Additional Minimum Pension Liability and Pension Underfunding

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Abstract

This study examines two views of additional minimum pension liability (AMPL). The traditional view emphasizes AMPL's computational precedents: accumulated benefit obligation, prepaid (accrued) pension cost, and pension plan assets. The component view emphasizes the underlying unrecognized prior service cost, unrecognized net losses (gains), estimated rate of pension increase, and accumulated benefit obligation. This study is an initial exploration of the relationship between AMPL recognition, its computational precedents, and its underlying components. We find that AMPL recognition is more strongly associated with its underlying components and thus provides support for the component view of AMPL, paving the way for further evaluation of AMPL.

Introduction

Additional minimum pension liability (AMPL) is a constructed accounting concept created by the FASB in SFAS 87. AMPL was designed to protect investors, creditors, and other decision-makers from underestimating the liabilities of a company with an underfunded pension plan. It occurs when both underfunding and sufficient off-balance sheet deferrals exist as a result of the company's use of smoothing techniques in its GAAP pension accounting. Research in this area has either ignored AMPL and explored underfunding alone or it has considered AMPL solely as a result of the pension investment deferrals. This study looks at companies that disclosed AMPL in their 1993-1996 annual reports in order to document the underlying determinates of AMPL. This preliminary study is important because the usual computation of AMPL uses summary variables that include components that are open to varied interpretations. Although preparers use accumulated benefit obligation, plan assets at fair value, and prepaid (accrued) pension cost to compute AMPL, the underlying components include unrecognized prior service cost, unrecognized net losses (gains), and estimated rate of compensation increase.

This paper tests the extent to which additional minimum pension liability is more closely associated with the rate of compensation increase, unrecognized net gains and losses, and unrecognized prior service cost rather than with underfunding alone. We develop a model that demonstrates that plan assets are relevant in establishing the existence of additional minimum pension liability but not in its quantitative measurement. Thus two pension plans that are equally underfunded may have different additional minimum pension liability because one plan may have few deferrals and more liability already on the books of the company and another plan may have many deferrals and less liability already on the company's books.

This paper shows that high levels of unrecognized prior service cost (UPSC), high levels of unrecognized net losses (gains) (UGL), and low levels of estimated rate of compensation increase (RCI) are significantly related to AMPL recognition while levels of plan assets at fair value (PA) and prepaid (accrued) pension cost (PAPC) generally are not. Thus, the traditional formulation of AMPL does not adequately identify the factors that are most important to AMPL recognition.

The importance of this conclusion is that each of these factors, which are disclosed in financial statement footnotes, can imply different company positions. For example, UPSC may result from competition in the marketplace for labor. If decision-makers are satisfied with a company's workforce, high levels of UPSC may indicate positive management decisions that decrease employee turnover and maintain a company's human resource pool. On the other hand, high levels of unrecognized net losses (low levels of unrecognized

net gains) may result from macro-economic changes to which a company cannot adjust. Poor investment performance, unrealistic estimates of returns on plan assets, and changes in actuarial assumptions may increase UGL beyond what the company can currently fund. Decision-makers could easily be dissatisfied with a company with an AMPL based on one of these factors. Thus it becomes important to correctly identify those factors that underlie AMPL recognition.

Literature Review

Additional minimum pension liability has seldom been mentioned in academic accounting research or in the business media, although pension accounting remains a current issue in accounting standard setting. Academic research typically evaluates pensions using the entire liability and asset amounts from footnotes. In fact, empirical work with AMPL had been tagged as unnecessary because AMPL is "both small and relatively rare" (Hand, Landsman & Monahan, 1998). Literature examining pensions is consistent, however, with AMPL's having some importance. Chen and Lin (1992), Kemp (1987), Sharad (1999), and Newell, Kreuze, and Hurtt (2002) differentiate the behavior of companies with underfunded pension plans from those with funded plans. Not all underfunded plans, however, exhibit AMPL. Amir and Benartzi (1999) examine underfunded plans to determine whether firms use their pension asset allocation to avoid recognition of AMPL. The greater use of fixed investments improves the predictability of investment returns and makes it less likely that unexpected investment losses will balloon deferrals and give rise to AMPL in the presence of underfunding.

More recent academic work has looked at the income statement effects of required GAAP pension smoothing techniques. The investment and amortization components of pension expense, and thus net income, are the result of the the same smoothing techniques that create AMPL on the balance sheet. In the absence of UGL or UPSC, neither the expense allocations nor AMPL would exist. Coronado and Sharpe (2003) identify mispricing of corporate stock due to the market's applying a common P/E ratio to pension earnings and operating earnings. The articulation of income statements and balance sheets suggests that the effect of smoothing on balance sheets may be similarly opaque to investors. Additional indirect evidence about the impact of AMPL is found in Harper and Strawser (1993). They document that firms increased their pension funding when they adopted SFAS No. 87 because more conservative reporting and greater disclosures are required with SFAS No. 87. The presence of AMPL, an increase to liabilities, was introduced in SFAS No. 87.

