Investigating the Market's Efficiency Regarding Pension Deficits After the Implementation of SFAS No. 158

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ABSTRACT, In 2006 SFAS No. 158 was introduced with the objective of increasing the transparency of accounting for defined benefit pension plans. This study examines whether firms with underfunded DB pension plans continued to be overvalued by the equity market after the implementation of this new standard. The findings suggest that while firms with large pension deficits are no longer overpriced, firms with small deficits are now overpriced by as much as 12% per year. This indicates that despite some improvements the market is still not efficient in valuing pension related items.

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1. INTRODUCTION

In the US pension funds have been part of the private sector since the 1850's. Pensions have traditionally been delivered through employer-sponsored pension funds, to which the company makes regular contributions, so that pledged defined benefits (DB) can be provided to the beneficiaries when needed. The responsibility of providing the required pension benefits to employees thus rests entirely on the shoulders of the fund and the sponsoring company. Since the 1980s there has been a shift away from DB pension plans to defined contribution (DC) pension plans, under which the sponsoring company has the obligation to regularly contribute a defined amount of money to the fund, essentially shifting the risk to the beneficiary who is now in charge of how his or her contributions are invested in the fund. Despite this shift away from DB plans, a considerable 42% of total US corporate pension assets are held in Defined Benefit Pension Plans with an aggregate asset value of an estimated $7.1 trillion.[1] Especially during recent years plagued by the global financial crisis, much attention was drawn to the fact that many corporate DB pension funds were severely underfunded. The potential impact of this deficit not only poses a threat to the very people expecting these pensions, but also to the firms sponsoring such plans as well as to the wider economy; pension funds are institutional investors whose transactions can have a significant impact on the (global) market.[2]

Given that it is the responsibility of the sponsoring firm to ensure that employees receive their entitled benefits upon retirement, pension fund actuaries compute the firm's pension liability called projected benefit obligation (PBO) as the present discounted value of all future pension obligations that are attributable to its employees' service up to that point in time. The amount of the benefits is usually computed as a function of each employee's age, tenure, and expected salary close to retirement, depending on the company's pension policy. The discount rate used is the rate, at which the obligation could be effectively settled. Financial Accounting Standard No. 158 (FASB, 2006) prescribes to use current rates of return on high-quality fixed income investments with maturities matching the duration of the benefits obligation. As the maturities of benefit obligations vary from firm to firm, management still has considerable discretion in choosing the discount rate to be used.

To offset this liability the contributions the firm makes to the fund are invested in traded assets, whose fair market value represent the pension fund's assets (FMVA). In the case that the present value of pension obligation (PBO) exceeds the market value of the allocated assets, the pension fund is underfunded and the pension plan is in deficit. An underfunded status can emerge due to different internal and external causes that impact the value of assets or liabilities. On the one hand pension assets are decreasing with a decline in the market value of a fund's assets; On the other hand an increase in the obligations can be brought about by a decrease in the long-term interest rates, serving as the discount factor of future obligations, and also by an increase in pension benefits due to pension plan amendments. Among these three aspects however, the value of assets and the chosen discount rate for the PBO play the most important role with regards to a plan's funded status and a possible mismatch between pension assets and pension obligations (Nakajima & Sasaki, 2010).

In a DB plan an underfunded pension fund effectively creates additional liabilities for the company, as the firm must reestablish the balance and thus make unexpected contributions that can be rather big in magnitude. Companies that incur such a deficit have the possibility to defer its recognition to the firm's income statement in order to smooth pension related expenses under the accounting standard SFAS No. 87, *"Employers' Accounting for Pensions"* (FASB, 1985). Hereby the costs of the deficit are distributed over and recognized on the income statement in the years following its first occurrence, with the remaining unrecognized portion of the deficit only being mentioned (disclosed) in the financial statements' footnotes. Under this practice the firm's income statement and balance sheet only incorporates a small fraction of this unfunded liability, resulting in a sizable pension liability that goes unrecognized. In addition to the fact that pension accounting is rather complicated and opaque, such an unrecognized liability presented in the footnotes could be overlooked or given less attention to. This would lead investors, who price a company's shares based on all the information available to the market, to overvalue the firm's shares as they cannot adequately incorporate this unfunded liability's implications on the firm's future cash flows and earnings. Firms could raise funds at a lower cost of capital and the market would be inefficient in allocating capital resources. These implications have received much attention from academic scholars, investors, analysts and regulatory bodies alike due to the fact that it is highly questionable that investors can fully incorporate the information in the manner in which is it presented under this accounting standard.

Early academic scholars conducted empirical research into this subject throughout the 1980's and their findings suggest that the market does not neglect pension related items (Feldstein & Seligman, 1981; Feldstein & Morck, 1983; Bulow, Morck, & Summers, 1987). Despite rejecting the null-hypothesis that market does not take pension-related information into account, these findings however do not exclude the fact that substantial mispricings can still exist, which is nonetheless a violation of the efficient market theory. Despite these findings, this topic was still being actively discussed and further empirical studies have been conducted up to this date in order to find evidence for such mispricings. Specifically Franzoni and Marin (2006) and Nakajima and Sasaki[3] (2010) find concrete evidence that firms with severely underfunded DB plans are overvalued by investors, and earn lower risk adjusted returns when the deficit materializes on the income statement. Nakajima and Sasaki (2010) further make a distinction between recognized and unrecognized pension obligations, and find that firms with large unrecognized pension liabilities earn lower risk-adjusted returns. This evidence is a further indication that the stock market fails to fully incorporate pension related information.

