Has the adoption of SFAS 158 caused firms to underestimate pension liability? A preliminary study of the financial reporting impact of SFAS 158

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ABSTRACT

SFAS 158 mandates that firms fully recognize the funded status of defined-benefit pension plans on the balance sheet and use the Projected Benefit Obligation (PBO) to estimate that status. Use of the PBO is likely to cause a dramatic increase in pension liabilities. Hence, firms may have incentives to modify assumptions used in the calculation of the PBO. In particular, we investigate the rate used to discount future - benefit obligations. We find that after controlling for movement in interest rates, firms use higher discount rates after the enactment of SFAS 158; this has the impact of lowering the PBO. We also find that firms' tendency to assume higher discount rates increases with the firms' leverage and decreases with liquidity. Our findings suggest that FASB should consider imposing stricter, bright line standards for discount rate assumptions.

Keywords: defined-benefit plan, projected benefit obligation, funded status, discount rates.

INTORDUCTION

In this study we provide preliminary results about the impact of *SFAS 158* on discount rates used to estimate defined- benefit pension liabilities. Enacted in 2006, *SFAS 158* requires firms to recognize a net asset or a net liability equal to the difference between the Projected Benefit Obligation (PBO) and the fair market value of the fund assets as of the balance sheet date (FASB 2006). The PBO is the actuarial present value of future pension benefits and includes expected future increases in compensation. Prior to *SFAS 158*, *SFAS 87* only required note disclosure. *SFAS 87* also imposed a minimum liability requirement equal to the difference between the Accumulated Benefit Obligation (ABO) and the value of the fund assets. The ABO was calculated as the present value of pension benefits based on current salaries. Future increases in wages were ignored, yielding a minimum liability that was significantly lower than that under the standards of *158* (FASB 1985). Ceteris paribus, using the PBO rather than the ABO to estimate funded status should cause pension liabilities to increase. In our study we investigate whether firms have changed the way they estimate the PBO. In particular we examine whether firms are using higher discount rates to help reduce the PBO and therefore the recorded pension liability.

The accounting for pension plans has a long and somewhat sordid history. Prior to *SFAS 87*, firms used a noncapitalization approach as plan assets (liabilities) were recognized only if the amounts funded were greater (less) than the pension expenses. The massive liabilities of future pension benefits were largely ignored. Enacted in 1985, *SFAS 87* brought about greater disclosure of pension obligations and a requirement to recognize a minimum pension liability (FASB 1985.) Although *SFAS 87* was a significant change in accounting for defined- benefit pension plans, it was only a small step toward a "full capitalization" approach. The *87* methodology allowed significant off-balance-sheet financing because the 'full' funded status of the pension fund utilizing the PBO only required note disclosure.

In spite of its widely acknowledged reporting deficiencies, *SFAS 87* remained the central accounting standard for defined- benefit pension plans for over 20 years. It is interesting to note the FASB comment found on paragraph 116 which states, "footnote disclosure is not an adequate substitute for recognition (FASB 1985)" It has been conjectured that the creators of *SFAS 87* did not intend its effects to be so permanent (Carpenter and Mahoney 2007.)

In 2006 *SFAS 158* was enacted. Prior to *SFAS 158*, the SEC issued a report (June 15, 2005) asserting that pension accounting standards needed greater reporting transparency. In response, on November 10, 2005 the FASB added a comprehensive two-phase project on accounting for defined-benefit pension plans to its agenda. The first phase resulted in an exposure draft which was issued on March 31, 2006. On September 29, 2006, it was adopted with slight modifications as *SFAS 158, Employers' Accounting for Defined*

Benefit Pension and Other Postretirement Plans, an Amendment of FASB Statements Nos. 87, 88, 106, and 132(R). A summary of *SFAS 158* may be observed at http://www.fasb.org/st/summary/stsum158.shtml.

While still incomplete, the 2006 enactment of *SFAS 158* was hailed as a long overdue and significant improvement in accounting for defined- benefit pension plans. Under SFAS 158, accruing the status of a plan's fund on the balance sheet was expected to increase reporting transparency. Using PBO to estimate that status was expected to provide a more reliable estimate of the plan's future obligations.

