNPA*SURPLUS_DUM*	.	.	-1.25	.	.	-1.01	-1.58
	.	.	(0.01)	.	.	(0.01)	(0.02)
EMPL	0.05	0.04	0.04	0.04	0.04	0.05	0.06
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R&D	2.81	3.13	3.19	3.30	3.29	2.75	3.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Summary Statistics							
Adj. R^2	52.28	54.75	54.92	54.01	55.17	51.20	46.37
N	3,388	2,312	2,312	2,312	2,312	3,388	1,594

Notes

The table presents coefficient estimates and two-tailed probability values (in parentheses) of the disaggregated pension expense component OLS regressions.

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 OTHER\_COST_{jt} + \beta_5 \$EXP\_RETURN_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 NPA_{jt} + \varepsilon_{jt} \quad (3)$$

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 OTHER\_FAIRCOST_{jt} + \beta_5 \$EXP\_RETURN_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \varepsilon_{jt} \quad (4)$$

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$ACTUAL\_RETURN_{jt} + \beta_5 NETOTHER\_FAIRCOST_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \varepsilon_{jt} \quad (6)$$

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$EXP\_RETURN_{jt} + \beta_5 \$UNEXP\_RETURN_{jt} + \beta_6 NETOTHER\_FAIRCOST_{jt} + \beta_7 BVEADJ_{jt} + \beta_8 FAIRNPA_{jt} + \varepsilon_{jt} \quad (7)$$

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 ADJINT_{jt} + \beta_4 BVEADJ_{jt} + \beta_5 FAIRNPA_{jt} + \beta_6 FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (8)$$

ADJNI is net income before extraordinary items and discontinued operations plus the after-tax reported pension expense. *SERVCOST* is the service cost. *INTCOST* is the reported interest cost. *OTHER_COST* represents all other pension costs associated with defined benefit pension plans that do not fall into any of the other categories. *$EXP_RETURN* is the expected dollar return on pension plan assets. *BVEADJ* is the book value of common equity excluding the recognized net pension asset. *NPA* is the recognized net pension asset. *OTHER_FAIRCOST* is fair value other pension costs including the actuarial gains and losses under fair value accounting. *FAIRNPA* is the fair value net pension asset. *$ACTUAL_RETURN* is the actual dollar return on pension plan assets. *NETOTHER_FAIRCOST* is the difference between *OTHER_FAIRCOST* and *$UNEXP_RETURN*. *$UNEXP_RETURN* is the difference between *$ACTUAL_RETURN* and *$EXP_RETURN*. *ADJINT* is the *NETCOST Method* interest cost defined as the excess of interest cost over the actual return on pension plan assets. *FAIRNPA*SURPLUS_DUM* is an interaction variable equal to *FAIRNPA* multiplied by a dummy variable, *SURPLUS_DUM*, equal to 1 if the pension plan is overfunded, and 0 otherwise. *EMPL* and *R&D* are also included in all model specifications. *EMPL* is the number of employees and *R&D* is research and development expense. All variables, except *EMPL*, are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. Fixed-year and industry effects are included in all model specifications. P-values are White (1980) heteroscedasticity-consistent.