As a consequence of the above mentioned transparency flaws of this accounting standard, the Financial Accounting Standards Board issued an amendment to this standard in 2006 in the form of another standard, SFAS No. 158, *"Employer's Accounting for Defined Benefits and Other Postemployment Plans- An Amendment of FASB Statements No. 78,88, 106 and 132(R)"* (FASB, 2006). This new regulation shifts the disclosure of the funding status from the footnotes to be recognized in the sponsoring firm's balance sheet. Despite this recognition of a more accurate measure of the pension liability on the balance

[1] Source: Watson Wyatt, 2013 estimates.

[2] As indicated by Pension Fund Capitalism by Clark (1998)

[3] Although this study is conducted with a sample of Japanese firms to find out whether pension related mispricing also exist in Japan, the relevant Japanese accounting standards are very similar to SFAS No.87.

[2] As indicated by Pension Fund Capitalism by Clark (1998)

sheet however, it is still possible to amortize the resulting deficit over the subsequent years. Some scholars believe that this change brings back the added volatility in pension related costs, while increasing the amount of value relevant information concerning pension assets, liabilities, costs and earnings. While the recognition of the funding status is perceived to be a step in the right direction regarding transparency and accuracy of the firm's financial position, the fact that the income smoothing mechanism is still in place leaves doubt whether investors are able to efficiently discern and value an unrecognized liability correctly when valuing a company's stock price. It is of interest to gain some insight into how efficiently investors incorporate pension related items after the passage of this new rule. This paper therefore attempts to answer the following research question:

Are firms with a corporate pension plan deficit under SFAS No. 158, "Employer's Accounting for Defined Benefits and Other Postemployment Plans" mispriced by the market?

This research therefore seeks to find evidence that suggests that the market is still inefficient, meaning that mispricings do exist due the implications of pension plan deficits even after SFAS No. 158 has taken effect. This paper strongly builds on the research conducted by Franzoni and Marin (2006) and Nakajima and Sasaki (2010) in testing the market's efficiency with respect to unfunded pension liabilities.

The findings of this research do not only add to the extant body of literature on this subject, it could also be relevant for standard setting bodies and market participants alike. The following sections of this paper include: an institutional background of the relevant pension accounting standards and a review of the academic literature into this topic in Section 2, an outline of the research design and descriptive statistics of the sample in Section 3, presentation of the data and discussion of results in Section 4, and a summary and conclusion in Section 5.

2. INSTITUTIONAL BACKGROUND AND RELATED LITERATURE

2.1 Accounting for Corporate DB Pension Plans

Accounting for DB pension plans has not only continuously been up for debate, but also evolved since the 1950's due to its lack of transparency. The first DB pension accounting standards *"Accounting for the Cost of Pension Plans"* Accounting Research Bulletin (ARB) 47 and Accounting Principles Board (APB) Opinion 8 were issued in 1956 and 1966 by the Committee for Accounting Principles (CAP) and the APB respectively. These two accounting standards did not require pension assets or liabilities to be disclosed on the balance sheet, as these were seen to belong to the separate pension fund entity. The focus of these standards was clearly on the annual cash contributions that the firm made to the fund. In most cases thus the amount funded was equal to the expense reported on the income statement. This was in fact the only manifestation of a DB pension plan on the sponsoring firm's financial statements.

2.1.1 Pension Accounting Under SFAS No. 87

In 1985 the Financial Accounting Standards Board (FASB) implemented SFAS No. 87, *"Employers' Accounting for Pensions"* (FASB, 1985), which represents the first major shift in the accounting for DB plans. Firms were required to compute their pension liability based on actuarial estimates of accrued pension expenses (Projected Benefit Obligation, PBO), and pension assets (PA) had to be measured at their fair market value. Through aligning pension accounting with accrual based accounting methods as advocated by the Generally Accepted Accounting Principles (GAAP), the reported pension liability provided a more accurate and actuarially sound obligation to investors and financial statements users. These items however, were not required to be recognized on the firm's balance sheet; instead they were to be disclosed in the accompanying footnotes. In fact most of the relevant pension-related items were relegated to the footnotes. The only pension related item recognized on the balance sheet was either a net prepaid pension asset or an accrued pension liability, which generally only represented a fraction of the pension assets and liabilities, as depicted in Figure 1. This amount is the result of netting several off-balance sheet items: the projected benefit obligation (PBO), the fair market value of pension assets, and three deferred items. The first deferred item, unrecognized gains/(losses), is a net amount from a decrease (increase) of the PBO estimate due to revised actuarial underlying assumptions on the one hand, and from the higher (lower) actual returns on plan assets compared to expected returns on the other hand. The second deferred item Prior Service Cost represents the increase in the PBO attributable to pension plan amendments, under which credit is given for employee service rendered in prior years. The third item Transition Liability stems from the increase in PBO due to the adoption of the new accounting standard SFAS No. 87.

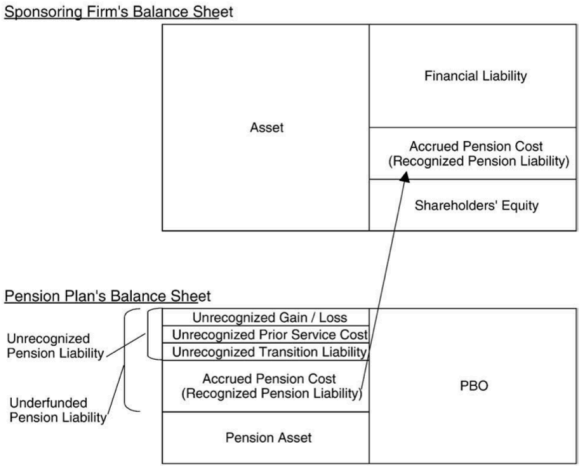

Figure 1. Diagram of pension liabilities (Nakajima and Sasaki, 2010)