In the business media, AMPL's occasional appearance suggests significant misunderstandings of AMPL. The Investment Dealer's Digest states, "Because companies with underfunded pensions would ultimately be required to make an additional minimum liability adjustment to their balance sheets, that liability might trigger debt rating agencies' concerns" (Tunick 2002, 10). However additional minimum pension liability may never appear for some underfunded companies because AMPL will only occur in the joint presence of underfunding and the presence of off-balance sheet deferrals. More often only the income statement impact of GAAP pension accounting and not the accompanying AMPL consequences are mentioned in the business press. Widely lamented is the netting of service cost with estimated pension investment income and use of smoothing procedures to spread pension asset investment gains and losses across future periods, decreasing the transparency of financial statements (for example, McGough & Schultz, 1999; Byrnes, 2000; Henry, 2001; Dale, 2002; MacDonald, 2003).

GAAP pension expense includes allocated interest and amortizations of deferred amounts. This benefit or burden to current operating earnings has led to a reaction against the unadjusted use of pension expense in decision-making. Standard and Poor's (S&P) has eliminated the investment component of pension expense from its measure of core earnings (Blitzer, Friedman & Silverblatt, 2000). The Wall Street Journal reports that many loan agreements exclude pension components of other comprehensive income in evaluating equity (Bryan-Low, 2002). Kranhold and Schultz (2003) report that General Electric adjusts GAAP income for the provision for pensions before using an income measurement in computing executive salaries. Bader (2003) recommends that financial analysts value corporations using only the service cost component of pension expense and adjusting the balance sheet to include the fair value of pension assets and pension accumulated benefit obligation. The balance sheet expression of the smoothing techniques, AMPL, is mentioned in

connection with S&P's credit rating function (Bryan-Low, 2002). Thus, there is much current interest in the distortions of GAAP pension accounting, including direct and indirect interest in AMPL.

The Financial Accounting Standards Board has reexamined the place of AMPL in accounting standard-setting. When the Financial Accounting Standards Board reconsidered disclosure effectiveness in 1995, pension accounting became an initial target (FASB, 1995). In fact the exposure draft on Employers' Disclosures about Pensions and Other Postretirement Benefits (FASB, 1997) includes, "financial analysts commented that information about unamortized balances of prior service cost and transition amounts is useful in assessing current earnings and forecasting future amortization (paragraph 3)." Prior service cost is a basic factor that can lead to additional minimum pension liability. FASB's initial revision of pension disclosures in Statement of Financial Accounting Standards No. 132 (SFAS 132) provided clearer disclosures about all pension-related accounts on the balance sheet and maintained the disclosure of accumulated benefit obligation for underfunded pension plans, which is used in GAAP accounting only for AMPL computation. Thus there is some indication that FASB considered AMPL information useful to decision-makers and therefore made some underlying disclosures more accessible. An alternative to providing copious disclosures about recognized items is to fundamentally clarify pension accounting so that fewer explanatory disclosures are required. Certainly pension accounting would be simplified without companies' reporting AMPL in addition to accruing pension expense. However, the loss of AMPL information without offsetting changes in the recognition and measurement of pension elements may be costly to information users. While pension disclosures have been changed again with Statement of Financial Accounting Standards No. 132 (revised 2003), FASB has not yet added the recognition and measure of pensions to its agenda.

Expanding the present understanding of the role of additional minimum pension liability in financial reporting can help financial statement users and standard-setters. This paper begins with a description of additional minimum pension liability and analyzes the role of its components.

Description of Additional Minimum Pension Liability

AMPL is the excess pension liability not covered by plan assets and not already disclosed in financial statements. It is calculated from the accumulated benefit obligation (ABO), plan assets at fair value (PA), and prepaid (accrued) pension cost (PAPC).