Table 6 Alternative *NETCOST* Method Specifications

	EQ. (9)	*EQ. (10)*
INTERCEPT	12.68	12.68
	(0.00)	(0.00)
ADJNI	8.51	8.47
	(0.00)	(0.00)
SERVCOST	-7.92	-10.42
	(0.01)	(0.00)
INTCOST	.	-17.64
	.	(0.00)
INTCOST-ACTUAL_RETURN	2.57	.
	(0.00)	.
FIN_DUM	1.53	1.04
	(0.04)	(0.22)
*(INTCOST-ACTUAL_RETURN)*FIN_DUM*	-5.94	.
	(0.00)	.
NETOTHER_FAIRCOST	-1.50	-2.04
	(0.00)	(0.00)
EXP_RETURN	.	15.41
	.	(0.00)
UNEXP_RETURN	.	-0.87
	.	(0.36)
*INTCOST*FIN_DUM*	.	-2.14
	.	(0.63)
*EXP_RETURN*FIN_DUM*	.	2.66
	.	(0.48)
*UNEXP_RETURN*FIN_DUM*	.	3.92
	.	(0.01)
BVEADJ	0.24	0.28
	(0.00)	(0.00)
FAIRNPA	1.64	1.10
	(0.00)	(0.00)
*FAIRNPA*SURPLUS_DUM*	-1.16	-1.39
	(0.01)	(0.00)
EMPL	0.04	0.03
	(0.00)	(0.00)
R&D	3.35	3.40
	(0.00)	(0.00)
Summary Statistics		
Adj. R^2	54.63	55.52
N	2,312	2,312

Notes
The table presents coefficient estimates and two-tailed probability values (in parentheses) of alternative *NETCOST* Method OLS model specifications.

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST - \$ACTUAL\_RETURN_{jt} + \beta_4 (INTCOST - \$ACTUAL\_RETURN) * FIN\_DUM_{jt} + \beta_5 FIN\_DUM_{jt} + \beta_6 BVEADJ_{jt} + \beta_7 FAIRNPA_{jt} + \beta_8 FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (9)$$

$$MVE_{jt} = \beta_0 + \beta_1 ADJNI_{jt} + \beta_2 SERVCOST_{jt} + \beta_3 INTCOST_{jt} + \beta_4 \$EXP\_RETURN_{jt} + \beta_5 \$UNEXP\_RETURN_{jt} + \beta_6 INTCOST * FIN\_DUM_{jt} + \beta_7 \$EXP\_RETURN * FIN\_DUM_{jt} + \beta_8 \$UNEXP\_RETURN * FIN\_DUM_{jt} + \beta_9 NETOTHER\_FAIRCOST_{jt} + \beta_{10} BVEADJ_{jt} + \beta_{11} FAIRNPA_{jt} + \beta_{12} FAIRNPA * SURPLUS\_DUM_{jt} + \varepsilon_{jt} \quad (10)$$

ADJNI is net income before extraordinary items and discontinued operations plus the after-tax reported pension expense. *SERVCOST* is the service cost. *INTCOST* is the reported interest cost. *INTCOST-$ACTUAL_RETURN* is the difference between interest cost and actual dollar return on pension plan assets. *(INTCOST-$ACTUAL_RETURN)*FIN_DUM* is an interaction variable equal to *INTCOST-$ACTUAL_RETURN* multiplied by *FIN_DUM*. *FIN_DUM* is a dummy variable equal to 1 if SFAS Nos. 87 and 132 interest cost is less than the actual return on pension plan assets, and 0 otherwise. *BVEADJ* is the book value of common equity excluding the recognized net pension asset. *FAIRNPA* is the fair value net pension asset. *FAIRNPA*SURPLUS_DUM* is an interaction variable equal to *FAIRNPA* multiplied by a dummy variable, *SURPLUS_DUM*, equal to 1 if the pension plan is overfunded, and 0 otherwise. *$EXP_RETURN* is the expected dollar return on pension plan assets. *$UNEXP_RETURN* is the difference between *$ACTUAL_RETURN* and *$EXP_RETURN*. *INTCOST*FIN_DUM* is an interaction variable equal to *INTCOST* multiplied by *FIN_DUM*. *$EXP_RETURN*FIN_DUM* is an interaction variable equal to *$EXP_RETURN* multiplied by *FIN_DUM*. *$UNEXP_RETURN*FIN_DUM* is an interaction variable equal to *$UNEXP_RETURN* multiplied by *FIN_DUM*. *NETOTHER_FAIRCOST* is the difference between *OTHER_FAIRCOST* and *$UNEXP_RETURN*. *EMPL* and *R&D* are also included in all model specifications. *EMPL* is the number of employees and *R&D* is research and development expense. All variables, except *EMPL*, are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. Fixed-year and industry effects are included in all model specifications. P-values are White (1980) heteroscedasticity-consistent.

