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The Market Value Implications of Pension Asset Allocation

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THE MARKET VALUE IMPLICATIONS OF PENSION ASSET ALLOCATION

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Diane Elizabeth Hendrix Turner

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To: Dean David R. Klock
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This dissertation, written by Diane Elizabeth Hendrix Turner, and entitled The Market Value Implications of Pension Asset Allocation, having been approved in respect to style is referred to you for judgment.

We have read the dissertation and recommend that it be approved.

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DEDICATION

I dedicate this dissertation to my husband, Skip, and my children, Andrew, Matthew, Joshua, and Kristin. A special feeling of gratitude to my husband, for without his support, sacrifices, and love, the completion of this work would not have been possible. His words of encouragement and his undying belief in my ability to complete this dissertation will forever be remembered in my heart. To my son Matthew, thanks for keeping me company and acting as my sound board. To Luke, Nanny loves you.

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ABSTRACT OF THE DISSERTATION

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Pension funds have been part of the private sector since the 1850's. Defined Benefit pension plans [DB], where a company promises to make regular contributions to investment accounts held for participating employees in order to pay a promised lifelong annuity, are significant capital markets participants, amounting to 2.3 trillion dollars in 2010 (Federal Reserve Board, 2013). In 2006, Statement of Financial Accounting Standards No.158 (SFAS 158), *Employers' Accounting for Defined Benefit Pension and Other Postemployment Plans,* shifted information concerning funding status and pension asset/liability composition from disclosure in the footnotes to recognition in the financial statements. I add to the literature by being the first to examine the effect of recent pension reform during the financial crisis of 2008-09.

This dissertation is comprised of three related essays. In my first essay, I investigate whether investors assign different pricing multiples to the various classes of pension assets when valuing firms. The pricing multiples on all classes of assets are significantly different from each other, but only investments in bonds and equities were value-relevant during the recent financial crisis. Consistent with investors viewing pension liabilities as liabilities of the firm, the pricing multiples on pension liabilities are significantly larger

than those on non-pension liabilities. The only pension costs significantly associated with firm value are actual rate of return and interest expense.

In my second essay, I investigate the role of accruals in predicting future cash flows, extending the Barth et al. (2001a) model of the accrual process. Using market value of equity as a proxy for cash flows, the results of this study suggest that aggregate accounting amounts mask how the components of earnings affect investors' ability to predict future cash flows. Disaggregating pension earnings components and accruals results in an increase in predictive power. During the 2008-2009 financial crisis, however, investors placed a greater (and negative) weight on the incremental information contained in the individual components of accruals. The inferences are robust to alternative specifications of accruals.

Finally, in my third essay I investigate how investors view under-funded plans. On average, investors: view deficits arising from under-funded plans as belonging to the firm; reward firms with fully or over-funded pension plans; and encourage those funds with unfunded pension plans to become funded. Investors also encourage conservative pension asset allocations to mitigate firm risk, and smaller firms are perceived as being better able to handle the risk associated with underfunded plans. During the financial crisis of 2008-2009 underfunded status had a lower negative association with market value.

In all three models, there are significant differences in pre- and post- SFAS 158 periods. These results are robust to various scenarios of the timing of the financial crisis and an alternative measure of funding.

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I. INTRODUCTION

Pension funds have been part of the private sector since the 1850's. Defined Benefit pension plans [DB], where a company promises to make regular contributions to investment accounts held for participating employees in order to pay a promised lifelong annuity, are significant capital markets participants. Investments by such plans amounted, for example, to 2.3 trillion dollars in 2010 (Federal Reserve Board, 2013). Given the magnitude of pension assets held in reserve, it is important to understand the effect of pension accounting standard-setting. With the recognition of actuarial gains and losses in comprehensive income, rates of return on pension assets have an economically significant impact on the book value of equity. [1]

In 1984, Statement of Financial Accounting Standards No. 87 (SFAS 87), *Employers' Accounting for Pensions* required, among other things, that four components of pension cost be disclosed: accrual of interest (INT) for the year on the projected pension benefit obligation (PBO); service cost - the present value of expected future pension payments attributed to employee services performed during the year (SVC); the actual rate of return on plan assets including realized and unrealized gains and losses, return on assets, and estimated return on assets including a deferred portion (RPLNA); and the net deferral and amortization of the effects of past transactions (TAMOR). In 2003, Statement of Financial Accounting Standards No.132R (SFAS 132R,) *Employers' Disclosures about Pensions and Other Postretirement Plans,* further enhanced pension disclosures by requiring firms to disclose the amounts invested in 4 major categories of plan assets:

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[1] For an example of the magnitude of this impact, on average, amounts equal to 61% of net income for the firms in this sample are provided by returns on pension assets.

bonds[2]; equity securities; real estate; and other assets. Other assets are the amounts not invested in equities, bonds or real estate and include hedge fund assets. In 2006, Statement of Financial Accounting Standards No.158 (SFAS 158), *Employers' Accounting for Defined Benefit Pension and Other Postemployment Plans,* went one step farther, shifting information concerning pension asset/liability composition from disclosure in the footnotes to recognition in the financial statements.

Prior studies have also found differences in how investors view recognized as opposed to disclosed information (see for example: Davis-Friday et al., 1999, Hirst, 2004, and Schipper, 2007). In these studies, I look at whether recognizing pension information (as opposed to disclosing it) altered its association with market values.[3] As Schipper (2007, p. 304) notes: "First, because recognition is subject to special criteria, and because SFAC No. 5 states that disclosure and recognition are not substitutes, it is evident that disclosure and recognition are not financial reporting alternatives—they are not intended to serve the same purpose." As previously noted, SFAS 158 requires pension information to be recognized in the financial statements. This added volatility to the financial statements through the inclusion of actuarial gains and losses in comprehensive income. Speaking to the impact of SFAS 158, Skaife et al., (2007) state that "SFAS 158 will lead to financial statements that better reflect the underlying economics of the plans…[SFAS 158] will eliminate the need to provide reconciliations in the notes to the financial statements that many users may not see or understand" (p. 202). It appears that FASB

[2] The amount invested in fixed income securities, cash and short-term securities, U.S. government and government agency securities, corporate bonds and notes, and mortgages.

[3] The passage of SFAS 87, SFAS 132R, and SFAS 158 suggests that the FASB believes disclosure, and later recognition, adds incremental value to the financial statements.

believes recognized information is more relevant to users of financial statements than disclosed information. Why else would FASB have issued SFAS 158 requiring the recognition of information disclosed under SFAS 132R? In their comment letter to the FSAB, PricewaterhouseCoopers states. "*We believe that recognizing these off-balance sheet amounts, which collectively are estimated at billions of dollars, represents a significant improvement in financial reporting….financial statements will be more complete and transparent by fully recognizing these amounts rather than continuing to relegate them to the financial statement footnotes, which can be difficult to understand*."

Many studies have verified the differences in investor responses to recognition versus disclosure. Kimbrough (2007) studies financial statement recognition and analyst coverage and finds them to be associated with firm value. Davis-Friday, et al., (1999), for example, study whether financial statement data is valued differently by financial markets if it is disclosed in the footnotes rather than recognized in the body of the financial statements. Using several valuations tests, they find that information that is recognized receives more weight than that which is disclosed. The format with which information is presented also impacts the weights non-professional investors place on that information (Maines and MacDonald, 2000). Specifically, they find that information on the volatility of unrealized gains is only taken into consideration by non-professionals when that information is formally presented in a statement of comprehensive income. Lehavy et al., (2011) analyze the complexity and readability of 10-K filings and find that "less readable 10-Ks are associated with greater dispersion, lower accuracy, and greater overall uncertainty in analyst earnings forecasts" (p. 1087), while Hodder, et al. (2008) find that something as simple as the structure of the indirect method of presenting operating cash flows can impede users' information processing. I examine the economic effects of SFAS 158 in terms of the actions taken by firms to compensate for the effects of pension accounting reform in terms of changes in investment percentage of the 4 classes of pension assets and how the stock market responds to perceived changes in risk (increases in volatility introduced by recognition). I add to the literature by examining how accounting presentation has affected pension asset allocation, accruals and the funded status of pension plans. There are significant differences in the pre- and post- SFAS 158 periods.

Accounting information and regulations do not, however, exist in a vacuum, and my sample period includes a global liquidity crisis. In the first quarter of 2007, the FDIC's *Quarterly Banking Profile* reported that FDIC-insured institutions experienced the largest year-over-year decline in quarterly earnings since the first quarter of 2001. At the same time, the increase in loss provisions was the largest in five years (http://www2.fdic.gov/qbp/2007mar/qbp.pdf). According to the *World Economic Report: Crisis and Recovery* issued in April 2009 by the International Monetary Fund (http://www.imf.org/external/pubs/ft/weo/2009/01/pdf/text.pdf),

> *In the year following the outbreak of the U.S. subprime crisis in August 2007, the global economy bent but did not buckle…. The situation deteriorated rapidly after the dramatic blowout of the financial crisis in September 2008, following the default by a large U.S. investment bank (Lehman Brothers), the rescue of the largest U.S. insurance company (American International Group, AIG)…. The global economy is in a severe recession inflicted by a massive financial crisis and acute loss of confidence.…Total expected write-downs on global exposures are estimated at about*

$4 trillion, of which two-thirds will fall on banks and the remainder on insurance companies, pension funds, hedge funds, and other intermediaries.

According to the National Bureau of Economic Research, the recession began in December 2007 and ended in June 2009. While the economy has not returned to pre-recession levels, June of 2009 marks the beginning of an economic expansion (http://www.nber.org/cycles/sept2010.html). I control for the financial crisis of 2008-2009 at both the firm and economy-wide levels and find that the financial crisis had an impact on pension asset allocation, accruals, and the funded status of pension plans.

My doctoral dissertation consists of three essays that examine the effects of pensions on the market value of equity. These essays examine pension reforms, controlling for the financial crisis of 2008-09, as they examine the value markets place on pension asset allocation, accruals and disaggregated pension earnings, and the funded status of pension plans.

My first dissertation essay examines whether market participants assign different pricing multiples to the various classes of assets and, if so, how this affects their use of the components of pension costs. Toward that end, I also explore the *classic* accounting question: which is more important to market participants, balance sheet information or income statement information? I also examine the existence of synergies between them, i.e., which is more value-relevant, information that is recognized or disclosed?

I find that the pricing multiples on the pension cost components: actual rate of return on plan assets (RPLNA) and interest (INT) are significantly different from each other and are the only plan costs with pricing multiples that are significantly associated with market values. This suggests that the other pension cost components are viewed as containing stale information (Barth et al., 1993).

Second, I find that the pricing multiples on pension asset/cost components are significantly different from each other. The significant differences in the pricing multiples of pension cost components and pension asset components suggests that investors respond to the relative riskiness of long-horizon pension assets and liabilities (Barth et al. 1993).

Next, I find that pension liabilities have larger pricing multiples than firm liabilities. This effect disappears, however, when pension costs and assets are disaggregated into their components. At the same time, pension assets have significantly lower pricing multiples than non-pension assets. The significantly larger pricing multiples on pension liabilities suggests that investors view pension liabilities as belonging to the firm while pension assets (with their significantly lower pricing multiples) are not viewed as belonging to the firm. This latter finding is consistent with the constraints placed on U.S. firms when they attempt to withdraw a pension surplus (Weidman and Weir, 2004, find a similar result for Canadian firms).

The fact that the significantly larger pricing multiple on plan liabilities disappears when more detail is provided regarding the composition of plan assets and costs suggests (consistent with Barth et al., 1993) that the incremental explanatory value of pension liabilities and costs are redundant once details on pension balance sheet variables are included.

In my second essay, I investigate the role of accruals in predicting future cash flows, extending the Barth et al. (2001a) model of the accrual process, in the context of pension accounting reform and the financial crisis of 2008-2009. I extend that research by examining the effect of disaggregating pension information into the major components of assets and costs. Consistent with prior literature concerning the effects of disaggregating (Barth et al., 2001a and Nam et al., 2012), I find that not only do the major components of accruals enhance predictive power but also that the major components of pension assets and liabilities enhance the predictive power of future cash flows. Further, investors attach different pricing multiples to the various components.

Barth et al., (2001a), extending the analysis of Dechow et al. (1998), was the first to examine how the components of earnings affect the ability to predict future cash flows (referred to below as the BCN model). They found that each accrual component significantly enhanced the ability to predict cash flows. They reasoned that since accruals contain information about delayed cash flows and future cash flows, the securities markets would assign different pricing models to the individual components of accruals. Nam et al. (2012), using a cross-sectional model, concludes that "Although the ability of accruals to contribute to the predictions of finite measures of cash flows varies with model specifications and levels of aggregations of the dependent variable, it is robust and unequivocally significant when the market value of equity is predicted" (p. 172). I extend this literature by including the effect of pension asset cost components, using both the BCN balance sheet model and the Modified Jones model (Dechow et al., 1995). I find, using both models, that pension assets and cost components, together with accrual components, enhance the ability to forecast future cash flows (proxied by the future market value of equity).

In addition, I find evidence that managers signal discretionary information to the markets during the financial crisis, and as a result, investors placed a greater weight on the incremental information contained in the individual components of accruals. There is a change in the sign and an increase in the magnitude of the effect of the accrual components for all accrual components except depreciation/amortization. I conclude that the reason the sign of depreciation and amortization does not change during the financial crisis may be due the inability of managers to signal using a cost that is tied to long-term rates of return on capital assets. I also discover a flight of capital from equities and real estate during the financial crisis (Bernanke et al., 1996; Brunnermeier and Pedersen, 2005, 2008; Caballero and Krishnamurthy, 2008 and Gelos and Wei, 2005).

In my third essay, I explore the association between the market value of equity and pension funding status. Funding status may have a substantial economic impact on cash flows. Under the Employee Retirement Income Security ACT (ERISA) of 1974, firms with private employer-sponsored DB plans funded from 80 to 90 percent of pension obligations, *may* have to accelerate cash contributions to the plan. Accelerated cash contributions are unconditionally *required* if the funding rate is below 80 percent (Coronado and Sharpe, 2003). The U.S. Pension Protection Act (2006) requires full funding status within 7 years (Amir et al., 2010). Therefore, pension funding, and the required cash to bring plans to funded status, may have a large impact on the value shareholders place on the sponsoring firm's equity. I find that investors reward firms that have fully funded pension plans with higher market values as compared to firms with underfunded plans. I also find that the capital markets perceive larger firms to have higher levels of risk with respect to pension liabilities, i.e., underfunded pension plans are more negatively associated with market values for larger firms as compared to smaller firms.

I find there are significant differences between pre- and post SFAS 158 periods. The increased differentiation between pension asset, liabilities and earnings by investors caused by accounting presentation means valuation errors may have decreased as evidenced by smaller pricing multiples on pension components coupled with smaller standard errors in the post-SFAS 158 period.

I organize the following dissertation by presenting background of pension accounting regulations in Chapter II and each of these three essays in Chapters III, IV, and V, respectively. I conclude with a discussion of the overall results and contributions of my dissertation in Chapter VI.

II. BACKGROUND ON PENSIONS

While pensions have been part of the fabric of U.S. business since the 1850's, at first, accounting standard setters were reluctant to formalize accounting for pensions. The reasons for this reluctance varied. One of the reasons that accrual-based pension accounting standards were not developed was that such standards were not seen as necessary. Rather than compensation, pensions were seen as a gratuity, a reward for loyal service (Glaum, 2009; Napier, 2009; Klumpes, 2001). As a result, pension accounting consisted of recognizing the cash paid in a given period. The practice of expensing pension costs when disbursed continued into recent years in countries such as Germany, where firms did not recognize a future liability for pension benefits (Ippolito, 1985).

The gratuity theory came under attack in the U.S. at the beginning of the 20th century when Henry Hatfield (1916) suggested employers should include “the amount necessary to provide for future pensions” in operating expenses. Despite a shift in attitudes that led to pensions being viewed as a form of deferred compensation (Ippolito, 1985), accounting regulators felt that since the pension calculations were highly complex, and that pension accounting should fall within the domain of actuaries (Napier 2009).

In response to wage and price controls during WWII, markets began to give credence to the view that pensions are an element of employee compensation, i.e., that present wages are given up in exchange for wages in retirement (pensions). As a result, in the post WWII period, two conflicting perspectives: the finance perspective and the labor economics perspective were developed. Both of these perspectives are based on the need to actuarially fund past service obligations in addition to the current policy of periodic expense measurement. They differ, however, in ownership and accounting recognition for pension assets and liabilities. We still see evidence of the schism between these two schools of thought and the compromises reached in current pension accounting regulations.

The finance perspective assumes that pension surpluses/deficits belong to shareholders while the labor economics perspective views pension surpluses/deficits as belonging to employees (Klumpes (2001). According to the finance perspective, the corporate financial structure of pensions is relevant in the market’s evaluation of the sponsoring firm. The finance perspective implies that the net worth of the pension fund (assets, current liabilities, and funded status) should be recognized on the sponsor’s balance sheet. Actuarial gains/ losses and costs (such as service costs, interest costs, etc.)

should likewise be reported on the income statement. The labor economics perspective implies that the pension fund is separate from the sponsor and therefore, should not be shown on the balance sheet except in the case of a deficit. SFAS 87, "*Employers' Accounting for Pensions*" (1985), the first pension accounting regulation by the FASB, represents a compromise between these two perspectives (Klumpes 2001).

As pensions began to be seen more as a form of deferred compensation, there was a call for accrual based accounting for pensions (Ippolito 1985; Blake, Khorasanee, Pickles, and Tyrall, 2008). The Employment Retirement Income Security Act (ERISA) passed in 1974 by the U.S. Congress is meant to ensure that employer-sponsored pension plans are financially secure. In response to ERISA, FASB issued a Discussion Memorandum: *Employer's Accounting for Pensions and Other Postemployment Benefits,* in 1981, from which the accounting standard SFAS No. 87, *Employers' Accounting for Pensions* (FASB 1985) was born.

As I note above, SFAS No. 87 represents a compromise between the corporate finance perspective and the labor economics perspective. It passed by the narrow margin of 4-3 (Napier 2009), and requires both the recognition of benefits accrued as of a date (without considering future pay increases: ABO) as well as the projected benefit obligation [PBO] which considers future pay increases if the pension formula is based on compensation levels. SFAS No. 87, however, clouds the value of a defined PBO by allowing a *corridor* approach. Under the corridor approach, firms are allowed to delay the recognition of gains and losses as long as they do not exceed 10% of the larger of: (a) the defined benefit obligation (DBO); or (b) the fair value of the plan assets. Under SFAS 87, information about funded status, fair value of plan assets, expected earnings rates, and

DBO are disclosed in the footnotes, not recognized in the body of the financial statements (Blake et. al 2008; Glaum 2009; Napier 2009).

SFAS 132R, *Employers' Disclosures About Pensions and Other Postretirement Benefits* (FASB 2003), enhances the disclosures concerning pension plans by requiring firms to disclose "the percentages of each major category of plan assets" without changing recognition or measurement rules (Chuk 2011). SFAS 158, *Employers' Accounting for Defined Benefits Pension and Other Postemployment Plans* (FASB 2006), goes further than previous regulations by shifting disclosures about funded status (the difference between PBO and the fair value of fund assets) from the footnotes to the balance sheet while still allowing for the corridor method in the income statement. Actuarial gains/losses are now recognized in other comprehensive income [OCI]. Thus, current pension accounting introduces volatility to both the balance sheet and income statement, but also provides more information about pension assets, liabilities, costs and earnings.

III. PENSION ASSET ALLOCATION

PRIOR LITERATURE AND HYPOTHESE DEVELOPMENT

Pension funds are important to capital markets. Given the magnitude of pension assets held in reserve, it is important to understand the effect of pension accounting standard-setting. Prior research has found that disaggregated costs can be more informative to investors than aggregate costs (Barth et al., 1992; Amir, 1996, Barth et al., 2001). Prior studies have also found differences in how investors view recognized as opposed to disclosed information (see for example: Davis-Friday et al., 1999, Hirst, 2004, and Schipper, 2007). In this study I look at not only the information content of disaggregated pension assets, but also at whether recognizing pension information (as opposed to disclosing it) altered its association with market values.

Early pension accounting research centers on the question of whether or not investors can cope with the complexity of estimations of actuarial gains/losses over long horizons—i.e. is pension information useful to investors? As posited by Barth, et al., (2001), value relevance studies, including ones concerning pension information, strive to be informative about the effects of accounting amounts on market value, not to tell standard-setters what standards should be. The early pension research is centered on two approaches, a balance sheet approach and an income statement approach. It was not until 1995, when Ohlson proposed the clean surplus model in which firm value is explained as the book value of equity and residual income that pension research took into consideration both balance sheet and income statement measures simultaneously.

Daley (1984) uses a cross-sectional equity model based on income statement amounts. He regresses the equity value of the firm on after-tax earnings before pension costs and after-tax pension costs.

$$MVE_{it} = \alpha + \beta_1 \, EbPC_{it} + \beta_2 \, PC_{it} + \varepsilon \qquad (1)$$

where EbPC are after-tax earnings before pension costs and PC are after-tax pension costs. His results suggest that pension expense is the "most consistent" cost measure, and reported period pension expense may be impounded into equity prices.

Continuing with the income approach, Barth, et al., (1992) explore the value-relevance of the components of pension costs and pension liabilities as required by SFAS 87. They use an expanded version of equation (1) which includes pension costs decomposed into the various components required by SFAS 87. Their model takes the following form:

$$MVE = \alpha + \beta_1 \, EbPC_{it} + \beta_2 \, INT_{it} + \beta_3 \, SVC_{it} + \beta_4 \, RPLNA_{it} + \beta_5 \, DEFRET_{it} + \beta_5 \, ATRANS_{it} + \varepsilon \quad (2)$$

where INT is interest cost, SVC is service cost, RPLNA is expected return on plan assets, DEFRET is the deferred return on plan assets, ATRANS is the amortization of the transition asset and EbPC is defined as above. They find that investors assign different price multiples to the pension cost components (although they find the pricing multiple on ATRANS is not significantly different from zero). The pricing multiples on pension income streams are generally larger than the price multiples of non-pension income streams. They argue that this supports the idea that investors view pension income as less risky than other income.

Landsman (1986) was the first to use the balance sheet approach in assessing the information content of pension accounting. Based on the accounting equation that equity is equal to assets minus liabilities, he divides the assets and liabilities into pension and non-pension components. The basic form of his equation is:

$$MVE = \alpha + \beta_1 \, NPA_{it} + \beta_2 \, NPL_{it} + \beta_3 \, PLA_{it} + \beta_4 \, PL_{it} + \varepsilon \quad (4)$$

where NPA is non-pension assets, NPL is non-pension liabilities, PLA is plan assets and PL is plan liabilities. He finds significant pricing multiples on pension assets and liabilities, and concludes that the securities markets value disclosed pension assets and liabilities similarly to recognized assets and liabilities.

Based on the idea that accounting standards prevent the book value of equity from equaling the market value of equity (non-recognition of intangible assets such as those which are internally-generated and the incorporation of historical values which mask current market values), Ohlson (1995) shows that the uncaptured book value is reflected in abnormal earnings (Glaum, 2009) and models the market value of equity with the following:

$$MVE = \alpha + \beta_1\, NPE_{it} + \beta_2\, EbPC_{it} + \beta_3\, PLA_{it} + \beta_4\, PL_{it} + \beta_4\, PC_{it} + \varepsilon \qquad (5)$$

where NPE is owner's equity plus pension liabilities, EbPC is earnings before pension costs, PLA is plan assets, PL is plan liabilities, and PC is pension costs. Most pension studies, including this one, are based upon Ohlson's model. One advantage of this model is that we can see whether balance sheet information and income information are applicable to pension accounting information and how they relate to each other. As Glaum (2009) points out, the model is over specified. If, for instance, fair values are measured with sufficient reliability, there are no intangibles attached to them, and/or there are no synergies with other corporate assets and liabilities. With respect to accounting standards (such as SFAS 87, SFAS 132R, and SFAS 158), researchers can, using the Ohlson model with its combined balance sheet/income statement approach, answer the question of whether investors place more weight on information that is recognized as compared to information that is disclosed.

