
An Empirical Analysis of the Motives for Fully Funded Defined Benefit Plan Terminations

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Abstract: Statistics gathered by the Pension Benefit Guaranty Corporation indicate that an average of 7,000 defined benefit plans were terminated per year between 1988 and 1997. Prior studies exploring motives for defined benefit pension plan terminations have focused exclusively on overfunded plans. This article expands upon the previous termination literature by examining motives for termination of fully funded defined benefit plans. The results indicate that fully funded terminations are partially driven by the firm's ability to access capital. The results also suggest that motives for termination vary depending on the size of the firm. [Keywords: defined benefit, pensions, terminations]

INTRODUCTION

In the wake of the Enron debacle, there has been renewed interest in retirement plans and their design. There are several major differences between defined contribution plans and defined benefit plans, the most discussed being who bears the investment risk. As dramatically illustrated by the massive retirement asset losses incurred by Enron workers, it is the employees who bear the investment risk with defined contribution plans. In addition, though some defined contribution plans have matching programs, changes to the programs can be made easily. In the past few years several large companies, including Ford Motor Company, Goodyear Tire

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and Rubber, and Charles Schwab Corporation, have reduced the level of guaranteed matching or eliminated matching programs altogether.

As a result of investment losses and cutbacks in defined contribution plans in recent years, there has been a great deal of discussion concerning the trade-offs between the freedom and flexibility of defined contribution plans and the retirement security provided by defined benefit plans. Some lawmakers have called for legislation to encourage the creation and maintenance of defined benefit pension plans (Flynn, 2002; Crenshaw, 2002). In addition, the Pension Benefit Guaranty Corporation (PBGC) listed to "protect existing defined benefit plans and their participants" as one of the four goals of its five-year plan (PBGC, 2003a). Thus, it is important to fully understand why firms have moved so dramatically away from defined benefit plans over the past twenty years.

Much of the shift away from defined benefit plans has occurred via the termination of existing plans. The number of standard terminations of defined benefit pension plans increased rather steadily during the 1980s. A study by Ledolter and Power (1984) attributes the increase in terminations in the early 1980s to the passing of the Employee Retirement Income Security Act of 1974 (ERISA). As reported by the PBGC in its annual Data Book, the number of terminations peaked in 1990, with almost 12,000 plans terminating that year. This increase in terminations sparked a substantial amount of research as authors attempted to explain why firms terminated their defined benefit pension plans. Others examined pension funding choices to determine what role these choices played in firms' overall financial decisions.

Studies that have examined motives for termination have focused exclusively on overfunded defined benefit plans, defined as plans in which the expected reversion exceeds \$1 million. The majority of studies focused on the financial aspects of the firm, finding consistent support for the use of pension assets in firms' overall financing decisions. Other studies considered the potential expropriation of wealth from workers to managers and stockholders and possible tax incentives as motives for termination, finding some support for each of these hypotheses. Fundamentally, however, previous research indicates that the primary motive for termination of an overfunded defined benefit plan is the firm's desire to recapture the excess assets of the plan.

This study analyzes the motives for termination of defined benefit plans that are fully funded but not overfunded. The term "fully funded" refers to plans in which the expected reversion is less than \$1 million. An examination of the motives for termination of these plans is warranted because more than 80 percent of the large standard terminations that occurred between 1988 and 1997 were fully funded rather than overfunded.

These plans being ignored in prior research leaves the motives for the vast majority of standard terminations completely unexplained in the literature.

This study aims to fill some of the gaps in prior literature, to reconcile some inconsistencies found across the literature, and to provide a more complete analysis of the termination decision by providing answers to three major questions. The first is whether motives for termination of defined benefit plans vary by funding status. By examining motives for termination of fully funded defined benefit pension plans, comparisons are made between the motives for termination of fully funded and overfunded defined benefit plans.

Another question the study addresses is whether motives for termination vary in when they become evident. The majority of the prior literature focuses on examining the variables of interest one year prior to the termination event. Since termination can be a lengthy process and part of a firm's overall financial plan, it is possible that the termination decision is made farther in advance of the actual event. Therefore, motives that may not have been supported in other studies that examined data only one year prior to the termination may be supported by a more extensive examination of plan and firm data two years prior to the event.

The last question the study addresses is whether motives for termination have changed over time. To answer this question, the sample is divided into two sub-periods. The first sub-period is 1988 to 1992; the second is 1993 to 1997. This allows for the comparison of motives for termination during the early period, when there were a large number of terminations, with those that occurred during the later period, when the number of terminations began to drop significantly.

The results of the study indicate that fully funded defined benefit plan terminations are driven primarily by firms' ability to access capital. This result also was found in prior studies examining motives for overfunded terminations, suggesting that the benefit gained from the removal of the financial commitment of future pension liabilities transcends funding status. Second, the results indicate that there are differences in motives depending on firm size. The ability to access capital is a motive only for large firms. Additionally, there is some support for the expropriation motive for small firms.

THE HYPOTHESES

This section of the paper explores the categories of motives regarding fully funded defined benefit plan terminations. The three categories of motives are financial, expropriation, and regulatory. Since all prior litera-

ture in this area has focused on overfunded pension plans, these studies will be used as a base to develop the hypotheses as they relate to the termination of fully funded pension plans. Within each section, comparisons are made between the expected results of this study and the results of prior termination literature examining overfunded plans.

Financial Hypothesis

As is the case with overfunded plans, contributions to fully funded defined benefit pension plans represent a financial commitment on the part of the firm. If the firm is experiencing financial distress, terminating a plan relieves the firm of future financial responsibility. Funds previously earmarked as pension contributions would then be available for other uses by the firm. These additional funds can be used to further reduce debt or fund some project that the firm was previously unable to undertake.