In the case that a loss emerged due to an increase in the PBO or a decrease in pension assets a materiality test more commonly known as the *'corridor rule'* was employed. If the loss was greater than 10% of the maximum between PBO and the pension assets, the firm was required to begin amortizing this loss in the next fiscal year. The period over which this loss was to be amortized was the average remaining service period of active employees expected to receive benefits under the pension plan. Furthermore, the Employee Retirement Income Act (ERISA) of 1974 required firms whose pension plans were severely underfunded, with the market value of assets being less than 90% of the Accumulated Benefit Obligation[4], to make additional mandatory contributions to the fund so that the deficit was to be eliminated within the following 3-5 years. In

[4] The Accumulated Benefit Obligation (ABO) is an approximate measure of the pension liability based on the assumption that the pension plan is to be terminated immediately and therefore, unlike the Projected Benefit Obligation (PBO), it does not consider any future salary increases.

such a case an additional minimum liability had to be added to the accrued pension cost, which was offset by a credit to Intangible Assets and a debit to Accumulated Other Comprehensive Income (AOCI) under Shareholder Equity. Deferring pension-related losses, instead of recognizing the entire loss, was seen as adequate as it reduced the volatility in the firm's earnings, with the notion that over the long-term pension related gains and losses would cancel each other out. If the deficit however exceeded a certain threshold, the firm was required to reduce this deficit for the protection of pension beneficiaries. This deferral effectively was an income smoothing mechanism: the mandatory recorded pension expense on the firm's income statement reflected the cost of servicing the pension plan, and included among other items the amortized losses and costs of the 3 unrecognized items displayed in Figure 1. This amortization as well as a potential additional minimum liability occurrence decreases future earnings and cash flows respectively.

By adding unrecognized items as well as an additional minimum liability into the calculation of the net accrued pension liability, the amount recognized on the balance sheet is distorted from the actual unfunded liability. The biggest flaw was that the unfunded obligation was reduced by the deferred amounts, which effectively decreased the recognized pension liability. In many cases firms that had unfunded pension liabilities were even able to record a net prepaid pension asset on their balance sheets, due to the fact that the total of these three deferred amounts exceeded the underfunded amount. In addition to the already intricate nature of accounting procedures for changes in a DB plan's assets and obligations, these smoothing mechanisms made it almost impossible for a financial statement user to grasp the true economic value of the pension fund ex ante. Especially with the most relevant items, namely the information underlying the recognized amounts, disclosed only in the footnotes it seemed that investors were being led astray. Much criticism had been voiced that SFAS No. 78 was potentially misleading because the financial statements concealed the income effects as well as the true economic position of DB pension plans. Notably during the early 2000's, a time when the market was in turmoil and large bankruptcies related to pension deficits made the news headlines, the FASB was put under pressure from other standard-setting bodies, the Securities and Exchange Commission (SEC) and even legislators to reform DB pension accounting. While SFAS No. 132 (R), *"Employers' Disclosures About Pensions and Other Postretirement Benefits"* (FASB, 2003) enhanced some of the disclosure requirements for pensions, it did not address the recognition of any of these items into the body of the financial reports. Regarding the accounting practices under these standards, the FASB realized that the financial information provided was neither representationally faithful nor understandable, which might lead to an inefficient allocation of resources in the capital markets. Recognizing that it was high time for an overhaul, the FASB initiated a three-phase reform project in November 2005, with Phase I culminating in the passage of a new accounting standard in 2006: SFAS No. 158, *"Employer's Accounting for Defined Benefits and Other Postemployment Plans- An Amendment of FASB Statements No. 78,88, 106 and 132(R)"* (FASB, 2006).

2.1.2 Pension Accounting Under SFAS No. 158

SFAS No. 158 marked another major shift in DB pension accounting. The aim of this statement was to improve financial reporting by making the information on the sponsoring firm's balance sheet more complete, timely and transparent. The standard became effective for fiscal years ending after December 15, 2006 (FASB, 2006) and it implemented changes in some pension related items and the way they are recorded on the firm's balance sheet. It did not change the calculation of the net pension cost, including the 10% amortization *'corridor'* of gains and losses, and thus has no impact on the periodic pension cost calculation and the income statement. The changes impacting the balance sheet however are striking.

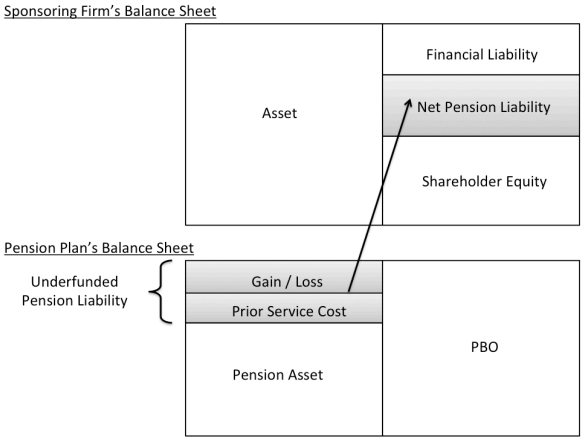

Figure 2. Diagram of Pension Liabilities under SFAS No. 158

It mandates the recognition of an underfunded (overfunded) status of pension obligations as a liability (asset) on the firm's balance sheet, with the status being the difference between the PBO and the fair market value of plan assets, as measured on the balance sheet date. Figure 2 provides a graphic overview of this impact. The previously unrecognized item Transition Liability is reclassified to Accumulated Other Comprehensive Income (AOCI) under shareholder equity, leaving only a Gain/ Loss and Prior Service Cost item to be recorded and offset in AOCI. Notably, as the entire unfunded liability in now being recognized the additional minimum liability becomes obsolete under this new standard. In conjunction with this new standard the US Pension Protection Act of 2006 ruled that firms with pension plan deficits have 7 years to eliminate their underfunding and achieve fully funded status.[5] In the case of severe underfunding of less than 80% the firm has to accelerate funding to reach fully funded status.