Under the traditional formulation, AMPL is determined by a two-stage calculation. First, minimum pension liability (MPL) is calculated as

$$MPL = max[ABO - PA, 0] \qquad (1)$$

If MPL is positive, then AMPL is calculated as

$$AMPL = max[MPL + PAPC, 0] \qquad (2)$$

where PAPC is a positive number if it is a prepaid cost, i.e., an asset; PAPC is a negative number if it is an accrued cost, i.e., a liability. Because AMPL is nonzero only if MPL > 0, the two-stage computation can be represented as

$$AMPL = I_{(MPL>0)} \cdot max[ABO - PA + PAPC, 0] \qquad (3)$$

where $I_{(MPL>0)}$ is a dummy variable that equals one if MPL is positive and zero otherwise.
Defining prepaid (accrued) pension cost in terms of its components suggests an alternative way to view AMPL. PAPC can be calculated as

$$PAPC = -PBO + PA + UPSC + UGL \qquad (4)$$

where PBO is the projected benefit obligation; PA is plan assets at fair value; UPSC is unrecognized prior service cost; and UGL is unrecognized net losses (gains). In this formulation, UGL is a positive number if a net loss and a negative number if a net gain. If PBO is approximated by

$$PBO \cong (1 + RCI)ABO \qquad (5)$$

where RCI is estimated rate of compensation increase, then PAPC may be approximated by

$$PAPC \cong -(1 + RCI)ABO + PA + UPSC + UGL \qquad (6)$$

Substituting this approximation into equation (3) gives the following approximation to AMPL:

$$AMPL \cong I_{(MPL>0)} \cdot max[-RCI \cdot ABO + UPSC + UGL, 0] \qquad (7)$$

where $MPL = max[ABO - PA, 0]$.

The traditional and component formulations yield different predictions on the effects of changes in pension plan components. The purpose of this paper is to examine which formulation of AMPL has more empirical support. The traditional formulation in equation (3) indicates that companies are more likely to have AMPL as ABO increases, PA decreases, and PAPC increases (i.e., becomes a larger asset or smaller liability). The component approach indicates that companies are more likely to have AMPL as PA decreases, as RCI decreases, UPSC increases (i.e., is a larger asset or smaller liability), and UGL increases (i.e., is a larger unrecognized net loss or smaller unrecognized net gain). The effect of increases in ABO depends on whether ABO is greater or less than PA, so ABO is not helpful in distinguishing between the two views.

Hypotheses

This paper examines five hypotheses concerning the effects of changes in pension plan components under traditional and component formulations of AMPL. The hypotheses compare firms with underfunded defined benefit pension plans with AMPL to those without.

<u>Hypothesis 1</u>. Under the traditional formulation, firms with and without AMPL have no significant difference in estimated rate of compensation increase. Under the component formulation, firms with no AMPL should have higher levels of RCI than firms with AMPL. The statistical test takes the following form:

H_0: mean of RCI (no AMPL) d" mean of RCI (AMPL)
H_A: mean of RCI (no AMPL) > mean of RCI (AMPL)

<u>Hypothesis 2</u>. Under the traditional formulation, firms with and without AMPL have no significant difference in unrecognized prior service cost. Under the component formulation, firms with no AMPL should have lower levels of UPSC than firms with AMPL. The statistical test takes the following form:

H_0: mean of UPSC (no AMPL) e" mean of UPSC (AMPL)
H_A: mean of UPSC (no AMPL) < mean of UPSC (AMPL)

<u>Hypothesis 3</u>. Under the traditional formulation, firms with and without AMPL have no significant difference in unrecognized net losses (gains). Under the component formulation, firms with no AMPL should have lower levels of UGL (smaller unrecognized net losses or larger unrecognized net gains) than firms with AMPL. The statistical test takes the following form:

H_0: mean of UGL (no AMPL) e" mean of UGL (AMPL)
H_A: mean of UGL (no AMPL) < mean of UGL (AMPL)

Hypothesis 4. Under both the traditional and component formulations, firms with no AMPL should have higher levels of pension assets than firms with AMPL. The statistical test takes the following form:

H_0: mean of PA (no AMPL) d" mean of PA (AMPL)

H_A: mean of PA (no AMPL) > mean of PA (AMPL)

Hypothesis 5. Under the component formulation, firms with and without AMPL have no significant difference in prepaid (accrued) pension cost. Under the traditional formulation, firms with no AMPL should have lower levels of PAPC (smaller prepaid or larger accrued pension cost) than firms with AMPL. The statistical test takes the following form:

H_0: mean of PAPC (no AMPL) e" mean of PAPC (AMPL)

H_A: mean of PAPC (no AMPL) < mean of PAPC (AMPL)

The two views lead to different predictions for the relationships between AMPL and the pension components RCI, UPSC, UGL, and PAPC (hypotheses 1, 2, 3, and 5). If the traditional view of AMPL is more appropriate, then the null hypotheses 1, 2, and 3 will not be rejected, while null hypotheses 4 and 5 will be rejected in the predicted direction. If the component view of AMPL is more appropriate, then null hypotheses 1, 2, 3, and 4 will be rejected in the predicted direction, while null hypothesis 5 will not be rejected.