Several studies examined this motive relating to the termination of overfunded defined benefit plans. Hsieh, Ferris, and Chen (1997) found that firms were more likely to terminate a defined benefit pension plan when cash was needed to honor short-term liabilities. The results of this study were consistent with prior research in this area (Petersen, 1992; Thomas, 1989; Mittelstaedt, 1989). They also found that firms experiencing less financial distress used alternative methods of generating cash flow, while those experiencing greater financial distress were more likely to terminate a plan. This result is consistent with the pecking order of new financing developed by Myers and Majluf (1984), which suggested that firms choose financing methods on the basis of the level of cost and risk. Therefore, firms prefer internal to external financing. Even though with fully funded terminations there is not a significant inflow of cash, as there is with overfunded terminations, if the amount of funds previously earmarked to fund contributions is significant to the firm relative to its size, the termination of these types of plans can still be considered a means of internal financing.

Several other studies have considered this issue as well, suggesting that during periods of financial distress, when external financing may be more costly or not attainable, termination of overfunded defined benefit plans is even more likely. Petersen (1992) is one such study. Using various financial measures, he found that firms experiencing a decline in earnings were more likely to terminate their overfunded defined benefit plans. The author's results were consistent with prior research in the area (Thomas, 1989; Mittelstaedt, 1989; Stone, 1987).

To test these hypotheses for fully funded plans, measures of a firm's financial condition and ability to access the capital market are examined. The current ratio, equal to the firm's current assets relative to its current

liabilities, is used as a measure of the firm's short-term cash needs. It is expected that if the fully funded termination is motivated by financial distress, an inverse statistical relationship with the current ratio will be evident in the years prior to termination. This result would indicate that the more current assets the firm has relative to its liabilities, the less likely the firm is to terminate its pension plan, as the firm has assets sufficient to honor its short-term obligations.

In addition to the current ratio, several alternate measures of short-term cash needs also are considered. These are the firm's quick ratio, times interest earned ratio, and fixed charge coverage ratio. The quick ratio is measured as the firm's cash, short-term investments, and inventory relative to its current liabilities. The times interest earned ratio is equal to earnings before interest payments and taxes relative to interest obligations. Finally, the fixed charge coverage ratio is measured as the firm's earnings before interest payments and taxes relative to its interest obligations and rental payments. As with the current ratio, these variables are expected to be negatively related to plan terminations if terminations are motivated by the need to meet short-term obligations.

Additionally, a variable measuring changes in dividend payments is included. A similar variable was used by Petersen (1992) in his termination study of overfunded plans. The variable is a proxy for management's predictions of future earnings and is measured using a dummy variable equal to one if dividends were decreased from the prior year and zero otherwise. For firms with fully funded plans, it is expected that if management feels the firm is experiencing and will continue to experience financial difficulty, it would likely reduce dividend payments in an effort to reduce cash outflows. Therefore, if financial distress is a motive for termination of fully funded defined benefit plans, positive statistical significance is expected between the dividend decrease variable and the probability of termination.

Petersen (1992) also discusses the importance of controlling for firms' other financing options when examining the termination decision, because firms can reduce cash outflows by freezing or restricting spending on a variety of activities. Petersen's model incorporates a set of variables designed to observe changes in firms' spending. If a firm is experiencing financial distress, it is likely that the firm would reduce its spending or at best maintain its current level of spending. This is expected to occur regardless of funding levels. Those variables considered by Petersen (1992) that are included in this study are net purchases of the firm's own debt and stock and expenditures on acquisitions, all scaled by total firm assets. These variables are expected to be either insignificant or significant and negatively related to the probability of termination. A positive and significant

effect may indicate that a firm is terminating a pension plan in order to fund some other activity within the firm, such as an acquisition, or to improve the firm's overall financial position by reducing other outstanding debt.

Access to the capital market is measured by examining each firm's level of fixed assets relative to total firm assets, as well as the amount of debt it already holds (calculated as total firm debt to total firm assets). As theorized by Petersen (1992) in his examination of overfunded plans, if a firm has higher levels of fixed assets, its ability to access external capital may be greater because it is able to use those assets as collateral. Also, as hypothesized in almost all prior overfunded termination studies, if a firm is already highly leveraged, its ability to access capital may be restricted, or securing additional debt may be too costly. This hypothesis also would apply to a highly leveraged firm with a fully funded plan. A firm with a fully funded plan may be more likely to terminate its plan not necessarily to gain access to excess plan assets (as, by definition, the firm expects little to no reversion) but to reduce its liabilities and potentially reduce the need or the cost of external capital.

In addition to examining the financial condition of the firm and its ability to access capital, the cost associated with maintaining assets sufficient to honor pension liabilities is observed. The normal cost for the plan relative to firm assets is used to examine this relationship. The normal cost represents the amount the firm has to contribute to the plan in a given year based on projected pension liabilities. Therefore, this is the amount of the additional funds the firm could now utilize for other purposes within the firm. Higher normal costs would be expected to increase the probability of termination of any defined benefit plan, regardless of funding status. Therefore, a positive statistical relationship is expected between the normal cost ratio and the probability of termination of fully funded defined benefit pension plans.

Expropriation Hypothesis

Both managers and stockholders can potentially benefit from the termination of a fully funded pension plan. This potential benefit stems from the design of the pension contract. Ippolito (1985) found that a firm's promise to pay real pension benefits upon the retirement of a worker (backloading of compensation) creates an implicit contract under which the worker loses if he leaves the firm. He further expands this theory in 1986, finding that since workers may accept a lower wage because of the promise of future income upon retirement, firms can gain by terminating pension plans, as the future retirement benefits are no longer a liability (Ippolito, 1986).¹ This gain is at the expense of workers and would apply to all defined benefit plans, regardless of funding status.