Barth et al. (1993) is the first study to employ the Ohlson model in exploring how investors value pension information. They examine the relationship between balance sheet and income information by decomposing the elements of pension disclosures into their various components.

$$MVE = \alpha + \beta_1\, Asset_{it} + \beta_2\, Liabilities + \beta_3\, EbPC_{it} + \beta_4\, PLA_{it} + \beta_5\, PL_{it} + \beta_6\, INT_{it} + \beta_7\, SVC_{it} + \beta_8\, RPLNA_{it} + \beta_9\, DEFRET_{it} + \beta_9\, ATRANS_{it} + \varepsilon \qquad (6)$$

where Asset is the firm's assets, liabilities is the firms' liabilities, EbPC is net income before pension costs, PLA is plan assets, PL is plan liabilities, INT is interest cost, SVC is service cost, RPLNA is the actual rate of return on plan assets, DEFRET is the deferred return on plan assets and ATRANS is the amortization of the transition asset. They find that when pension balance sheet data is known, pension income statement data becomes redundant, i.e., it provides no additional information.

Therefore, if pension accounting information has value relevance to investors and investors view pension assets and liabilities as belonging to the firm, I would expect the market to assign non-zero pricing multiples to the various pension asset and liability components (Barth et al. 1992). My first hypothesis (in alternative form) is thus:

H_1: Since the components of pension assets and liabilities represent various levels of risk and the securities markets perceive pension assets and liabilities to be assets and liabilities of the firm, the securities markets will assign different weights to the various components of pension assets and liabilities.

Consistent with Wiedman and Weir (2004), I expect investors to view pension deficits (pension liabilities and costs) as liabilities of the firm but, due to legal restrictions limiting a firm's ability to access pension surpluses, I expect investors to view pension assets as not belonging to the firm. Thus my second hypothesis (in alternative form) is:

H2: Pension costs and liabilities are more strongly associated with the market value of equity than are the assets of a pension plan.

However, consistent with Barth et al. (1993), I expect that when both balance sheet pension accounts and pension cost components are presented simultaneously, the pricing multiples on pension cost components (SVC, DEFRET and ATRANS) will be insignificant (i.e., they provide redundant information to investors). Over specification may also lead to a decrease in value relevant information for pension liabilities. My third and fourth hypotheses (in alternative form) are thus:

H3: Including both balance sheet information and income statement information in a single model will cause over specification of the model: i.e. some pension cost components (SVC, DEFRET, and ATRANS) will be redundant and thus not associated with firm value.

H4: Including both balance sheet information and income statement information in a single model will cause over specification of the model: i.e., pension liability information will be somewhat redundant in explaining firm value and will decrease in explanatory power.

Since firm value should respond to perceived levels of risk and return, investment in real estate and other assets (which include hedge funds) will be associated with the market value of equity at greater rates than investments in bonds and equities. My fifth hypothesis (in alternative form) is thus:

H5: Due to higher perceived risk by investors, investment in real estate and others assets (which include hedge funds) will have greater weights (larger pricing multiples) than the pricing multiples on bonds and equity.

This relationship may not however, hold for all economic environments. Due to the desire for *safe harbors* during times of economic downturn, it is likely investors will reward pension funds that increase their investments in bonds and equities during recessionary periods. My next hypothesis (in alternative form) is thus:

H6: During the recent financial crisis, pension plan investment in bonds and equity (representing lower risk and larger percentages of investment) will receive greater price multiples from investors than will pension plan investments in real estate and other assets.

Finally, I examine whether investors interpret information differently based on presentation: recognition vs. disclosure. Adding to the extensive literature in this area, I predict that the pricing multiples on pension assets/liabilities/costs will be statistically different in the pre- and post-SFAS_158 periods. Pension liabilities and costs may decrease or lose significance to investors because they are presented simultaneously with more detailed pension asset information. Due to the volatility of the real estate market, I expect pension real estate assets to increase in importance. Due to increased volatility introduced into the financial statements by recognizing information in the body of the financial statements, I expect firms to increase their investment in bonds and to decrease their investment in equities, resulting in a concurrent change in the pricing multiples on bonds and equities (Amir et al. 2010; Chuk, 2011). My final hypothesis (in alternative form) is thus:

H7: Due to a change in presentation (from disclosure to recognition), the pricing multiples on pension assets/liabilities/costs will be different in the pre- and post-SFAS 158 periods.

SAMPLE AND RESEARCH DESIGN

Financial and pension data were collected from Compustat (Fundamentals Annual and Pension Annual) while security prices were collected from CRSP. The sample firms were required to be U.S. firms with defined benefit pension plans, that had total assets greater than pension assets, and with complete financial and pension data available. These screens resulted in 7,316 firm years for 1,188 individual firms. The data cover the period 2003 through 2011, a period in which firms were required to either disclose or recognize the composition of their pension assets and costs. Since I study the same cross-sectional unit (in this case, firms) over time, I employ a panel data regression of the Ohlson clean surplus model (5). According to Baltagi (1998, p.7), panel data gives "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency" while taking heterogeneity explicitly into account. Pooled Ordinary Least Squares Regression often camouflages the heterogeneity (uniqueness) that may exist among firms, i.e., the individuality of each firm is subsumed in the disturbance term ε_t (Gujarati, 2003). I run a Hausman test and determine a fixed effects model fits the data better than a random effects model. One of the advantages of a fixed-effects model is the ability to control for all time-invariant differences between individual firms, so that the models cannot be biased because of omitted time-invariant characteristics such as industry.

RESULTS

The descriptive statistics for 2003-2011 are presented in Table 1. Looking for evidence of the timing of the Financial Crisis, we notice a decline in total assets (TA) and pension assets (PAssets) in 2008 and 2009. There is also a decline in earnings and earnings before pension costs (EbPC) in 2008 with an increase in both for 2009. Interest costs (INT) and service costs are relatively stable for all years. There is, however, a negative rate of return on pension plan assets in 2008. Despite a relatively stable percentage for investment in real estate, pension real estate values are higher in 2007 than in 2008. It appears then, that the financial crisis did not take effect until 2008 and most variables indicate the beginning of a recovery in 2009.

Looking at the percentage changes (Table 2 and Figure 1) in the classes of pension assets, I find a decrease from 2007 to 2008 in the percentage of investments in equity holdings and a corresponding increase in the percentage of investments in bonds. This is consistent with managers of pension fund assets seeking a "safe harbor" in times of economic downturn. This gives further credence to the idea that the Financial Crisis began to be felt in 2008, not 2007.

I begin my analysis by using a simple model in which the market value of equity at fiscal year-end is regressed on total assets, total liabilities, and earnings before extraordinary items.

$$MVE_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 TL_{it} + \beta_3 Earnings_{it} + \beta_4 AssetTurn_{it} + \beta_5 FinCrisis_{it} + \beta_6 Fin\_TA_{it} + \varepsilon \quad (7)$$

The results of this regression are presented in Table 3. I use fiscal year end values because they are measured on the same days as the dependent variables. As in Barth et al. (1992), using fiscal year end values requires an implicit assumption that earnings are reflected in the share price on that day. Other studies suggest that using this assumption about fiscal year-end prices is reasonable (Beaver et al., 1980; Collins and Kothari, 1989). I control for the Financial Crisis at the firm level with asset turnover (AssetTurn) since an immediate decline in sales would be the likely result of an economic downturn, while managers are less likely to be able to immediately adjust asset levels. I control for the Financial Crisis on an economy-wide basis using an indicator variable, Fin_Crisis, whose value is 1 for the years 2008 and 2009 and zero otherwise. I then interact Fin_Crisis with TA to evaluate the effect of the Financial Crisis on TA. The pricing multiples on TA, TL and Earnings are significant and of the expected sign. Also, as expected, as a firm's AssetTurn rises so does the market value of equity (MVE). The effect of FinCrisis implies a flight of capital, behavior that is prompted by a financial crisis (Bernanke et al., 1996; Brunnermeier and Pedersen, 2005, 2008; Caballero and Krishnamurthy, 2008 and Gelos and Wei, 2005).

Using a version of the Ohlson Clean surplus model (equation (5)), I examine the effect of pension accounting information on MVE by separating liabilities into aggregate totals for pension (PenAssets) and non-pension assets (AbPA, total assets before pension assets), pension (PLiab) and non-pension liabilities (TLbPL, total liabilities before pension liabilities), and earnings before extraordinary items and pension costs (EbPC) and pension costs (Costs).

$$MVE_{it} = \beta_0 + \beta_1\, AbPA_{it} + \beta_2\, TLbPL_{it} + \beta_3\, EbPC_{it} + \beta_4\, PenAssets_{it} + \beta_5\, PCosts_{it} + \beta_6\, PLiab_{it} + \beta_7\, AssetTurn_{it} + \beta_8\, FinCrisis_{it} + \beta_9\, Fin\_AbPA_{it} + \beta_{10}\, Fin\_PenAssets_{it} + \varepsilon \quad (8)$$

Consistent with investors viewing pension assets, costs and liabilities as containing value relevant information, PAssets, PCosts, and PLiab are significantly correlated with MVE. As predicted by Wiedman and Wier (2004), pension liabilities have a greater effect on MVE than do total liabilities of the firm before pension liabilities. This implies that investors view pension liabilities as belonging to the firm. On the other hand, the pricing multiple on pension assets is smaller than the pricing multiple on total assets before pension assets. This indicates that investors do not view pension assets as assets of the firm. This is probably due to the legal restrictions that prevent firms accessing pension assets for non-pension uses.

The pricing multiple on pension costs is surprisingly positive. Barth et al. (1992) found a similar result with pension service costs and posited that this may be due to some pension costs not being viewed by the securities markets as a measure of pension liabilities, but instead acting as a proxy for the value created by human capital. The Financial Crisis is significant and negatively associated MVE. Once again, the significant negative pricing multiples on both non-pension and pension assets are indicative of a flight of capital (Bernanke et al., 1996; Brunnermeier and Pedersen, 2005, 2008; Caballero and Krishnamurthy, 2008 and Gelos and Wei, 2005).

Expanding the model in Barth et al. (1993), I examine the incremental value relevance of the information revealed by the various components of both pension assets and liabilities. As per Barth et al. (1992), I decompose TAMOR into two principal components DEFRET (deferred return on plan assets) and ATRANS (the amortization of the transition asset).[4] My test equation is:

$$MVE_{it} = \beta_0 + \beta_1\ AbPA_{it} + \beta_2\ TLbPL_{it} + \beta_3\ EbPC_i + \beta_4\ Equity_{it} + \beta_5\ Bonds_{it}$$
$$+ \beta_6\ Real\ Estate_{it} + \beta_7\ Other\ Assets_{it} + \beta_8\ PLiab_{it} + \beta_9\ SVC_{it} + \beta_{10}\ INT_{it}$$

[4] Appendix A shows how to calculate DEFRET and ATRANS from SFAS 87 disclosures as per Barth et al. (1992).

$$+ \beta_{11} \text{ DEFRET}_{it} + \beta_{12} \text{ RPLNAit} + \beta_{13} \text{ ATRANS}_{it} + \beta_{14} \text{ AssetTurn}_{it}$$

$$+ \beta_{15} \text{ FinCrisis}_{it} + \beta_{16} \text{ Fin\_AbPA}_{it} + \beta_{17} \text{ Fin\_Bonds}_{it} + \beta_{18} \text{ Fin\_Equity}_{it}$$

$$+ \beta_{19} \text{ Fin\_RealEstate}_{it} + \beta_{20} \text{ Fin\_OtherAssets}_{it} + \varepsilon \qquad (9)$$

Consistent with Barth et al. (1993), I find that the explanatory value of pension cost components is limited once pension balance sheet information (pension assets) is included. The pricing multiple on pension liabilities, although significant and negative, is smaller than the pricing multiple on non-pension liabilities. As expected, when the actual return on plan assets increases, the market value of equity increases but its effect is much lower than that of earnings before pension costs. This is consistent with investors not considering pension surpluses to be assets of the firm. Consistent with this line of reasoning, I find that the pricing multiples on the different classes of pension assets are much lower than the pricing multiple on non-pension assets. While real estate assets comprise the smallest percentage of pension assets, they have the greatest weight with respect to the market value of equity. This indicates that investors recognize the riskiness of this class of assets and impound that into market values. The impact of the financial crisis is greater in this model, becoming more negatively associated with MVE. While the pricing multiple on non-pension assets is still negatively associated with MVE (once again implying a flight of capital), the percentages of pension assets invested in bonds and equity are significant and positively associated with MVE. The investment in real estate and other assets appears to contain no value relevant information for investors. Again, this may be due to the relatively large economic impact of bonds and equities that results from their comprising the vast majority of pension assets.

ADDITIONAL TESTS

As I previously mentioned, the FDIC reported that the largest year-over-year decline in quarterly earnings occurred in the first quarter of 2007 (FDIC's *Quarterly Banking Profile*). In August 2007, the U.S. subprime crisis began. Therefore, I re-run Model (9) after redefining the period of the Financial Crisis as 2007-09 (FinCrisis2). The results of these tests are presented in Table 4.

$$\begin{aligned} MVE_{it} = {} & \beta_0 + \beta_1\, AbPA_{it} + \beta_2\, TLbPL_{it} + \beta_3\, EbPC_{i} + \beta_4\, Equity_{it} + \beta_5\, Bonds_{it} \\ & + \beta_6\, Real\ Estate_{it} + \beta_7\, Other\ Assets_{it} + \beta_8\, SVC_{it} + \beta_9\, INT_{it} + \beta_{10}\, DEFRET_{it} \\ & + \beta_{11}\, RPLNA_{it} + \beta_{12}\, ATRANS_{it} + \beta_{13}\, PLiab_{it} + \beta_{14}\, AssetTurn_{it} + \beta_{15}\, FinCrisis2_{it} \\ & + \beta_{16}\, Fin2\_Equity_{it} + \beta_{17}\, Fin2\_Bonds_{it} + \beta_{18}\, Fin2\_RealEstate_{it} \\ & + \beta_{19}\, Fin2\_OtherAssets_{it} + \beta_{20}\, Fin2\_AbPA + \varepsilon \qquad (10) \end{aligned}$$

The results of this regression are presented in Table 4.

While most pricing multiples are similar to those from Model (9), there are some notable exceptions. The power of both significant interest components (INT and RPLNA) is greater in this model, suggesting that pension costs are seen as contributing more to the market value of the firm while non-pension assets are seen as contributing less. The most noticeable difference between the two models is the change in sign of the coefficient on the financial crisis variable. When FinCrisis is defined as 2007-09, I find no association with market values. It is implausible that the financial crisis had no significant effect on firm values given that expected write-downs on global exposures were estimated to be \$4 trillion. This indicates that the financial crisis is misspecified when using the years 2007-09 across all classes of assets.

In Model (11), I specify the Financial Crisis as 2007-09 for RealEstate and 2008-09 for all other classes of assets (both pension and non-pension). Under this scenario, investment in other assets is significant and negative, meaning MVE increases as assets in this class are sold off. This is the only model in which the pricing multiple on other assets is significant. The pricing multiples on INT and RPLNA and PLiab decrease, indicating that investors are less likely to view pension liabilities and costs as belonging to the firm. At the same time, the pricing multiples on pension assets generally decrease. The pricing multiples increase on non-pension assets and liabilities as does the pricing multiple on non-pension earnings. Perhaps most disturbing is that the pricing multiple on the influence of the Financial Crisis is significant and positive. Thus these results indicate another misspecification of the financial crisis. I conclude, based on the results of the three different models of the financial crisis, that it is most likely the crisis occurred in the years 2008-09 with respect to the financial variables included in these models.

I rerun the regression for model (9) using only firms with positive earnings before extraordinary items before pension costs (positive EbPC). The results are presented in Table 5. Wiedman and Weir (2004) find that funding status is more closely associated with stock prices for companies with underfunded pension plans as compared to firms with overfunded plans. Only four of the firm years in this sample are considered underfunded using their definition (PenAssets – PLiab >0). This is a much higher percentage of the sample than the sample of Canadian firms they employ for the years 2000 and 2001 (their percentage of funded firms is 72% an 97%, respectively). I find that AssetTurn does not appear to provide value relevant information. The pricing multiple on the FinCrisis is significantly larger in magnitude than the pricing multiple for the sample of all firms. It appears, therefore, that profitable firms were more negatively impacted (nearly five times greater) by the Financial Crisis than a sample of both profitable and unprofitable firms. This is consistent with profitable firms having more to lose (in terms of market value) in a period of economic downturn. Looking at the effect on pension costs for profitable firms, the actual return on pension assets loses its significance to investors while SVC is significant and negative and INT becomes more significantly negative. These results are not consistent with the findings of Barth et al. (1993) in which SVC has a positive correlation with MVE and RPLNA has a significantly positive correlation with MVE. This may be due, however, to positive multicollinearity between pension cost components (Barth et al., 1992; Glaum, 2009). The effect of non-pension equity is less, as evidenced by smaller pricing multiples on non-pension assets and liabilities, while the effect of earnings is greater. At the same time, the pricing multiples on pension assets are greater (with the exception of real estate assets which declines), meaning pension assets exhibit a more positive relationship with the market value of equity than non-pension assets. This is consistent with investors viewing pension assets as being less risky than non-pension assets.

Next, I evaluate the effect of pension accounting reform (a change in presentation) using

$$\begin{aligned} MVE_{it} = {} & \beta_0 + \beta_1\, AbPA_{it} + \beta_2\, TLbPL_{it} + \beta_3\, EbPC_i + \beta_4\, Equity_{it} + \beta_5\, Bonds_{it} \\ & + \beta_6\, Real\ Estate_{it} + \beta_7\, Other\ Assets_{it} + \beta_8\, PLiab_{it} + \beta_9\, SVC_{it} + \beta_{10}\, INT_{it} \\ & + \beta_{11}\, DEFRET_{it} + \beta_{12}\, RPLNA_{it} + \beta_{13}\, ATRANS_{it} + \beta_{14}\, AssetTurn_{it} \\ & + \beta_{15}\, FinCrisis_{it} + \beta_{16}\, Fin\_AbPA_{it} + \beta_{17}\, Fin\_Bonds_{it} + \beta_{18}\, Fin\_Equity_{it} \\ & + \beta_{19}\, Fin\_RealEstate_{it} + \beta_{20}\, Fin\_OtherAssets_{it} + \varepsilon \qquad (9) \end{aligned}$$

I estimate the pricing multiples for the pre- and post SFS 158 periods with a panel regression with fixed effects for each period, which allow separate slope pricing multiples for each firm in each period. I test the joint null hypothesis that pricing multiples for the pre- and post-SFAS periods are equal to one another and equal to zero. I reject the null hypothesis ($\beta_0 = \beta_1 = \ldots\ldots = \beta_{20} = 0$): the market does in fact assign value to the individual components. The results of these estimates (and the following tests) are presented in Table 6.

Finally, I test the whether the pricing multiples from the pre-SFAS 158 period are different from the pricing multiples from the post-SFAS 158. I reject the null hypothesis that the pricing multiples from pre-SFA 158 period equal from the pricing multiples from the post-SFS period ($p = 0.000$). This implies investors assign different market values based on a change in presentation (in this case, going from disclosure to recognition).

I find that generally the pricing multiples on pension costs are insignificant, consistent with Barth et al. (1993) that income statement information is often redundant when presented simultaneously with balance sheet information. Although the pricing multiple on pension interest costs (INT) maintains significance, its coefficient is lower when information quality increases due to recognition. A similar effect is observed for the pricing multiple on pension liabilities (PLiab).

The reaction to a change in presentation is, as predicted, mixed for the classes of pension asset. Real estate investments, the most volatile class of assets due to the subprime mortgage bubble in late 2006, has the largest increase in value assigned by the market, nearly twice the magnitude of change for bonds and equity. Consistent with Amir et al. (2011) and Chuk (2010), due to a shift from equities to bonds, I find an increase in the pricing multiple for bonds from the pre- to post- period and a corresponding decrease in the pricing multiple for equities. I conclude from these results that the capital markets recognize a difference between recognition and disclosure, giving more weight to information that is recognized than to information that is disclosed.

CONCLUSIONS

In conclusion, the results of this study suggest that, for U.S. firms, in the years 2003-2011, the securities markets found incremental information content in the composition of pension assets as provide by SFAS 132R and SFAS 158. Consistent with the findings of Barth et al. (1993), I find that for SVC, DEFRET and ATRANS the explanatory value of these pension costs becomes redundant once pension balance sheet variables are included. Consistent with prior literature, pension assets are not viewed as the property of the firm but pension deficits (pension liabilities and pension costs) are viewed as firm debts. During the Financial Crisis of 2008-09, managers of pension funds reduced investments in equity and increased investments in bonds. This may be due to pressures of recognition or because they were seeking less risky investments in a time of economic downturn. In addition, I find evidence that investors assign more significance to pension accounting information that is recognized in the financial statements than to pension information that is disclosed.

IV. ACCRUALS AND THE PREDICTION OF FUTURE CASH FLOWS

PRIOR LITERATURE AND HYPOTHESE DEVELOPMENT

This study investigates the role of accruals in predicting future cash flows, using the market value of equity as a proxy for future cash flows. Prior pension research has shown that: (1) pension assets are not considered as property of the firm (Barth, et al., 1993); (2) despite pension assets not being viewed by investors as property of the firm, equities, the largest class of pension assets, is correlated with future returns (Amir and Benartzi, 1998); (3) pension liabilities are, however, viewed as belonging to the firm (Barth et al., 1992); and (4) pension income statement information can often be redundant when presented with pension balance sheet information (Barth et al., 1993). As noted by Amir and Benartzi (1998), pension returns are economically significant and lead to higher overall rates of return for the firm.

The model used in Barth et al., (2001a), is based on the Modified Jones Model (Dechow et al., 1995) [DSS] for nondiscretionary accruals in event year *t*:

$$NDA_t = \propto_1 \left(\frac{1}{A_{t-1}}\right) + \propto_2 (\Delta REV_t - \Delta REC_t) + \propto_3 (PPE_t) \quad (1)$$

where:

A_{t-1} = total Assets at *t–1*;

ΔREV_t = annual change in revenues in year *t* scaled by total assets at *t-1*;

ΔREC_t = the annual change in net receivables in year *t* scaled by total assets at *t-1*;

PPE_t = the gross property plant and equipment in year *t* scaled by total assets at *t-1*.

Estimates of the firm-specific parameters, $\propto_1, \propto_2$, and $\propto_3$ are generated using the following model in the estimation period:

$$TA_t = a_1 \left(\frac{1}{A_{t-1}}\right) + a_2(\Delta REV_t - \Delta REC_t) + a_3(PPE_t) + \nu_t \qquad (2)$$[5]

where total accruals (TA_t) are calculated as:

$$TA_t = \Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STD_t - Dep_t) / (A_{t-1}) \qquad (3)$$

where:

ΔCA_t = the annual change in current assets;

ΔCL_t = the annual change in current liabilities;

$\Delta Cash_t$ = the annual change in cash and cash equivalents;

ΔSTD_t = the annual change in debt included in current liabilities;

Dep_t = depreciation and amortization expense; and

A_{t-1} = total assets.

BCN disaggregates earnings into its major components:

$$CF_{i,t+1} = \propto_0 + \propto_1 CF_{i,t} + \propto_2 \Delta AR_{i,t} + \propto_3 \Delta INV_{i,t} + \propto_4 \Delta AP_{i,t} + \propto_5 DEPR_{i,t}$$
$$+ \propto_6 AMORT_{i,t} + \propto_2 OTHER_{i,t} + \varepsilon_t \qquad (4)$$

where:

CF = cash flow from operations;

$\Delta AR_{i,t}$ = the period-to-period change in accounts receivables;

$\Delta INV_{i,t}$ = the period-to-period change in inventory;

$\Delta AP_{i,t}$ = the period change in accounts payable;

[5] I regress annually, based on one-digit SIC codes. I am unable to run annual regressions based on 2-digit SIC codes due to data limitations. However, the fixed effects regressions, employed in determining the associations between accruals and future cash flows, should control for industry effects.

$DEPR_{i,t}$ = depreciation expense;

$AMORT_{i,t}$ = amortization expense; and

$OTHER_{i,t}$ = the aggregate of other accruals.[6]

Following Barth et al. (2001a) and Nam et al. (2012), I designate the market value of equity [MVE] as a proxy for the present value of all future cash flows. My benchmark model is thus:

$$MVE_{t+1} = \propto_0 + \propto_1 MVE_t + \propto_2 ACC_t + \varepsilon \quad (5)$$

$$= \propto_0 + \propto_1 MVE_t + \propto_2 \Delta AR_{i,t} + \propto_3 \Delta INV_{i,t} + \propto_4 \Delta AP_{i,t} + \propto_5 DEPAMOR_{i,t} + \propto_6 OTHER_{i,t} + \varepsilon_t \quad (6)$$

As per Nam et al. (2012), I combine $DEPR_{i,t}$ and $AMORT_{i,t}$ into a single variable $DEPAMOR_t$, representing depreciation and amortization expenses. My deflator is total assets.