Prior research suggests that markets impound information more easily when information is recognized in the statements rather than disclosed in the notes. A recent study of banks shows that the significance of the relationship between changes in stock prices and fair values of derivative financial instruments increases when values are recognized instead of disclosed (Ahmed 2006.) In another study, using survey results from a sample of 400 commercial lenders, Harper et. al. (1991) find that the decisions of lenders are more heavily influenced by liabilities recorded on the balance sheets of loan applicants than by liabilities merely disclosed in the notes. A study by the Divisions of Research & Statistics and Monetary Affairs of the Federal Reserve Board provides empirical evidence that prior to *SFAS 158* investors misvalued defined- benefit pensions inducing sizable errors in the value of the sponsoring firm. The authors argue that *SFAS 158* should improve the ability of investors to value DBP firms (Coronado et. al. 2008.) Other research suggests that using the full funded status of defined- benefit plans may be useful for valuation (Trivedi and Young 2006).

In addition to the FASB initiative, the U.S. Pension Protection Act of 2006 (the PPA of 2006) which was signed into law on August 17, 2006 mandates that firms with under-funded plans have seven years to eliminate deficiencies (Pension Protection Act 2006). (Plans are required to achieve fully funded status as follows: 92% in 2008, 94% in 2009, 96% in 2010 and 100% in 2011). In addition if the plan's funded status falls below 80 percent the sponsor must accelerate funding. Prior to the President singing the bill into law, the bill passed the senate on August 3 and passed the House on July 28 of 2006.

MOTIVATION AND HYPOTHESES

Liabilities from under-funded pension plans can be substantial and a probable consequence of the new standard is that reported pension liabilities will increase, post *SFAS 158* incentives to "manage" liabilities downward. . CFO Holly Koeppel of American Electric Power stated in a recent interview that "we have a very large pension plan…..and that in light of the current environment we will begin increased funding in 2010, depending on what happens in the market it could be 2009" (Katz 2008). According to a recent report by Moody's rating agency, 10 percent of non – financial companies will experience liquidity shortfalls in 2009 (Leone 2008). Although funding requirements could be reduced by simply increasing contributions, we expect that after implementation of *SFAS 158*

managers may avoid using scarce cash to fund non-value adding pension plans and instead discount estimated future benefits with higher rates. The PPA of 2006 prescribes that companies use rates on investment grade bonds or better to benchmark discount rates (Pension Protection Act of 2006). GAAP suggests using interest rates on high grade bonds (FASB 2006). The unreported monthly mean (median) difference between Aaa and Baa corporate bonds for the 2000 to 2007 period of this study is a statistically significant .929 (.895) percent. Hence, under current provisions, managers have considerable leeway over the actual rate used. Since the size of the discount rate is inversely related to the level of the PBO and the time periods over which these rates are used to discount future benefits are long, small changes in rate assumptions can have significant effects on pension liabilities. For example, the estimated PBO assuming a 5% discount rate and 20 year employment period, followed by a defined- benefit of $50,000 per year for 15 years is $196,600. Using the same assumptions, increasing the discount rate to 6% reduces the PBO to $151,416, a 23% reduction. Although this example over-simplifies the processes and assumptions used to estimate PBOs, it does illustrate how relatively small changes in discount rate assumptions can have a dramatic effect on recognized pension liabilities.

Insert Figure I about here

Since numerous assumptions are required to estimate pension liabilities (life expectancy, years of service, income levels etc.) actuaries are utilized to obtain estimates. The ultimate level of the discount rate, however, while addressed in law is an accounting choice and remains within the domain of the manager. Since small changes in these rates can have such a large impact on the magnitude of the PBO, the enactment of *SFAS 158* gives managers incentive to modify rate assumptions.

After controlling for changes in market interest rates we predict and empirically test for an increase in post *SFAS 158* discount rates. In addition, we expect this post *SFAS 158* increase in discount rates to increase with the level of a firm's financial risk as approximated by liquidity and leverage. That is, to comply with legal funding requirements and avoid potential debt covenant violations, managers of firms with low liquidity and / or high debt loads have greater motivation to reduce pension liabilities with higher discount rates. We test these assertions with the following hypotheses:

H1: Rates used to discount a defined- benefit pension plan's estimated future benefit obligation increase after the adaptation of *SFAS 158.*

H2: The lower a firm's Cash to Current Liabilities ratio, the higher the rate used to discount a defined- benefit pension plan's estimated future benefit obligation and this inverse relationship increases in the post *SFAS 158* reporting period.