Studies related to expropriation that examined terminations of overfunded pension plans have yielded mixed results. The majority of these studies examined movements in stock prices to determine if firms experienced abnormal returns around the announcement of a plan termination or the actual legal date of termination. It was theorized that if a plan was terminated and the excess assets recaptured by the firm, this would indicate that expropriation of wealth from workers to stockholders occurred. If the market expected the assets would be used for the betterment of the firm, such as to fund a net present value project, the plan termination would be viewed as favorable and the market would react positively to this "signal." Some studies (e.g. Alderson and Chen, 1986; VanDerhei, 1987; Datta, Iskandar-Datta, and Zychowicz, 1995) found that firms did experience abnormal returns around the announcement date or legal date of termination, while others (Mittelstaedt and Regier, 1990; Moore and Pruitt, 1990) did not. The study most similar to the current study that empirically examined this issue is that of Petersen (1992). Using variables measuring the types of workers participating in defined benefit pension plans and the types of plans sponsored, he found that more generous plans and plans with more vested and retired employees (plans with the greatest pension bond) were more likely to terminate.

The present study uses the ratio of vested participants to total participants to determine if expropriation of wealth from workers to managers and stockholders is a motive for termination of fully funded plans. As in prior studies of overfunded plans, this variable is used to measure the size of the pension bond. Since vested participants are the employees to which the firm already owes benefits, termination of the plan would freeze benefits at their current levels and prevent the accumulation of higher benefits, and therefore an even greater liability for the firm.

Regulatory Hypothesis

The area of regulatory change affecting a firm's decision to terminate a defined benefit pension plan examined by this study is related to the cost of maintaining the plan. The PBGC originally instituted a flat premium fee of \$1 per participant for all defined benefit pension plans to guarantee workers' benefits. Over the years, the fee has increased to its current level of \$19 per plan participant, with an additional variable amount added for underfunded plans.

In order to measure the effect on terminations of increases in the cost of maintaining defined benefit plans, a variable that measures the administrative cost relative to firm assets is included.² Two increases in the PBGC premium occurred during the period covered by this study, one in 1987 and another in 1990. It is predicted that these increases in PBGC premiums

as well as legislation that has increased the administrative costs of maintaining a defined benefit plan will increase the probability of termination of fully funded defined benefit pension plans.³ The effect of these regulatory changes was not empirically examined in any of the prior literature that examined overfunded defined benefit plan terminations.

SAMPLE AND METHODOLOGY

Description of Sample

The sample of plans used in this study comes from the population of plans filing the Form 5500. Several screening procedures were applied to the data. Because firm-specific financial data is used in the analysis, only plans of firms that have financial data available on the Compustat Database are included. Second, only plans with 100 or more participants are used. This screening is necessary because, for firms with less than 100 participants, the annual filing of the 5500 Form is optional and therefore may create some bias. Third, only single-employer plans are used. Since this is a firm and plan level analysis, multi-employer plans are eliminated, as the decision to terminate these plans is likely not made by a single firm. Fourth, firms that do not have useable data or that have missing data needed for the analysis are excluded. These screening procedures were used in a majority of the termination studies that examined overfunded pension plans. The additional screening procedure that differentiates this paper from prior literature is that, after rediscounting plan liabilities using a common discount rate, plans where the potential reversion is more than \$1 million were eliminated. Previous studies did just the opposite, eliminating plans where the potential reversion was less than \$1 million, since their focus was on overfunded plans.

Terminating plans were first identified based on the Form 5500. Termination status, as well as the termination dates, were then verified using the PBGC Standard Termination List. Terminations of large, public plans that were on the PBGC list but not recorded on the 5500 Form were re-categorized as terminating plans.

Panel A of Table 1 provides some descriptive information about the sample. The final sample contains 110 terminating fully funded plans and 1,587 non-terminating fully funded plans. During the same period, the number of large, public, overfunded plan terminations was 72. The most fully funded terminations, 36, occurred in 1991, after which the number of terminations generally declined.

Industry dummy variables were constructed using the 2-digit SIC Code classification scheme. For the purpose of general discussion, these

Table 1. Sample Description

<i>Panel A: Number of Plans</i>				
Year	Terminating	Non-terminating	Total	Percent of total sample
1988	8	115	123	7.25%
1989	6	87	93	5.48%
1990	12	173	185	10.90%
1991	36	519	555	32.70%
1992	18	260	278	16.38%
1993	9	130	139	8.19%
1994	2	29	31	1.83%
1995	14	202	216	12.73%
1996	4	58	62	3.65%
1997	1	14	15	0.88%
	110	1587	1697	100.00%

<i>Panel B: Industry Statistics</i>		
Division	Number	Percent
Mining	77	4.54%
Manufacturing	1,435	84.56%
Transportation, Communications, Electric, Gas, and Sanitary Services	53	3.12%
Wholesale Trade	45	2.65%
Retail Trade	20	1.18%
Services	17	1.00%
Public Administration	50	2.95%
	1,697	100.00%

dummies were aggregated to the division level. Firms in the Finance, Insurance, and Real Estate Division were deleted from the sample because of differences in the type of financial information provided by these firms and the varying regulatory environment they face.⁵ As shown in Panel B of Table 1, the plans of manufacturing firms account for nearly 85 percent of the sample. This large proportion of plans in manufacturing firms also was observed in some of the overfunded termination studies.

Methodology

Logistic regression models are constructed to model the termination decision. Separate models are developed to analyze data one and two years

prior to termination. By examining multiple years of data prior to termination, the study is able to determine when motives for termination become evident. Next, the data are divided into sub-periods and the same analysis is done. The primary purpose of examining sub-periods is to determine if motives for termination have changed over time. The sub-periods are 1988 to 1992 and 1993 to 1997.