In cross-sectional comparisons, levels of components are measured rather than the change in levels. Hence the hypothesis tests in this paper are indirect tests of the effects of changes in pension plan components on AMPL disclosure. Nonetheless, if the two groups of firms exhibit a significant difference in the level of a key component, then the difference should be consistent with the true effect of a change in level and thus enable us to determine whether the traditional or component view of AMPL is more appropriate.

The above analysis in which independent variables are examined one at a time for their effect on the dependent variable has an important limitation. If the independent variables are correlated, then the analysis may be incomplete without also considering their joint effects. For firms with underfunded plans in our sample, the correlation between PA and PAPC (both scaled by PBO to remove any size bias) is about 0.8 in any fiscal year, and the correlation between PA and UGL (both scaled by PBO) is about -0.4 to -0.5 in any fiscal year. *A priori* the test statistics for hypotheses 4 and 5 may be positively correlated while the test statistics for hypotheses 3 and 4 may be negatively correlated. The results should be interpreted with this in mind. The effect of the correlations of PAPC and UGL with PA is mitigated by the fact that the predicted effect of PA on AMPL is the same under both the traditional and component views. All other pairs of independent variables have insignificant correlations.

Sample and Data

This study draws data from the edition of Research Insight (formerly COMPUSTAT) current through November 2001. Additional minimum pension liability was established by SFAS No. 87, paragraphs 36 to 38. While other provisions of SFAS No. 87 were implemented for "fiscal years beginning after December 15, 1986" (SFAS No. 87, para 76), AMPL was not required to be measured until "fiscal years beginning after December 15, 1988" (SFAS No. 87, para 76). Thus for firms with calendar year fiscal years, the first year of recognition of AMPL is 1989, and the first Research Insight fiscal year in which all companies are required to measure AMPL is fiscal year 1990. This paper begins its analysis with 1993, several years after the original implementation, to allow companies to adjust to this change in the disclosure environment. In June 1997 the exposure draft predecessor of SFAS 132, "Employers' Disclosures about Pensions and Other Postretirement Benefits," was issued primarily to coordinate and streamline the disclosures of pensions under SFAS No. 87 and of other post-retirement benefits under SFAS No. 106. In February 1998 the final version of SFAS No. 132 was issued. It introduced detailed reconciliations of projected benefit obligation and plan assets but eliminated and combined some disclosures related to accumulated benefit obligation.[1] This paper therefore limits its analysis to Research Insight fiscal years 1993–1996 (fiscal years ending June 1993 through May 1997) in order to preserve a common disclosure environment across the sample.

The population is restricted to independent and publicly traded operating firms incorporated in the United States. A firm is included in the sample for a given fiscal year if data for the fiscal year meets the following conditions (Research Insight data item in parentheses). Four key year end financial variables must be positive: market capitalization (MKVALF), common shares outstanding (CSHO), total assets (AT), and total sales (SALE). Four other key financial variables must be present: stockholders' equity (SEQ), total debt (DT), income before extraordinary items (IB), and net income (NI). The population excludes closed-end funds and unit trusts (SIC code 6726), royalty traders and Real Estate Investment Trusts (SIC codes 6790-6799), and other nonoperating establishments (SIC code 9995). The population also excludes nonindependent firms (i.e., subsidiaries) identified by CUSIP coding (99 in digits 5 and 6 and 00 in digits 7 and 8 of the CUSIP number).[2]

In each fiscal year, the population is subdivided at three levels. The first subdivision is defined by the firm's projected benefit obligation (PBO), which is computed as projected benefit obligations for overfunded plans (PBPRO), plus projected benefit obligations for underfunded plans (PBPRU).[3] The population is subdivided into firms with no defined benefit pension plan (PBO = 0 or missing) versus those with such plans (PBO > 0). The subpopulation of firms with PBO > 0 is subdivided into those with fully funded plans (generally, those with PBPRU = 0 or missing) and those with underfunded plans (generally, those with PBPRU > 0).[4] Finally, the subpopulation of firms with underfunded plans is subdivided into those with no AMPL (PADDML = 0 or missing) versus those with AMPL (PADDML > 0). Hypothesis tests in this study concern these last two subgroups.