H3: The lower a firm's Current Assets to Current Liabilities ratio, the higher the rate used to discount a defined- benefit pension plan's estimated future benefit obligation and this inverse relationship increases in the post *SFAS 158* reporting period.

H4: The higher a firm's Long Term Debt to Total Assets ratio, the higher the rate used to discount a defined- benefit pension plan's estimated future benefit obligation and this relationship increases in the post *SFAS 158* reporting period.

H5: The lower a firm's Earnings before Interest and Taxes to Interest Paid ratio the higher the rate used to discount a defined- benefit pension plan's estimated future benefit obligation and this inverse relationship increases in the post *SFAS 158* reporting period.

SAMPLE AND METHODOLOGY

Our sample consists of firms with defined-benefit pension plans included in the Compustat database for years 2000 to 2007. To reduce the effect that extreme observations might have on our estimates, we winsorize continuously measured variables in the top and bottom one half percent. After eliminating firms with insufficient data to estimate our model we obtain 4,318 usable firm year observations.

Our dependant variable, adjusted pension discount rate ($APDR_{it}$) is regressed on control variables and variables of interest. We control for movement in overall interest rates by measuring $APDR_{it}$ as the difference between the discount rate used by the firm and the rate on AA ten-year term corporate bonds. Two OLS models, a main effects model, and an interaction model are used to test our hypotheses. To assess the effects of Financial Risk (FR_{it}) on $APDR_{it}$ we use four variables; two that yield a proxy for liquidity and two that proxy for leverage. The two liquidity variables are: the ratio of a firm's cash and marketable securities to current liabilities ratio ($CASH_{it}$), and the current assets to current liabilities ratio (CR_{it}). The two leverage variables are: total long term debt to total assets ratio (LEV_{it}) and the earnings before interest and taxes to interest expense ratio ($TIMES_{it}$). The two liquidity variables may seem similar. Although the current ratio is a widely used measure of liquidity, to mitigate the potential effect of inventory balances on interpretations of our findings and more strictly assess the effects of short term liquidity we also include $CASH_{it}$.

The requirement for balance sheet recognition of plans' funded status begin with fiscal years ending after December 15, 2006. To capture the main effect of *SFAS 158* on the level of the discount rate we, therefore, use a 2007 year dummy equal to one for observations in 2007 and zero otherwise (FASB).

To estimate the effects of short and long term financial risk on discount rate levels conditional on implementation of *SFAS 158*, we interact our FASB year dummy with each of our financial risk measures, i.e. $CASH_{it}$*FASB, CR_{it}*FASB, LEV_{it}*FASB and $TIMES_{it}$*FASB. A significantly positive coefficient for the FASB dummy provides support for H1. A significantly negative (positive) coefficient for variables, $CASH_{it}$, CR_{it},

(LEV_{it}) $EBIT_{it}$ and their corresponding FASB interaction terms provide support for hypotheses H2 – H4, respectively.

We also include variables to control for the potential effects of other factors on our dependent variable and variables of interest. Large firms with greater visibility may have more sophisticated and reliable financial reporting systems. To control for potential size effects on estimates, we include the natural log of each firm's total assets ($SIZE_{it}$). In addition, since younger (older) firms should have shorter (longer) time horizons over which to estimate future benefit obligations, we include the variable, AGE_{it}, and define it as the number of years since the firm's initial public offering.

We test our assertions with the following models:

$$ADPR_{it} = SIZE_{it} + AGE_{it} + FASB + FR_{it} + e_{it} \quad (1)$$

$$APDR_{it} = SIZE_{it} + AGE_{it} + FASB + FR_{it} + FR_{it}* FASB + e_{it} \quad (2)$$

where FR_{it} represents our above described measures of liquidity and leverage: $CASH_{it}$, CR_{it}, LEV_{it}, $TIMES_{it}$ and FR_{it}* FASB represents their corresponding post *SFAS 158* interaction terms.