Since BCN (2001a) finds that aggregate components of prior cash flows and accruals mask information relevant for predicting future cash flows, disaggregating prior cash flows and accruals in their major components will increase investors' ability to predict future cash flows. As per BCN (2001a), I predict that the pricing multiples on ChAP will be negative and that the pricing multiples on ChINV and ChAR will be positive. Given that depreciation and amortization are intended to match the costs of long-term assets and that firms presumably purchase these assets in order to increase cash flows, if matching is achieved between capital expenditures and their associated depreciation/amortization, the pricing multiple on DEPAMOR will reflect the expected positive return and be greater

[6] OTHER = EARN - (CF + ΔAR + ΔINV – ΔAP – DEPR – AMORT), where Earn is net income before extraordinary items

than zero. This should hold even if the return is lower than the firms' cost of capital. My first hypothesis (in the alternative form) is thus:

H_1: Since the various components of accruals capture different information about delayed cash flows and future expected cash flows, the securities markets will assign different pricing multiples to the components of accruals.

Value relevance studies like this one, are designed to determine which particular accounting amounts contain information that is used by investors to determine firms' value (Barth et al., 2001b). In pension value relevance research, prior studies have tried to determine whether investors view pension funds as belonging to the firm, and if so, which pension components do investors view as relevant in determining firms' market value (Daley, 1984; Landsman, 1986; Barth et al., 1992; Amir, 1996; Amir and Benartzi, 1998; Barth et al.; 2001a; Barth et al., 2001b, just to name a few). Some have used a balance sheet approach and some have used an income statement approach. It was not until 1995, when Ohlson introduced the clean surplus model that pension research took into consideration both balance sheet and income statement measures simultaneously.

The first model is the Daley (1984) cross-sectional equity model which uses an income statement approach by regressing the after-tax earnings before pension costs and after-tax pension costs on the market value of equity.

$$MVE_{it} = \alpha + \beta_1 \, EbPC_{it} + \beta_2 \, PC_{it} + \varepsilon \qquad (7)$$

Where:

EbPC = after-tax earnings before pension costs; and

PC = after-tax pension costs.

Daley concludes that pension expense may be impounded into equity prices.

Continuing with an income statement approach, Barth et al. (1992) explore whether the market assigns different pricing multiples to disaggregated pension cost components. They use an expanded version of equation (7) which takes into account SFAS 87 requirement to decompose pension costs into four components.[7] Their model takes the following form:

$$MVE = \alpha + \beta_1 \, EbPC_{it} + \beta_2 \, INT_{it} + \beta_3 \, SVC_{it} + \beta_4 \, RPLNA_{it} + \beta_5 \, DEFRET_{it} + \beta_5 \, ATRANS_{it} + \varepsilon \quad (8)$$

where:

INT = interest cost;

SVC = service cost;

RPLNA = the expected return on plan assets;

DEFRET = the deferred return on plan assets;

ATRANS = the amortization of the transition asset; and

EbPC is as defined as above.

Not only do they find that investors assign different price multiples to the pension cost components (although they find the pricing multiple on ATRANS is not significantly different from zero), they argue that the generally larger price multiples on pension income streams when compared to the price multiples of non-pension income streams supports the idea that investors view pension income as less risky than other income.

[7] Barth et al., (1992) further decompose TAMOR into DEFRET and ATRANS. Appendix A describes how to calculate these amounts and the relationship of the variables to each other.

Landsman (1986), by dividing assets and liabilities into pension and non-pension components, was the first to use the balance sheet approach in assessing the information content of pension accounting. The basic form of his model is:

$$MVE = \alpha + \beta_1 NPA_{it} + \beta_2 NPL_{it} + \beta_3 PLA_{it} + \beta_4 PL_{it} + \varepsilon \quad (9)$$

where:

NPA = non-pension assets;

NPL = non-pension liabilities;

PLA = plan assets; and

PL = plan liabilities.

He also finds significant pricing multiples on pension assets and liabilities, and concludes that the securities markets value disclosed pension assets and liabilities similarly to recognized assets and liabilities.

Building on the idea that accounting standards prevent the market value of equity from equaling the book value of equity (non-recognition of intangible assets such as those which are internally-generated and the incorporation of historical values which mask current market values), based on Ohlson (1995), Glaum (2009) explains how most subsequent pension studies have captured book value as reflected in abnormal earnings in the following model:

$$MVE = \alpha + \beta_1 NPE_{it} + \beta_2 EbPC_{it} + \beta_3 PLA_{it} + \beta_4 PL_{it} + \beta_4 PC_{it} + \varepsilon \quad (10)$$

where:

NPE = owner's equity plus pension liabilities;

EbPC = earnings before pension costs;

PLA = plan assets;

PL = plan liabilities; and

PC = pension costs.

Employing this model we can see, for the first time, whether pension balance sheet information and pension income information are related to a firm's market value and how they relate to each other, although in an efficient market, the model is over specified (Glaum, 2009). If, for instance, fair values are measured with sufficient reliability, then there will be no intangibles attached to them, and/or there are no synergies with other corporate assets and liabilities.

Barth et al. (1993), by decomposing the elements of pension disclosures into their various components, is the first study to employ the Ohlson model in exploring how investors value pension information, in particular, the relationship between balance sheet and income information There model is:

$$MVE = \alpha + \beta_1 Asset_{it} + \beta_2 Liabilities + \beta_3 EbPC_{it} + \beta_4 PLA_{it} + \beta_5 PL_{it} + \beta_6 INT_{it} + \beta_7 SVC_{it} + \beta_8 RPLNA_{it} + \beta_9 DEFRET_{it} + \beta_9 ATRANS_{it} + \varepsilon \quad (11)$$

where:

Asset = the firm's assets;

Liabilities = the firms' liabilities;

EbPC = net income before pension costs;

PLA = plan assets;

PL = plan liabilities;

INT = interest cost;

SVC = service cost;

RPLNA = the actual rate of return on plan assets;

DEFRET = the deferred return on plan assets; and

ATRANS = the amortization of the transition asset.

They find that when pension balance sheet data is known, pension income statement data becomes redundant, i.e., it provides no additional information.

Based on the previous literature, my second hypothesis (in alternative form) is:

H_2: Investors view pension liabilities as being liabilities of the firm, thus pension liabilities will be negatively associated with expected future cash flows.

Barth et al. (1993) find that pension balance sheet and income data information are so correlated that no additional information is provided by the income statement data once the balance sheet data is known. Therefore, my third hypothesis (in the alternative form) is:

H_3: Including both balance sheet information and income statement information in a single model will cause over-specification of the model. Thus most or all of the pension cost components will be redundant and not associated with expected future cash flows.

Amir and Benartzi (1998) examine whether expected rates of return (ERR) and the percentage of pension assets invested in various classes of assets are correlated with future returns on pension assets and conclude that the percentage invested in equities is correlated with future returns. They find that ERR and the percentage of plan assets invested in equities are weakly correlated, and that only the percentage invested in equity is correlated with future pension returns. Asthana (2008) looks at the role of expected rate of return on pension assets under SFAS 87. Their data suggests that managers may inflate earnings per share (when they are going to miss earnings expectations) by inflating ERR and that this inflation is directly tied to the amount by which earnings will miss the target and to earnings sensitivity. Given that pension returns are economically significant (for my dataset, on average, return on pension plans comprises about 61% of earnings), I expect managers to manage earnings by shifting the composition of the investment of the pension assets. I also expect managerial signaling/earnings management during the 2008-2009 financial crisis, will result in changes in both the magnitude and sign of the pricing multiples during that period. My fourth, fifth and sixth hypotheses (in the alternative form) are thus:

H_4: Given that pension returns are economically significant for many firms and plan sponsors with more equity securities would employ higher expected rates of return, the percentage of pension assets invested in equities will be positively correlated with future expected cash flows.

H_5: Managers will signal/manage earnings using accruals during the 2008-2009 financial crisis. This will result in changes in the pricing multiples of various components of pension assets during the recent financial crisis.

H_6: During recent financial crisis, a flight of capital from equities will result in a negative association between investments in equities and future cash flows.

Finally, I examine how the impact of accounting information on future cash flows may differ with the information is disclosed rather than recognized. Kimbrough (2007) studies financial statement recognition and analyst coverage and finds them to be associated with firm value. Davis-Friday et al., (1999) study whether financial statement data is valued differently by financial markets if it is disclosed in the footnotes rather than recognized in the body of the financial statements. Using several valuations tests, they find that information that is recognized receives more weight than that which is disclosed.

The format with which information is presented also impacts the pricing multiples non-professional investors place on that information (Maines and MacDonald, 2000). Specifically, they find that information on the volatility of unrealized gains is only taken into consideration by non-professionals when that information is formally presented in a statement of comprehensive income. Lehavy et al., (2011) analyze the complexity and readability of 10-K filings and find that "less readable 10-Ks are associated with greater dispersion, lower accuracy, and greater overall uncertainty in analyst earnings forecasts" (p. 1087), while Hodder, et al. (2008) find that something as simple as the structure of the indirect method of presenting operating cash flows can impede users' information processing. My final hypothesis (stated in the alternative) is thus:

H_7: The change in presentation from disclosure to recognition, will be associated with different (greater) pricing multiples on pension assets/liabilities/ costs and accruals in the pre- versus post-SFAS 158 periods.

SAMPLE AND RESEARCH DESIGN

Financial and pension data were collected from Compustat (Fundamentals and Pension Annual) while security prices were collected from CRSP. The sample firms were required to be U.S. firms with defined benefit pension plans, that had total assets greater than pension assets, and with complete financial and pension data available for three consecutive years.[8] These screens resulted in 6,506 firm years for 1,098 individual firms. The data is collected for the period 2003 through 2011, a period in which firms were

[8] Necessary to calculate lags

required to disaggregate the composition of their pension assets and costs. Since I study the same cross-sectional unit (in this case, firms) over time, I employ panel data regression of the balance sheet models for accruals. According to Baltagi (1998, p.7), panel data gives "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency" while taking heterogeneity explicitly into account. Pooled Ordinary Least Squares Regression often camouflages the heterogeneity (uniqueness) that may exist among firms, i.e., the individuality of each firm is subsumed in the disturbance term ε_t (Gujarati, 2003). I run a Hausman test and determine a fixed effects model fits the data better than a random effects model. One of the advantages of a fixed-effects model is the ability to control for all time-invariant differences between individual firms, so that the models cannot be biased because of omitted time-invariant characteristics such as industry.

Combining the BCN balance sheet models of accruals (equations (5) and (6)) with the Ohlson Clean Surplus model (10) and the BBL model (11), my models for investigating whether aggregate pension components partially mask information related to future cash flows are:

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 PA_{t-1} + \beta_4 PC_{t-1} + \beta_5 PLiab_{t-1} + \beta_6 ACC_{t-1} + \beta_7 AssetTurn_{t-1} + \beta_8 FinCrisis_{t-1} + \beta_{11} Fin\_PA_{t-1} + \beta_{12} Fin\_PC_{t-1} + \beta_{13} Fin\_ACC_{t-1} + \varepsilon \quad (12)$$

and

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 Bonds_{t-1} + \beta_4 Equity_{t-1} + \beta_5 RealEstate_{t-1} + \beta_6 OtherAssets_{t-1} + \beta_7 SVC_{t-1} + \beta_8 INT_{t-1} + \beta_9 DEFRET_{t-1} + \beta_{10} RPLNA_{t-1} + \beta_{11} ATRANS_{t-1} + \beta_{12} PLiab_{t-1} + \beta_{13} ChAR_{t-1} + \beta_{14} ChINV_{t-1} + \beta_{15} ChAP_{t-1}$$

$$+ \beta_{16} \text{DEPAMOR}_{t-1} + \beta_{17} \text{OtherACC}_{t-1} + \beta_{18} \text{AssetTurn}_{t-1} + \beta_{19} \text{FinCrisis}_{t-1}$$
$$+ \beta_{20} \text{Fin\_Bonds}_{t-1} + \beta_{21} \text{Fin\_Equity}_{t-1} + \beta_{22} \text{Fin\_RealEstate}_{t-1}$$
$$+ \beta_{23} \text{Fin\_OtherAssets}_{t-1} + \beta_{24} \text{Fin\_SVC}_{t-1} + \beta_{25} \text{Fin\_INT}_{t-1}$$
$$+ \beta_{26} \text{Fin\_DEFRET}_{t-1} + \beta_{27} \text{Fin\_RPLNA}_{t-1} + \beta_{28} \text{Fin\_ATRANS}_{t-1}$$
$$+ \beta_{29} \text{Fin\_ChAR}_{t-1} + \beta_{30} \text{Fin\_ChINV}_{t-1} + \beta_{31} \text{Fin\_ChAP}_{t-1}$$
$$+ \beta_{32} \text{Fin\_DEPAMOR}_{t-1} + \beta_{33} \text{Fin\_OtherACC}_{t-1} + \varepsilon \qquad (13)$$

where:

MVE = Fiscal year-end market value of common equity at time t or t-1;

NPE = Owner’s equity plus net pension liabilities;

EbPC = Earnings before extraordinary items before pension costs;

PA = Pension assets: Equity + Bonds + RealEstate + OtherAssets;

Equity = Pension assets invested in equities;

Bonds = Pension assets invested in bonds;

RealEstate = Pension assets invested in real estate;

OtherAssets = Pension assets not invested in equities, bonds, or real estate;

PLiab = Market value of firm’s pension debt;

PC = Pension costs: SVC + INT + DEFRET + RPLNA + ATRANS;

SVC = Pension service costs;

INT = Pension interest costs;

DEFRET = Deferred return on plan assets;

RPLNA = Actual return on plan assets;

ATRANS = Amortization of the transition asset;

ACC = Accruals: NI before extraordinary items net of extraordinary items/discontinued operations that affect cash flows;

ChAR = Change in accounts receivable;

ChINV = Change in inventories;

ChAP = Change in accounts payable;

DEPAMOR = Depreciation and amortization expense;

OtherACC = Other accruals: ACC – (ChAR + ChINV – ChAP +DEPAMOR);

AssetTurn = Sales divided by total asset;

FinCrisis = 1 for years 2007, 2008, 2009, 0 otherwise;

Fin_PA = Interaction between FinCrisis and PA;

Fin_Bonds = Interaction between FinCrisis and Bonds;

Fin_Equity = Interaction between FinCrisis and Equity;

Fin_RealEstate= Interaction between FinCrisis and RealEstate;

Fin_OtherAssets= Interaction between FinCrisis and OtherAssets;

Fin_PLiab = Interaction between FinCrisis and PLiab;

Fin_PC = Interaction between FinCrisis and PC;

Fin_SVC = Interaction between FinCrisis and SVC;

Fin_INT = Interaction between FinCrisis and INT;

Fin_DEFRET = Interaction between FinCrisis and DEFRET;

Fin_RPLNA = Interaction between FinCrisis and RPLNA;

Fin_ATRANS = Interaction between FinCrisis and ATRANS;

Fin_ACC = Interaction between FinCrisis and ACC;

Fin_ChAR = Interaction between FinCrisis and ChAR;

Fin_ChINV = Interaction between FinCrisis and ChINV;

Fin_ChAP = Interaction between FinCrisis and ChAP;

Fin_DEPAMOR= Interaction between FinCrisis and DEPAMOR;

Fin_OtherACC= Interaction between FinCrisis and OtherACC; and

Fin_AssetTurn = Interaction between FinCrisis and AssetTurn

RESULTS

The descriptive statistics for 2004-2011 are presented in Table 7. The sample spans 2002-2011 because the analysis relies on at least one year of future market value of equity and at least one year of change in accruals. It spans 2003-2011 because decomposition of pension assets was only required under FAS 132R and SFAS 158. The accrual components are calculated from balance sheet data. Following Sloan (1996), all variables are deflated by average total assets. The sample excludes financial services firms (SIC codes 6000-6999) because the model is not designed to reflect their activities (Barth et al., 2001a). Overall, although the use of individual components of pension assets, pension costs and accruals may help to increase prediction accuracy, the decrease in degrees of freedom may offset the benefits for cross-sectional analysis. Given the need to calculate lags, the results may also be affected by survivorship bias.

Table 8 contains the percentages of pension assets invested in the 4 classes of assets as required by SFAS 132R and SFAS 158 (*bonds, equity, real estate, and other assets*). Figure 2displays the annual mean percentages in graphical form. I find a decrease in the percentage invested in equities and a corresponding increase in the percentage invested in bonds between 2007-2008. This is consistent with managers of pension fund assets seeking a "safe harbor" in times of economic downturn. This shift may also, however, be due in part to the recognition requirements imposed by SFAS 158 (Amir et al., 2010; Fried, 2010; Chuk, 2011).

Table 9 presents the regression estimates from equations (12) and (13), which test the association of the components of pension assets/liabilities, revenues/expenses with future cash flows (current market value of equity) and accruals. As expected, all pricing multiples of accruals, both aggregated and disaggregated with the exception of the change in inventories, are significant in predicting next period cash flows. It would be surprising if models containing accruals were not associated with future cash flows in a superior fashion than models employing prior cash flows alone. This is because accruals inherently contain information about future cash flows whereas prior cash flows do not. The signs are as predicted and consistent with Barth et al. (2001a). Since inventory can be stated in terms of the current change in revenues (Barth et al., 2001a), the insignificant pricing multiple of the change of inventories may be due to inventory disclosures containing redundant information. Comparing the associated R^2s [9], model (13) with the disaggregated accruals, pension assets and pension liabilities has substantially more predictive ability than model (12) with aggregated amounts.

Assessing the association of pension information with future cash flows (model 12), I find that none of the pricing multiples associated with pension assets (PA), pension liabilities (PLiab), or pension costs (PC) are significant. When the components as disaggregated into their individual components, however, we see not only an increase in

[9] STATA provides three R-squares when running panel data regressions (xtreg): within, between, and overall. Within represents the R-squared from the mean-deviated regression, i.e. the ordinary r-square from running OLS on the transformed data and is the one reported here.

overall predictability but also that the markets, in some cases, do assign significant pricing multiples to the individual components. Consistent with Amir and Benartzi (1998), investments in equities are significant to investors in predicting future cash flows. The pricing multiple is, however, small which implies that investors do not view pension assets as belonging to the firm. Pension liabilities are negatively associated with future cash flows. This suggests that investors view pension liabilities as belonging to the firms. As predicted, most pension cost pricing multiples are not significant when presented with balance sheet information. SVC is the exception. SVC is defined by the FASB as "the addition to the pension obligation attributable to services rendered by employees during the period" (Barth et al., 1992). The sign is surprisingly positive. Barth et al. (1992) found a similar result with pension service costs and posited that this may be due to some pension costs not being viewed by the securities markets as a measure of pension liabilities, but instead acting as a proxy for the value created by human capital. The long-term horizon of this pension cost may also be a reason for its importance to investors, as the effects of the other pension costs have shorter lives or are susceptible to annual changes.

The 2008-2009 financial crisis has a negative effect on future cash flows and the pricing multiple is greater when disaggregated accounting components are used. During the financial crisis, the model shows the predicted flight of capital (Bernanke et al., 1996; Brunnermeier and Pedersen, 2005, 2008; Caballero and Krishnamurthy, 2008; and Gelos and Wei, 2005). Real estate pension assets are also negatively associated with future cash flows. This is a logical reaction to the sub-prime mortgage crisis. Increases in service costs and interest costs pricing multiples during the financial crisis are significant and negative. The change in sign for the pricing multiple of service cost from the non-financial crisis period may be viewed by investors as a signal from managers that value created by human capital declined during the period. All other pricing multiples for pension costs are not significantly different from zero, indicating that, in the presence of balance sheet information, the income statement information is considered redundant.

Once again, we see that investors value the incremental information contained in the individual components of accruals during the financial crisis. Again, the change in the sign may be due to signaling by managers. The sign of the pricing multiple on depreciation and amortization does not, however, change during the financial crisis. This may be due to the inability of managers to signal using a cost that is tied to the long-term rate of return on capital assets. An increase in accounts receivables during the financial crisis may, for example, signal that customers are slower to pay. Similarly, an increase in inventories during the crisis may be viewed by investors as resulting from lower inventory turnover. Similar inferences can be drawn for the change in accounts payable and other accruals. Differences in the magnitudes of the pricing multiples on accrual components are quite large when compared to the pricing multiples outside of the financial crisis. The absolute value of the changes ranges from 52.4% for depreciation and amortization expense to 181% for other accruals. This implies that investors were more concerned with accruals during the financial crisis.

SFAS 158 does appear to have produced a significant overall change in the predictability of future cash flows (Table 10): i.e. investors view recognized accounting amounts differently from disclosed amounts.[10] The pricing multiples are not significantly different form zero for individual pension asset classes but the pricing multiple for net pension equity is significantly different in the pre- and post-periods - with a decrease in the weight on NPE following recognition. The pricing multiple for earnings before pension costs is also significantly lower in the post SFAS 158 period. Except for the expected rate of return on pension assets for which the pricing multiple is smaller in the post-SFAS period, investors view the information contained in the individual components of pension costs as being stale when presented along with balance sheet amounts. The same can be said of pension liabilities. There are, however, significant differences between ChINV and ChAP for the post- and pre-SFAS periods. When comparing the R^2s of the pre- and post-SFAS 158 periods, we see that model (13), which includes recognized accounting amounts, has substantially more predictive ability than model (12) with disclosed accounting amounts.

ADDITIONAL TESTS

Dechow et al. (1995), [DSS], provides an alternative definition for comparing the power of aggregated accruals. Consistent with previous studies of earnings management (Healy 1985 and Jones, 1991), they compute total accruals (TA) as:

$$TA_t = \Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STD_t - Dep_t)/ (A_{t-1}) \quad (1)$$

[10] I exclude the year 2006 from this model because the year 2006 includes MVE_{2006} period where SFAS 158 was in effect while all other variables are for the year 2005 period when SFAS 158 was not in effect.

Discretionary accruals are then estimated using model (2) by subtracting the predicted level of nondiscretionary accruals (NDA) form total accruals (standardized by lagged total assets).

$$TA_t = a_1 \left(\frac{1}{A_{t-1}}\right) + a_2(\Delta REV_t - \Delta REC_t) + a_3(PPE_t) + \nu_t \quad (2)$$

Future cash flows are the estimated using aggregated and disaggregated pension components.

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 PA_{t-1} + \beta_4 PC_{t-1} + \beta_5 PLiab_{t-1} + \beta_6 DA_{t-1} + \beta_7 NDA_{t-1} + \beta_8 AssetTurn_{t-1} + \beta_9 FinCrisis_{t-1} + \beta_{10} Fin\_PA_{t-1} + \beta_{11} Fin\_PC_{t-1} + \beta_{12} Fin\_DA_{t-1} + \beta_{13} Fin\_NDA_{t-1} + \varepsilon \quad (14)$$

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_2 Bonds_{t-1} + \beta_3 Equity_{t-1} + \beta_4 Real\ Estate_{t-1} + \beta_5 Other\ Assets_{t-1} + \beta_6 SVC_{t-1} + \beta_7 INT_{t-1} + \beta_8 DEFRET_{t-1} + \beta_9 RPLNA_{t-1} + \beta_{10} ATRANS_{t-1} + \beta_{11} PLiab_{t-1} + \beta_{12} DA_{t-1} + \beta_{13} NDA_{t-1} + \beta_{14} AssetTurn_{t-1} + \beta_{15} FinCrisis_{t-1} + \beta_{16} Fin\_Bonds_{t-1} + \beta_{17} Fin\_Equity_{t-1} + \beta_{18} Fin\_RealEstate_{t-1} + \beta_{19} Fin\_OtherAssets_{t-1} + \beta_{20} Fin\_SVC_{t-1} + \beta_{21} Fin\_INT_{t-1} + \beta_{22} Fin\_DEFRET_{t-1} + \beta_{23} Fin\_RPLNA_{t-1} + \beta_{24} Fin\_ATRANS_{t-1} + \beta_{25} Fin\_DA_{t-1} + \beta_{26} Fin\_NDA_{t-1} + \varepsilon \quad (15)$$

where:

DA = discretionary accruals as calculated by the Modified Jones Model;

NDA = nondiscretionary accruals as calculated by the Modified Jones Model;

and all other variables are as previously specified. The results of these tests are presented in Table 11.