Companies with defined benefit pension plans are significantly different from those without such plans. The former represents a self-selected group of companies that chose to offer their employees a defined benefit pension plan. Otherwise, they represent the full spectrum of companies in terms of size, profitability, and capital structure. However, these firms are more likely to be manufacturing, transportation, and communications companies and less likely to be service companies than firms with no defined benefit pension plans. See Table 1 for Research Insight fiscal year 1996. Companies with defined benefit pension plans tend to be larger companies. As a group, they have significantly greater market capitalization, total assets, total debt, total sales, net income, and number of employees, on average, than firms without defined benefit pension plans. See Table 2 for Research Insight fiscal year 1996. (Statistics in Tables 1 and 2 for other fiscal years are similar.)

Companies with underfunded pension plans are significantly different from those with fully funded plans. Firms with underfunded plans are more likely to be manufacturing companies and less likely to be transportation, communications, or financial service companies (Table 1). Companies with underfunded benefit pension plans tend on average to have significantly more employees, greater sales, lower net operating assets to sales, and higher periodic pension cost (Table 2).

Companies with and without AMPL have roughly similar industry representation (Table 1). However, firms with AMPL tend to have significantly more employees, greater projected benefit obligation, more pension plan assets, and higher periodic pension cost, on average, than companies with no AMPL (Table 2).

Contrary to some assertions in the literature, AMPL has been neither rare nor negligible. For Research Insight fiscal year 1996, 368 firms disclosed AMPL. The interquartile range for AMPL was $0.676 million–$9.925 million, and the median value was $2.463 million. Statistics for the other fiscal years in this study are similar.

Most pension fund variables in this study are computed by adding the corresponding Research Insight items for overfunded and underfunded plans at each firm:

- UPSC = unrecognized prior service cost = PCUPSO + PCUPSU;
- UGL = unrecognized net losses (gains) = POAJO + POAJU;
- PA = pension plan assets at fair value = PPLAO + PPLAU;
- PAPC = prepaid (accrued) pension cost = PCPPAO + PCPPAU;
- ABO = accumulated benefit obligation = PBACO + PBACU.

In addition, one other pension plan item was collected:

- RCI = estimated rate of compensation increase in percent (PPRCI in Research Insight).

The pension fund variables in this study are aggregated across all defined benefit pension plans at a firm. Although pension plans are restricted funds, this study assumes that companies manage their pensions as a whole. Thus AMPL is a company liability rather than simply an underfunded measure of a particular pension plan. In fact, information about the specific pension plan that gives rise to AMPL need not be disclosed. Although pensions are accounted for on a plan-by-plan basis, disclosures are for pension plans grouped by their funding status. So even the information disclosed about underfunded pension plans is not necessarily related directly to the amount of AMPL recorded.

For Research Insight fiscal year 1996, the projected benefit obligations for firms with defined benefit pension plans (PBO > 0) range from $0.293 million to $82,027 million. The range for other fiscal years is similarly wide. Thus, with the exception of RCI, comparison of the absolute level of variables is inappropriate because a size effect may bias the results. Pension variables in the hypothesis tests are scaled by PBO because it represents the best theoretical measure of pension plan obligation. Additional tests conducted with number of employees, accumulated benefit obligation, and total assets as the scaling variables produced results similar to those reported in this paper.

Missing data items in Research Insight plague the study of defined benefit pension plans. When a company discloses only overfunded plans or only underfunded plans, Research Insight rarely makes the logical deduction that no funds of the other variety exist. In situations when a researcher would record zero as values for the overfunded (or underfunded) versions of UPSC, UGL, PA, PAPC, ABO, and PBO, Research Insight typically lists the missing data code (@NA). Therefore, for each of these variables in this study, companies with complete data for the overfunded (underfunded) pension plan item and the missing data code for the underfunded (overfunded) item are assumed to have zero values for the missing item.

In addition, Research Insight assigns the missing value code to RCI for some companies with otherwise complete data. This situation may arise when a company reports a range of values or separate values for different types of defined benefit pension plans at the firm. An informal sampling of actual annual reports underlying the Research Insight database reveals uncaptured pension footnote data of this sort. To address this problem, we repeat the test of Hypothesis 1 with missing values of RCI imputed as 100(PBO/ABO - 1) provided that the imputed value is positive.[5] An alternative approach that we did not take to address this missing data problem would be to manually collect pension footnote data and then compute the midpoint of ranges reported for RCI rather than omitting this information or imputing it (the two approaches in the current study).

Results

The cross-sectional hypothesis tests tend to support the component formulation of AMPL and generally are inconsistent with the traditional formulation. For at least two of the four fiscal years, the null hypothesis in Hypotheses 1, 2, and 3 (tests of RCI, UPSC, and UGL, respectively) is rejected in favor of the alternative that is consistent with the component formulation. The evidence is strongest in the tests on UGL, where the p-values are smaller than 0.001 (see Table 3). Null Hypothesis 5 (the test of PAPC) is not rejected at the 20% level in three of the four fiscal years, except 1996, when it is rejected in favor of the alternative that is consistent with the traditional formulation. Of the 16 hypothesis tests (H1, H2, H3, and H5 for four fiscal years each), only one supports the traditional over the component formulation while eight support the component over the traditional formulation.