The dependent variable for the regression models is based on the firm's decision to terminate or not terminate the fully funded defined benefit plan in a given year. It is defined as zero for plans that did not terminate and one for plans that did terminate. The basic model is defined as:

$$\text{Termination} = f(\text{financial variables, expropriation variables, regulatory variables, control variables})$$

The termination year is set to time zero for terminating plans. For non-terminating plans, a random assignment method, without replacement, is used to determine time zero. With this procedure, each plan is included in the model only once. The number of non-terminating plans assigned to each sample year is based on the percentage of the terminating plans that appear in that year. The purpose of this random assignment without replacement is to minimize any potential economic or firm-specific effects that may be present in any given year. This procedure was used in several prior termination and insolvency studies (Thomas, 1989; Mittelstaedt, 1989; Barniv and Hathorn, 1997).

To best determine the effect of the variables of interest on the probability of termination, several control variables also are included in the logistic regression models. Firm and year dummies are added to capture any firm-specific and/or economic effects that may occur during the sample period. In addition, the natural log of company assets is included as a company size control. A complete variable list with definitions is provided in Table 2.

RESULTS

Summary Information

Summary statistics for the funding ratio and the variables of interest are presented in Table 3.⁶ The funding ratio is defined as total plan assets to rediscounted plan liabilities. From three years prior to termination to the year prior to termination, the median funding ratios of both terminating and non-terminating plans decreased. However, the decrease for terminating plans was more than three times that of non-terminating plans. In

Table 2. Variable List and Descriptions

Variable	Variable Construction	Explanation
FUNDING	plan assets/plan liabilities	Total plan assets/total plan liabilities rediscouted using a common rate
Financial motive		
CRATIO	data4/data5	Current assets/current liabilities
QUICK	data1+data3/data5	Cash, short-term investments, and inventory/current liabilities
TIMESINT	data170/data15	Earnings before interest payments and taxes/interest obligations
FIXCHRG	data170/data15+data96	Earnings before interest payments and taxes/(interest obligations and rental payments)
DDUMMY	data26*data27	Dummy variable = 1 if decrease in dividends, 0 otherwise
FIXASST	data8/data6	Fixed assets (plant, property & equipment)/total company assets
LEVER	data6 – data60 – data130/data6	Debt/total company assets
NORCOST	normal cost/data6	Normal cost/total company assets
NETDEBT	data114 – data111/data6	Net purchases of firms' own debt/ total company assets
NETSTCK	data115 – data108/data6	Net purchases of firms' own stock/ total company assets
ACQSTN	data129/data6	Expenditures on acquisitions/total company assets
Expropriation motive		
VESTED	vested parts/total parts	Vested participants/total participants
Regulatory motive		
TLCARRY	data52	Dummy variable = 1 if positive tax loss carryforwards, 0 otherwise
FEDTAX	data63	Dummy variable = 1 if federal taxes paid, 0 otherwise
ADEXPSE	administrative expense/ data6	Administrative cost/total company assets
EXCISE	excise tax year dummy	Dummy variable = 1 if year is greater than 1990, 0 otherwise
Control variable		
LNASSET	ln(data6)	Log of company assets

Table 3. Summary Statistics

<i>Panel A: Funding Ratio Statistics</i>						
	Non-Terminating			Terminating		
	Minus 1	Minus 2	Minus 3	Minus 1	Minus 2	Minus 3
MEAN	2179.90	19879.04	6258.12	33.69	4301.96	2354.56
MEDIAN	1.161	105.970	1.706	0.969	62.483	2.650
IQR	1.478	2894	249.604	0.372	2585.0	515.461
MIN	0.000	0.002	0.000	0.000	0.088	0.687
MAX	232381	17988860	269690	1589.4	22263.3	21932.5
<i>Panel B: Independent Variable Summary Statistics</i>						
Variable	Minus 1			Minus 2		
	Mean	Min	Max	Mean	Min	Max
<i>Financial motive</i>						
CRATIO	1.9220	0.4792	5.9013	1.9515	0.5666	5.1092
DDUMMY	0.1379	0.0000	1.0000	0.1592	0.0000	1.0000
NETDEBT	-0.0002	-0.2415	0.2173	0.0009	-0.2600	0.2171
NETSTCK	-0.0048	-0.1825	0.0891	-0.0051	-0.1690	0.1020
ACQSTN	0.0174	0.0000	0.1986	0.0200	0.0000	0.2288
FIXASST	0.3656	0.0599	0.8215	0.3741	0.0527	0.8194
LEVER	0.6363	0.1885	1.7166	0.6278	0.2023	1.6828
NORCOST	0.0003	0.0000	0.0077	0.0003	0.0000	0.0061
<i>Expropriation motive</i>						
VESTED	0.4435	0.0000	1.0000	0.4529	0.0000	1.0000
<i>Regulatory motive</i>						
ADEXPSE	0.0001	0.0000	0.0014	0.0001	0.0000	0.0014
<i>Control variable</i>						
LNASSET	7.0443	3.1390	10.8971	6.9322	3.3474	10.8055

CRATIO = current assets/current liabilities; DDUMMY = dummy variable equal to 1 if decrease in dividends, 0 otherwise; NETDEBT = net debt purchases/total firm assets; NETSTCK = net stock purchases/total firm assets; ACQSTN = expenditures on acquisitions/total firm assets; FIXASST = fixed assets/total firm assets; LEVER = debt/total firm assets; NORCOST = normal cost/total firm assets; VESTED = vested participants/total plan participants; ADEXPSE = administrative costs/total firm assets; LNASSET = log of firm assets

addition, the median funding ratio one year prior to termination was nearly 20 percent less for terminating plans than for non-terminating plans. Finally, the median funding ratio of terminating plans was approximately 97 percent, suggesting that more than 50 percent of terminating plans had to add cash to the plans in order to complete a standard termination according to PBGC regulations.⁷

These differences may be caused by several factors. First, they may indicate that the decision to terminate is made several years prior to the termination event and the decrease in the funding ratio observed is a direct result of firms altering their contributions in order to reduce the amount of excess assets in the plan upon termination and thereby avoid the excise tax. Second, the difference may be the result of an overall contraction in spending that results in a reduction in contributions by firms that eventually terminate plans. This contraction in spending may be an early indication of firms in financial distress. Third, the difference in funding ratios may be reflective of differences in the investment performance of terminating plans compared to non-terminating plans.