Comparing the R^2s with the R^2s obtained using Model (12) and Model (13), we see the incremental information contained in the individual components of accruals as defined by BCN increase the predictability of future cash flows when compared to the discretionary and nondiscretionary accruals employed in DSS.

Using aggregate accounting amounts for pension assets and costs, Model (14) indicates that investors value pension disclosures by assigning differing pricing multiples to pension assets, liabilities and costs. The pricing multiple of pension assets is significant and small, consistent with investors, while valuing the incremental information of pension assets, choosing not to treat those pension assets as belonging to firms. The pricing multiple on pension costs is not statistically different from zero. This is consistent with the information provided by pension costs being redundant when presented with balance sheet information. The large significant pricing multiple on pension liabilities is consistent with investors viewing pension liabilities as belonging to the firm and thus, of help in predicting future cash flows.

Turning to the incremental information derived from disaggregating pension assets and costs into their individual components, we see similar results to the BCN Model (13). I find larger pricing multiples in this model when compared to BCN. The significance and magnitude of the pricing multiple on equities indicates that investors value the amount of pension assets invested in equities, but do not view these pension assets as belonging to the firm. As above, pension liabilities are viewed as belonging to firms and their power in predicting future cash flows increases when pension components are disaggregated. As in BCN, only service costs are valued by investors in predicting future cash flows.

Aggregated accounting amounts mask the effect of discretionary and nondiscretionary accruals. The pricing multiples for discretionary and nondiscretionary accruals are insignificant in the Model (14) which uses aggregated pension amounts. Consistent with prior literature (Subramanyam, 1996 and Bowen et al., 1987), however, (and assuming that the modified Jones model is able to correctly decompose total accruals into discretionary and nondiscretionary accruals) discretionary and nondiscretionary accruals have incremental value for investors in predicting future cash flows (Model 15). The pricing multiples on discretionary and nondiscretionary accruals are 36.188 and 0.001 respectively. Unlike Subramanyam (1996), however, the weight attached to discretionary accruals is much greater than the weight attached to nondiscretionary accruals. This indicates investors are assigning greater importance to the discretionary information being supplied by managers about future earnings.[11]

Once again, the 2008-2009 financial crisis has a negative association with future cash flows, although the multiple is higher in this model than in BCN. As with BCN, the model shows a flight of capital (Bernanke et al., 1996; Brunnermeier and Pedersen, 2005, 2008; Caballero and Krishnamurthy, 2008 and Gelos and Wei, 2005) for equities and real estate assets. The increase in the pricing multiple for service costs during the financial crisis is significant and negative as before. Surprisingly, interest costs have a large significant positive pricing multiple. This may be caused by a correlation in balance sheet and income statement pension information. As before; other pricing multiples for pension

[11] An alternative explanation is that this result may be due to measurement error arising from misspecification of the cross-sectional Modified Jones model (discretionary accruals may be contaminated with nondiscretionary components).

costs are not significantly different from zero, indicating the information is considered stale.

Looking at the effect of the financial crisis on accruals, the multiple on Fin_DA and Fin_NDA are similar in magnitude and sign to those in Model (14). This may signify that disaggregating pension assets and costs had little effect on the interaction between the financial crisis and accruals.

As in BCN, SFAS 158 does appear to have produced a significant overall change in the predictability of future cash flows (Table 12): i.e. investors view recognized accounting amounts differently from disclosed amounts. As with BCN, the differences in pricing multiples on pension assets in the pre-and post-SFAS 158 periods are not significant but the pricing multiple for net pension equity (which is adjusted for the effect of pensions) is significantly different in the pre- and post- periods. The pricing multiple for earnings before pension costs is significantly lower in the post-SFAS 158 period when compared to the pre-SFAS 158 period. The pricing multiple for expected rate of return on pension assets decreases (meaning a smaller weight in the post-SFAS 158 period) while the pricing multiple for service costs increases. There is no significant change in the information provided by pension liabilities. With respect to discretionary and nondiscretionary accruals, there are significant differences in nondiscretionary accruals while there is no significant change in the information provided by discretionary accruals. This is due to the rather large standard deviations associated with discretionary accruals when compared to comparably smaller standard deviations associated with nondiscretionary accruals. When comparing the R^2s of the pre- and post-SFAS 158 periods, we see that model (13) with recognized accounting amounts has substantially more predictive ability than model (12) with disclosed accounting amounts. Thus, we conclude investors value recognized accounting information differently from disclosed accounting information.

CONCLUSIONS

Consistent with Barth et al. (2001a), the results of this study suggest that, for U.S. firms, in the years 2003-2011, aggregate accounting amounts mask how the components of earnings affect investors' ability to predict future cash flows. Disaggregating pension earnings components and accruals results in an increase in predictive power. Each accrual component, with the exception of change in inventories, reflects different information relating to future cash flows. Consistent with Amir and Benartzi (1998), the pricing multiple on equities, the largest class of pension assets, is significant and positive. During the 2008-2009 financial crisis, investors placed a greater weight on the incremental information contained in the individual components of accruals. The change in the sign and magnitude of the effect of the accrual components may be the result of signaling by managers. The sign of depreciation and amortization does not, however, change during the financial crisis and may be due the inability of managers to signal using a cost that is tied to the long-term rate of return on capital assets. The inferences are robust to alternative specifications of accruals. In addition, I find evidence that investors assign more significance to pension accounting information that is recognized in the financial statements than to pension information that is disclosed.

V. FUNDED STATUS OF PENSION PLANS IN THE U.S

PRIOR LITERATURE AND HYPOTHESE DEVELOPMENT

In my final study, I examine the association between funding status and the market value of equity. With the recognition of actuarial gains and losses in comprehensive income, rates of return on pension assets have an economically significant impact on the book value of equity. [12] Funding status may also an impact on cash flows. Under the Employee Retirement Income Security ACT (ERISA) of 1974, firms with private employer-sponsored DB plans funded from 80 to 90 percent of pension obligations, *may* have to accelerate cash contributions to the plan. Accelerated cash contributions are unconditionally *required* if the funding rate is below 80 percent (Coronado and Sharpe, 2003). The U.S. Pension Protection Act (2006) requires full funding status within 7 years (Amir et al., 2010). Therefore, pension funding, and the required cash to bring plans to funded status, may have a large impact on the value shareholders place on the sponsoring firm's equity. I find that investors reward firms that have fully funded pension plans with higher market values as compared to firms with underfunded plans. I also find that the capital markets perceive larger firms to have higher levels of risk with respect to pension liabilities, i.e., underfunded pension plans are more negatively associated with market values for larger firms as compared to smaller firms.

Prior literature has found that pension funding levels have an impact on pension asset allocations (Bader, 1991; Amir and Benartzi, 1998, 1999; Chuk, 2011; Amir et al., 2010; Fried, 2010). This research suggests that companies invest more in bonds while

[12] For an example of the magnitude of this impact, on average, amounts equal to 61% of net income for the firms in this sample are provided by returns on pension assets.

decreasing investments in equities as a means of avoiding contributions to pension plans when cash flows are low (Friedman,1983; Bodie et al., 1984; Amir et al., 2010). My research adds to the literature by finding that firms with underfunded plans are rewarded by capital markets for investing in bonds rather than equities. The switch from equities may also, however, be tied to SFAS 158 and its required recognition of the asset and income components of pension plans.

Barth et al. (1992) developed a model to investigate whether market participants assign different pricing multiples to pension cost components when determining security prices. Using an income approach, they use an expanded version of the Daley (1984) model which includes pension costs decomposed into the various components required by SFAS 87. Their model takes the following form:

$$MVE = \alpha + \beta_1 \, EbPC_{it} + \beta_2 \, INT_{it} + \beta_3 \, SVC_{it} + \beta_4 \, RPLNA_{it} + \beta_5 \, DEFRET_{it} + \beta_5 \, ATRANS_{it} + \varepsilon \qquad (1)$$

where INT is interest cost, SVC is service cost, RPLNA is expected return on plan assets, DEFRET is the deferred return on plan assets, ATRANS is the amortization of the transition asset and EbPC is earnings before pension costs. They find that investors assign different price multiples to the pension cost components (although they find the pricing multiple on ATRANS is not significantly different from zero). The pricing multiples on pension income streams are generally larger than the price multiples of non-pension income streams. They argue that this supports the idea that investors view pension income as less risky than other income.

Landsman (1986) was the first to use the balance sheet approach in assessing the information content of pension accounting. Based on the accounting equation that equity is equal to assets minus liabilities, he divides the assets and liabilities into pension and non-pension components. The basic form of his equation is:

$$MVE = \alpha + \beta_1 NPA_{it} + \beta_2 NPL_{it} + \beta_3 PLA_{it} + \beta_4 PL_{it} + \varepsilon \quad (2)$$

where NPA is non-pension assets, NPL is non-pension liabilities, PLA is plan assets and PL is plan liabilities. He finds significant pricing multiples on pension assets and liabilities, and concludes that the securities markets value disclosed pension assets and liabilities similarly to recognized assets and liabilities.

Barth et al. (1993) is the first pension study to employ the Ohlson (1995) Clean Surplus model which combines both balance sheet and income statement information. Barth et al. (1993) [BBL] examine how investors value pension information. Using this model BBL examine the relationship between balance sheet and income statement information by decomposing the elements of pension disclosures into their various components.

$$MVE = \alpha + \beta_1 Asset_{it} + \beta_2 Liabilities + \beta_3 EbPC_{it} + \beta_4 PLA_{it} + \beta_5 PL_{it} + \beta_6 INT_{it} + \beta_7 SVC_{it} + \beta_8 RPLNA_{it} + \beta_9 DEFRET_{it} + \beta_9 ATRANS_{it} + \varepsilon \quad (3)$$

where:

Asset = the firm's assets;

liabilities = firms' liabilities;

EbPC = net income before pension costs;

PLA = plan assets;

PL = plan liabilities;

INT = interest cost;

SVC = service cost;

RPLNA = the actual rate of return on plan assets;

DEFRET = the deferred return on plan assets; and

ATRANS = the amortization of the transition asset.

They find that when pension balance sheet data is known, pension income statement data becomes redundant, i.e., it provides no additional information.

Building on BBL, Weidman and Wier (2004), examine the role of the funded status of pensions, in explaining market values. They computed the funded status (FS) as PENASSET less PENLIAB. They find that investors appear to find the deficit arising from underfunded plans as a liability of the firm, but any surplus arising from over-funded plans is not view as an asset of the firm. Their basic equation is:

$$MVE = \alpha + \beta_1 \, Asset_{it} + \beta_2 \, Liabilities + \beta_3 \, EbPC_{it} + \beta_4 \, FS_{it} + \beta_5 \, OVER_{it} + \beta_6 \, FS{*}OVER_{it} + \varepsilon \quad (4)$$

where:

FS = pension assets less pension liabilities;

OVER = to 1 when the funded status of the plan is positive (0 otherwise); and

FS*OVER = the interaction between OVER and FS.

Assets and Liabilities are not adjusted for pension plans as in BBL, while EbPC is defined as in BBL. Instead of over-funded pension plans, I chose to directly examine the effect of underfunded plans by using the indicator variable, UNDER which is equal to 1 when the funded status of the plan is underfunded (0 otherwise).

My first and second hypotheses (in the alternative) are:

H_1: Investors will view deficits in funding as liabilities belonging to the firm.

H_2: Investors will encourage firms with underfunded plans to become funded.

Gopalakrishnan and Sugrue (1993) examine the relationship between the projected benefit obligation (PBO) and MVE. They note that during the early stages of the pension policy promulgation process, the FASB favored PBO, instead of the accumulated benefit obligation [ABO] as the appropriate measure of pension liability. However, when SFAS 87 was issued, the FASB settled for the recognition of a "minimum liability" on the balance sheet (when ABO exceeds the fair value of plan assets). Gopalakrishnan and Sugrue (1993) find that investors perceive PBO as a liability of the firm, consist with the FASB's notion (1985, para. 149) that the PBO provides a more realistic measure of the employer's obligations on a going concern. Their model is based on Landsman (1986), substituting PBO for PLiab:

$$MVE = \alpha + \beta_1 \, Asset_{it} + \beta_2 \, Liabilities + \beta_3 \, PLA_{it} + \beta_4 \, PBO_{it} + \varepsilon \qquad (5)$$

Where:

PBO = the projected benefit obligation, and all other variables are as previously defined.

Bader (1991) tests the effect of funding policy on asset allocation and finds funding has an inverted U-shaped relation with the percentage of pension funds allocated to equities. He argues that firms attempt to minimize the volatility of their pension contributions: plans that are extremely overfunded and underfunded should invest in bonds. In determining whether expected rates of returns or the percentage of pension assets allocated to equities is correlated with future returns on pension assets, Amir and Benartzi (1998) state that,

> *It is expected, rather than the actual, return that affects reported income. For example, an increase in ERR will cause a decrease in net pension expense, and*

hence, an increase in reported net income. Differences between the assumed and actual returns do not enter the income statement unless they exceed a cutoff of 10 percent of the larger of PBO or the fair value of pension assets. (p.337)

They find ERR (expected earnings return on pension assets) and the percentage of pension assets allocated to equities are related weakly and only the percentage of equity is correlated with future returns on pension assets.

Amir and Benartzi (1999) find managers prefer fixed-income investments rather than equity investments when they are close to recognizing an additional minimum pension liability. Amir and Benartzi (1999) also find firms allocate their pension assets between equities and fixed income investments to reduce volatility. Amir et al. (2009) define pension funding status as the fair value of pension assets divided by ABO. They find after the passage of SFAS 158, companies on average, shifted funds from equities to bonds and that this shift is related to changes in funding levels and the expected impact of SFAS 158. Companies offset firm risk by using a more conservative pension asset allocation (more bonds).

My third, fourth and fifth hypotheses (in the alternative) are:

H_3: When pension plans are under underfunded, the market will reward more conservative pension allocation such as investment in debt securities and fixed income instruments.

H_4: The expected rate of return on pension assets will be positively associated with the market value of the firm.

H_5: Pension income, while positively associated with the market value of the firm, will not be perceived as belonging to the firm.

With the passage of SFAS 132R, pension asset allocations must be disclosed. The FASB requires pension assets be allocated to four classifications: bonds[13]; equity securities; real estate; and other assets. Other assets are the amounts not invested in equities, bonds or real estate and include hedge fund assets. Prior studies find that managers may be inclined to divest equities and invest in bonds in order to reduce the likelihood of making cash contributions to their pension plans when the plans are extremely underfunded or overfunded (Friedman, 1983; Bodie et al., 1984; Amir et al., 2009).

Given this shift in pension asset allocation, I expect that investing in equities will be negatively associated with firm value. Larger firms generally have higher operating risk and may be unable to offset the risk represented by underfunded pension plans. Small changes in pension assumptions (expected rate of return, service costs, etc.) and pension asset allocation can produce a large impact on the firm's net income. This is especially true for firms possessing large pension funds (Amir et al., 1998, demonstrate this using American Airlines). I expect the market will recognize that the risks associated with unfunded pension plans will less detrimental to the market value of equity for smaller firms when compared to larger firms.

I examine the relationship between market value of equity and the allocation of pension asserts to see if investors reward a shift from equities to other investments and add to the literature that examines whether the method of accounting presentation (recognition vs. disclosure) affects pension asset allocation. I expect the pricing multiple

[13] The amount invested in fixed income securities, cash and short-term securities, U.S. government and government agency securities, corporate bonds and notes, and mortgages.

on investments in equities to be negative. My sixth and seventh hypotheses (in the alternative form) are thus:

H_6: Investors will reward firms who invest their pension assets more conservatively (i.e. investment in equities will be negatively associated with firm value).

H_7: Due to the associated risks of managing large pension funds and the potential impact on net income, smaller firms will be perceived as being better able to handle the risk associated with underfunded pension plans.

Finally, the financial crisis of 2008-2009 was in large part caused by the collapse of the sub-prime mortgage market. With total expected write-downs on global exposures being estimated at about $4 trillion, I expect the financial crisis to have a negative impact on firms. I also expect investors will want mangers to focus more on core operations as opposed to the funded status of pensions. My final hypotheses (in the alternative) are thus:

H_8: During the Financial Crisis, investments of pension assets in real estate will be negatively associated with firm value.

H_9: Investors will want managers to focus on increasing core operations. As a result, firms with underfunded pension plans will be less penalized during the financial crisis.

H_{10}: Investors will want managers to focus on increasing core operations. As a result, investors will discourage firms from becoming funded during the financial crisis.

SAMPLE AND RESEARCH DESIGN

Financial and pension data were collected from Compustat (Fundamentals Annual and Pension Annual) while security prices were collected from CRSP. The sample firms were required to be U.S. firms with defined benefit pension plans that had complete financial and pension data available. These screens resulted in 6,226 firm years for 1,170 individual firms. The data cover the period 2003 through 2011, a period in which firms were required to 1) disclose and then later to 2) recognize the composition of their pension assets and costs. Since I study the same cross-sectional unit (in this case, firms) over time, I employ a panel data regression of the Ohlson clean surplus model (5). According to Baltagi (1998, p.7), panel data gives "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency" while taking heterogeneity explicitly into account. Pooled Ordinary Least Squares Regression often camouflages the heterogeneity (uniqueness) that may exist among firms, i.e., the individuality of each firm is subsumed in the disturbance term ε_t (Gujarati, 2003). I run a Hausman test and determine a fixed effects model fits the data better than a random effects model. One of the advantages of a fixed-effects model is the ability to control for all time-invariant differences between individual firms, so that the models cannot be biased because of omitted time-invariant characteristics such as industry.

Extending Barth et al. (1993), and Weidman and Wier (2004), I regress market value of equity on disaggregated pension asset allocation as required by SFAS 132R and SFAS 158. Pension assets are classified into 4 classes: bonds, equities, real estate and other assets (which include hedge funds, mortgage-backed securities, and private placement). Table 13 presents the percentages of asset classifications by year. Figure 3 plots the classifications graphically. Overall, stocks and bonds comprise between 91.2% and 94.4% of total pension funds.

As in Weidman and Wier (2004), I examine whether funded status has value for investors and whether market value is more strongly associated with stock price for underfunded plans than for over-funded plans. I expect investors to reward firms that are funded and to encourage firms that are underfunded to become funded. This is consistent with firms viewing pension liabilities as belonging to the firm.

Since Barth et al. (1993) find that no additional information may be provided by income statement data when balance sheet information is presented, I limit pension cost components to prior service costs and interest costs, which have been found to be significant in several studies. Consistent with Barth et al. (1992), I predict the pricing multiple will be positive for service costs (they posit it acts as a proxy for increases in human capital). I make no prediction for interest costs.

Since the market value of equity takes into account investors' expectations for future cash flows, I control for expected, rather than actual, returns on pension assets. As stated by Amir and Benartzi (1998), "(i)t is the expected, rather than the actual, return that affects reported income" (p.337). I expect a positive association with firm value for expected returns but at the same time, I expect the pricing multiple to be smaller than the pricing multiple for core earnings. This is consistent with investors viewing pension earnings as not belonging to the firm.

I also seek to answer the question of whether funding levels affect pension asset allocation. Prior research (Friedman,1983; Bodie et al., 1984; Amir et al., 2009) suggests that companies invest more pension assets in bonds to offset high levels of risk. Investing in bonds may also be a means of avoiding contributions to pension plans when cash flows are low (Amir et al., 2009). Given this shift in pension asset allocation, I expect that investing in equities will be negatively associated with firm value. For underfunded firms, investment in bonds will be encouraged by the market. Larger firms generally have higher operating risk and may not be able to offset the risk represented by underfunded pension plans (Amir et al., 2009). Thus I expect the market will recognize that the risks associated with unfunded pension plans can be more detrimental to the market value of large firms as compared to the market value of small firms.

I next control for the effects of the financial crisis on funding levels and pension asset allocation. Given that a major cause of the 20008-2009 financial crisis was the collapse of the sub-prime mortgage market, I expect investors to encourage a divestment in pension real estate holdings. Given the need to concentrate on core operations, I expect investors, while still rewarding firms with funded pension plans and encouraging those firms who have unfunded plans to become funded, to focus less on funding pension plans (the pricing multiple will become less negative).

Finally, I examine the value relevance between recognized and disclosed accounting information. Schipper (2007, p. 304) notes: "First, because recognition is subject to special criteria, and because SFAC No. 5 states that disclosure and recognition are not substitutes, it is evident that disclosure and recognition are not financial reporting alternatives—they are not intended to serve the same purpose." I expect significant differences pre- and post- SFAS 158 periods and that these results will be robust to various scenarios of the timing of the financial crisis.

I test value relevance with the following equation:

$$MVE_{it} = \beta_0 + \beta_1\, NPE_{it} + \beta_2\, EbPC_{it} + \beta_3\, Bonds_{i} + \beta_4\, Equity_{it} + \beta_5\, Real\ Estate_{it}$$
$$+ \beta_6\, Other\ Assets_{it} + \beta_7\, Funded_{it} + \beta_8\, Under_{it} + \beta_9 Under\_Funded_{it}$$

$$+ \beta_{10}\, Under\_Bonds_{it} + \beta_{11}\, SVC_{it} + \beta_{12}\, INT_{it} + \beta_{13}\, EXPRET_{it} + \beta_{14}\, size_{it}$$

$$+ \beta_{15}\, size\_Under2_{it} + \beta_{16}\, Div_{it} + \beta_{17}\, FinCrisis_{it} + \beta_{18}\, Fin\_Bonds_{it} + \beta_{19}\, Fin\_Equity_{it}$$

$$+ \beta_{20}\, Fin\_RealEstate_{it} + \beta_{21}\, Fin\_OtherAssets_{it} + \beta_{22}\, Fin\_Under_{it}$$

$$+ \beta_{23}\, Fin\_Funded_{it} + \beta_{24}\, Fin\_Under\_Funded_{it} + \varepsilon \qquad (6)$$

where

MVE = Fiscal year-end market value of common equity;
NPE = Owner's equity plus net pension liabilities scaled by common shares outstanding;
EbPC = Earnings before extraordinary items before pension costs scaled by common shares outstanding;
Bonds = Pension assets invested in bonds scaled by common shares outstanding;
Equity = Pension assets invested in equities scaled by common shares outstanding;
RealEstate = Pension assets invested in real estate scaled by common shares outstanding;
OtherAssets = Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding;
Funded = Pension assets divided by Accumulated Benefit Obligation, PA/ABO;
Under = 1 if Funded < 1, 0 otherwise;
Under_Funded = Interaction term for Under and Funded;
Under_Bonds = Interaction term for Under and Bonds;
SVC = Pension service costs scaled by common shares outstanding;
INT = Pension interest costs scaled by common shares outstanding;
EXPRET = Expected Return on plan Assets scaled by common shares outstanding;
Div = Dividends scaled by common shares outstanding;
Size = Natural logarithm of total assets;
size_Under = Interaction term for size and Under;
FinCrisis = If year = 2008-09, 1; 0 otherwise;
Fin_Bonds = Interaction between FinCrisis and plan assets invested in bonds;
Fin_Equity = Interaction between FinCrisis and plan assets invested in equities;
Fin_RealEstate = Interaction between FinCrisis and plan assets invested in real estate;
Fin_OtherAssets = Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate;
Fin_Under = Interaction between FinCrisis and Under;
Fin_Funded = Interaction between FinCrisis and Funded;
Fin_Under_Funded = Interaction between FinCrisis and Under and Funded; and
N = Number of firm years.

RESULTS

The descriptive statistics are presented in Table 14. On average, pension funds are funded at the 77.91%, meaning, on average, most pension funds are not fully funded for the sample. In fact, of the 6832 firm years, 6226 represent unfunded pension plan years (91.1% of the firm years). A closer look at the funded status of firms reveals, however, that at the 90% and 80% funded levels, percentages of firms with unfunded pension accounts decrease to 78.6% and 57.2%. Regression estimates are presented in Table 15. For my model, I defined funded as being funded as plan assets divided by accumulated benefit obligation: PA/ABO (Amir et al., 2010).

As expected, non-pension book value and non-pension earnings (NPE and EbPC) are positively associated with market value. In regards to pension asset allocation, I find that the market rewards firms who decrease their investment in equities, thereby more closely aligning pension assets with pension obligations. Equities represent the largest class of pension assets. All other pension asset pricing multiples are not significantly different from zero.