Figure 3 provides a useful overview of the effects of the individual aforementioned items by bringing them together in the form of an accounting spreadsheet. The first two columns display the recorded changes in pension assets and PBO over the period of one calendar year. The second and third columns show how new prior service costs, losses on the PBO and pension assets, and the amortization of prior losses are being matched in the respective Accumulated Other Comprehensive Income accounts. The fifth column shows the various components that make up the periodic pension expense. Two aspects are worth noting here: firstly that only the amortization of prior losses are added in, and secondly that expected rather than actual returns on assets its used to determine the pension expense. As the pension expense is the only pension-related item recognized on the firm's income statement, it is rather clear that this amount by itself does not convey a pension fund's true economic value in case of underfunding. The following column indicates the company's cash account, from which contributions to the fund are made. Lastly, the final column represents the net pension asset or liability the company reports

[5] Progressively reaching fully funded status was mandated by achieving a funded status of 92% in 2008, 94% in 2009, 96% in 2010, and 100% in 2011. (Pension Protection Act, 2006)

on its balance sheet. The starting point for this figure is the funded status, plan assets less the PBO, at the beginning of the year. Then the changes from the PBO and assets for the entire period are added, with the exception of the amortized amounts, as the losses and the prior service cost are taken into account in full the period they occur. Netting all these items from the balance at the beginning of the year, the end-of-year balance is determined. Consistent with double-entry bookkeeping, this amount is equal to the difference between plan assets and PBO at the end of the year, as indicated in the row.

	Recorded in Accounts						Reported Only
	PBO	Plan Assets	Prior Service Cost -AOCI	Net Loss -AOCI	Pension Expense	Cash	Net Pension (Liability)/ Asset
Balance, Jan. 1, Year *t*	(PBOJan)	PAJan	PSCJan	NLJan			(PBOJan)+PAJan
Service Cost	(x)				x		(x)
Interest Cost	(x)				x		(x)
Expected Return on Assets		x			(x)		x
Adjust for: Loss on assets		(x)		x			(x)
Amortization of:							
Prior service cost- AOCI			(x)		x		
Net loss- AOCI				(x)	x		
Loss on PBO	(x)			x			(x)
Prior service cost (new)	(x)		x				(x)
Contributions to fund		x				(x)	x
Retiree benefits paid	x	(x)					
Balance, Dec. 31, Year *t*	PBODec	PADec	PSCDec	NLDec	PE		(PBODec)+PADec

Figure 3. Pension Accounting Spreadsheet Illustration under SFAS No. 158

In essence this new standard does not provide any additional information to the market, however it drastically changes the way this information is presented in the financial statements with the aim of eliminating any potential mispricings induced by the lack of transparency under previous standards. In this regard SFAS No. 158 represents a big step in the right direction for DB pension accounting. Despite these improvements regarding the recognition and measurement of pension related items there are still some aspects under this standard that may lead to the disguise of a DB pension plan's true economic position. The most relevant remaining issues are related to (i) the delayed recognition and smoothing mechanism for gains and losses and prior service costs, (ii) the discretion with which the discount rate for measuring the PBO is chosen, (iii) the assumptions underlying the expected rate of return on assets (FASB). Phase II of FASB's reform amended the disclosure standard SFAS No. 132 (R) in December 2008, providing guidance on plan asset disclosure. The above-mentioned issues under SFAS No. 158 however, are not catered for in this phase. Unfortunately during the subsequent Phase III, which was expected to address these factors, the entire project was removed from the board's agenda in January 2014.

2.2 Review of Related Literature

Due to the apparent lack of transparency surrounding pension accounting, academic scholars have conducted research into this topic since the 1970's; their findings however are mixed. While some authors find that the market does take into account pension related items and prices them correctly, other's findings indicate that that the Efficient Market Hypothesis is violated, more specifically that companies with an unfunded pension liability are overvalued by the market. To gain a more systematic overview, this section reviews the relevant literature under the backdrop of the respective accounting standards.

2.2.1 Pre- SFAS No. 158 Studies

Studies from the 1980's mainly use data from US firms prior to the introduction of SFAS No. 87 and mostly conclude that the market is efficient in valuing pension related information, and that the firm valuation as indicated by the stock price is correct (Feldstein & Seligman, 1981; Feldstein & Morck, 1983; Bulow et al., 1987). More specifically Feldstein and Morck (1983) find that the market adjusts understated pension obligations using a standard interest rate, which implies a higher degree of rationality by the market. The findings of Bulow et al. (1987) support the notion of market efficiency regarding pension related accruals by taking into account the endogeneity of a plan's funded status.

Studying firms after the passage of SFAS No. 87, studies differentiate their focus on whether and how different pension related items are valued by the market. Investigating the effects that mandatory pension contributions, resulting from a severely underfunded pension plan, have on a firm's investment and its performance Rauh (2006) finds that a firm's investment activities, especially capital expenditures, and the firm's performance declines with increased mandatory contributions to DB plans. Especially in financially constrained companies that are strongly dependent on external sources of financing, such additional cash outflows can lead to a cash flow shock and an investment dilemma. This effect is seen as especially strong when the mandatory contributions a firm has to make are a result of unexpected movements in the assets market. Investigating whether the negative implications from an underfunded pension plan are correctly impounded into the firm's stock price, authors expect that investors might neglect pension related information in the footnotes regarding the underfunding and misprice firms because they do not take into account the negative implications on future earnings and cash flows. This expectation is based on the notion that the market

fixates on bottom-line earnings as indicated by the findings of Chan, Chan, Jegadeesh and Lakonishok (2006) and Sloan (1996).