RESULTS

Table 1 provides descriptive statistics for variables. The mean (median) pension benefit discount rate for the 2000 to 2007 period of our study is 6.00 (6.00). The mean (median) discount rate adjusted for high quality, intermediate term bond rates is -.06 (.16). Mean (median) age of sample firms is 13.90 (11.78). Mean (median) values for the cash to current liabilities, current assets to current liabilities, long term debt to assets and earnings before interest and taxes to interest paid ratios are respectively: .47 (.22), 2.0 (1.63), .129 (.037) and 165.09 (3.97).

Insert Table 1 about here

Pearson correlations (Table 2) suggest that larger and older firms utilize lower discount rates. Results also show negative and significant correlations between adjusted pension discount rates and measures of liquidity: CASH and CR. In addition, the correlation between our measures of financial leverage: LEV and (TIMES) and the level of the discount rate is also positively (negatively) significant. Finally, univariate results provide preliminary evidence which suggests that discount rates adjusted for market rates increased after *SFAS 158*.

Insert Table 2 about here

Results of main effects Equation 1 are provided in Table 3. Regarding control variables and in accordance with Pearson correlations, larger and older firms use lower rates to discount estimated future benefit obligations. Results for variable of interest, FASB, support the assertion that after the enactment of *SFAS 158*, adjusted discount rates increased. In addition, the coefficients for all financial risk measures are significant and in

the expected direction. Firms with lower levels of liquidity utilize higher discount rates to estimate current values of PBOs. Similarly, firms with relatively more financial leverage also utilize higher discount rates to estimate current values of PBOs.

Insert Table 3 about here

Estimates for interaction model coefficients are shown in Table 4. Of the four financial risk measures only one liquidity interaction, CR_{it}*FASB and one leverage interaction, $TIMES_{it}$*FASB are significant at the 0.05 level. Hence overall results support assertions that discount rates increase with lower firm liquidity and increased leverage, but the evidence would be stronger if all 4 financial risk interactions were significant.

Insert Table 4 about here

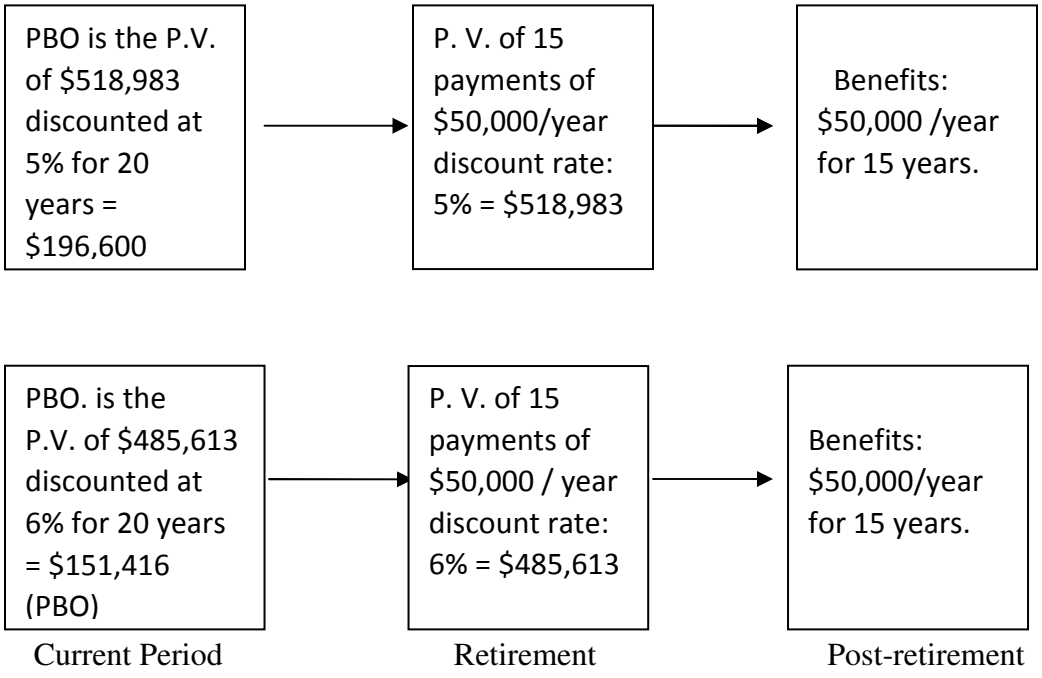
CONCLUSION

This study provides a preliminary examination of how newly enacted *SFAS 158* may affect discount rate levels used to estimate projected benefit obligations. Results of this study provide support for the idea that after *SFAS 158* firms use higher discount rates to reduce estimated projected benefit obligations and pension liabilities.