Means Comparison

Before proceeding to the logistic regression, a means comparison analysis using the t-test procedure is performed. The procedure compares the means of the funding ratios and the variables of interest for firms terminating plans and those not terminating plans and tests the hypotheses that the means are statistically different. Significant differences in the means for firms terminating plans and those that do not terminate plans may provide some indication of the variables that will be significant in the logistic analysis.

Results of the means analysis are presented in Table 4 for the three years prior to termination as well as the three years following termination. An examination of the funding ratios both three years prior to termination and one year prior to termination indicates that the funding ratio of terminating plans is significantly less than that of non-terminating plans. The results for variables related to the financial motives for termination indicate that, prior to termination, firms that terminated plans had higher current ratios than firms that did not terminate plans. In addition, firms terminating plans spent more reducing outstanding debt than firms that did not terminate plans. These results may indicate that firms terminating plans were not doing so as a means to meet short-term obligations or because of any financial distress. In the three years leading up to the termination event, firms terminating plans had significantly less fixed assets. Two years prior to termination, firms that did not terminate plans were more highly leveraged. However, this result is not observed one year

prior to termination. These results indicate that the need to raise capital may be a motive for plan termination, and that this motive becomes evident only in the year prior to termination. Also, firms terminating plans had lower normal costs than did firms that did not terminate plans, suggesting that the costs associated with keeping the plan funded to appropriate levels is likely not a motivating factor in the decision to terminate pension plans. With regard to the other motives prior to termination, firms of terminating plans had fewer vested participants and lower administrative costs when compared to firms of non-terminating plans, suggesting that expropriation may not be a motive for termination. Finally, firms of terminating plans were smaller than firms of non-terminating plans.

The results of the means comparisons of fully funded terminating and non-terminating plans do differ from those found in prior literature that examined overfunded terminating and non-terminating plans. Prior studies found that firms with overfunded terminating plans were more highly leveraged than firms with overfunded non-terminating plans. The opposite effect was observed for this sample of fully funded plans. With these plans, it is the firms of non-terminating plans that were more highly leveraged.

There also are some similarities in the results of the means comparisons for this study and studies of overfunded plans. Stone (1987) found that firms with overfunded plans that did not terminate had more fixed assets than those that terminated. Also, the author found that firms with non-terminating overfunded plans were larger than firms with plans that terminated. This size difference was observed in prior studies as well (Hamdallah and Ruland, 1986; Thomas, 1989). Both of these results were also observed in the fully funded sample.

Following the termination event, firms of terminating plans still had higher levels of current assets relative to current liabilities, had fewer fixed assets relative to total assets, and spent more on debt reduction than did firms of plans that did not terminate. Additionally, firms terminating plans were less likely to reduce dividends but spent less on stock repurchases than did firms that did not terminate plans. These results indicate that there are no substantial differences when examining the financial differences between firms terminating plans and those that did not, before and after the termination event, suggesting that the terminations are likely not strongly motivated by financial distress.

Logistic Regression Results: Minus 1 Analysis

The results of the logistic regression analysis of the data one year prior to termination, presented in Table 5, offer little support for the hypothesis that terminations are motivated by financial distress. The spending on debt

Table 4. Means Comparison

<i>Panel A: Means Comparisons—Before Termination</i>											
Variable	Minus 1		Minus 2		Minus 3		t-value	t-value	t-value	t-value	t-value
	0	1	0	1	0	1					
FUNDING	2179.90	33.69	19879.04	4301.96	6258.12	2354.56	5.99*	1.45	1.45	2.06**	2.06**
Financial motive											
CRATIO	1.9137	2.0409	1.9273	2.3020	1.9516	2.5754	-1.43	-3.34*	-3.34*	-4.01*	-4.01*
DDUMMY	0.1399	0.1091	0.1553	0.2154	0.1622	0.1111	0.91	-1.28	-1.28	0.81	0.81
NETDEBT	-0.0013	0.0153	0.0007	0.0027	-0.0050	-0.0124	-2.09**	-0.24	-0.24	0.46	0.46
NETSTCK	-0.0043	-0.0126	-0.0044	-0.0156	-0.0061	-0.0012	1.39	1.48	1.48	-1.00	-1.00
ACQSTN	0.0174	0.0162	0.0197	0.0244	0.0225	0.0364	0.34	-1.13	-1.13	-1.28	-1.28
FIXASST	0.3686	0.3225	0.3787	0.3073	0.3889	0.3210	3.29*	4.47*	4.47*	3.38*	3.38*
LEVER	0.6339	0.6708	0.6331	0.5509	0.6187	0.5542	-1.02	2.77*	2.77*	1.36	1.36
NORCOST	0.0003	0.0002	0.0004	0.0001	0.0004	0.0004	0.92	3.07*	3.07*	0.11	0.11
Expropriation motive											
VESTED	0.4443	0.4319	0.4540	0.4368	0.4559	0.4456	0.50	0.57*	0.57*	0.30	0.30
Regulatory motive											
ADEXPSE	0.0001	0.0001	0.0001	0.0000	0.0001	0.0000	-0.30	2.89*	2.89*	2.75*	2.75*
Control variable											
LNASSET	7.0541	6.9028	6.9612	6.5126	6.9014	6.2181	0.87	2.00**	2.00**	2.34**	2.34**