Franzoni's (2009) findings indicate that mandatory contributions to a DB plan have a negative effect on stock returns, and that this effect is magnified by the degree of financing constraints, which is consistent with the above-mentioned findings of Rauh (2006). Furthermore, Franzoni and Marin (2006), and Nakajima and Sasaki (2010) find evidence that firms with large deficits in their DB pension plans show a substantial valuation mismatch in their stock prices; the stock price being overvalued. They find these valuation errors to be caused by the fact that the pertinent pension items are mainly disclosed in the footnotes of financial statements, to which investors pay little attention. Also they find evidence that these firms on average earn lower risk-adjusted returns.

To identify whether stock prices reflect the fair value of net pension assets as reported in the footnotes, or pension cost accruals included in the pension expense reported in the income statement, Coronado and Sharpe (2003) and Coronado, Mitchell, Sharpe and Nesbitt (2008) find that stock prices do reflect information included in the pension cost accruals. However Coronado et al. (2008) find that the pension accruals reported on the balance sheet under FSAS No. 87 poorly reflects the true pension value, which corroborate the view of Franzoni and Marin (2006) in that the market does not correctly perceive how DB pension plans influence corporate valuation. While the arguments of Franzoni and Marin (2006) are congruent with those of Coronado and Sharpe (2003) in that the market does not correctly value the pension liability, their findings differ in one respect: Coronado and Sharpe (2003) indicate that all firms with DB plans are overvalued, while Franzoni and Marin (2006) suggest that only firms with substantially underfunded plans are overpriced. Further evidence on the market's inefficiency to correctly value pension related items is presented by Picconi's (2006). In his study he examines disclosed changes in pension assets and liabilities and finds that both prices and analyst forecasts fail to fully incorporate new pension information at the time it becomes available in the footnotes. The findings indicate that the information disclosed in footnotes is disregarded, while there is evidence to suggest that investors do take into account pension amounts that have already been recognized in income. Based on these findings Coronado et al. (2008) believe that the pension accounting reform launched by the FASB could considerably help investors in better valuing firms, which would have important consequences on their market values.

In the light of the markets inefficiency to value pension-related items under SFAS No. 87, Hann, Heflin and Subramanayam (2007) compare the value and credit relevance of smoothed versus fair income statement and balance sheet pension values. Contrasting to the belief of Coronado et al. (2008), their findings overall indicate that fair values hinder the value and credit relevance of the income statement and balance sheet combined. Furthermore Hann, Lu and Subramanayam (2007) conclude that the flexibility that firms enjoy in setting the actuarial assumptions does not impair the value relevance of the PBO. On the contrary, the results suggest that the discretionary component of pension obligations is incrementally value relevant.

2.2.2 Post-SFAS No. 158 Studies

With the implementation of SFAS No. 158 effective in 2006, research has focused on the impact this new accounting standard has on firm value. There are two main strands of literature that analyze data after the implementation of SFAS No. 158: One strand's focus lies on the value-relevance of financial statements items, while the other examines the potential management of financial statements through underlying discretionary assumptions.

Investigating the impact that SFAS No. 158 has on firm valuation by the market, academic scholars draw quite contrasting conclusions based on their results. On the one hand there is evidence that suggests that the newly recognized items on the balance sheet are value-relevant and improve the usefulness of pension-related accounting information (Mitra & Hossain, 2009; Houmes, Boylan, & Crosby, 2012), while other findings on the other hand, indicate no significant difference in the incremental value relevance between previously disclosed and newly recognized items (Beaudoin, Chandar, & Werner, 2011). More specifically, Mitra and Hossain (2009) find a negative relationship between the level of and changes in returns and the pension transition adjustment and OCI components in 2006 mainly for large (S&P 500) firms in their sample, suggesting that the stock market reacts negatively to the adverse impact of SFAS No. 158 on net worth and future cash flows when the impact is substantial in magnitude. In line with this conclusion the findings of Houmes, Boylan and Crosby (2012) also suggest that the implementation of SFAS No. 158, in particular the recognition of pension liabilities on the balance sheet, improved reporting quality. They compare the pre-and post SFAS 158 incremental value relevance of the balance sheet and the income statement, and their results indicate that the ability of book values to explain market values increased after SFAS No. 158. While the incremental ability of net income to explain market values did not change significantly after the implementation of SFAS No. 158, there was however a slight decline in the value relevance of the income statement.

In sharp contrast to these findings however are the findings from the research conducted by Beaudoin, Chandar and Werner (2011). They also investigate the incremental value-relevance of the newly recognized funded status under SFAS No. 158 in its adoption year 2006 relative to the corresponding previously disclosed amounts and they find no incrementally significant association with market prices of newly recognized amounts over the same information that was previously disclosed. Overall, they find that equity investors do price the SFAS-imposed pension differential, regardless of whether such information is recognized or disclosed in the firms financial statements. Their results are therefore consistent with the equity market being efficient with respect to pension information and indicates that the passage of SFAS No. 158 has not changed the manner in which market participants use pension related financial statement information. It is worth noting that larger firms and firms that have larger off-balance-sheet liabilities drive their overall equity valuation results. Similarly to the results from studies that use data before the passage of SFAS No. 87, Beaudoin et al. (2011) show that investors do price the imposed pension differential, however this does not include that their valuation is indeed correct.