I find the relationship between funded status and market value to be statistically insignificant using both a linear and a non-linear (untabulated) model. Consistent with Wiedman and Weir (2004) who find, for Canadian firms, that the funded status of pension plans is more strongly associated with firms' market values for underfunded plans, I find that the market assigns a negative pricing multiple to firms with underfunded pension plans. The pricing multiple on becoming funded (Funded) is not significant.

The market, in turn, rewards firms who seek to decrease their pension liabilities, i.e. the pricing multiple on Under_Funded is large and positive. Under_Funded represents the effect of adjusting a firm's funded status, for firms with underfunded pension plans in comparison to firms with funded/overfunded plans that similarly increased their funded status. The positive pricing multiple suggests that investors assign a higher pricing multiple to firms with underfunded plans who increase their funded status when compared to firms with funded/overfunded plans who increase their funded status.

I also find evidence that suggests, for underfunded plans, the market rewards a reduction in risk and a decrease in volatility as evidenced by an increase in bonds for underfunded plans. Consistent with the idea that a more conservative asset allocation (investing more pension assets in bonds) can ensure that a minimum pension liability will not need to be recognized (Amir, et al., 2009) as well as offset high corporate risk (Friedman, 1983 and Bodie et al.,1984), I find that investors assign a positive pricing multiple to firms with underfunded pension plans that invest in bonds (Under_Bonds). This is also consistent with several prior studies (Bader, 1991; Amir and Benartzi,1998 & 1999), that find firms have an inverted-U relation between funding levels and the percentage invested in equities (i.e. extremely underfunded/overfunded plans invest in bonds to minimize the volatility of future pension contributions).

Consistent with Barth et al. (1992), service costs, which proxy for increases in human capital, are positively associated with market values. Consistent with Barth et al. (1995), pension income statement information, because of its high correlation to pension balance sheet information, provides no additional information (the pricing multiple on INT is not significantly different from zero).

Because of the corridor effect, which allows firms to avoid recognizing the differences between assumed and actual returns on the income statement (unless they exceed a cutoff of 10 percent of the larger of the fair value of pension plans or the projected benefit obligation), I find the expected rate of return affects reported income and subsequently, the market value of equity (Amir and Benartzi, 1998). I also note that while the pricing multiple on expected returns on pension plans (EXPRET) is positive and highly significant, it is substantially smaller than the positive and significant pricing multiple on earnings before pension costs (EbPC). This is consistent with legal limitations on firms' ability to access pension surpluses. A firm may not be able to fully realize the benefits of a pension surplus, so the market does not consider the surplus to be an asset of the firm (Wiedman and Weir, 2004).

I also find that the market perceives larger firms to have greater risk with regard to pension liabilities, i.e. having an underfunded pension plan is more detrimental to market value for larger firms than for smaller firms. Given the magnitude of these pricing multiples, investors view pension liabilities (in this case, liabilities arising from underfunded pension plans) as belonging to the firm. Given how even small changes in pension asset allocation can lead to changes in the expected rate of return on pension plans, which in turn leads to substantial changes in funding levels (especially for firms with large pension to equity ratios), firm value has the expected negative association with firm size for firms with underfunded pension plans when compared to firms that have funded or overfunded pension plans.

Again, as expected, the financial crisis of 2008-2009 has a negative impact on the market value of equity while dividend payout was positively associated with firm value. One of the causes for the financial crisis of 2008-2009 was the decline of real estate prices caused by the sub-prime mortgage crisis. As a result, increased real estate holdings are negatively associated with the market value of equity. It does not appear, however, that the financial crisis had an impact on the pricing multiples of the other classes of pension assets.

Interestingly, during the 2008-2009 financial crisis, the pricing multiple of Funded is less negative and becoming funded for firms with underfunded plans is associated with decreases in firm value.[14] The message investors appear to be sending to firm managers is to cover your pension obligations as best you can during the financial crisis but not at the expense of core operations.

ADDITIONAL TESTS

Alternative Measure of Funded

In Model (1), I define Funded as plan assets divided by accumulated benefit obligation: PA/ABO (Amir et al., 2010). Weidman and Weir (2004) define funded as pension assets less pension liabilities. I modify their measure to reflect the percentage of funding (100 * (1 +((PA – PBO) /PBO)).[15] The results for Model (2) are given in Table 16.

Several pricing multiples in Model (2) have similar magnitudes and the same sign as I found in Model (1) (NPE, EbPC, Equity, Under_Bonds, SVC, EXPRET, Div,

[14] During the financial crisis, the combined pricing multiple (Under + Fin_Under) is -1293.12, compared to -7881.015 (Under). For the combined pricing multiple on underfunded firms who are adjusting the funded percentage of their pension plans during the financial crisis, the change goes from having a positive association with firm value outside of the financial crisis (4069.536) to having a negative association with firm value during the crisis (-1856.6).

[15] For instance, if plan assets are valued at \$110m, the PBO is \$100m., then Funded = 100 * (1 +((PA – PBO) /PBO)) = 100 * (1 +((110 – 100)/100)) = 100* (1.1) = 110%.

Fin_RealEstate). Others are insignificant (RealEstate, OtherAssets, INT, Fin_Bonds, Fin_Equity, and Fin_OtherAssets). While the other pricing multiples generally maintain the same sign, implying similar conclusions to those drawn by Model (1), there are some differences between the magnitudes of the estimates for the pricing multiples. While the explanatory ability of Model (2) is greater is greater than Model (1) (as evidenced by the R^2s), there are apparent problems with misspecifications in Model (2).

In terms of pension asset allocation, the pricing multiple on bonds is significantly negative in Model (2). With the pricing multiples on the two largest classes of pension assets being negatively associated with market value and no corresponding positive pricing multiples on real estate or other pension assets, it is unclear just how investors would prefer firms to allocate pension assets. This appears to be a misspecification of the model.

A second problem arises with the pricing multiples on Funded2, Under2 and Under2_Funded2. Increasing the funded percentage is positively associated with MVE (it is insignificant in Model (1)) and the pricing multiple on Under2 is much smaller than the pricing multiple on Under (Model (1)). The effect of becoming funded when a firm has an underfunded pension fund becomes insignificant. Model (2) suggests that investors are rewarding all firms who increase their funded status and penalizing all firms with underfunded pension plans while not encouraging firms with underfunded plans to become funded.

Other differences involve larger pricing multiples (size_Under2, FinCrisis, and Fin_Funded2) or a smaller pricing multiple (Fin_Under_Funded2). Overall, the estimates for Model (2 lead to the same conclusions as drawn from Model (1).

Recognition vs. Disclosure

Using both definitions of funded, I find there is a significant difference between the pre- and post-SFAS period. In regards to pension asset allocation, investment of pension assets in real estate declined in value as did the effect of investing in bonds and size for firms with underfunded pension plans. Income items, such as service costs and expected returns for pension items, have also decreased in information content. Given the decrease in pricing multiples and the resulting magnitudes for pension assets and income streams, it appears that investors do not view pension assets and earnings as belonging to the firm.

Tables 17 and 18 present the results of my tests for differences between disclosure and recognition. The decrease in the magnitude of the pricing multiples on SVC implies that the contribution of human capital declined with recognition. The pricing multiples on Under_Bonds, EXPRET, and size_Under also decreased significantly. These changes are accompanied by smaller standard deviations (not tabulated), implying investors may be more confident about the information due to recognition. Changes in the pricing multiples of the components of pensions in the pre- and post-SFAS 158 periods imply that recognition of pension components has permitted investors to further differentiate between core and pension earnings. Using various simulations, Coronado and Sharpe (2003), find large valuation errors occur for many firms when there is a failure to differentiate between core and pension earnings. This is especially true during a period where there is a steep decline in stock prices coupled with a drop in interest rates. As a result of the increased differentiation of pension assets, liabilities and earnings by investors, valuation errors may have decreased. Similar results are found using the alternative definition of Funded in Model (2). I conclude from these results that the capital markets recognize a difference between recognition and disclosure, giving more weight to information that is recognized than to information that is disclosed.

Alternative Timing of Financial Crisis

In my models, I define the financial crisis as occurring in the years 2008 and 2009 for all classes of pension assets. However, the U.S. subprime crisis began in August 2007 and may have caused investors to treat real estate pension investments differently in 2007 when compared to other classes of assets (Model (4)). On the other hand, since the subprime crisis had such a dramatic effect on the entire economy, perhaps the effects of the economic downturn were being felt by all classes of pension asset investment in 2007 as well as 2008-2009 (Model (3)). I test Equation (6) under both scenarios. The results of these tests are presented in Table 19.

Looking at the R^2s, both Model (3) and Model (4) have lower explanatory value than Model (2). In Model (3), in which the financial crisis is defined as occurring in 2007-2009, the effect of the financial crisis is not significantly different from zero. Since it is implausible that the financial crisis had no significant effect on firm values given that expected write-downs on global exposures were estimated to be $4 trillion, this would indicate that the financial crisis is misspecified when using the years 2007-09 across all classes of assets. All other pricing multiples have the same sign and are generally similar in magnitude. However, the magnitude of the effect of the financial crisis on firms with underfunded plans is about 75% less than when the financial crisis is defined as 2008-2009. Also, the effect of becoming funded for underfunded firms during the financial crisis is 43% less using this alternative timing of the financial crisis. Model (4) exhibits a problem similar to Model (3): the pricing multiple on the financial crisis is not significantly different from zero, with similar differences on Fin_Under and Fin_Under_Funded. For these reasons, defining the financial crisis as occurring in 2008-2009 seems to present a more realistic view of the effect of the economic downturn than do either of the alternative definitions.

CONCLUSIONS

Examining a sample of U.S. firms with defined benefit pensions plans from 2003-2011, this study investigates how investors view the deficit arising from under-funded plans. I conclude that funded status does have an effect on pension asset allocation and that investors encourage conservative pension asset allocation to mitigate firm risk associated with underfunded pension plans. Due to the increased visibility caused by the recognition of pension assets, liabilities and earnings, investors have rewarded firms who have decreased their risk by allocating a smaller proportion of pension assets to equities. During the financial crisis of 2008-2009, investors also encouraged a decrease in investments in real estate.

Investors view deficits arising from under-funded plans as belonging to the firm. Investors reward firms with fully or over-funded pension plans and encourage those funds with unfunded pension plans to become funded. During the financial crisis of 2008-2009, while funding percentage continued to be negatively associated with market value, being unfunded had less negative consequences for firms in terms of market value. Becoming funded during the financial crisis was actually associated with a decrease in firm value.

Due to the associated risks of managing large pension funds and the potential impact on the net income of firms, smaller firms are perceived by capital markets as being better able to handle the risk of underfunded pension plans. The expected rate of return on pension assets, while, positively associated with MVE, is not viewed as belonging to the firm.

In regards to disclosure versus recognition, I find that there are significant differences pre- and post- SFAS 158. These results are robust to various scenarios of the timing of the financial crisis and an alternative measure of funded. As a result of the increased differentiation between pension assets, liabilities and earnings, by investors, valuation errors may have decreased (information content increased) as evidenced by smaller pricing multiples on pension components coupled with smaller standard errors.

VI. DISCUSSION

This dissertation adds to the discussion of whether pension information is value relevant. As stated by Barth et al. (2001), "An important role of accountants is to summarize or aggregate information that might be available from other sources. Note also that the concepts of value relevance and decision relevance differ. In particular, accounting information can be value relevant but not decision relevant if it is superseded by more timely information." The data suggest that investors do, in fact, value the incremental information contained in disaggregated pension costs and assets. I find this holds whether examining pension information by itself or in the context of accruals or pension funding levels. Pension information is significantly associated with the market value of equity.

My first study adds to the literature on whether investors value balance sheet information or income information to a greater extent. Consistent with Barth et al. (1993), this study is one of the first to find that the explanatory value of pension cost components is redundant once pension balance sheet items are disaggregated into their individual components. This study also contributes to the literature because it is one of the first to examine the effect of the incremental information provided by the disaggregation of pension plan assets into individual investment classifications before, during, and after the financial crisis of 2008-09. Finally, this study contributes to the literature by suggesting that recognized accounting information is more relevant to investors than accounting information that is disclosed.

My second study finds disaggregated pension earnings components and accruals contain incremental information that investors value—specifically, disaggregated pension components increase predictive powers in regards to future cash flows. Aggregate totals mask how the components of earnings affect investors' ability to predict future cash flows. Signaling by managers, during the financial crisis of 2008-2009, results in a change in the sign and magnitude of the effect of the pricing multiples of accrual components, with investors placing a greater weight on the individual components of accruals. Nevertheless, the sign of depreciation and amortization does not change during the financial crisis. This is probably due to the inability of managers to signal using a cost that is tied to the long-term rate of return on capital assets.

My third essay deals with whether investors are paying attention to funding levels. The period under study, 2003-2001, represents the first time funding levels were either disclosed (SFAS 132R) or recognized (SFAS 158). I find the market rewards firms who have funded pension plans and at the same time, rewards firms who increase their funded levels. During the financial crisis, I find investors are more concerned with core earnings. During this time, firms were less negatively impacted by their unfunded status and increasing the funded level appears to decrease the market value of equity. Investors reward conservative pension investment plans, by encouraging divestment in equities and rewarding investment in bonds when plans are underfunded. I add to the literature by showing that funded levels not only affect the market value of equity but pension asset allocation. Once again, I show that pension assets are not considered as belonging to the firm while pension liabilities (in this case, underfunded pension plans) are perceived as belonging to the firm.

In all 3 studies, I find that there are significant differences disclosed and recognized accounting information. These results are robust to various scenarios of the timing of the financial crisis. Most significantly, I find that. valuation errors may have decreased (information content increased) as evidenced by smaller pricing multiples on pension components coupled with smaller standard errors. I find that there are significant differences pre- and post- SFAS 158. These results are robust to various scenarios of the timing of the financial crisis and an alternative measure of funded. This result appears to be driven by the passage of SFAS 158.

My findings may thus be of interest to standard-setters in that I raise the question of whether the direct increase in the quality of pension information resulting from the rule change (recognizing various classes of pension assets/liabilities) is of greater value than the indirect costs (introducing volatility into the financial statements through recognizing net surpluses/deficits and actuarial gains/losses).

ACCOMPANYING TABLES

Table 1
Descriptive statistics for 2003-2011, variables in per-share form [a]

Variable	2003-2006 Mean	2003-2006 Std. dev.	2007 Mean	2007 Std. dev.	2008 Mean	2008 Std. dev.	2009 Mean	2009 Std. dev.	2010-11 Mean	2010-11 Std. dev.
MVE	34.80	51.94	38.87	60.18	25.10	45.78	31.01	52.40	37.73	76.76
TA	42.18	59.81	45.15	67.33	44.87	72.29	44.54	73.75	49.55	92.48
TL	27.19	40.65	28.38	34.09	29.48	34.99	27.80	33.28	30.83	39.67
Earnings	1.69	6.39	1.96	6.06	0.67	6.54	1.19	3.80	2.28	9.95
AbPA	35.67	53.86	38.10	61.88	39.72	68.93	39.04	69.53	42.91	87.36
TLbPL	23.27	36.89	27.53	32.72	27.63	32.68	25.98	31.10	28.72	36.46
EbPC	1.94	6.51	2.14	6.28	0.81	6.71	1.43	4.15	2.53	10.33
PAssets	651.82	1184.86	704.71	1390.9	515.09	915.73	549.96	954.99	664.03	1254
PCosts	1.47	2.72	1.27	2.34	-0.59	1.70	1.18	2.58	1.30	2.67
PLiab	3.93	7.55	0.85	2.10	1.85	3.37	1.82	3.17	2.11	4.46
Bonds	186.61	359.36	219.21	525.03	191.78	362.22	204.19	364.12	258.11	476.3
Equity	419.70	767.85	431.83	860.09	273.86	544.38	295.21	594.98	345.23	817.0
RealEstate	12.93	64.71	14.82	74.89	11.58	40.26	9.20	32.20	11.77	43.98
OtherAssets	32.58	158.28	38.85	142.52	37.86	117.27	41.37	124.66	48.91	146.2
INT	0.42	0.70	0.41	0.69	0.42	0.66	0.42	0.65	0.43	0.73
SVC	0.19	0.28	0.16	0.28	0.15	0.27	0.14	0.28	0.14	0.32
RPLNA	0.73	1.47	0.59	1.21	-1.35	2.64	0.50	1.68	0.56	1.60
DEFRET	5.59	10.35	6.50	12.70	8.84	16.17	5.36	13.21	6.25	12.86
ATRANS	-5.45	10.03	-6.39	12.48	-8.75	15.87	-5.23	13.03	-6.09	12.68
AssetTurn	1.10	0.691	1.08	0.70	1.15	0.78	0.99	0.68	1.02	0.69
N	3191		883		854		827		1561	

[a]MVE	Fiscal year-end market value of common equity
TA	Total Assets
TL	Total Liabilities
Earnings	Income before extraordinary items
AbPA	Total assets before pension assets
TLbPL	Total liabilities before pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PAssets	Total pension assets
PCosts	Total pension costs
PLiab	Market value of firm's pension debt
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
INT	Pension interest costs
SVC	Pension service costs
RPLNA	Actual return on plan assets
DEFRET	Deferred return on plan assets
ATRANS	amortization of the transition asset
AssetTurn	Sales divided by total assets
N	Number of firm years

Table 2 Percentages of Classes of Pension Assets[b]

	2003-2006		2007		2008		2009		2010-11	
Variable	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Bonds	31.19	14.11	32.50	15.44	37.99	16.40	37.97	16.24	38.83	16.39
Equity	62.92	14.68	60.44	15.85	53.06	16.28	53.64	17.44	52.71	17.45
RealEstate	1.28	3.28	1.50	3.64	1.73	3.97	1.36	3.19	1.38	3.12
OtherAssets	4.60	10.67	5.57	12.58	5.22	14.64	7.02	14.03	7.09	13.80
N	3191		883		854		827		1561	

[b] Equity — Percentage of plan assets invested in equities
Bonds — Percentage of plan assets invested in bonds
RealEstate — Percentage of plan assets invested in real estate
OtherAssets — Percentage of plan assets not invested in equities, bonds, or real estate
N — Number of firm years

Figure 1

Percentages of Classes of Pension Assets

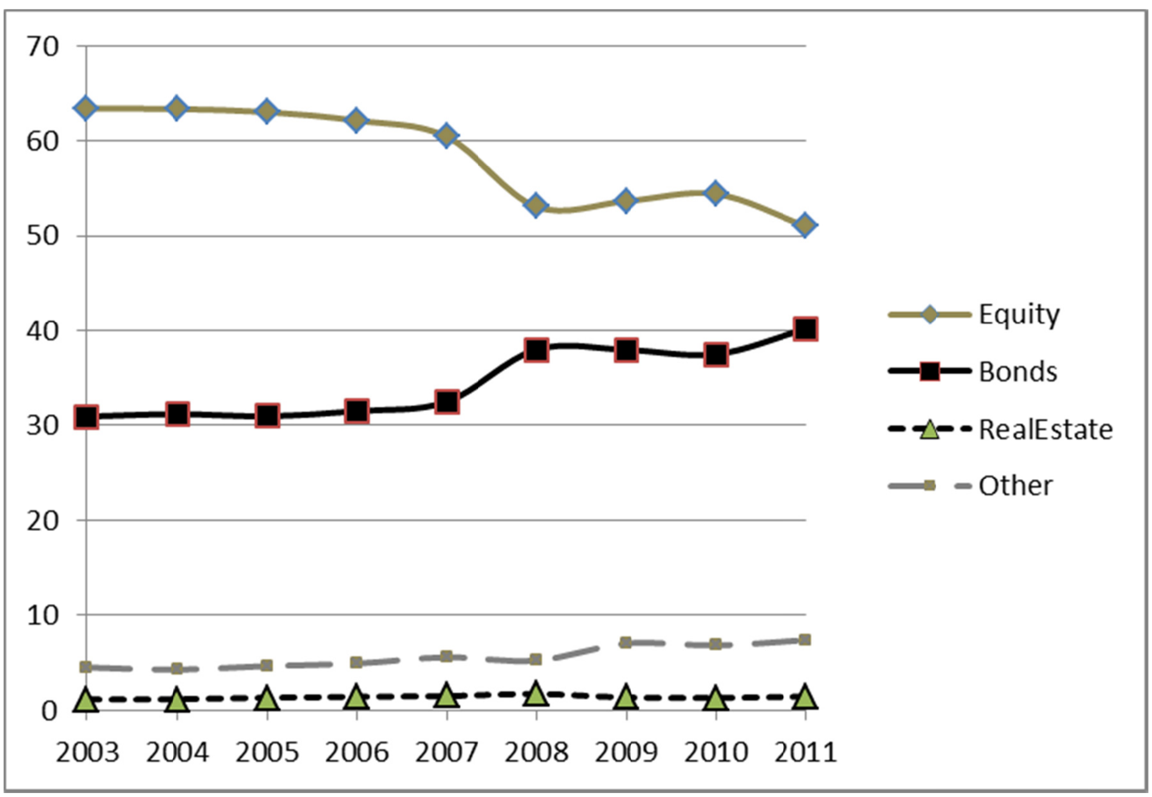

Table 3 Estimation of market value for 2003-2011, variables in per-share form (N=7316)[c]

$$MVE_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 TL_{it} + \beta_3 Earnings_{it} + \beta_4 AssetTurn_{it} + \beta_5 FinCrisis_{it} + \beta_6 Fin\_TA_{it} + \varepsilon \quad (7)$$

$$MVE_{it} = \beta_0 + \beta_1 AbPA_{it} + \beta_2 TLbPL_{it} + \beta_3 EbPC_{it} + \beta_4 PenAssets_{it} + \beta_5 PCosts + \beta_6 PLiab_{it} + \beta_7 AssetTurn_{it} + \beta_8 FinCrisis_{it} + \beta_9 Fin\_AbPA_{it} + \beta_{10} Fin\_PenAssets_{it} + \varepsilon \quad (8)$$

$$MVE_{it} = \beta_0 + \beta_1 AbPA_{it} + \beta_2 TLbPL_{it} + \beta_3 EbPC_i + \beta_4 Equity_{it} + \beta_5 Bonds_{it} + \beta_6 Real\ Estate_{it} + \beta_7 Other\ Assets_{it} + \beta_8 PLiab_{it} + \beta_9 SVC_{it} + \beta_{10} INT_{it} + \beta_{11} DEFRET_{it} + \beta_{12} RPLNA_{it} + \beta_{13} ATRANS_{it} + \beta_{14} AssetTurn_{it} + \beta_{15} FinCrisis_{it} + \beta_{16} Fin\_AbPA_{it} + \beta_{17} Fin\_Bonds_{it} + \beta_{18} Fin\_Equity_{it} + \beta_{19} Fin\_RealEstate_{it} + \beta_{20} Fin\_OtherAssets_{it} + \varepsilon \quad (9)$$

Variables	Model (7)	Model (8)	Model (9)
TA	0.688***		
TL	-0.610***		
Earnings	1.142***		
AbPA		0.671***	0.697***
TLbPL		-0.625***	-0.587***
EbPC		1.184***	1.151***
PAssets		0.011***	
PCosts		0.156**	
PLiab		-0.725***	-0.364***
Bonds			0.022***
RealEstate			0.078***
Equity			0.018***
OtherAssets			0.031***
INT			-25.040***
SVC			-2.117
RPLNA			0.491***
DEFRET			-0.853
ATRANS			-1.018
AssetTurn	2.342***	1.866**	3.101***
FinCrisis	-0.321	-0.215***	-1.125**
Fin_TA	-0.154***		
Fin_AbPA		-0.150***	-0.149***
Fin_PA		-0.001***	
Fin_Bonds			0.005**
Fin_Equity			0.004***
Fin_RealEstate			-0.014
Fin_OtherAssets			-0.005
Overall R^2	0.8780	0.8830	0.8701

*, **, *** Significance at .10, .05, .01.

Table 3 (cont.)