Table 4. (Continued)

Variable		Plus 1		Plus 2		Plus 3		t-value	
		0	1	0	1	0	1		
Financial motive									
CRATIO	1.8226	1.9739	-1.78	1.7485	1.9358	-2.25**	1.6760	1.7529	-0.91
DDUMMY	0.1569	0.1091	1.58	0.1468	0.1273	0.56	0.1575	0.0727	3.20*
NETDEBT	0.0038	0.0407	-2.38**	-0.0004	0.0047	-0.88	0.0005	0.0025	-0.32
NETSTCK	-0.0103	-0.0388	2.71*	0.0024	0.0001	0.52	0.0030	-0.0031	1.05
ACQSTN	0.0190	0.0244	-1.20	0.0200	0.0165	1.04	0.0222	0.0328	-1.64
FIXASST	0.3655	0.3180	3.02*	0.3605	0.3270	2.13**	0.3613	0.3129	3.14*
LEVER	0.6486	0.6546	-0.16	0.6487	0.6593	-0.30	0.6383	0.6568	-0.50
Control variable									
LNASSET	7.2020	7.1500	0.31	7.2508	7.11156	0.75	7.2726	7.30976	-0.20

* Significant at .01 level

** Significant at .05 level

CRATIO = current assets/current liabilities; DDUMMY = dummy variable equal to 1 if decrease in dividends, 0 otherwise; NETDEBT = net debt/purchases/total firm assets; NETSTCK = net stock purchases/total firm assets; ACQSTN = expenditures on acquisitions/total firm assets; FIXASST = fixed assets/total firm assets; LEVER = debt/total firm assets; NORCOST = normal cost/total firm assets; VESTED = vested participants/total plan participants; ADEXPSE = administrative costs/total firm assets; LNASSET = log of firm assets

reduction is positive and significant in the full model, suggesting that firms terminating plans increased debt reduction. This may reflect the firms' attempt to reduce debt to improve their overall financial position. In addition, in the later sub-period model, the spending on stock is significant and negative, indicating that firms spending less on the repurchase of stock are more likely to terminate. These results are different from the results found in the studies examining motives for termination of overfunded plans in that stronger support was found for the financial motives for termination.

The results do offer some support for the access-to-capital motive for termination. The leverage variable is significant and positive in the full model and the first sub-period model, indicating that more highly leveraged firms are more likely to terminate than are other firms. This result provides some support for the hypothesis that either the cost of obtaining external capital or the ability to obtain external capital is a motivating factor in the decision to terminate fully funded defined benefit pension plans.

When examining the quick ratio as an alternate measure of short-term cash needs, the results are consistent. When the times-interest-earned ratio is used, the results are fairly consistent as well. The only difference is that in addition to the stock spending variable being significant and negative in the second sub-period model, it also is significant and negative in the full model. Finally, when the fixed-charge ratio is used, there are two differences in the results for the full model: (1) leverage is significant only at the 10 percent level, and (2) size is significant and negative. Regardless of the measure of short-term cash needs used, no support is found for the expropriation or regulatory motives for termination.

Logistic Regression Results: Minus 2 Analysis

The results of the models examining data two years prior to termination are reported in Table 6. The results offer no support for any of the motives for termination. The size variable is the only variable significant in any of the models, suggesting that larger firms are less likely to terminate fully funded pension plans. The results of the minus-one-year model indicate that there is some support for termination being related to the need to access capital. However, the termination decision does not appear to be made far in advance of the termination event, as evidenced by the insignificance of these same variables in the minus-two-year model.

Robustness Tests

The first set of robustness tests examines tax motives considered in studies of overfunded plan terminations. Studies examining the tax incentives for termination of overfunded defined benefit plans have focused on both tax loss carryforwards and the firm's marginal tax rate. If a firm has

Table 5. Logistic Regression Results for Minus 1 Data^a

	Full model	1988–1992	1993–1997
Financial motive			
CRATIO	0.1553 (.1460)	0.2307 (.2307)	0.2024 (.3064)
DDUMMY	0.1317 (.3426)	-0.4275 (.4931)	0.3746 (.6847)
NETDEBT	4.1080** (1.8755)	4.1433 (2.8987)	-2.9709 (4.2170)
NETSTCK	-4.3692 (2.3445)	1.8554 (3.9112)	-11.5883* (3.8481)
ACQSTN	-1.9972 (3.7735)	5.1572 (4.5842)	-22.2258 (14.2032)
FIXASST	-0.6696 (.7623)	1.5379 (1.0534)	-2.5406 (1.8531)
LEVER	0.8893** (.4261)	1.5823** (.6611)	-1.2868 (1.3479)
NORCOST	-191.3000 (161.6)	-109.7000 (167.1)	-1211.1000 (973.5)
Expropriation motive			
VESTED	-0.0761 (.5278)	-1.1084 (.6717)	-0.0920 (1.1461)
Regulatory motive			
ADEXPSE	673.2000 (690.0)	1191.0000 (801.7)	1072.2000 (1779.1)
Control variable			
LNASSET	-0.1331 (.0804)	-0.0306 (.1228)	-0.2979 (1943)
R ²	0.1612	0.2808	0.3375

CRATIO = current assets/current liabilities; DDUMMY = dummy variable equal to 1 if decrease in dividends, 0 otherwise; NETDEBT = net debt purchases/total firm assets; NETSTCK = net stock purchases/total firm assets; ACQSTN = expenditures on acquisitions/total firm assets; FIXASST = fixed assets/total firm assets; LEVER = debt/total firm assets; NORCOST = normal cost/total firm assets; VESTED = vested participants/total plan participants; ADEXPSE = administrative costs/total firm assets; LNASSET = log of firm assets

^aStatistics reported are variable coefficients and standard errors.