Rate of Compensation Increase (RCI) has a greater frequency of missing values than the variables in the other hypothesis tests. About one third of all firm/fiscal year observations in the underfunded plan sample are missing RCI. To check whether a missing data bias exists, we repeated the test of Hypothesis 1 with each missing value of RCI imputed as 100(PBO/ABO - 1), provided this value was positive. The null hypothesis is rejected in all four years in favor of the alternative that is consistent with the component formulation.

The results in Table 3 are relatively robust. Alternative scaling factors—number of employees, accumulated benefit obligation, or total assets—yield similar results to those from tests where PBO is the scaling factor. Nonparametric tests of the hypotheses using the adjusted Wilcoxon test (also known as the Mann-Whitney test) generally confirm the results of the parametric tests reported in Table 3.

Conclusion

In summary, the traditional view of AMPL as a function of accumulated benefit obligation, plan assets, and prepaid (accrued) pension cost has little support in this study as a useful empirical explanation of AMPL. Instead, AMPL is more directly related to the underlying components of unrecognized prior service cost and unrecognized net losses (gains). This decomposition of AMPL suggests that the meaning of AMPL to a firm may depend on which of these two components is more responsible for the AMPL status. Companies can choose to increase unrecognized prior service cost through negotiations with employees; companies can adjust or fail to adjust to external changes in their pension plans to create unrecognized net losses (gains). Additional minimum pension liability may mean different things to different decision-makers, depending on the interplay of these two factors. Future studies will look at the individual firm time series of unrecognized prior service cost, unrecognized net losses (gains), and AMPL status to identify the changes that prompted recognition of AMPL.

End Notes

[1] See Luecke and Andrzejewski (1998) for a summary of the SFAS No. 132 disclosure changes.

[2] The population also excludes 36 firms identified by examining company names for multiple issues, pro-forma duplicate listings, and nontrading consolidated statements.

[3] If only one of the two variables is available, we impute the other as zero. If both are missing, we infer that the firm had no defined benefit pension plans in that fiscal year.

[4] For most firms with underfunded plans in the period covered by the analysis in this paper, Research Insight reports values for PBPRU and other pension fund data items associated with underfunded plans at the firm. Hence, PBPRU > 0 usually flags a firm with underfunded

plans at the firm. Hence, PBPRU > 0 usually flags a firm with underfunded plans. However, for a few firms (15 to 18 per year) in our sample, Research Insight apparently combines overfunded and underfunded amounts in PBPRO and other pension fund data items usually associated with overfunded plans but also reports a positive value for PADDML, Research Insight's data item for AMPL. To assure that these firms are correctly categorized, we assign firms with PBO > 0 to the subpopulation with underfunded plans if one of two conditions exist: (a) if PBPRU > 0; or (b) if PBPRU is missing but PADDML > 0. Otherwise a firm with PBO > 0 is classified as having fully funded plans.

[5] For Research Insight fiscal years 1993-1996, about 37% of the underfunded firm/fiscal year observations are missing RCI. The other variables had missing data rates of less than 1%.

Table 1. Industry Composition of Population.
Firms are publicly traded U.S. companies.
Fiscal years ending June 1996–May 1997 (Research Insight fiscal year 1996).

Economic Sector by SIC Code	No Defined Benefit Pension Plans		Defined Benefit Pension Plans		Fully Funded Plans		Under -funded Plans		No AMPL		With AMPL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture, forestry, fishing	14	0.3	5	0.4	1	0.1	4	0.6	2	0.7	2	0.5
Mining & Construction	224	5.0	56	4.0	29	4.2	26	3.9	11	3.8	15	3.9
Manufacturing: consumer-cyclicals	556	12.4	288	20.7	116	16.7	166	24.7	56	19.5	110	8.6
Manufacturing: consumer staples	1,165	26.0	455	32.7	176	25.4	270	40.2	115	40.1	155	40.4
Transportation, communications	265	5.9	210	15.1	158	22.8	50	7.5	24	8.4	26	6.8
Wholesale & retail trade	526	11.7	120	8.6	58	8.4	61	9.1	28	9.8	33	8.6
Finance, insurance, real-estate	760	17.0	181	13.0	122	17.6	55	8.2	29	10.1	26	6.8
Services: hotels, personal, business	734	16.4	55	4.0	23	3.3	31	4.6	17	5.9	14	3.6
Services: health, legal, social, etc.	238	5.3	14	1.0	7	1.0	6	0.9	5	1.7	1	0.3
Public administration	0	0.0	6	0.4	4	0.6	2	0.3	0	0.0	2	0.5
TOTAL	4,482	100.0	1,390	100.0	694	100.0	671	100.0	287	100.0	384	100.0