The second strand of literature tied to the passage of SFAS No. 158 investigates whether firms alter their discount rates in order to reduce the increased recognized pension obligation induced by the passage of this new standard. All researching authors come to a unanimous conclusion, namely that companies do in fact increase their rate used to discount future-benefit obligations. (Houmes & Boylan, 2010; Houmes, Boylan, & Chira, 2011; Jones, 2013; Fried & Davis-Friday, 2013) More specifically, the tendency to assume higher discount rates increases with a firm's leverage and decreases with liquidity

Houmes & Boylan, 2010; Houmes et al., 2011). Furthermore Fried and Davis (2013) find the discount rate choice to be related to the magnitude of the SFAS No. 158 balance sheet adjustment with firms with larger required liability adjustments being more likely to increase their discount rates. In line with these findings Jones (2013) finds that smaller companies and companies with a larger unrecorded pension liability were more likely to select actuarial assumptions that reduced the benefit obligation in the post-SFAS No. 158 time period. Additionally, the findings indicate that companies with debt-contracting incentives have a larger increase in the funded status due to changing actuarial assumptions. Overall these findings all support the notion that management is concerned about the impact that the implementation of SFAS No. 158 has on its valuation and its cost of capital, and therefore alter the underlying assumptions in order to portray a smaller pension obligation to financial statement users.

All in all, the market appears to react negatively to the newly recognized increased pension liability, which is supported by the increased value-relevance of this item on the balance sheet. However the fact that firms manipulate the underlying discount rate upwards in order to counteract this increase, coupled with the notion that the market may not have changed the way in which it uses pension related information (Beaudoin et al., 2011), forms a quite delicate combination against the proven backdrop of mispricings during the time prior to SFAS No. 158. As before, the question of whether the market is able to *correctly* price the pension liability as well as its underlying assumptions remains unanswered. Therefore the following testable hypotheses for this research paper is:

H1: Firms with underfunded Defined Benefit Pension Plans earn abnormal negative risk-adjusted returns as a consequence of mispricing.

3. METHODOLOGY

3.1 Portfolio Analysis Method

For testing market efficiency with respect to a firms' DB plan, funded status portfolio analysis is used as in Franzoni and Marin's (2006) and Nakajima and Sasaki's work. Firms are sorted into portfolios according to their respective funding ratio *FR* values. The first 10 portfolios contain underfunded firms for a given year with the funding ratio being negative ($FR < 0$) and the eleventh portfolio consists of firms that have an overfunded plan with ($FR > 0$). The latter portfolio is used as a benchmark in the analysis for the purpose of completeness. In July of year *t* the companies are distributed over the eleven portfolios according to their *FR* value for the fiscal year ending in the calendar year *t*-1, with the first 10 portfolios being formed by the deciles of underfunded firms. More specifically, the first ten groups are formed using the breakpoints of the *FR* of NYSE firms with negative *FR*, as in Fama and French (1993), in order to avoid lower decile portfolios from encompassing only smaller NASDAQ companies. The first portfolio thus contains the most underfunded firms, the tenth the least underfunded firms and the eleventh contains all companies that have an overfunded pension plan.

Following this portfolio formation, it is now possible to create monthly portfolio return series by equally weighting the returns of the companies in each portfolio from July of year *t* to June of year *t* +1. In choosing the portfolio formation date to be July of year *t* it is ensured that the available information is already available to the market.[6] Means and standard deviations of monthly excess returns (return minus 1-month T-bill rate) are computed for each portfolio and then portfolios are reformed annually, from which average values for the entire period are obtained. Also reported are average values for the funding ratio as well as for the firm characteristics size, B/M ratio and leverage.

In the following step time-series regressions are run based on the Fama-French Three-Factor Model for risk-adjusted returns in order to determine mispricings due to the market participants' misunderstanding of the true impact of an underfunded DB pension plan. More specifically, risk-adjusted returns (alphas) are defined as the intercepts resulting from the regressions

$$R_{it} = \alpha_i + b_i EXM_t + h_i HML_t + s_i SMB_t + \varepsilon_{it}$$

where R_{it} is the average monthly return of the i^{th} portfolio at time *t*, and EXM, HML and SMB are monthly risk factors for time *t*. EXM denotes the excess market return and is the difference between the market portfolio return and the risk-free rate, the HML factor is defined as the returns on a portfolio of high B/M firms minus those of a portfolio of low B/M firms, and SMB is similarly the return on the portfolio that is long in small firms and short in large firms. For practical reasons these factors are not constructed in this study, but instead the historical monthly values from Kenneth French's website are used. Moreover, b_i, h_i, and s_i represent the respective factor loadings for the i^{th} portfolio.

Even though the tests based on this factor model are a joint test of the hypothesis to be tested and the validity of the factor model itself, extant literature has documented that the Fama-French model adequately explains the variation of stock returns. However to prevent the discussion to be vulnerable to the joint-hypothesis problem (Fama, 1970) alphas are also calculated based on the single-factor CAPM model

$$R_{it} = \alpha_i + b_i EXM_t + \varepsilon_{it}$$

3.2 Variables

For the purpose of researching the funded status, this paper makes use of accounting data as found in the annual statements using the Compustat data entry that lists the net pension asset/ liability, which is defined as the difference between the fair market value of pension assets *FVPA* and the projected benefit obligation *PBO*. However, due to the fact that the same dollar amount of underfunding can have a different impact on the earnings and cash flows of a firm depending on the firm's size, it is necessary to normalize this net pension asset/ liability by the book value of equity. In the case of underfunding, the numerator is the product of (-1) and the net pension liability. *BVE* is the book value of common ordinary equity, for which the values from the same annual statement are used. The variable that is employed for the funding ratio *FR* is thus defined as

$$FR = \frac{FVPA - PBO}{BVE}$$

3.3 Sample

The data used for this research encompasses Compustat accounting data from January 2007 to December 2011, and returns data from July 2008 to June 2013, which was retrieved from the monthly dataset of the Center for Research on Security Prices (CRSP). The sample used for this research consists of US firms listed on the NYSE, AMEX and NASDAQ with ordinary common stock and therefore ADRs, REITs and units of beneficial interest are excluded. Firms that are delisted for financial reasons and for which a delisting return is available, the said return is used and the company is then dropped from the portfolio. The sample is further restricted to those

[6] Consistent with Fama and French (1993).

companies that that sponsor Defined Benefit pension plans and actually have the above-mentioned accounting pension data available on their financial reports and have at least 2 years of accounting data available.[7] Also companies for which the *FR* is more than 5 standard deviations away from the annual mean are excluded in order to correct for the outlier effect. As a last step firms with negative book value of equity are also excluded from the sample.