*Significant at .01 level,

** Significant at .05 level

tax loss carryforwards, the taxable amount of the reversion can be reduced or eliminated entirely. For firms with lower marginal tax rates, an additional dollar of taxable income would result in lower tax payments than it would for firms with higher marginal tax rates. Since, with overfunded plans, it is expected that some excess assets will revert to the firm, it is hypothesized that firms with tax loss carryforwards and lower marginal tax rates are more likely to terminate.

Several studies, including those of Hamdallah and Ruland (1986) and Clinch and Shibano (1996), considered tax motives for termination. Hamdallah and Ruland (1986) found that of their matched sample of 80 firms, those that terminated their overfunded pension plans were more likely to have tax carryforwards relative to those that did not. The results of the Clinch and Shibano (1996) study were consistent with this finding. The authors examined a sample of firms that covered a slightly longer period and found a significant relationship between the reversion decision and tax benefits (level of federal tax payments and tax loss carryforwards). These results support the theory that a firm with tax loss carryforwards can use them to offset the income received from the reversion, or essentially reduce the amount of the reversion that is subject to taxation. It also supports the potential link between a firm's marginal tax rate and termination of an overfunded defined benefit plan.

For fully funded plans, the firm receives little to no reversion upon termination. Thus, the firm's incentives to terminate are not expected to be influenced by the presence of tax loss carryforwards or lower marginal tax rates. Therefore, it is hypothesized that tax incentives will have little or no effect on the probability of termination of fully funded plans. Consistent with prior termination studies, this study uses a dummy variable equal to one if the firm has tax loss carryforwards and zero otherwise. A separate dummy variable is constructed for federal tax payments. This variable is equal to one if the firm paid federal taxes in that year and zero otherwise. These results are not reported here, as the likelihood ratio test does not indicate that the addition of the tax variables improves the overall fit of the model.⁸

Next, less financially distressed and more financially distressed firms are examined. Those firms that decreased dividends during the period are considered more financially distressed. Those firms that did not change dividends or increased dividends are considered less financially distressed. As discussed in the previous section, changes in dividend levels have been found to proxy for management's view of the financial status of the firm. If managers feel the firm's financial future is positive, they can signal this belief to the market by increasing dividend payments. This measure of financial distress was also considered by Hsieh, Ferris, and

Table 6. Logistic Regression Results for Minus 2 Data^a

	Full model	1988–1992	1993–1997
Financial motive			
CRATIO	0.2508 (.2107)	-0.0885 (.3044)	0.5464 (.3098)
DDUMMY	0.3635 (.3966)	0.2916 (.6073)	-0.1822 (.8593)
NETDEBT	1.3689 (2.7096)	-0.9893 (3.2381)	5.1743 (5.1519)
NETSTCK	-2.0900 (3.6719)	1.5276 (7.1785)	-2.1147 (5.4203)
ACQSTN	2.7098 (3.8072)	-0.9967 (5.7207)	9.9595 (5.6608)
FIXASST	-2.2655 (1.3477)	-2.0387 (1.6075)	-1.9838 (2.1438)
LEVER	-1.0139 (1.0237)	-1.9404 (1.4512)	-0.1527 (1.5656)
NORCOST	-415.5000 (271.7)	-349.0000 (313.7)	-990.1000 (1808.7)
Expropriation motive			
VESTED	-0.5342 (.7225)	-1.6031 (1.0343)	0.1211 (1.2257)
Regulatory motive			
ADEXPSE	-1468.5000 (1341.5)	-1787.4000 (1590.1)	831.5000 (2390.2)
Control variable			
LNASSET	-0.3787* (.1397)	-0.4839* (.1824)	-0.1615 (.2099)
R ²	0.2633	0.3112	0.3689

CRATIO = current assets/current liabilities; DDUMMY = dummy variable equal to 1 if decrease in dividends, 0 otherwise; NETDEBT = net debt purchases/total firm assets; NETSTCK = net stock purchases/total firm assets; ACQSTN = expenditures on acquisitions/total firm assets; FIXASST = fixed assets/total firm assets; LEVER = debt/total firm assets; NORCOST = normal cost/total firm assets; VESTED = vested participants/total plan participants; ADEXPSE = administrative costs/total firm assets; LNASSET = log of firm assets

^aStatistics reported are variable coefficients and standard errors.

*Significant at .01 level

** Significant at .05 level

Chen (1997) in their analysis of the effect of the level of financial distress on plan termination.

The results of these models are reported in Table 7. One year prior to termination, the debt spending and leverage variables are both significant and positive for the less financially distressed firms. These results suggest that the significance of these variables found in the primary models is attributable to the less financially distressed firms. For those firms experiencing financial distress, the net stock spending variable is significant and negative, indicating that even though these firms are experiencing financial distress, the firms may not take all available steps to reduce cash outflows. Interestingly, when the data two years prior to termination are examined, this effect is observed for the less financially distressed firms. In addition, two years prior to termination, the fixed asset variable is significant and negative for the less financially distressed firms, suggesting that for these firms, terminations are partially motivated by the need to access external capital. Finally, the leverage variable is significant and negative for the more financially distressed firms. This suggests that firms that are more highly leveraged are less likely to terminate their fully funded defined benefit plans. This result was also found by Clinch and Shibano in their 1996 study of overfunded plans.