[c]MVE	Fiscal year-end market value of common equity
TA	Total Assets
TL	Total Liabilities
Earnings	Income before extraordinary items
AbPA	Total assets before pension assets
TLbPL	Total liabilities before pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PAssets	Total pension assets
PCosts	Total pension costs
PLiab	Market value of firm's pension debt
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
INT	Pension interest costs
SVC	Pension service costs
RPLNA	Actual return on plan assets
DEFRET	Deferred return on plan assets
ATRANS	Amortization of the transition asset
AssetTurn	Sales divided by total assets
FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_TA	Interaction between FinCrisis and Total assets
Fin_AbPA	Interaction between FinCrisis and Total assets before pension assets
Fin_PA	Interaction between FinCrisis and plan assets
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_Bonds	Interaction between FinCrisis and plan bonds invested in bonds
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
N	Number of firm years

Table 4 Estimation of market value for 2003-2011, variables in per-share form (N=7316)[d] to determine effect of various Financial Crisis periods on Asset classifications

$$MVE_{it} = \beta_0 + \beta_1\ AbPA_{it} + \beta_2\ TLbPL_{it} + \beta_3\ EbPC_i + \beta_4\ Equity_{it} + \beta_5\ Bonds_{it} + \beta_6\ Real\ Estate_{it} + \beta_7\ Other\ Assets_{it} + \beta_8\ SVC_{it} + \beta_9\ INT_{it} + \beta_{10}\ DEFRET_{it} + \beta_{11}\ RPLNA_{it} + \beta_{12}\ ATRANS_{it} + \beta_{13}\ PLiab_{it} + \beta_{14}\ AssetTurn_{it} + \beta_{15}\ FinCrisis_{it} + \beta_{16}\ Fin\_Equity_{it} + \beta_{17}\ Fin\_Bonds_{it} + \beta_{18}\ Fin\_RealEstate_{it} + \beta_{19}\ Fin\_OtherAssets_{it} + \beta_{20}\ Fin\_AbPA + \varepsilon \quad (9)$$

$$MVE_{it} = \beta_0 + \beta_1\ AbPA_{it} + \beta_2\ TLbPL_{it} + \beta_3\ EbPC_i + \beta_4\ Equity_{it} + \beta_5\ Bonds_{it} + \beta_6\ Real\ Estate_{it} + \beta_7\ Other\ Assets_{it} + \beta_8\ SVC_{it} + \beta_9\ INT_{it} + \beta_{10}\ DEFRET_{it} + \beta_{11}\ RPLNA_{it} + \beta_{12}\ ATRANS_{it} + \beta_{13}\ PLiab_{it} + \beta_{14}\ AssetTurn_{it} + \beta_{15}\ FinCrisis2_{it} + \beta_{16}\ Fin2\_Equity_{it} + \beta_{17}\ Fin2\_Bonds_{it} + \beta_{18}\ Fin2\_RealEstate_{it} + \beta_{19}\ Fin2\_OtherAssets_{it} + \beta_{20}\ Fin2\_AbPA + \varepsilon \quad (10)$$

$$MVE_{it} = \beta_0 + \beta_1\ AbPA_{it} + \beta_2\ TLbPL_{it} + \beta_3\ EbPC_i + \beta_4\ Equity_{it} + \beta_5\ Bonds_{it} + \beta_6\ Real\ Estate_{it} + \beta_7\ Other\ Assets_{it} + \beta_8\ SVC_{it} + \beta_9\ INT_{it} + \beta_{10}\ DEFRET_{it} + \beta_{11}\ RPLNA_{it} + \beta_{12}\ ATRANS_{it} + \beta_{13}\ PLiab_{it} + \beta_{14}\ AssetTurn_{it} + \beta_{15}\ FinCrisis2_{it} + \beta_{16}\ Fin2\_Equity_{it} + \beta_{17}\ Fin2\_Bonds_{it} + \beta_{18}\ Fin\_RealEstate_{it} + \beta_{19}\ Fin2\_OtherAssets_{it} + + \beta_{20}\ Fin2\_AbPA + \varepsilon \quad (11)$$

Variables	Model (9)	Model (10)	Model (11)
AbPA	0.697***	0.663***	0.701***
TLbPL	-0.587***	-0.549***	-0.592***
EbPC	1.151***	1.337***	1.125***
PLiab	-0.364***	-0.236***	-0.355***
Bonds	0.022***	0.022***	0.022***
RealEstate	0.078***	0.082***	0.073***
Equity	0.018***	0.019***	0.017***
OtherAssets	0.031***	0.033***	0.031***
INT	-25.040***	-29.304***	-24.578***
SVC	-2.117	-2.480	-1.543
RPLNA	0.491***	0.820***	-0.521***
DEFRET	-0.853	0.684	-0.662
ATRANS	-1.018	0.505	-0.823
AssetTurn	3.101***	2.800***	3.066***
FinCrisis	-1.125**		
AbPA_Fin	-0.149***		
AbPA_Fin2		-0.109***	-0.157***
Fin_Bonds	0.005**		0.004*
Fin_Equity	0.004***		0.003*
Fin_RealEstate	-0.014		
Fin_Other Assets	-0.005		-0.008*
FinCrisis2		0.223	0.912***
Fin2_Bonds		0.005**	
Fin2_Equity		0.005***	
Fin2_RealEstate		-0.015	0.005
Fin2_Other Assets		-0.002	
Overall R^2	0.8701	0.8671	0.8705

*, **, *** Significance at .10, .05, .01.

Table 4 (cont.)

[d]MVE	Fiscal year-end market value of common equity
AbPA	Total assets before pension assets
TLbPL	Total liabilities before pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PAssets	Total pension assets
PCosts	Total pension costs
PLiab	Market value of firm's pension debt
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
INT	Pension interest costs
SVC	Pension service costs
RPLNA	Actual return on plan assets
DEFRET	Deferred return on plan assets
ATRANS	amortization of the transition asset
AssetTurn	Sales divided by total assets
FinCrisis	if year = 2008-09, 1; 0 otherwise
Fin_AbPA	Interaction between FinCrisis and total assets before plan assets
FinCrisis_Equity	Interaction between FinCrisis and plan assets invested in equities
FinCrisis_Bonds	Interaction between FinCrisis and plan bonds invested in bonds
FinCrisis_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
FinCrisis_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
FinCrisis2	1 for years 2007-2009; 0 otherwise
Fin2_AbPA	Interaction between FinCrisis2 and total assets before plan assets
FinCrisis2_Equity	Interaction between FinCrisis2 and plan assets invested in equities
FinCrisis2_Bonds	Interaction between FinCrisis2 and plan bonds invested in bonds
FinCrisis2_RealEstate	Interaction between FinCrisis2 and plan assets invested in real estate
FinCrisis2_OtherAssets	Interaction between FinCrisis2 and plan assets not invested in equities, bonds, or real estate

Table 5 Estimation of market value for 2003-2011, variables in per-share form (N=6093)[e] to determine effect of various Financial Crisis periods on Asset classifications; Firms with positive earnings only

$$MVE_{it} = \beta_0 + \beta_1\ AbPA_{it} + \beta_2\ TLbPL_{it} + \beta_3\ EbPC_i + \beta_4\ Equity_{it} + \beta_5\ Bonds_{it} + \beta_6\ Real\ Estate_{it} + \beta_7\ Other\ Assets_{it} + \beta_8\ SVC_{it} + \beta_9\ INT_{it} + \beta_{10}\ DEFRET_{it} + \beta_{11}\ RPLNA_{it} + \beta_{12}\ ATRANS_{it} + \beta_{13}\ PLiab_{it} + \beta_{14}\ AssetTurn_{it} + \beta_{15}\ FinCrisis_{it} + \beta_{16}\ FinCrisis\_Equity_{it} + \beta_{17}\ FinCrisis\_Bonds_{it} + \beta_{18}\ FinCrisis\_RealEstate_{it} + \beta_{19}\ FinCrisis\_OtherAssets_{it} + \beta_{20}\ Fin\_AbPA + \varepsilon \quad (9)$$

Variables	Model (9) with positive earnings
AbPA	0.591***
TLbPL	-0.485***
EbPC	3.041***
PLiab	-0.137**
Bonds	0.028***
RealEstate	0.062***
Equity	0.029***
OtherAssets	0.036***
INT	-46.572***
SVC	-5.135**
RPLNA	0.282
DEFRET	1.277
ATRANS	1.285
AssetTurn	0.126
FinCrisis	-5.727***
Fin_AbPA	-0.037***
Fin_Bonds	0.009***
Fin_Equity	0.004*
Fin_RealEstate	0.012
Fin_Other Assets	0.002
Overall R^2	0.9125

*, **, *** Significance at .10, .05, .01.

Table 5(cont.)

[e]MVE	Fiscal year-end market value of common equity
AbPA	Total assets before pension assets
TLbPL	Total liabilities before pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PAssets	Total pension assets
PCosts	Total pension costs
PLiab	Market value of firm's pension debt
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
INT	Pension interest costs
SVC	Pension service costs
RPLNA	Actual return on plan assets
DEFRET	Deferred return on plan assets
ATRANS	amortization of the transition asset
AssetTurn	Sales divided by total assets
FinCrisis	if year = 2008-09, 1; 0 otherwise
Fin_AbPA	Interaction between FinCrisis and Total assets before pension assets
Fin_Bonds	Interaction between FinCrisis and plan bonds invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate

Table 6 Estimation of market value for 2003-2011, variables in per-share form to determine the effect of SFAS 158 (N = 2272 for 2003-2005 and N = 5044 for 2006-2011)[f]

$$MVE_{it} = \beta_0 + \beta_1 AbPA_{it} + \beta_2 TLbPL_{it} + \beta_3 EbPC_i + \beta_4 Equity_{it} + \beta_5 Bonds_{it} + \beta_6 Real\ Estate_{it} + \beta_7 Other\ Assets_{it} + \beta_8 PLiab_{it} + \beta_9 SVC_{it} + \beta_{10} INT_{it} + \beta_{11} DEFRET_{it} + \beta_{12} RPLNA_{it} + \beta_{13} ATRANS_{it} + \beta_{14} AssetTurn_{it} + \beta_{15} FinCrisis_{it} + \beta_{16} Fin\_AbPA_{it} + \beta_{17} Fin\_Bonds_{it} + \beta_{18} Fin\_Equity_{it} + \beta_{19} Fin\_RealEstate_{it} + \beta_{20} Fin\_OtherAssets_{it} + \varepsilon \quad (9)$$

Variable[16]	AbPA	TLpPL	EbPC	Bonds	Equity	RealEstate	OtherAssets	PLiab	INT	SVC	RPLNA
Pre SFAS 158 2003-05	1.419***	-1.298***	0.723***	-0.001	0.026***	0.031*	0.015**	0.031	-15.810***	9.386*	-1.672**
Post SFAS 158 2006-2011	0.471***	-0.149***	1.167***	0.016***	0.011***	0.061***	0.027***	-0.945***	-21.235***	-5.568*	0.040**
Difference	-0.948	1.149	0.444	0.017	-0.015	0.030	0.012	-0.976	-5.425	-14.954	1.712
F (1, 6094)	44.03	71.92	47.60	19.25	12.48	4.81	0.29	5.47	11.28	0.08	2.19
Prob>F	0.000	0.000	0.000	0.000	0.000	0.0004	0.590	0.019	0.0008	0.774	0.139

Overall $R^2 = 0.8187$

Variable	DEFRET	ATRANS	AssetTurn	FinCrisis	Fin_AbPA	Fin_Bonds	Fin_Equity	Fin_RealEstate	Fin_OtherAssets
Pre SFAS 158 2003-05	2.281	3.342*	7.010***						
Post SFAS 158 2006-2011	-1.477*	-1.582*	2.846***	-0.992*	0.003	0.003	0.005***	-0.18	-0.003
Difference[17]	-3.758	-4.924	-4.164	-	-	-	-	-	-
F (1, 6094)	0.02	0.41	2.21	9.08	538.0	0.74	8.83	1.55	1.12
Prob>F	0.521	0.521	0.0132	0.003	0.000	0.391	0.003	0.214	0.290

Overall $R^2 = .8558$

[16] *, **, *** Significance at 0.10, 0.05, 0.01

[17] For the variables FinCrisis, Fin_AbPA, Fin_Bonds, Fin_Equity, Fin_RealEstate, and Fin_Other Assets, I am testing if these coefficients are equal to zero.

Table 6 (cont.)

H_0: $\beta_0 = \beta_1 = \ldots\ldots = \beta_{20} = 0$	H_0: AbPA1 = AbPA2 & TLbPL2 = TLbPL1…..& AssetTurn2 = AssetTurn1& Fin2Crisis= 0 &….Fin2_OtherAssets = 0[18]
$F(34, 6094) = 253.98$	$F(20, 6094) = 56.48$
Prob>F = 0.000	Prob>F = 0.000

[f]MVE	Fiscal year-end market value of common equity
AbPA	Total assets before pension assets
TLbPL	Total liabilities before pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PLiab	Market value of firm's pension debt
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
INT	Pension interest costs
SVC	Pension service costs
RPLNA	Actual return on plan assets
DEFRET	Deferred return on plan assets
ATRANS	Amortization of the transition asset
AssetTurn	Sales divided by total assets
FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_TA	Interaction between FinCrisis and Total assets
Fin_AbPA	Interaction between FinCrisis and Total assets before pension assets
Fin_PA	Interaction between FinCrisis and plan assets
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_Bonds	Interaction between FinCrisis and plan bonds invested in bonds
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
N	Number of firm years

[18] AbPA1 is the coefficient for AbPA in pre-SFAS 158 period, AbPA2 is the coefficient for AbPA in post-SFAS 158 period, etc. and Fin2Crisis is the coefficient for FinCrisis in the post –SFAS 158 period, etc.

Table 7 Descriptive statistics (scaled by total assets); 2004-2011[a]
N=6056

Variable	Mean	St. dev.	Variable	Mean	St. dev.
MVE_t	1.115	0.996	$DEFRET_{t-1}$	0.143	0.190
MVE_{t-1}	1.039	0.864	$RPLNA_{t-1}$	0.010	0.028
NPE_{t-1}	0.488	0.267	$ATRANS_{t-1}$	-0.140	0.188
$EbPC_{t-1}$	0.046	0.090	ACC	0.041	0.092
PA_{t-1}	14.506	15.357	$ChAR_{t-1}$	0.006	0.048
$Bonds_{t-1}$	4.695	5.706	$ChINV_{t-1}$	0.005	0.035
$Equity_{t-1}$	8.755	9.627	$ChAP_{t-1}$	0.004	0.033
$RealEstate_{t-1}$	0.250	0.845	$DEPAMOR_{t-1}$	0.042	0.023
$OtherAssets_{t-1}$	0.806	2.641	$OtherACC_{t-1}$	0.076	0.978
$PLiab_{t-1}$	0.066	0.098	$AssetTurn_{t-1}$	0.059	0.221
PC_{t-1}	0.026	0.026			
SVC_{t-1}	0.004	0.004	DA_{t-1}	-6.76 e-06	0.0004
INT_{t-1}	0.010	0.010	NDA_{t-1}	-0.0002	0.003

[a]MVE Fiscal year-end market value of common equity at time t or t-1
NPE Owner's equity plus net pension liabilities
EbPC Earnings before extraordinary items before pension costs
PA Pension assets: Equity + Bonds + RealEstate + OtherAssets
Equity Pension assets invested in equities
Bonds Pension assets invested in bonds
RealEstate Pension assets invested in real estate
OtherAssets Pension assets not invested in equities, bonds, or real estate
PLiab Market value of firm's pension debt
PC Pension costs: SVC + INT + DEFRET + RPLNA + ATRANS
SVC Pension service costs
INT Pension interest costs
DEFRET Deferred return on plan assets
RPLNA Actual return on plan assets
ATRANS Amortization of the transition asset
ACC Accruals: NI before extraordinary items less operating cash flows before extraordinary items and deprivation/amortization.
ChAR Change in accounts receivable
ChINV Change in inventories
ChAP Change in accounts payable
DEPAMOR Depreciation and amortization expense
OtherACC Other accruals: ACC – (ChAR + ChINV – ChAP +DEPAMOR)
AssetTurn Sales divided by total asset
NDA Non-discretionary accruals using the Modified Jones model
DA Discretionary accruals calculated using the Modified Jones model
N Number of firm years

Table 8
Mean Percentage of plan assets invested in various classes of Assets (2004-2011)[b]

Year	Variable	Mean	St.Dev.	Year	Variable	Mean	St.Dev.
2004	Bonds	30.855	13.128	2008	Bonds	32.106	14.824
N = 502	Equity	63.695	14.136	N = 817	Equity	60.684	15.225
	RealEstate	1.112	2.666		RealEstate	1.505	3.687
	Other Assets	4.338	11.255		Other Assets	5.706	12.855
2005	Bonds	31.149	13.456	2009	Bonds	38.091	16.495
N = 769	Equity	63.459	14.272	N = 797	Equity	53.018	16.361
	RealEstate	1.107	3.193		RealEstate	1.698	3.919
	Other Assets	4.285	10.319		Other Assets	7.194	14.811
2006	Bonds	31.116	14.147	2010	Bonds	37.929	15.957
N = 848	Equity	62.958	14.518	N = 773	Equity	53.676	17.224
	RealEstate	1.341	3.456		RealEstate	1.370	3.218
	Other Assets	4.585	10.307		Other Assets	7.025	14.123
2007	Bonds	31.399	14.896	2011	Bonds	37.492	16.013
N = 819	Equity	62.167	15.348	N = 731	Equity	54.389	16.954
	RealEstate	1.443	3.582		RealEstate	1.288	3.075
	Other Assets	4.991	11.323		Other Assets	6.831	13.870

[b]Bonds Percentage of pension assets invested in bonds
Equity Percentage of pension assets invested in equities
RealEstate Percentage of pension assets invested in real estate
Other Assets Percentage of pension assets not invested in bonds, equities and real estate

Figure 2 Mean Percentage of plan assets invested in various classes of Assets (2003-2010)

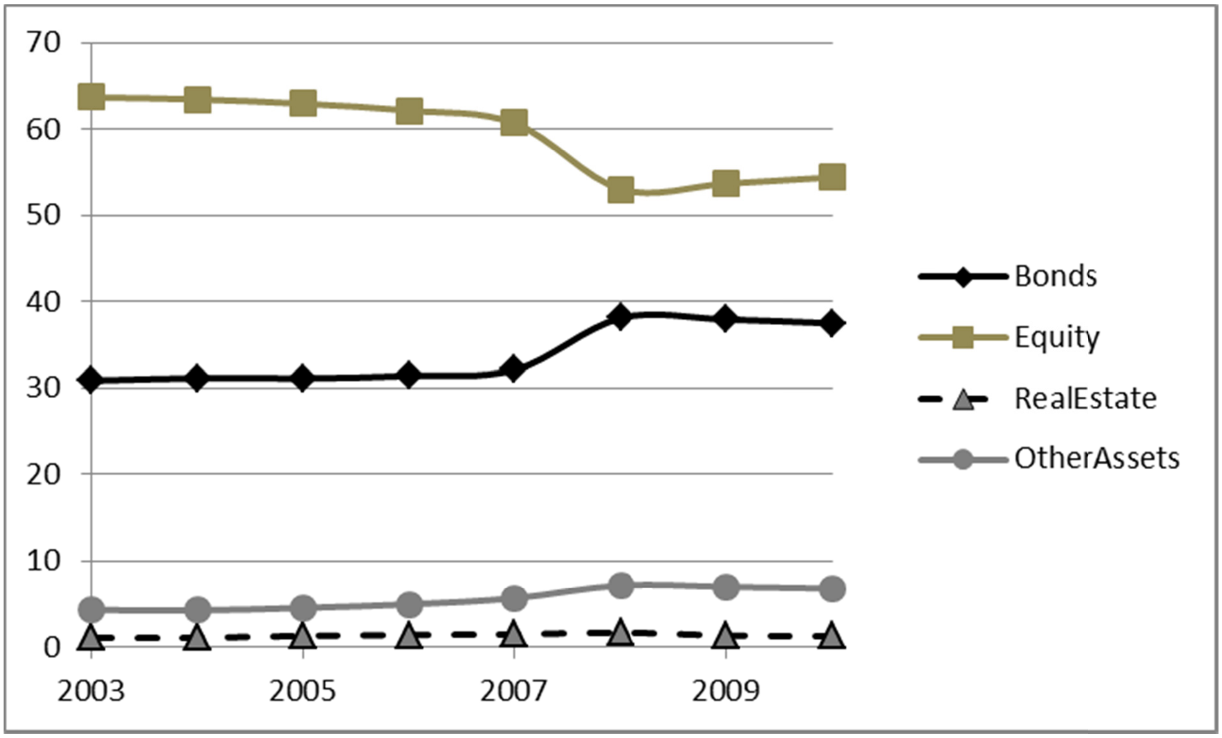

Table 9
Estimation of market value for 2003-2011, scaled by total assets (N=6056)[c]

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 PA_{t-1} + \beta_4 PC_{t-1} + \beta_5 PLiab_{t-1} + \beta_6 ACC_{t-1} + \beta_7 AssetTurn_{t-1} + \beta_8 FinCrisis_{t-1} + \beta_{11} Fin\_PA_{t-1} + \beta_{12} Fin\_PC_{t-1} + \beta_{13} Fin\_ACC_{t-1} + \varepsilon \quad (12)$$

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 Bonds_{t-1} + \beta_4 Equity_{t-1} + \beta_5 RealEstate_{t-1} + \beta_6 OtherAssets_{t-1} + \beta_7 SVC_{t-1} + \beta_8 INT_{t-1} + \beta_9 DEFRET_{t-1} + \beta_{10} RPLNA_{t-1} + \beta_{11} ATRANS_{t-1} + \beta_{12} PLiab_{t-1} + \beta_{13} ChAR_{t-1} + \beta_{14} ChINV_{t-1} + \beta_{15} ChAP_{t-1} + \beta_{16} DEPAMOR_{t-1} + \beta_{17} OtherACC_{t-1} + \beta_{18} AssetTurn_{t-1} + \beta_{19} FinCrisis_{t-1} + \beta_{20} Fin\_Bonds_{t-1} + \beta_{21} Fin\_Equity_{t-1} + \beta_{22} Fin\_RealEstate_{t-1} + \beta_{23} Fin\_OtherAssets_{t-1} + \beta_{24} Fin\_SVC_{t-1} + \beta_{25} Fin\_INT_{t-1} + \beta_{26} Fin\_DEFRET_{t-1} + \beta_{27} Fin\_RPLNA_{t-1} + \beta_{28} Fin\_ATRANS_{t-1} + \beta_{29} Fin\_ChAR_{t-1} + \beta_{30} Fin\_ChINV_{t-1} + \beta_{31} Fin\_ChAP_{t-1} + \beta_{32} Fin\_DEPAMOR_{t-1} + \beta_{33} Fin\_OtherACC_{t-1} + \varepsilon \quad (13)$$

Variable	Model 12	Model 13
NPE_{t-1}	0.641***	0.760***
$EbPC_{t-1}$	1.598***	1.521***
PA_{t-1}	0.004	
$Bonds_{t-1}$		-0.002
$Equity_{t-1}$		0.008*
$RealEstate_{t-1}$		0.027
$OtherAssets_{t-1}$		0.005
$PLiab_{t-1}$	-0.149	-0.562***
PC_{t-1}	0.727	
SVC_{t-1}		14.040***
INT_{t-1}		2.197
$DEFRET_{t-1}$		2.501
$RPLNA_{t-1}$		0.361
$ATRANS_{t-1}$		2.614
ACC	0.843**	
$ChAR_{t-1}$		2.743***
$ChINV_{t-1}$		0.457
$ChAP_{t-1}$		-1.911***
$DEPAMOR_{t-1}$		2.197**
$OtherACC_{t-1}$		0.854**
$AssetTurn_{t-1}$	0.266***	0.187***
FinCrisis	-0.188***	-0.248***
Fin_PA	0.006***	
Fin_Bonds		-0.006
Fin_Equity		-0.019***
Fin_RealEstate		-0.006*
Fin_OtherAssets		-0.009
Fin_PC	-1.168	
Fin_SVC		-8.610*

Table 9 (cont.)