3.4 Descriptive Statistics

There are 5,246 company-years in the sample between 2007 and 2011 that result from the intersection of these requirements. The year with the minimum (maximum) number of firms is 2012 (2009) with 705 (1,153) companies. The average *FR* in the whole sample is about -13.5%, with the minimum *FR* being -682% and the maximum 5,999%. This sample encompasses return data for 60 months for the period between July 2008 and June 2013.

In Table 1 some descriptive statistics of the sample are presented. Panel A gives some average key figures of the companies in each portfolio in terms of their pension funding status, their size, their book value of equity in relation to the market value, average debt levels and the number of firms in each portfolio. Notably the FR in the portfolio with the most underfunded firms is almost negative one, with a big difference to the second portfolio. The funding ratio keeps increasing somewhat steadily up to the least underfunded one. The spread in FR is however rather big. Looking at the firms sizes, smaller companies tend to be either in the most and least underfunded portfolios, with big firms in the middle ranges and on the overfunded area as indicated by portfolio numbers 4, 5 and 11. The Book-to-Market Ratio is quite steady over all underfunded as well as the overfunded portfolio, which might indicate that underfunding is not related to a company being a growth or value firm. Average debt levels also seem to be higher in the middle range as indicated by portfolio 5 and for overfunded DB pension firms. This might indicate that firms with highly underfunded pension funds take their deficits into account when making capital structure decisions as indicated by Shivdasani and Stefanescu (2010) and that they might have difficulties obtaining debt capital. Whereas the low levels of debt with the least underfunded firms, could be explained by prudent management who wishes to keep debt levels and obligations low. Overfunded firms have on average more than double the amount of debt than underfunded firms with the highest levels, which could indicate that they are profitable companies with sufficient after tax income to be able to service their obligations. The number of firms populating each portfolio is also quite steady, with the least underfunded and overfunded being equal and somewhat higher. The overfunded portfolio initially contained on average more than double the number of firms, however due to the fact that many firms had negative book equity they were removed from the sample. Looking at Panel B, portfolio average excess returns and their standard deviations are listed. Interestingly the most underfunded firms have on average higher returns than overfunded firms, however they also have the highest standard deviations compared to the other returns'.

4. REGRESSION RESULTS

Table 2 presents regression results based on the single factor CAPM model. It is noteworthy that all alphas are negative, even the portfolio with overfunded pension plans. This could be indicating that all DB firms are overvalued. However, it is noteworthy that the alphas for the three least underfunded portfolios are in fact significantly overpriced, with the most severe overpricing of 1% , which amounts to 12% annually for portfolio 9. Looking at the factor loading for portfolio 1, it is possible to observe the highest factor loading, which matches with the obervations from table 1, that due to the high average retuns and the high standard deviation portfolio 1 also has high market risk. However, unlike Nakajima and Sasaki (2010) these findings do not indicate that the most underfunded firms earn negative risk-adjusted returns.

Looking at the time-series regressions based on the Fama-French three-factor model presented in Table 3 a very similar picture emerges with regard to the mispricing, however the alphas for all underfunded portfolios are even more negative in this regression. From Panel B it is visible that firms included in portfolio 1 not only have high betas but also have large factor loadings on SMB. Another aspect looking at the SMB loadings is that the 3 least underfunded portfolios as well as the overfunded one, also have significant factor loadings. This indicates that the firms that are significantly overpriced are small firms.

What is quite interesting about these findings is that there is in fact evidence that firms with underfunded defined benefit pension plans are still overpriced after the implementation of SFAS 158, however the tendency is quite different from the findings of Sasaki and Nakajima (2010) and Franzoni and Marin (2006). While they find the most underfunded firms to be the most overpriced, the findings from this research find the least underfunded firms to be overpriced. However the findings that overpriced firms are small firms are in line with their findings.

5. CONCLUSION

Investigating whether firms with underfunded defined benefit pension plans are still mispriced by the market after the passage of SFAS No. 158 this study find evidence that despite the attempt to improve the accounting transparency and the true economic value of the pension plan, the market is still not efficient in processing pension related information. These differences in the findings compared to previous findings indicate that there has been some improvement in the valuation of firms with severely underfunded DB plans, as there is no longer evidence that they are significantly overpriced. However the fact that now the least underfunded firms are overpriced can be interpreted in the following manner: due to the fact that the relative underfunding for the most underfunded firms is much larger than for the least underfunded firms investors price a larger obligation with more caution, suggesting that they tend to price it correctly. However for relatively smaller obligations they do not seem to be so strict in their valuation, or maybe they perhaps even value the fact that the underfunding is low and that is why these firms are overpriced. Regarding the question whether investors take into account the discount rate manipulation as could be observed by studying the footnotes, it remains questionable. This topic lends itself to further research as to the reasons underlying the mispricing. Also in this study any tax-effects were ignored, which might also help explain the valuation of investors in more detail.

[7] This is done to correct for the survival bias brought about by Compustat's recording mechanism as indicated by Banz and Breen (1986).