Although results generally support hypotheses, our study has limitations. In light of the recency of *SFAS 158*, available data are limited. Table I shows that out of the entire sample 11.6 percent of the firm year observations occur in 2007, the last and only post *SFAS 158* year. As additional data becomes available future studies should provide additional insight into the results of this preliminary study. In addition, the period of this study does not take into account the recent stock market decline. For firms in our sample, the non – reported mean (median) percentage of plan assets invested into equities is 61.5 (61) percent. Hence further investigation of the effects of the current market decline on the financial health of defined-benefit plans in juxtaposition with new reporting requirements of *SFAS 158* should provide additional insight. Assuming reductions in plan asset values, challenges associated with inadequate funding of defined- benefit plans should increase.

Nevertheless, current provisions of *SFAS 158* and the PPA of 2006 allow managers considerable latitude in determining the magnitude of the discount. Given the importance of meeting retirement obligations of millions of employees covered under defined- benefit plans it might be argued that requiring utilization of higher quality AAA bonds to benchmark rates would be more appropriate. Further, rates used to discount future benefit obligations should be static across industries and firms. Hence using a universal rate tied to quality debt instruments would enhance comparability of pension liabilities across firms.

Figure I
Effect of Discount Rate Changes on PBO



Assumes that employee works for 20 years after which she retires and receives an ordinary annuity of 15 annual payments at the end of every year for 15 years and discount rates of 5% and 6%.

PBO discounted at 5% = $196,600

PBO discounted at 6% = $151,416

Percentage decrease in PBO = 23%

Table 1
Descriptive Statistics
(n = 4,318)

	Minimum	Maximum	Mean	Median	Std. Deviation
PDR	1.000	21.00	5.995	6.000	1.510
APDR	-5.622	15.444	-.061	.163	1.414
TA	.103	275,941.000	6574.004	1,221. 638	20284.974
AGE	-.42	58.73	13.901	11.779	9.975
CASH	-.010	11.63	.4684	.2158	.805
CA	.000	99,823.000	2154.621	427.174	6343.77
CL	.297	99,680.000	1669.874	253.875	5438.877
CR	.000	57.832	1.999	1.633	1.738
LTD	.000	55,746.647	1409.641	271.209	4307.814
LEV	.000	2.986	.129	.037	.237
TIMES	-134.285	20099.486	165.0911	3.971	4056.0
FASB	.000	1.00	.116	.000	.320

PDR is pension benefit discount rate.
APDR is the difference between the pension benefit discount rate and the average yearly rate on AA rated bonds.
TA is a firm's end of year total assets.
AGE is the years since firm issued initial public offering.
CASH total cash and marketable securities divided by current liabilities
CA is the firm's current assets.
CL is the firm's current liabilities.
CR is the current assets to current liabilities ratio.
LTD is the firm' long term debt.
LEV is total long term debt divided by total assets, both as of the end of the year.
$TIMES_{it}$ is earnings before interest and taxes divided by interest paid.

FASB is a dummy variable equal to one and 0 otherwise for year 2007, the year after FASB pronouncement *SFAS 158*.

Table 2
Correlations of Pension Benefit Discount and Variables of Interest
(n = 4, 318)

	PDR	APDRA	TA	AGE	CASH	CR	LEV	TIMES	FASB
PDR	1	.863**	-.215**	-.296**	-.094**	-.056**	.074**	-.064**	-.005
APDR		1	-.207**	-.352**	-.072**	-.052**	0.064**	-.056**	.118**
TA			1	.283**	-.070**	-.118**	-.002**	.004	.004
AGE				1	.011	.011	-.087**	.081**	-.078**
CASH					1	.566**	-.022	.161**	.004
CR						1	-.023	.078	-.007
LEV							1	-.022	.006
TIMES								1	-.007
FASB									1

** Significant at the $p < .01$ level (two-tailed).

PDR is the pension benefit discount rate.
APDR is the difference between the pension benefit discount rate and the average yearly rate on AA rated bonds with a ten year term.
TA is a firm's end of year total assets.
AGE is the years since firm issued initial public offering.
CASH is firm i's total cash and marketable securities divided by current liabilities, both as of the end of the year t.
CR is the current assets to current liabilities ratio.
LEV is total long term debt divided by total assets, both as of the end of the year.
TIMES is earnings before interest and taxes divided by interest paid.
FASB is a dummy variable equal to one and 0 otherwise for year 2007, the year after FASB pronouncement *SFAS 158*.