Variable	Model 12	Model 13
Fin_INT		32.547***
Fin_DEFRET		-3.198
Fin_RPLNA		-0.013
Fin_ATRANS		-3.204
Fin_ACC	-2.843***	
Fin_ChAR		-5.558***
Fin_ChINV		-5.558***
Fin_ChAP		4.701***
Fin_DEPAMOR		3.348***
Fin_Oth		2.401***
Adjusted R^2	0.1745	0.2032

[c]

MVE	Fiscal year-end market value of common equity at time t or t-1
NPE	Owner's equity plus net pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PA	Pension assets: Equity + Bonds + RealEstate + OtherAssets
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
PLiab	Market value of firm's pension debt
PC	Pension costs: SVC + INT + DEFRET + RPLNA + ATRANS
SVC	Pension service costs
INT	Pension interest costs
DEFRET	Deferred return on plan assets
RPLNA	Actual return on plan assets
ATRANS	Amortization of the transition asset
ACC	Accruals: NI before extraordinary items less operating cash flows before extraordinary items and deprivation/amortization.
ChAR	Change in accounts receivable
ChINV	Change in inventories
ChAP	Change in accounts payable
DEPAMOR	Depreciation and amortization expense
OtherACC	Other accruals: ACC – (ChAR + ChINV – ChAP +DEPAMOR)
AssetTurn	Sales divided by total asset
FinCrisis	1 for years 2007, 2008, 2009, 0 otherwise
Fin_PA	Interaction between FinCrisis and PA
Fin_Bonds	Interaction between FinCrisis and Bonds
Fin_Equity	Interaction between FinCrisis and Equity
Fin_RealEstate	Interaction between FinCrisis and RealEstate
Fin_OtherAssets	Interaction between FinCrisis and OtherAssets
Fin_PLiab	Interaction between FinCrisis and PLiab
Fin_PC	Interaction between FinCrisis and PC
Fin_SVC	Interaction between FinCrisis and SVC
Fin_INT	Interaction between FinCrisis and INT
Fin_DEFRET	Interaction between FinCrisis and DEFRET
Fin_RPLNA	Interaction between FinCrisis and RPLNA
Fin_ATRANS	Interaction between FinCrisis and ATRANS

Table 9 (cont.)

Fin_ACC	Interaction between FinCrisis and ACC
Fin_ChAR	Interaction between FinCrisis and ChAR
Fin_ChINV	Interaction between FinCrisis and ChINV
Fin_ChAP	Interaction between FinCrisis and ChAP
Fin_DEPAMOR	Interaction between FinCrisis and DEPAMOR
Fin_OtherACC	Interaction between FinCrisis and OtherACC
Fin_AssetTurn	Interaction between FinCrisis and AssetTurn
N	Number of firm years

Table 10
Estimation of market value for 2003-2011, scaled by Total Assets to determine the effect of SFAS 158 (N = 1271 for 2004-2005 and N = 3937 for 2007-2011)[d]

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 Bonds_{t-1} + \beta_4 Equity_{t-1} + \beta_5 RealEstate_{t-1} + \beta_6 OtherAssets_{t-1} + \beta_7 SVC_{t-1} + \beta_8 INT_{t-1} + \beta_9 DEFRET_{t-1} + \beta_{10} RPLNA_{t-1} + \beta_{11} ATRANS_{t-1} + \beta_{12} PLiab_{t-1} + \beta_{13} ChAR_{t-1} + \beta_{14} ChINV_{t-1} + \beta_{15} ChAP_{t-1} + \beta_{16} DEPAMOR_{t-1} + \beta_{17} OtherACC_{t-1} + \beta_{18} AssetTurn_{t-1} + \beta_{19} FinCrisis_{t-1} + \beta_{20} Fin\_Bonds_{t-1} + \beta_{21} Fin\_Equity_{t-1} + \beta_{22} Fin\_RealEstate_{t-1} + \beta_{23} Fin\_OtherAssets_{t-1} + \beta_{24} Fin\_SVC_{t-1} + \beta_{25} Fin\_INT_{t-1} + \beta_{26} Fin\_DEFRET_{t-1} + \beta_{27} Fin\_RPLNA_{t-1} + \beta_{28} Fin\_ATRANS_{t-1} + \beta_{29} Fin\_ChAR_{t-1} + \beta_{30} Fin\_ChINV_{t-1} + \beta_{31} Fin\_ChAP_{t-1} + \beta_{32} Fin\_DEPAMOR_{t-1} + \beta_{33} Fin\_OtherACC_{t-1} + \varepsilon \quad (13)$$

Variable[19]	NPE	EbPC	Bonds	Equity	RealEstate	OtherAssets	SVC	INT	RPLNA	DEFRET	ATRANS
Pre SFAS 158 2004-05	0.924***	3.427***	0.010	0.014	0.049*	0.015	9.318	-2.699	3.353	4.239	6.245*
Post SFAS 158 2007-2011	0.758***	0.782*	-0.001	0.012*	0.016	0.006	18.496***	5.812	-4.116	-1.008	-1.111
Difference	-0.166	-2.645	-0.011	-0.002	-0.033	-0.009	9.178	8.511	-7.469	-5.247	-7.356
F (1, 4072)	3.40	7.91	0.75	0.04	1.28	0.51	1.41	0.60	5.06	0.79	1.52
Prob>F	0.065	0.005	0.386	0.834	0.258	0.475	0.236	.439	0.025	0.375	0.218

Variable	PLiab	ChAR	ChINV	ChAP	DEPAMOR	OtherACC	AssetTurn	FinCrisis	Fin_Bonds	Fin_Equity
Pre SFAS 158 2004-05	-0.383	1.778*	-1.312	0.056	3.055**	0.024	-0.025			
Post SFAS 158 2007-2011	0.316	3.663***	1.564**	-3.388***	2.185*	0.894**	0.352***	-0.179***	-0.007	-0.022***
Difference[20]	0.699	1.885	2.876	-3.444	-0.870	0.870	0.377			
F (1, 4072)	0.84	2.34	5.55	5.50	0.40	0.92	15.84	17.07	0.77	11.18
Prob>F	0.360	0.127	0.019	0.019	0.527	0.338	0.000	0.000	0.381	0.001

[19] *, **, *** Significance at 0.10, 0.05, 0.01

[20] For the variables FinCrisis, Fin_XXX, I am testing if these coefficients are equal to zero.

Table 10 (cont.)

Variable	Fin_RealEstate	Fin_OtherAssets	Fin_SVC	Fin_INT	Fin_DEFRET	Fin_RPLNA	Fin_ATRANS	Fin_ChAR	Fin_ChINV
Post SFAS 158 2007-2011	-0.036	-0.001	-6.997	22.676***	0.593	4.627***	0.786	-5.799***	-3.683***
F (1, 4911)[21]	2.238	0.88	1.38	10.20	0.01	2.91	0.02	66.19	28.98
Prob>F	0.123	0.349	0.240	0.001	0.909	0.088	0.880	0.000	0.000

Variable	Fin_ChAP	Fin_DEPAMOR	Fin_OtherACC
Post SFAS 158 2007-2011	5.512***	2.938***	-1.744***
F (1, 4911)[22]	35.36	13.43	52.18
Prob>F	0.000	0.000	0.000

Adjusted R^2
Pre-SFAS 158: 0.0672
Post-SFAS 158: .2252

H_0: $\beta_0 = \beta_1 = \ldots\ldots = \beta_{33} = 0$
F (52, 4077) = 21.72
Prob > F = 0.0000

H_0: NPE1 = NPE2 & EbPC2 = EbPC1…..& AssetTurn2 = AssetTurn1& Fin2Crisis= 0 &….Fin2_OtherAssets = 0[23]
F (33, 4077) = 18.64
Prob>F = 0.000

[21] For the variables Fin_XXX, I am testing if these coefficients are equal to zero.

[22] For the variables Fin_XXX, I am testing if these coefficients are equal to zero.

[23] NPE1 is the coefficient for NPE in pre-SFAS 158 period, NPE2 is the coefficient for NPE in post-SFAS 158 period, etc. and Fin2Crisis is the coefficient for FinCrisis in the post–SFAS 158 period, etc.

Table 10 (cont.)

[c] MVE	Fiscal year-end market value of common equity at time t or t-1	FinCrisis	1 for years 2007, 2008, 2009, 0 otherwise
NPE	Owner's equity plus net pension liabilities	Fin_Bonds	Interaction between FinCrisis and Bonds
EbPC	Earnings before extraordinary items before pension costs	Fin_Equity	Interaction between FinCrisis and Equity
Bonds	Pension assets invested in bonds	Fin_RealEstate	Interaction between FinCrisis and RealEstate
Equity	Pension assets invested in equities	Fin_OtherAssets	Interaction between FinCrisis and OtherAssets
Table 10 (cont.)			
RealEstate	Pension assets invested in real estate	Fin_PLiab	Interaction between FinCrisis and PLiab
OtherAssets	Pension assets not invested in equities, bonds, or real estate	Fin_SVC	Interaction between FinCrisis and SVC
PLiab	Market value of firm's pension debt	Fin_INT	Interaction between FinCrisis and INT
SVC	Pension service costs	Fin_DEFRET	Interaction between FinCrisis and DEFRET
INT	Pension interest costs	Fin_RPLNA	Interaction between FinCrisis and RPLNA
DEFRET	Deferred return on plan assets	Fin_ATRANS	Interaction between FinCrisis and ATRANS
RPLNA	Actual return on plan assets	Fin_ChAR	Interaction between FinCrisis and ChAR
ATRANS	Amortization of the transition asset	Fin_ChINV	Interaction between FinCrisis and ChINV
ChAR	Change in accounts receivable	Fin_ChAP	Interaction between FinCrisis and ChAP
ChINV	Change in inventories	Fin_DEPAMOR	Interaction between FinCrisis and DEPAMOR
ChAP	Change in accounts payable	Fin_OtherACC	Interaction between FinCrisis and OtherACC
DEPAMOR	Depreciation and amortization expense	Fin_AssetTurn	Interaction between FinCrisis and AssetTurn
OtherACC	Other accruals: ACC – (ChAR + ChINV – ChAP +DEPAMOR)	N	Number of firm years
AssetTurn	Sales divided by total asset		

Table 11
Estimation of market value for 2003-2011, scaled by total assets (N=6056)[e]

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_3 PA_{t-1} + \beta_4 PC_{t-1} + \beta_5 PLiab_{t-1} + \beta_6 DA_{t-1} + \beta_7 NDA_{t-1} + \beta_8 AssetTurn_{t-1} + \beta_9 FinCrisis_{t-1} + \beta_{10} Fin\_PA_{t-1} + \beta_{11} Fin\_PC_{t-1} + \beta_{12} Fin\_DA_{t-1} + \beta_{13} Fin\_NDA_{t-1} + \varepsilon \quad (14)$$

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_2 Bonds_{t-1} + \beta_3 Equity_{t-1} + \beta_4 Real\ Estate_{t-1} + \beta_5 Other\ Assets_{t-1} + \beta_6 SVC_{t-1} + \beta_7 INT_{t-1} + \beta_8 DEFRET_{t-1} + \beta_9 RPLNA_{t-1} + \beta_{10} ATRANS_{t-1} + \beta_{11} PLiab_{t-1} + \beta_{12} DA_{t-1} + \beta_{13} NDA_{t-1} + \beta_{14} AssetTurn_{t-1} + \beta_{15} FinCrisis_{t-1} + \beta_{16} Fin\_Bonds_{t-1} + \beta_{17} Fin\_Equity_{t-1} + \beta_{18} Fin\_RealEstate_{t-1} + \beta_{19} Fin\_OtherAssets_{t-1} + \beta_{20} Fin\_SVC_{t-1} + \beta_{21} Fin\_INT_{t-1} + \beta_{22} Fin\_DEFRET_{t-1} + \beta_{23} Fin\_RPLNA_{t-1} + \beta_{24} Fin\_ATRANS_{t-1} + \beta_{25} Fin\_DA_{t-1} + \beta_{26} Fin\_NDA_{t-1} + \varepsilon \quad (15)$$

Variables	Model (3)	Model (4)
NPE	0.675***	0.812***
EbPC	0.510***	0.508***
PA	0.007***	
Bonds		-0.002
Equity		0.012**
RealEstate		0.025
OtherAssets		0.006
PC	0.252	
SVC		16.371***
INT		6.243
DEFRET		1.908
RPLNA		-0.216
ATRANS		2.059
PLiab	-0.283**	-0.759***
DA	35.393	36.188*
NDA	0.006	0.001
AssetTurn	0.284***	0.189***
FinCrisis	-0.308***	-0.314***
Fin_PA	0.005**	
Fin_Bonds		-0.008
Fin_Equity		-0.028***
Fin_RealEstate		-0.040**
Fin_OtherAssets		-0.015*
Fin_PC	-1.028	
Fin_SVC		-15.189***
Fin_INT		40.752***
Fin_DEFRET		-1.777
Fin_RPLNA		0.573
Fin_ATRANS		-1.806
Fin_DA	79.692*	87.941*
Fin_NDA	-1.718***	-1.472***
Overall R^2	0.1432	0.1648

Table 11 (cont.)

[e] MVE	Fiscal year-end market value of common equity at time t or t-1
NPE	Owner's equity plus net pension liabilities
EbPC	Earnings before extraordinary items before pension costs
PA	Pension assets: Equity + Bonds + RealEstate + OtherAssets
Equity	Pension assets invested in equities
Bonds	Pension assets invested in bonds
RealEstate	Pension assets invested in real estate
OtherAssets	Pension assets not invested in equities, bonds, or real estate
PLiab	Market value of firm's pension debt
PC	Pension costs: SVC + INT + DEFRET + RPLNA + ATRANS
SVC	Pension service costs
INT	Pension interest costs
DEFRET	Deferred return on plan assets
RPLNA	Actual return on plan assets
ATRANS	Amortization of the transition asset
NDA	Non-discretionary accruals using the Modified Jones model
DA	Discretionary accruals calculated using the Modified Jones model
AssetTurn	Sales divided by total asset
FinCrisis	1 for years 2007, 2008, 2009, 0 otherwise
Fin_PA	Interaction between FinCrisis and PA
Fin_Bonds	Interaction between FinCrisis and Bonds
Fin_Equity	Interaction between FinCrisis and Equity
Fin_RealEstate	Interaction between FinCrisis and RealEstate
Fin_OtherAssets	Interaction between FinCrisis and OtherAssets
Fin_PLiab	Interaction between FinCrisis and PLiab
Fin_PC	Interaction between FinCrisis and PC
Fin_SVC	Interaction between FinCrisis and SVC
Fin_INT	Interaction between FinCrisis and INT
Fin_DEFRET	Interaction between FinCrisis and DEFRET
Fin_RPLNA	Interaction between FinCrisis and RPLNA
Fin_ATRANS	Interaction between FinCrisis and ATRANS
Fin_DA	Interaction between FinCrisis and DA
Fin_NDA	Interaction between FinCrisis and NDA
Fin_AssetTurn	Interaction between FinCrisis and AssetTurn
N	Number of firm years

Table 12
Estimation of market value for 2003-2011, scaled by Total Assets to determine the effect of SFAS 158 (N = 1271 for 2004-2005 and N = 3937 for 2007-2011)[f]

$$MVE_t = \beta_0 + \beta_1 NPE_{t-1} + \beta_2 EbPC_{t-1} + \beta_2 Bonds_{t-1} + \beta_3 Equity_{t-1} + \beta_4 Real\ Estate_{t-1} + \beta_5 Other\ Assets_{t-1} + \beta_6 SVC_{t-1} + \beta_7 INT_{t-1} + \beta_8 DEFRET_{t-1} + \beta_9 RPLNA_{t-1} + \beta_{10} ATRANS_{t-1} + \beta_{11} PLiab_{t-1} + \beta_{12} DA_{t-1} + \beta_{13} NDA_{t-1} + \beta_{14} AssetTurn_{t-1} + \beta_{15} FinCrisis_{t-1} + \beta_{16} Fin\_Bonds_{t-1} + \beta_{17} Fin\_Equity_{t-1} + \beta_{18} Fin\_RealEstate_{t-1} + \beta_{19} Fin\_OtherAssets_{t-1} + \beta_{20} Fin\_SVC_{t-1} + \beta_{21} Fin\_INT_{t-1} + \beta_{22} Fin\_DEFRET_{t-1} + \beta_{23} Fin\_RPLNA_{t-1} + \beta_{24} Fin\_ATRANS_{t-1} + \beta_{25} Fin\_DA_{t-1} + \beta_{26} Fin\_NDA_{t-1} + \varepsilon \quad (15)$$

Variable[24]	NPE	EbPC	Bonds	Equity	RealEstate	OtherAssets	SVC	INT	RPLNA	DEFRET	ATRANS
Pre SFAS 158 2004-05	0.971***	3.034***	0.008	0.013	0.049*	0.014	6.159	4.955	3.003	4.040	6.016*
Post SFAS 158 2007-2011	0.796***	-0.008	-0.001	0.014**	0.011	0.007	21.345***	9.396	-4.241	-0.167	-0.214
Difference	-0.175	-3.042	-0.009	0.001	-0.038	-0.007	15.186	4.441	-7.244	-4.207	-6.230
F (1, 4081)	3.62	124.48	0.60	0.00	1.74	0.26	3.97	0.16	4.68	0.51	1.10
Prob>F	0.057	0.000	0.440	0.954	0.187	0.613	0.047	0.688	0.031	0.474	0.293

Variable	PLiab	DA	NDA	AssetTurn	FinCrisis	Fin_Bonds	Fin_Equity	Fin_RealEstate	Fin_OtherAssets	Fin_SVC
Pre SFAS 158 2003-05	-0.441	13.818	-0.277	-0.042						
Post SFAS 158 2007-2011	0.119	1.358	1.402***	0.354***	-0.203***	-0.008	-0.028***	-0.033	-0.014	-11.768**
Difference[25]	0.56	-12.46	1.679	0.396						
F (1, 4072)	0.53	0.04	14.55	16.12	62.16	1.04	17.61	1.97	2.37	3.86
Prob>F	0.467	0.840	0.000	0.000	0.000	0.308	0.000	0.161	0.124	0.050

[24] *, **, *** Significance at 0.10, 0.05, 0.01

[25] For the variables FinCrisis, Fin_XXX, I am testing if these coefficients are equal to zero.

Table 12 (cont.)

Variable	Fin_INT	Fin_DEFRET	Fin_RPLNA	Fin_ATRANS	Fin_DA	Fin_NDA
Post SFAS 158 2007-2011	28.386***	0.727	4.864*	0.868	133.466**	-2.776
F (1, 4911) [26]	15.79	0.02	3.15	0.03	4.12	49.13
Prob>F	0.000	0.890	0.076	0.869	0.042	0.000

Adjusted R^2
Pre-SFAS 158: 0.0607
Post-SFAS 158: 0.1996

H_0: $\beta_0 = \beta_1 = \ldots\ldots = \beta_{33} = 0$
F (43, 4081) = 23.45 Prob > F = 0.000

H_0: NPE1 = NPE2 & EbPC2 = EbPC1…..& AssetTurn2 = AssetTurn1& Fin2Crisis= 0 &….Fin2_OtherAssets = 0[27]
F (27, 4081) = 18.97 Prob > F = 0.000

[f] MVE	Fiscal year-end market value of common equity at time t or t-1	FinCrisis	1 for years 2007, 2008, 2009, 0 otherwise
NPE	Owner's equity plus net pension liabilities	Fin_Bonds	Interaction between FinCrisis and Bonds
EbPC	Earnings before extraordinary items before pension costs	Fin_Equity	Interaction between FinCrisis and Equity
Bonds	Pension assets invested in bonds	Fin_RealEstate	Interaction between FinCrisis and RealEstate
Equity	Pension assets invested in equities	Fin_OtherAssets	Interaction between FinCrisis and OtherAssets
RealEstate	Pension assets invested in real estate	Fin_PLiab	Interaction between FinCrisis and PLiab
OtherAssets	Pension assets not invested in equities, bonds, or real estate	Fin_SVC	Interaction between FinCrisis and SVC
PLiab	Market value of firm's pension debt	Fin_INT	Interaction between FinCrisis and INT
SVC	Pension service costs	Fin_DEFRET	Interaction between FinCrisis and DEFRET
INT	Pension interest costs	Fin_RPLNA	Interaction between FinCrisis and RPLNA

[26] For the variables Fin_XXX, I am testing if these coefficients are equal to zero.

[27] NPE1 is the coefficient for NPE in pre-SFAS 158 period, NPE2 is the coefficient for NPE in post-SFAS 158 period, etc. and Fin2Crisis is the coefficient for FinCrisis in the post–SFAS 158 period, etc.

Table 12 (cont.)

DEFRET	Deferred return on plan assets	Fin_ATRANS	Interaction between FinCrisis and ATRANS
RPLNA	Actual return on plan assets	Fin_DA	Interaction between FinCrisis and DA
ATRANS	Amortization of the transition asset	Fin_NDA	Interaction between FinCrisis and NDA
DA	Discretionary accruals using the Modified Jones model	Fin_AssetTurn	Interaction between FinCrisis and AssetTurn
NDA	Nondiscretionary accruals using the Modified Jones model	N	Number of firm years
AssetTurn	Sales divided by total assets		

Table 13 Percentages of Classes of Pension Assets[a]

Year	Variable	Mean	St. dev.	Year	Variable	Mean	St. dev.
2003	Bonds	30.45	12.55	2008	Bonds	37.46	15.11
N = 504	Equity	63.94	13.65	N = 731	Equity	53.73	14.92
	RealEstate	1.09	2.63		RealEstate	1.77	4.06
	OtherAssets	4.51	11.57		OtherAssets	7.05	13.35
2004	Bonds	30.94	12.81	2009	Bonds	37.14	15.34
N = 789	Equity	63.71	13.56	N = 753	Equity	54.63	16.41
	RealEstate	1.07	2.64		RealEstate	1.34	3.12
	OtherAssets	4.26	10.34		OtherAssets	6.90	13.11
2005	Bonds	30.47	13.08	2010	Bonds	37.37	15.79
N = 863	Equity	63.74	13.44	N = 763	Equity	54.64	16.75
	RealEstate	1.26	2.90		RealEstate	1.26	2.95
	OtherAssets	4.53	9.62		OtherAssets	6.73	12.81
2006	Bonds	30.84	14.18	2011	Bonds	39.88	16.18
N = 878	Equity	62.98	14.44	N = 748	Equity	51.76	17.03
	RealEstate	1.45	3.32		RealEstate	1.145	3.08
	OtherAssets	4.73	10.40		OtherAssets	6.91	12.14
2007	Bonds	32.00	14.48				
N = 803	Equity	61.08	14.92				
	RealEstate	1.44	3.30				
	OtherAssets	5.47	12.05				

Changes in the percentages for the classes of pension assets

	Equity	Bonds	RealEstate	OtherAssets
2003-2005	-0.31%	0.10%	15.60%	0.44%
2006-2011	-17.82%	29.27%	0.00%	46.09%
Overall	-19.05%	30.97%	33.03%	53.22%

[a] Equity — Percentage of plan assets invested in equities
Bonds — Percentage of plan assets invested in bonds
RealEstate — Percentage of plan assets invested in real estate
OtherAssets — Percentage of plan assets not invested in equities, bonds, or real estate
N — Number of firm years

Table 14

Descriptive statistics for 2003-2011, variables in per-share form, 1170 firms
N = 6832 [b]
(Number of underfunded firms = 6,226; Number of fully or overfunded firms = 606)

Variable	Mean	Std. dev.	Variable	Mean	Std. dev.
MVE	8586.43	26375.74	OtherAssets	40.90	155.72
NPE	17.07	44.25	Funded	77.91	19.78
EbPC	2.97	8.24	SVC	38.62	128.18
Bonds	387.53	773.04	INT	97.89	362.57
Equity	212.64	416.42	EXPRET	1620.52	6594.67
RealEstate	12.94	59.31	Div	195.55	790.49
			Size	-3.07	1.66

[b]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded	Percentage Funded using Pension Assets less Pension Benefit Obligation, (PA – PBO)
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding
Div	Dividends scaled by common shares outstanding
Size	Natural logarithm of total assets
N	Number of firm years