Notes. SIC codes are approximate for these fiscal years. Research Insight reports current SIC codes but not historical codes. 2001 was the current year for the database from which this sample was drawn. Codes: agriculture, forestry, fishing: 0001-0999; mining & construction: 1000-1999; manufacturing of consumer-cyclicals: 2000-2999; manufacturing of consumer staples: 3000-3999; transportation, communications: 4000-4999; wholesale & retail trade: 5000-5999; finance, insurance, real estate: 6000-6999; hotels, personal, business service: 7000-7999; health, legal, social services: 8000-8999; public administration: 9000-9999. The subsample of companies with defined benefit pension plans is subdivided into those with fully funded plans and those with underfunded plans. The subsample of companies with underfunded plans is subdivided into those with no additional minimum pension liability (AMPL) and those with AMPL. Fiscal years 1993-1995 have similar sample distributions.

Table 2. Financial Characteristics of Population.
Firms are publicly traded U.S. companies.
Fiscal years ending June 1996–May 1997 (Research Insight fiscal year 1996).
Median values of financial variables and *t*-tests for differences in the means.
Employees in 1000s; all other variables except ratios are in $ millions.

	No Defined Benefit Plans	Defined Benefit Plans	*t*-stat for difference in means	Fully Funded Plans	Under-funded Plans	*t*-stat for difference in means	No AMPL	With AMPL	*t*-stat for difference in means
	Median	Median		Median	Median		Median	Median	
Employees	0.266	3.601	-11.06	2.765	4.830	-2.99	3.900	5.697	-2.74
Financial Statement Items									
Market Capitalization	58.528	583.352	-10.84	549.961	633.343	-1.97	528.080	717.848	-0.57
Total Assets	59.132	802.243	-9.37	803.931	784.4	0.94	653.638	911.833	-0.71
Total Debt	4.350	184.056	-5.68	187.344	179.184	0.75	149.600	221.056	-0.21
Stockholders' Equity	26.802	272.197	-13.76	280.230	249.937	-0.44	242.400	255.729	-0.75
Total Sales	40.146	696.262	-11.51	598.066	805.374	-2.48	649.300	985.155	-1.52
Net Income	1.044	30.833	-11.35	30.916	29.912	-1.71	27.335	31.063	0.00
Financial Ratios									
Net Operating Assets to Sales	0.539	0.589	2.84	0.678	0.527	2.95	0.563	0.513	1.50
Debt Ratio	0.130	0.255	-3.68	0.256	0.253	-2.45	0.246	0.266	-1.85
Return on Assets	0.014	0.041	-10.06	0.039	0.046	0.38	0.046	0.046	-0.10
Pension Plan Items									
Projected Benefit Obligation				53.871	70.787	-0.99	43.061	102.124	-2.46
Pension Plan Assets				55.222	63.566	-0.32	38.679	86.798	-2.64
Periodic Pension Cost				0.685	1.822	-3.91	1.434	2.329	-1.89
Sample Size	4,482	1,390		694	671		287	384	

Notes. Net operating assets to sales ratio calculated as (stockholders' equity + total debt - cash)/(total sales), where Research Insight CHE was used for cash. Calculations using cash plus investments and advances (CHE plus IVAEQ variables in Research Insight) yield similar results. *t*-statistics computed assuming unequal variances. The sample size for some variables was smaller than the value above. In particular, a small number of firms in the above sample were missing one or more of the following variables: employees, net operating assets to sales ratio, pension assets, and periodic pension cost.

Table 3. Results of Cross-sectional Hypothesis Tests.

Firms are publicly traded U.S. companies.

Fiscal years ending June 1993–May 1997 (Research Insight fiscal years 1993–1996).