Table 3
Results of the Estimation of Equation 1
(n = 4,318)

Equation 1 (Main Effects):

$APDR_{it} = SIZE_{it} + AGE_{it} + FR_{it} + FASB + e_{it}$

	CASH	CR	LEV	TIMES
$SIZE_{it}$	-.071***	-.075***	-.062***	-.050***
AGE_{it}	-.046***	-.046***	-.046***	-.048***
FASB	.437***	.435***	.432***	.436***
$CASH_{it}$	-.140***			
CR_{it}		-.055***		
LEV_{it}			.186***	
$TIMES_{it}$				-.001*
F	181.787	178.970	174.017	164.711
Sig.	.000	.000	.000	.000
Adj. R^2	.143	.142	.138	.146

*, **, ***, Significant at the p = .05, .01, and .001 levels (one-tailed).

$APDR_{it}$ is the difference between the pension benefit discount rate and the average yearly rate on AA rated bonds with a ten year term.
$SIZE_{it}$ is the natural logarithm of total assets for firm i in year t.
AGE_{it} is the number of years since firm issued initial public offering.
FASB is a dummy variable equal to one and 0 otherwise if for year 2007, the year after FASB pronouncement *SFAS 158*.
$CASH_{it}$ is firm i's total cash and marketable securities divided by current liabilities, both as of the end of the year t.
CR_{it} is firm i's total current assets divided by total current liabilities, both as of the end of the year t.
LEV_{it} is firm i's total long term debt divided by total assets, both as of the end of the year t.
$TIMES_{it}$ is earnings before interest and taxes divided by interest paid.

Table 4
Results of the Estimation of Equation 2
(n = 4,318)

Equation 2 (Main Effects with Interaction):
$APDR_{it} = SIZE_{it} + AGE_{it} + FR_{it} + FASB + FR_{it}*FASB + e_{it}$

	CASH	CR	LEV	TIMES
$SIZE_{it}$	-.071***	-.075***	-.062***	-.050***
AGE_{it}	-.046***	-.046***	-.046***	-.048***
FASB	.476***	.585***	.456***	.436***
$CASH_{it}$	-.134***			
$CASH_{it}$*FASB	-.081			
CR_{it}		-.051***		
CR_{it}*FASB		-.076*		
LEV_{it}			.211**	
LEV_{it}*FASB			-.185	
$TIMES_{it}$				-.001*
$TIMES_{it}$*FASB				-.016*
F	145.583	143.701	139.909	132.569
Sig.	.000	.000	.000	.000
Adj. R^2	.143	.138	.138	.146

*, **, ***, Significant at the p = .05, .01, and .001 levels (one-tailed).

$APDR_{it}$ is the difference between the pension benefit discount rate and the average yearly rate on AA rated bonds with a ten year term.
$SIZE_{it}$ is the natural logarithm of total assets for firm i in year t.
AGE_{it} is the number of years since firm issued initial public offering.
FASB is a dummy variable equal to one and 0 otherwise if for year 2007, the year after FASB pronouncement *SFAS 158*.
$CASH_{it}$ is firm i's total cash and marketable securities divided by current liabilities, both as of the end of the year t.
$CASH_{it}$*FASB is the interaction term between $CASH_{it}$ and FASB.
CR_{it} is firm i's total current assets divided by total current liabilities, both as of the end of the year t.
CR_{it}*FASB is the interaction term between CR_{it} and FASB.
LEV_{it} is firm i's total long term debt divided by total assets, both as of the end of the year t.
LEV_{it}*FASB is the interaction term between LEV_{it} and FASB.
$TIMES_{it}$ is earnings before interest and taxes divided by interest paid.
$TIMES_{it}$*FASB is the interaction term between $TIMES_{it}$*FASB

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