Table 7 Descriptive Statistics of Pension Plans' Funding Status

Panel A: Funding Status by Year

	Mean	Median	Std Dev
		Year = 1998 (N=273)	
PENSASSET	2071.0	299.4	6657.1
PENSLIAB	1865.1	302.1	5737.8
FUNDING	205.9	-2.7	1356.1
		Year = 1999 (N=332)	
PENSASSET	2174.9	324.3	7081.2
PENSLIAB	1687.4	266.8	5195.9
FUNDING	487.5	23.9	2171.9
		Year = 2000 (N=399)	
PENSASSET	2021.5	200.5	7677.5
PENSLIAB	1699.8	189.8	6534.2
FUNDING	321.7	2.0	1807.9
		Year = 2001 (N=400)	
PENSASSET	1209.3	123.4	4490.5
PENSLIAB	1328.6	139.6	4325.1
FUNDING	-119.3	-10.5	1127.6
		Year = 2002 (N=449)	
PENSASSET	1076.3	126.1	3423.3
PENSLIAB	1488.5	170.8	4406.5
FUNDING	-412.2	-38.4	1403.1
		Year = 2003 (N=487)	
PENSASSET	1638.8	173.5	5398.8
PENSLIAB	2162.8	243.5	6515.9
FUNDING	-524.0	-50.0	1811.2
		Year = 2004 (N=557)	
PENSASSET	1865.2	184.0	6019.2
PENSLIAB	2376.0	255.9	7121.4
FUNDING	-510.8	-47.4	1690.6
		Year = 2005 (N=491)	
PENSASSET	2087.5	197.5	7034.9
PENSLIAB	2470.3	261.0	7678.4
FUNDING	-382.8	-49.9	1213.8

Panel B: Descriptive Statistics by Funding Status

	Overfunded Plans (N=833)			*Underfunded Plans (N=2,555)*		
	Mean	Median	Std Dev	Mean	Median	Std Dev
PENSASSET	2882.6	367.5	8646.9	1378.4	151.0	4880.9
PENSLIAB	2351.5	304.9	7107.8	1791.9	208.2	5839.5
FR	1.229	1.144	0.305	0.738	0.762	0.172
NPA	0.913	0.230	1.642	0.092	-0.029	1.456
GAAP PENSEXP	-0.046	-0.001	0.249	0.186	0.098	0.276
NETCOST PENSEXP	0.310	0.166	0.423	0.277	0.148	0.380
$*EXP_RETURN*	0.724	0.402	0.849	0.406	0.174	0.606
$*ACTUAL_RETURN*	0.727	0.281	1.365	0.299	0.076	0.923
LEV	0.556	0.566	0.166	0.563	0.570	0.182
PROF	0.064	0.056	0.047	0.068	0.056	0.063

Notes

The table presents descriptive statistics of the pension plans' funding status. Panel A presents yearly descriptive statistics regarding the fair value of pension plan assets, projected benefit obligations and funding status. *PENSASSET* is the fair value of pension plan assets and *PENSLIAB* is the projected benefit obligation. *FUNDING* is the difference between pension plan assets *(PENSASSET)* and pension liabilities *(PENSLIAB)*. Panel B presents descriptive statistics for overfunded and underfunded pension plans. *PENSASSET* and *PENSLIAB* are as defined above. *FR* is the funding ratio defined as *PENSASSET* over *PENSLIAB*. *NPA* is recognized net pension assets deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. *GAAP PENSEXP* and *NETCOST PENSEXP* is *GAAP* and *NETCOST* pension expense respectively. *GAAP PENSEXP* is pension expense as currently reported under SFAS Nos. 87 and 132 deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. *NETCOST Method PENSEXP* is defined as service cost plus

the excess of interest cost over the actual return on pension plan assets deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. *$EXP_RETURN* is the expected dollar return on pension plan assets and *$ACTUAL_RETURN* is the actual dollar return on pension plan assets, both deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. *LEV* is leverage and *PROF* is profitability.