Figure 3

Percentages of Classes of Pension Assets

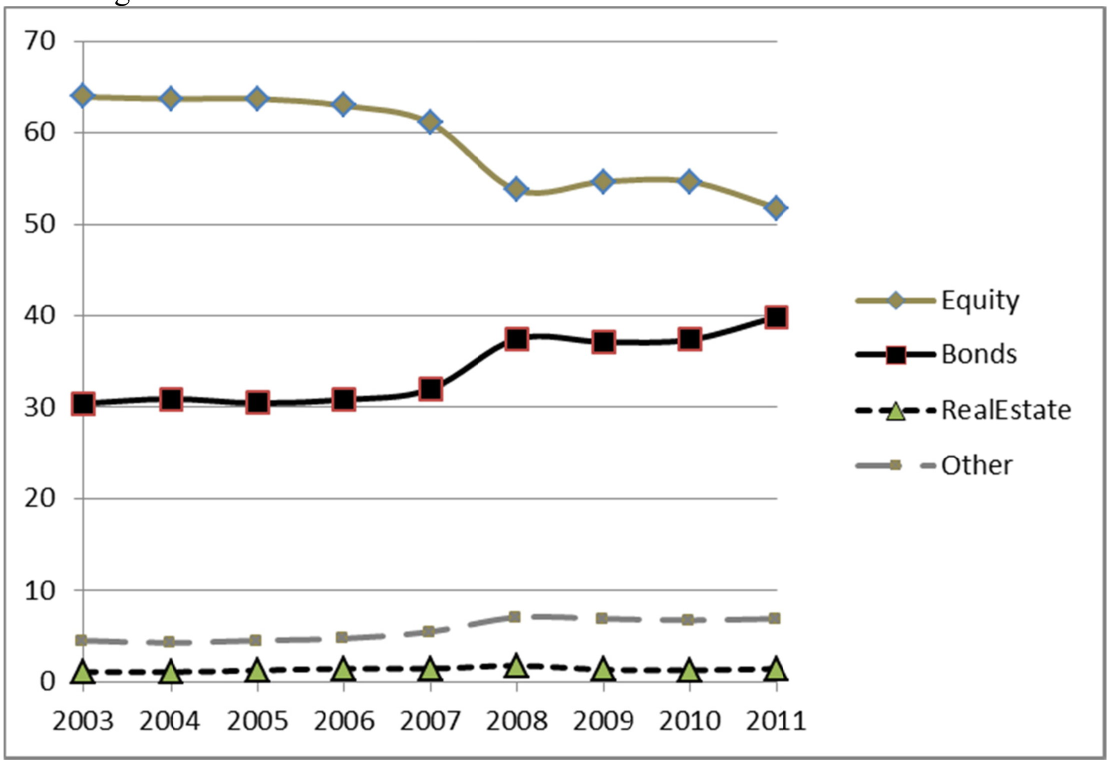

Table 15 Estimation of market value for 2003-2011, variables in per-share form
N = 6000 [c]
(Number of underfunded firms = 4,777; Number of fully or overfunded firms = 1223)

$$MVE_{it} = \beta_0 + \beta_1 NPE_{it} + \beta_2 EbPC_{it} + \beta_3 Bonds_i + \beta_4 Equity_{it} + \beta_5 \ Real\ Estate_{it} + \beta_6 Other\ Assets_{it} + \beta_7 Funded_{it} + \beta_8 Under_{it} + \beta_9 Under\_Funded_{it} + \beta_{10} Under\_Bonds_{it} + \beta_{11} SVC_{it} + \beta_{12} \ INT_{it} + \beta_{13} EXPRET_{it} + \beta_{14} size_{it} + \beta_{15} size\_Under2_{it} + \beta_{16} Div_{it} + \beta_{17} FinCrisis_{it} + \beta_{18} Fin\_Bonds_{it} + \beta_{19} Fin\_Equity_{it} + \beta_{20} Fin\_RealEstate_{it} + \beta_{21} Fin\_OtherAssets_{it} + \beta_{22} Fin\_Under_{it} + \beta_{23} Fin\_Funded_{it} + \beta_{24} Fin\_Under\_Funded_{it} + \varepsilon \quad (6)$$

Variables	Model(1)
NPE	16.506**
EbPC	75.732***
Bonds	-1.058
Equity	-1.941***
RealEstate	4.766
OtherAssets	-0.810
Funded	-4.263
Under	-7881.015***
Under_Funded	4069.536***
Under_Bonds	1.352**
SVC	22.204***
INT	0.274
EXPRET	0.221***
size	195.518
size_Under	-590.825***
Div	5.138***
FinCrisis	-3395.354***
Fin_Bonds	0.561
Fin_Equity	0.012
Fin_RealEstate	-28.965***
Fin_OtherAssets	0.420
Fin_Under	6587.897***
Fin_Funded	9.336***
Fin_Under_Funded	-5926.085***
Adjusted R^2	0.1025

*, **, *** Significance at .10, .05, .01.

Table 15 (cont.)

[c]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded	Pension assets divided by Accumulated Benefit Obligation, PA/ABO
Under	1 if Funded < 1, 0 otherwise
Under_Funded	Interaction term for Under and Funded
Under_Bonds	Interaction term for Under and Bonds
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding
Div	Dividends scaled by common shares outstanding
size	Natural logarithm of total assets
size_Under	Interaction term for size and Under
FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_Bonds	Interaction between FinCrisis and plan assets invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
Fin_Under	Interaction between FinCrisis and Under
Fin_Funded	Interaction between FinCrisis and Funded
Fin_Under_Funded	Interaction between FinCrisis and Under and Funded
N	Number of firm years

Table 16 Estimation of market value for 2003-2011, variables in per-share form
N = 6832 [d]
(Number of underfunded firms = 6,226; Number of fully or overfunded firms = 606)

$$MVE_{it} = \beta_0 + \beta_1 NPE_{it} + \beta_2 EbPC_{it} + \beta_3 Bonds_i + \beta_4 Equity_{it} + \beta_5 RealEstate_{it} + \beta_6 OtherAssets_{it} + \beta_7 Funded2_{it} + \beta_8 Under2_{it} + \beta_9 Under2\_Funded2_{it} + \beta_{10} Under2\_Bonds_{it} + \beta_{11} SVC_{it} + \beta_{12} INT_{it} + \beta_{13} EXPRET_{it} + \beta_{14} size_{it} + \beta_{15} size\_Under2_{it} + \beta_{16} Div_{it} + \beta_{17} FinCrisis_{it} + \beta_{18} Fin\_Bonds_{it} + \beta_{19} Fin\_Equity_{it} + \beta_{20} Fin\_RealEstate_{it} + \beta_{21} Fin\_OtherAssets_{it} + \beta_{22} Fin\_Under2_{it} + \beta_{23} Fin\_Funded2_{it} + \beta_{24} Fin\_Under2\_Funded2_{it} + \varepsilon \quad (6)$$

Variables	Model(2)
NPE	11.473*
EbPC	71.221***
Bonds	-1.712**
Equity	-1.872***
RealEstate	4.066
OtherAssets	-0.294
Funded2	56.985**
Under2	-4960.355***
Under2_Funded2	-0.987
Under2_Bonds	1.713**
SVC	21.969***
INT	-0.207
EXPRET	0.226***
size	692.911***
size_Under2	-971.243***
Div	5.125***
FinCrisis	-4283.356***
Fin_Bonds	0.392
Fin_Equity	0.041
Fin_RealEstate	-29.605***
Fin_OtherAssets	-0.139
Fin_Under2	12771.060**
Fin_Funded2	65.127
Fin_Under2_Funded2	-33.309**
Adjusted R^2	0.1033

*, **, *** Significance at .10, .05, .01.

Table 16 (cont.)

[d]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded2	Percentage Funded using Pension Assets less Pension Benefit Obligation, 100 * (1 +((PA – PBO) /PBO))
Under2	1 if Funded2 < 100%, 0 otherwise
Under2_Funded2	Interaction term for Under2 and Funded2
Under2_Bonds	Interaction term for Under2 and Bonds
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding
Div	Dividends scaled by common shares outstanding
size	Natural logarithm of total assets
size_Under2	Interaction term for size and Under2
FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_Bonds	Interaction between FinCrisis and plan assets invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
Fin_Under2	Interaction between FinCrisis and Under2
Fin_Funded2	Interaction between FinCrisis and Funded2
Fin_Under2_Funded2	Interaction between FinCrisis and Under2 and Funded2
N	Number of firm years

Table 17 Estimation of market value for 2003-2011, variables in per-share form to determine the effect of SFAS 158 N = 6000[e] N = 1878 for 2003-2005 with 1481 underfunded and 397 fully or overfunded; N = 4122 for 2006-2011 with 3296 underfunded and 826 fully or overfunded

$$MVE_{it} = \beta_0 + \beta_1 NPE_{it} + \beta_2 EbPC_{it} + \beta_3 Bonds_i + \beta_4 Equity_{it} + \beta_5 \text{ Real Estate}_{it} + \beta_6 \text{Other Assets}_{it} + \beta_7 Funded_{it} + \beta_8 Under_{it} + \beta_9 Under\_Funded_{it} + \beta_{10} Under\_Bonds_{it} + \beta_{11} SVC_{it} + \beta_{12} INT_{it} + \beta_{13} EXPRET_{it} + \beta_{14} size_{it} + \beta_{15} size\_Under_{it} + \beta_{16} Div_{it} + \beta_{17} FinCrisis_{it} + \beta_{18} Fin\_Bonds_{it} + \beta_{19} Fin\_Equity_{it} + \beta_{20} Fin\_RealEstate_{it} + \beta_{21} Fin\_OtherAssets_{it} + \beta_{22} Fin\_Under_{it} + \beta_{23} Fin\_Funded_{it} + \beta_{24} Fin\_Under\_Funded_{it} + \varepsilon \quad (6)$$

Variable[28]	NPE	EbPC	Bonds	Equity	RealEstate	OtherAssets	Funded	Under	Under_Funded
Pre SFAS 158 2003-05	13.191	37.518	-5.805***	-0.998	12.619*	-1.821	-1.233	-8294.605***	3552.76*
Post SFAS 158 2006-2011	10.461	86.794***	-3.044***	-1.549***	2.751	-1.006	151.312	-8024.644***	3205.284
Difference	-2.7	49.3	2.8	-0.6	-9.9	0.8	152.5	270.0	-347.5
F (1, 4883)	0.02	0.52	1.30	0.91	2.70	0.20	0.36	0.01	0.03
Prob>F	0.88	0.47	0.25	0.34	0.10	0.66	0.55	0.91	0.87

Variable	Under_Bonds	INT	SVC	EXPRET	size	size_Under	Div	FinCrisis	Fin_Bonds
Pre SFAS 158 2003-05	6.936***	-17.366***	82.660***	0.450**	-436.736	-597.500	3.898***		
Post SFAS 158 2006-2011	2.695***	9.183***	20.886***	0.095	488.823*	-879.580***	5.112***	-3092.763***	0.231
Difference[29]	-4.2	26.5	-61.8	-0.4	925.6	-282.1	1.2		
F (1, 4883)	3.39	83.37	63.71	3.70	4.91	0.36	5.71	13.06	0.04
Prob>F	0.07	0.00	0.00	0.05	0.02	0.55	0.02	0.00	0.83

[28] *, **, *** Significance at 0.10, 0.05, 0.01

[29] For the variables FinCrisis, Fin_Bonds, Fin_Equity, Fin_RealEstate, and Fin_Other Assets, Fin_Under, Fin_Funded, Fin_Under_Funded, I am testing if these coefficients are equal to zero.

Table 17 (Cont.)

Variable	Fin_Equity	Fin_RealEstate	Fin_Other Assets	Fin_Under	Fin_Funded	Fin_Under_Funded
Post SFAS 158 2006-2011	0.136	-30.062***	0.876	5542.59***	-140.930	-5326.042***
Difference[30]						
F (1, 4883)	0.05	17.64	0.17	9.77	0.33	6.79
Prob>F	0.82	0.00	0.68	0.00	0.57	0.01

H_0: $\beta_0 = \beta_1 = \ldots\ldots = \beta_{24} = 0$
F(41, 4883) = 17.79
Prob>F = 0.000

H_0: NPE1 = NPE2 & EbPC2 = EbPC1…..& Div2 = Div1& Fin2Crisis= 0 &….Fin2_Under_Funded = 0[31]
F(24, 4883) = 9.57
Prob>F = 0.000

[e]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded	Pension assets divided by accumulated benefit obligation: PA/ABO
Under	1 if Funded < 1; 0 otherwise
Under_Funded	Interaction term for Under and Funded
Under_Bonds	Interaction term for Under and Bonds
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding
Div	Dividends scaled by common shares outstanding
size	Natural logarithm of total assets
size_Under	Interaction term for size and Under

[30] For the variables FinCrisis, Fin_Bonds, Fin_Equity, Fin_RealEstate, and Fin_OtherAssets, Fin_Under, Fin_Funded, Fin_Under_Funded I am testing if these coefficients are equal to zero.

[31] NPE1 is the coefficient for NPE in pre-SFAS 158 period, NPE2 is the coefficient for NPE in post-SFAS 158 period, etc. and FinCrisis is the coefficient for FinCrisis in the post –SFAS 158 period, etc.

Table 17 (Cont.)

FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_Bonds	Interaction between FinCrisis and plan assets invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
Fin_Under	Interaction between FinCrisis and Under
Fin_Funded	Interaction between FinCrisis and Funded
Fin_Under_Funded	Interaction between FinCrisis and Under and Funded
N	Number of firm years

Table 18 Estimation of market value for 2003-2011, variables in per-share form to determine the effect of SFAS 158 N = 6832 [f]
N = 2156 for 2003-2005 with 1995 underfunded and 161 fully or overfunded; N = 4676 for 2006-2011 with 4231 underfunded and 445 fully or overfunded

$$MVE_{it} = \beta_0 + \beta_1\ NPE_{it} + \beta_2\ EbPC_{it} + \beta_3\ Bonds_i + \beta_4\ Equity_{it} + \beta_5\ RealEstate_{it} + \beta_6\ OtherAssets_{it} + \beta_7\ Funded2_{it} + \beta_8\ Under2_{it} + \beta_9 Under2\_Funded2_{it} + \beta_{10}\ Under2\_Bonds_{it} + \beta_{11}\ SVC_{it} + \beta_{12}\ INT_{it} + \beta_{13}\ EXPRET_{it} + \beta_{14}\ size_{it} + \beta_{15}\ size\_Under2_{it} + \beta_{16}\ Div_{it} + \beta_{17}\ FinCrisis_{it} + \beta_{18}\ Fin\_Bonds_{it} + \beta_{19}\ Fin\_Equity_{it} + \beta_{20}\ Fin\_RealEstate_{it} + \beta_{21}\ Fin\_OtherAssets_{it} + \beta_{22}\ Fin\_Under2_{it} + \beta_{23}\ Fin\_Funded2_{it} + \beta_{24}\ Fin\_Under2\_Funded2_{it} + \varepsilon \quad (6)$$

Variable[32]	NPE	EbPC	Bonds	Equity	RealEstate	OtherAssets	Funded2	Under2	Under2_Funded2
Pre SFAS 158 2003-05	12.494	31.900	-8.042**	-1.217*	-1.217*	-0.433	63.69**	-6029.52**	-2.860
Post SFAS 158 2006-2011	4.491	89.406***	-3.799***	-1.682***	3.688	-0.802	-19.103	-5781.165***	-19.103
Difference									
F (1, 5621)	0.25	0.97	1.30	0.62	2.37	0.05	0.00	0.01	0.25
Prob>F	0.62	0.33	0.25	0.43	0.12	0.82	0.97	0.092	0.62

Variable	Under2_Bonds	INT	SVC	EXPRET	size	size_Under2	Div	FinCrisis	Fin_Bonds
Pre SFAS 158 2003-05	7.880***	-18.119***	78.726***	0.464***	522.871	-1322.519**	4.351***		
Post SFAS 158 2006-2011	3.475***	7.463***	23.239***	0.088	809.186***	-1041.611***	5.108***	-4363.264***	0.020
Difference[33]									
F (1, 5621)	1.70	69.49	81.44	4.72	0.25	0.21	2.66	11.23	0.00
Prob>F	0.19	0.00	0.00	0.03	0.62	0.64	0.10	0.000	0.98

[32] *, **, *** Significance at 0.10, 0.05, 0.01

[33] For the variables FinCrisis, Fin_Bonds, Fin_Equity, Fin_RealEstate, and Fin_Other Assets, Fin_Under, Fin_Funded, Fin_Under_Funded I am testing if these coefficients are equal to zero.

Table 18 (Cont.)

Variable	Fin_Equity	Fin_RealEstate	Fin_Other Assets	Fin_Under2	Fin_Funded2	Fin_Under2_Funded2
Post SFAS 158 2006-2011	0.114	-30.131***	0.488	11181.7*	56.789	-92.922*
Difference[34]						
F (1, 5621)	0.04	20.64	0.06	3.39	1.27	3.06
Prob>F	0.84	0.00	0.80	0.07	0.26	0.08

H_0: $\beta_0 = \beta_1 = \ldots\ldots = \beta_{24} = 0$
F(41, 5621) = 20.20
Prob>F = 0.000

H_0: NPE1 = NPE2 & EbPC2 = EbPC1…..& Div2 = Div1& Fin2Crisis= 0 &….Fin2_Under_Funded = 0[35]
F(24, 5621) = 10.20
Prob>F = 0.000

[f]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded2	Percentage Funded using Pension Assets less Pension Benefit Obligation, 100 * (1 +((PA – PBO) /PBO))
Under2	1 if Funded2< 100%, 0 otherwise
Under2_Funded2	Interaction term for Under2 and Funded2
Under2_Bonds	Interaction term for Under2 and Bonds
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding

[34] For the variables FinCrisis, Fin_Bonds, Fin_Equity, Fin_RealEstate, and Fin_OtherAssets, Fin_Under2, Fin_Funded2, Fin_Under2_Funded2 I am testing if these coefficients are equal to zero.

[35] NPE1 is the coefficient for NPE in pre-SFAS 158 period, NPE2 is the coefficient for NPE in post-SFAS 158 period, etc. and FinCrisis is the coefficient for FinCrisis in the post –SFAS 158 period, etc.

Table 18 (Cont.)

Div	Dividends scaled by common shares outstanding
size	Natural logarithm of total assets
size_Under2	Interaction term for size and Under2
FinCrisis	If year = 2008-09, 1; 0 otherwise
Fin_Bonds	Interaction between FinCrisis and plan assets invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
Fin_Under2	Interaction between FinCrisis and Under2
Fin_Funded2	Interaction between FinCrisis and Funded2
Fin_Under2_Funded2	Interaction between FinCrisis and Under2 and Funded2
N	Number of firm years

Table 19 Estimation of market value for 2003-2011, variables in per-share form
N = 6000 [g]
(Number of underfunded firms = 4,777; Number of fully or overfunded firms = 1223)

$$MVE_{it} = \beta_0 + \beta_1 NPE_{it} + \beta_2 EbPC_{it} + \beta_3 Bonds_i + \beta_4 Equity_{it} + \beta_5 \text{ Real Estate}_{it} + \beta_6 \text{ Other Assets}_{it} + \beta_7 Funded_{it} + \beta_8 Under_{it} + \beta_9 Under\_Funded_{it} + \beta_{10} Under\_Bonds_{it} + \beta_{11} SVC_{it} + \beta_{12} INT_{it} + \beta_{13} EXPRET_{it} + \beta_{14} size_{it} + \beta_{15} size\_Under2_{it} + \beta_{16} Div_{it} + \beta_{17} FinCrisis_{it} + \beta_{18} Fin\_Bonds_{it} + \beta_{19} Fin\_Equity_{it} + \beta_{20} Fin\_RealEstate_{it} + \beta_{21} Fin\_OtherAssets_{it} + \beta_{22} Fin\_Under_{it} + \beta_{23} Fin\_Funded_{it} + \beta_{24} Fin\_Under\_Funded_{it} + \varepsilon \quad (6)$$

Variables	Model(2)	Model(3)	Model(4)
NPE	16.506**	14.694*	15.228*
EbPC	75.732***	81.521***	81.527***
Bonds	-1.058	-0.668	-1.442
Equity	-1.941***	-1.740***	-1.901***
RealEstate	4.766	4.448	4.416
OtherAssets	-0.810	-0.472	-0.847
Funded	-4.263	-3.778	-4.157
Under	-7881.015***	-6223.169***	-6325.666***
Under_Funded	4069.536***	2131.482	2064.886
Under_Bonds	1.352**	0.809	1.717**
SVC	22.204***	22.965***	22.229***
INT	0.274	-0.629	0.080
EXPRET	0.221***	0.219***	0.226***
size	195.518	246.277	235.398
size_Under	-590.825***	-633.149***	-627.859***
Div	5.138***	5.110***	5.105***
FinCrisis	-3395.354***	-330.223	-424.140
Fin_Bonds	0.561	0.128	0.257
Fin_Equity	0.012	0.218	0.224
Fin_RealEstate	-28.965***	-7.190	-32.059***
Fin_OtherAssets	0.420	-0.188	0.297
Fin_Under	6587.897***	1422.974**	1435.358**
Fin_Funded	9.336***	5.040	5.455
Fin_Under_Funded	-5926.085***	-3362.910***	-2956.053***
Adjusted R^2	0.1025	0.0957	0.998

*, **, *** Significance at .10, .05, .01.

Table 19 (cont.)

[g]MVE	Fiscal year-end market value of common equity
NPE	Owner's equity plus net pension liabilities scaled by common shares outstanding
EbPC	Earnings before extraordinary items before pension costs scaled by common shares outstanding
Bonds	Pension assets invested in bonds scaled by common shares outstanding
Equity	Pension assets invested in equities scaled by common shares outstanding
RealEstate	Pension assets invested in real estate scaled by common shares outstanding
OtherAssets	Pension assets not invested in equities, bonds, or real estate scaled by common shares outstanding
Funded	Pension assets divided by Accumulated Benefit Obligation, PA/AB0
Under	1 if Funded < 1, 0 otherwise
Under_Funded	Interaction term for Under and Funded
Under_Bonds	Interaction term for Under and Bonds
SVC	Pension service costs scaled by common shares outstanding
INT	Pension interest costs scaled by common shares outstanding
EXPRET	Expected Return on plan Assets scaled by common shares outstanding
Div	Dividends scaled by common shares outstanding
size	Natural logarithm of total assets
size_Under	Interaction term for size and Under
Fin_Bonds	Interaction between FinCrisis and plan assets invested in bonds
Fin_Equity	Interaction between FinCrisis and plan assets invested in equities
Fin_RealEstate	Interaction between FinCrisis and plan assets invested in real estate
Fin_OtherAssets	Interaction between FinCrisis and plan assets not invested in equities, bonds, or real estate
Fin_Under	Interaction between FinCrisis and Under
Fin_Funded	Interaction between FinCrisis and Funded
Fin_Under_Funded	Interaction between FinCrisis and Under and Funded
N	Number of firm years

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Appendix A: Estimation of DEFRET and ATRANS

TAMOR, the net deferral and amortization pension cost component, is required under SFAS 87. What is not required is the four components of TAMOR: ATRANS (amortization of the transition asset at the date of adoptions of SFAS 87); DEFRET (the net gain or loss during the period which is deferred for later recognition); the amortization of prior service cost; and the amortization of the gain or loss from earlier periods. Barth et al. (1992) that ATRANS and DEFRET are the primary components of TAMOR with the other two components assumed to be on average zero. They are often not disclosed but can be calculated from information that is required in the financial statements using a method outlined in Barth et al. (1992).

First, one starts by calculating EXPRET, the expected rate of return. It is the product of the assumed long-term rate of return (rate) and the beginning- of-year plan assets (PALAG). ℓ is the remaining service life of the employees covered by the pension plan and TR_ASSET is the transition asset at the time of adoption. The relations are as follows:

$$\text{EXPRET} = \text{rate} * \text{PALAG}$$

$$\text{DEFRET} = \text{EXPRET} - \text{RPLNA}$$

$$\text{ATRANS} = 1/\ell * \text{TR\_ASSET}$$

$$\text{TAMOR} = \text{DEFRET} + \text{ATRANS} + \varepsilon$$

$$\text{TAMOR} + \text{RPLNA} = (\text{rate} * \text{PALAG}) + (1/\ell * \text{TR\_ASSET})$$

Based on the relations above, the following cross-sectional regression is used to estimate DEFRET and ATRANS:

$$TAMOR + RPLNA = \beta_0 + \beta_1 \text{ PALAG} + \beta_2 \text{ TR\_ASSET} + \varepsilon$$

(In Barth et al. (1996), other variables were included to control for early and non-early adopters. Believing these effects have diminished sufficiently over time, I omit them).If ATRANS or DEFRET are given then the estimated values are set equal to the reported value.

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- Discussion of *The Impact of the Elimination of the 20-F on Home Bias* with Clark M. Wheatley, FIU at the 2013 CTLA and Annual Meeting of the American Accounting Association in Anaheim, CA in August 2013
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- Presented undergraduate thesis at regional meeting of the American Mathematical Society at Jacksonville University, Jacksonville, FL, January 2005
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