Table 1. Descriptive Statistics

FR is defined as net pension assets divided by the book value of equity. In the case of underfunding, the numerator of FR is the product of -1 and net pension liability. Firms with negative FR in the calendar year *t* -1 are assigned to ten groups according to the deciles of the FR for the sample firms to form portfolios starting from July of year *t*. Portfolio 11 denotes the portfolio consisting of firms for which FR > 0. Panel A reports the annual averages of the FR, the market value of equities in million US dollars (Size), the B/M ratio, long term debt in million US dollars, and the annual average of the number of firms in each portfolio. Panel B reports the averages and standard deviations of excess returns for each portfolio. Portfolio returns are calculated by equally weighting the returns. The sample covers the formation periods from July 2008 to June 2013. Panel C reports the means and standard deviations for the EXM, SMB and HML factors.

	1	2	3	4	5	6	7	8	9	10	11
Panel A: Portfolio Characteristics											
FR	-0.937	-0.237	-0.146	-0.101	-0.072	-0.051	-0.034	-0.021	-0.012	-0.004	0.133
Size	6,884.4	5,919.4	6,640.8	10,262.1	9,335.3	8,426.7	9,946.4	6,000.4	5,598.0	7,758.4	9,700.4
B/M	0.70	0.70	0.69	0.65	0.74	0.78	0.77	0.76	0.77	0.76	0.76
Debt	2,867.6	2,238.3	3,065.7	1,940.6	3,802.3	2,592.6	2,497.9	2,036.4	2,405.4	2,436.5	8,274.3
Firms	79.8	81.2	81.6	86.6	90.8	98.8	96.0	97.2	96.2	120.4	120.6
Panel B: Returns											
Mean	0.57	0.54	0.19	0.34	0.22	0.07	0.12	-0.08	-0.27	0.18	0.26
Std Dev	10.58	8.82	8.01	7.95	7.85	7.13	8.05	7.29	7.45	7.55	7.82
Panel C: Factors											
			EXM			SMB			HML		
Mean			0,86			0,36			-0,03		
Std Dev			5,49			2,34			2,87		

Table 2. Time-Series Regression based on Single-Factor CAPM Model

FR is defined as net pension assets divided by the book value of equity. In the case of underfunding, the numerator of FR is the product of -1 and net pension liability. Firms with negative FR in the calendar year *t* -1 are assigned to ten groups according to the deciles of the FR for the sample firms to form portfolios starting from July of year *t*. Portfolio 11 denotes the portfolio consisting of firms for which FR > 0. Portfolio returns are calculated by equally weighting the returns. Panel A reports the constants (alphas) from the time-series regressions of portfolio excess returns on the single factor CAPM model, whereas Panel B reports the coefficients (factor loadings) of the EXM and the adjusted *R*-squares from the regressions. The sample period is from July 2008 to June 2013. *t*-statistics are reported in parentheses.

	1	2	3	4	5	6	7	8	9	10	11
Panel A: Alphas											
	-0.60	-0.45	-0.62	-0.46	-0.63	-0.67	-0.71	-0.84	-1.00	-0.63	-0.58
	(-1.04)	(-1.10)	(-1.55)	(-1.09)	(-1.67)	(-2.11)	(-1.70)	(-2.29)	(-2.67)	(-1.96)	(-1.57)
Panel B: Factor Loadings and R^2											
EXM	1.75	1.50	1.33	1.30	1.32	1.20	1.33	1.21	1.23	1.29	1.32
	(16.82)	(20.31)	(18.18)	(16.86)	(19.32)	(20.89)	(17.58)	(18.17)	(18.14)	(22.06)	(19.47)
R^2	0.83	0.88	0.85	0.83	0.87	0.88	0.84	0.85	0.85	0.89	0.87

Table 3. Time-Series Regression based on Fama-French Three-Factor Model

FR is defined as net pension assets divided by the book value of equity. In the case of underfunding, the numerator of FR is the product of -1 and net pension liability. Firms with negative FR in the calendar year *t* -1 are assigned to ten groups according to the deciles of the FR for the sample firms to form portfolios starting from July of year *t.* Portfolio 11 denotes the portfolio consisting of firms for which FR > 0. Portfolio returns are calculated by equally weighting the returns. Panel A reports the constants (alphas) from the time-series regressions of portfolio excess returns on the three Fama-French factors, EXM, HML, and SMB. Panel B reports the coefficients (factor loadings) of the factors and the adjusted *R*-squares from these regressions. The sample period is from July 2008 to June 2013. *t*-statistics are reported in parentheses.

	1	2	3	4	5	6	7	8	9	10	11
Panel A: Alphas											
	-0.61	-0.46	-0.66	-0.51	-0.69	-0.72	-0.74	-0.88	-1.07	-0.68	-0.58
	(-1.10)	(-1.14)	(-1.63)	(-1.19)	(-1.85)	(-2.24)	(-1.76)	(-2.47)	(-2.94)	(-2.18)	(-1.65)
Panel B: Factor Loadings and R^2											
EXM	1.55	1.38	1.24	1.23	1.23	1.20	1.25	1.09	1.14	1.20	1.17
	(12.22)	(15.07)	(13.53)	(12.57)	(14.53)	(16.42)	(13.03)	(13.39)	(13.74)	(16.76)	(14.43)
SMB	0.56	0.33	0.31	0.32	0.39	0.13	0.30	0.42	0.43	0.37	0.39
	(2.03)	(1.67)	(1.55)	(1.50)	(2.14)	(0.85)	(1.43)	(2.39)	(2.38)	(2.38)	(2.23)
HML	0.32	0.18	0.06	0.02	0.01	-0.12	0.08	0.15	-0.03	0.02	0.26
	(1.46)	(1.14)	(0.37)	(0.13)	(0.10)	(-0.95)	(0.49)	(1.05)	(-0.22)	(0.20)	(1.86)
R^2	0.84	0.88	0.85	0.83	0.87	0.88	0.84	0.86	0.86	0.90	0.88

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