Table 8 Disaggregated Pension Expense Regressions by Funding Status

	GAAP Method	*NETCOST Method*	*NETCOST Method (excluding 0 interest cost)*
INTERCEPT	12.37	12.08	8.83
	(0.00)	(0.00)	(0.02)
ADJNI	7.60	7.58	7.55
	(0.00)	(0.00)	(0.00)
PENSEXP (Underf.)	-11.52	-0.38	-0.62
	(0.00)	(0.74)	(0.67)
*PENSEXP*SURPLUS_DUM*	6.98	-3.07	-0.41
	(0.01)	(0.08)	(0.86)
SURPLUS_DUM	-1.51	0.15	-0.63
	(0.03)	(0.84)	(0.58)
BVEADJ	0.31	0.30	0.24
	(0.00)	(0.00)	(0.00)
NPA	0.68	.	.
	(0.00)	.	.
FAIRNPA	.	1.61	1.68
	.	(0.00)	(0.00)
*FAIRNPA*SURPLUS_DUM*	.	-1.15	-1.67
	.	(0.00)	(0.01)
EMPL	0.05	0.05	0.06
	(0.00)	(0.00)	(0.00)
R&D	2.45	2.70	2.99
	(0.00)	(0.00)	(0.00)
Adj. R^2	51.84	51.22	46.11
N	3,388	3,388	1,594

Notes

The table presents coefficient estimates and two-tailed probability values (in parentheses) of the *GAAP* and *NETCOST* disaggregated pension expense OLS regressions for overfunded and underfunded plans. *ADJNI* is net income before extraordinary items and discontinued operations plus the after-tax reported pension expense. *GAAP PENSEXP* is pension expense as currently reported under SFAS Nos. 87 and 132. *NETCOST Method PENSEXP* is defined as service cost plus the excess of interest cost over the actual return on pension plan assets. *PENSEXP*SURPLUS_DUM* is an interaction variable equal to *GAAP/NETCOST* pension expense multiplied by *SURPLUS_DUM*. *SURPLUS_DUM* is a dummy variable equal to 1 if the pension plan is overfunded, and 0 otherwise. *BVEADJ* is the book value of common equity excluding the recognized net pension asset. *NPA* is the recognized net pension asset. *FAIRNPA* is the fair value net pension asset. *FAIRNPA*SURPLUS_DUM* is an interaction variable equal to *FAIRNPA* multiplied by *SURPLUS_DUM*. *EMPL* is the number of employees and *R&D* is research and development expense. All variables, except *EMPL*, are deflated by the number of common shares outstanding at fiscal year-end, adjusted for stock splits and dividends. Fixed-year and industry effects are included in all model specifications. P-values are White (1980) heteroscedasticity-consistent.

Table 9 Jack-knife Regressions

Panel A: Aggregate Regressions

GAAP Method	*NETCOST Method*
1,802 *(53.19%)*	1,586 *(46.81%)*

Panel B: Disaggregated Pension Expense Regressions

GAAP Method	*NETCOST Method*
1,762 *(52.01)*	1,626 *(47.99)*

Panel C: Disaggregated Pension Expense Component Regressions

GAAP Method	*NETCOST Method*	*FV1 Method*	*FV2 Method*	*FV3 Method*
1,826 *(53.90)*	1,562 *(46.10)*	.	.	.
.	.	788 *(23.26, 52.57)*	804 *(23.73, 48.85)*	720 *(21.25, 62.10)*

Notes

The table presents the results of Jack-knife regressions. Panel A presents the results of the aggregate regressions, Panel B of the disaggregated pension expense regressions and Panel C of the disaggregated pension expense component regressions. The row number below each method represents the number of times that each method terminates first with the lowest prediction errors (% in parentheses). The cumulative percent (%) (how many times each method terminates first or second) is presented for the disaggregated *FV* pension expense component regressions in Panel C (second number inside the parentheses).