Hypotheses 0: subpopulation with AMPL = 0; +: subpopulation with AMPL > 0	Fiscal Year	Mean of Test Statistic (Standard Deviation) [Sample Size] for Subpopulation		t-statistic (1-sided p-value)	Consistent with Formulation of AMPL:	
		AMPL=0	AMPL>0		Traditional	Component
H1$_0$: mean RCI(0) $\leq$ mean RCI(+)	1993	4.8871 (1.0169)[149]	4.8601 (1.1481)[259]	0.24 (0.406)	n.i.	n.i.
	1994	4.9908 (0.9439)[169]	4.8165 (1.1784)[246]	1.60 (0.055)	No	Yes
H1$_A$: mean RCI(0) > mean RCI(+)	1995	4.7795 (0.9274)[176]	4.6220 (1.0974)[273]	1.58 (0.058)	No	Yes
	1996	4.6671 (0.9664)[175]	4.5662 (1.0867)[239]	0.98 (0.164)	n.i.	n.i.
H2$_0$: mean UPSC(0)$\geq$ mean UPSC(+)	1993	0.0260 (0.0579)[229]	0.0403 (0.0683)[393]	-2.66 (0.004)	No	Yes
	1994	0.0295 (0.0791)[264]	0.0449 (0.0820)[371]	-2.37 (0.009)	No	Yes
H2$_A$: mean UPSC(0) < mean UPSC(+)	1995	0.0324 (0.0970)[279]	0.0369 (0.0724)[430]	-0.71 (0.239)	n.i.	n.i.
	1996	0.0292 (0.0801)[285]	0.0359 (0.0776)[381]	-1.09 (0.138)	n.i.	n.i.
H3$_0$: mean UGL(0)$\geq$ mean UGL(+)	1993	0.0503 (0.1549)[229]	0.0964 (0.1634)[394]	-3.45 (0.0003)	No	Yes
	1994	0.0103 (0.1575)[265]	0.0781 (0.1666)[371]	-5.18 (0.0000)	No	Yes
H3$_A$: mean UGL(0) < mean UGL(+)	1995	0.0235 (0.1566)[279]	0.0893 (0.1641)[431]	-5.31 (0.0000)	No	Yes
	1996	-0.0173 (0.1632)[286]	0.0379 (0.1770)[381}	-4.11 (0.0000)	No	Yes

Table 4. Results of Cross-sectional Hypothesis Tests.
Firms are publicly traded U.S. companies.
Fiscal years ending June 1993–May 1997 (Research Insight fiscal years 1993–1996).

Hypotheses; 0: subpopulation with AMPL = 0	Fiscal Year	Mean of Test Statistic (Standard Deviation) [Sample Size] for Subpopulation		t-statistic (1-sided p-value)	Consistent with Formulation of AMPL:	
+: subpopulation with AMPL > 0		AMPL=0	AMPL>0		Traditional	Component
$H4_0$: mean PA(0)≤ mean PA(+)	1993	0.8004 (0.2814)[229]	0.8097 (0.2425)[395]	-0.43 (0.668)	n.i.	n.i.
	1994	0.8431 (0.2647)[266]	0.8162 (0.2472)[372]	1.32 (0.094)	Yes	Yes
$H4_A$: mean PA(0) > mean PA(+)	1995	0.8227 (0.2852)[281]	0.8141 (0.2513)[432]	0.42 (0.336)	n.i.	n.i.
	1996	0.8389 (0.3119)[287]	0.8872 (0.2686)[284]	-2.15 (0.984)	n.i.	n.i.
$H5_0$: mean PAPC(0)≥ mean PAPC(+)	1993	-0.1233 (0.2475)[229]	-0.1441 (0.2003)[395]	1.45 (0.874)	n.i.	n.i.
	1994	-0.1163 (0.2475)[266]	-0.1461 (0.2137)[372]	1.62 (0.947)	n.i.	n.i.
$H5_A$: mean PAPC(0) < PA(+) mean PAPC(+)	1995	-0.1209 (0.2464)[281]	-0.1447 (0.2157)[432]	1.36 (0.913)	n.i.	n.i.
	1996	-0.1487 (0.2659)[287]	-0.1111 (0.2152)[384]	-2.02 (0.022)	Yes	No

Notes. RCI = estimated rate of compensation increase in %. UPSC = unrecognized prior service cost. UGL = unrecognized net losses (gains). PA = pension assets. PAPC = prepaid (accrued) costs. Test results are reported for UPSC, UGL, PA, and PAPC scaled by projected benefit obligation (PBO). t-statistics for UPSC, UGL, PA, and PAPC scaled by number of employees or by total assets are similar to the above. t-statistic and one-sided p-value are computed assuming equal variance. (Results assuming unequal variances are very similar.) If a one-sided t-test rejects the null hypothesis in favor of the alternative at the 10% level or better, then we write "Yes" if the alternative is consistent with the formulation and "No" if it is not. If a one-sided t-test does not reject the null hypothesis, then, strictly speaking, we have no formal statistical evidence in favor or against either formulation. So we write n.i. (not inconsistent with the indicated formulation of AMPL).

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