This result appears counterintuitive and is not specifically discussed by Clinch and Shibano (1996). One possible explanation for this observed effect is that if debt is viewed as an alternative means of financing relative to plan termination, cost-benefit analyses have found that external financing is most economically feasible for firms that are securing external financing by increasing their level of debt. This appears contrary to the debt financing theory of Myers and Majluf (1984), which suggests that firms will typically prefer internal to external financing because it is less costly. However, these results may indicate that internal financing is not always more economical than external financing, possibly because of the various costs associated with plan terminations. ERISA requires that a firm filing for a standard termination of a defined benefit pension plan complete several layers of paperwork and administrative tasks, including sending termination notices to all plan participants as well as notices outlining their accrued benefits and the procedures used to calculate the benefits. The firm also is required to file a notice of termination with the PBGC. As for benefits, termination requires the immediate and full vesting of all plan participants and the purchase of annuities for the participants to protect their benefits from possible adverse market changes. Finally, the firm must provide the PBGC with a complete list of all missing participants and either the information of the insurer with which their annuities have been

Table 7. Logistic Regression Results with Sample Divided into Less Financially Distressed and More Financially Distressed Groups^a

	Minus 1		Minus 2	
	Less	More	Less	More
Financial motive				
CRATIO	0.2010 (.1645)	-0.3976 (.4737)	0.2154 (.1801)	-1.0373 (.6439)
FIXASST	-0.2228 (.8148)	-5.6717 (2.9736)	-2.1853** (1.0558)	-4.2305 (2.7482)
NETDEBT	4.1678** (2.0112)	1.2894 (10.1864)	1.6743 (2.4086)	-24.8778 (16.6105)
NETSTCK	-2.4390 (2.5809)	-16.7149** (8.3903)	-6.5502** (2.7423)	-7.5974 (9.8223)
ACQSTN	0.0104 (3.8562)	-48.6613 (35.1087)	2.8408 (3.3907)	-2.3116 (10.6393)
LEVER	1.0538** (.4380)	-7.3793 (4.1243)	-0.6101 (.7500)	-10.4920** (4.8718)
NORCOST	-502.3000 (323.9)	133.8000 (252.4)	-319.2000 (313.8)	-911.9000 (751.9)
Expropriation motive				
VESTED	-0.1631 (.5608)	1.1935 (1.7857)	-0.9642 (.7333)	-1.0215 (2.3730)
Regulatory motive				
ADEXPSE	811.4000 (941.3)	1437.3000 (1337.0)	-1854.700 (1687.8)	-766.3000 (4053.1)
Control variable				
LNASSET	-0.1350 (.0850)	0.1333 (.3644)	-0.1909 (.1034)	-0.2003 (.3451)
R ²	0.1740	0.3893	0.1150	0.4664

CRATIO = current assets/current liabilities; DDUMMY = dummy variable equal to 1 if decrease in dividends, 0 otherwise; NETDEBT = net debt purchases/total firm assets; NETSTCK = net stock purchases/total firm assets; ACQSTN = expenditures on acquisitions/total firm assets; FIXASST = fixed assets/total firm assets; LEVER = debt/total firm assets; NORCOST = normal cost/total firm assets; VESTED = vested participants/total plan participants; ADEXPSE = administrative costs/total firm assets; LNASSET = log of firm assets

^aStatistics reported are variable coefficients and standard errors.

*Significant at .01 level

** Significant at .05 level

established or deposits equal to their accrued benefits to be held on their behalf by the PBGC (PBGC, 2003b).

If the firm establishes a new defined benefit plan covering these same employees, there are specific rules the firm must follow for the plan to qualify as a replacement plan. In cases in which the firm recaptures excess assets and a change in the funding method is needed, the firm must obtain approval from the Internal Revenue Service (PBGC, 1984). Considering these costs, as well as the additional capital that may need to be added to the plan⁹ in order to complete a standard termination and the possible decrease in employee morale, it is plausible that external financing may be a more cost-effective means of raising capital for some firms.

Several other variations of models were constructed. First, to determine if there are any differences in motives for termination based on the size of the firm, the sample is divided into small and large firms according to the natural log of company assets. Two interesting results were found for the leverage variable and the percentage of vested participants one year prior to termination. The leverage variable is significant and positive only for the large firms, indicating that these firms were driving the results observed in the primary models. In addition, the vested variable is significant and positive for small firms and significant and negative for large firms. These competing results with regard to firm size explain why the variable is not significant in the primary models. In the minus-two models, several variables are significant for the large firms. The fixed asset ratio, leverage ratio, and administrative expense ratio all are significant and negative. As with the primary models, these results indicate that, two years prior to termination, there is no evidence found to support any of the motives for termination.

Next, models were constructed to examine the effect of a particular regulatory change on the probability of termination. The Omnibus Budget Reconciliation Act of 1990, passed in November of 1990, increased the excise tax on reversions from 15 percent to 50 percent, unless a minimum of 25 percent of the excess assets were placed into a replacement plan. If this was done, then the excise tax was reduced to 20 percent of the reversion. This Act reduced the attractiveness of defined benefit plans because of the increased cost of termination if the plan became overfunded.

To determine if this excise tax increase affected the probability of termination of fully funded plans, the primary set of full models was re-run with an additional dummy variable.¹⁰ The variable is equal to one in the years of the sample in which the 50 percent excise tax applied and zero in the other years. The excise tax variable was not significant in either the minus-one or the minus-two models and the other results were consistent with those discussed above. This suggests that, for fully funded plans, the

increase in the excise tax occurring in 1990 did not affect the probability of termination.

Two final sets of models were constructed related to the financial motives for termination. Since market conditions can affect debt and stock purchase decisions, models were re-run using only the acquisition variable as the measure of the firm's spending patterns. The results are generally consistent with those reported above. The only difference is observed in the full minus-one model. In this model, size is significant and negative. Finally, models were run including firms' P-E ratio, a proxy for firms' anticipated investment opportunities. As discussed above, firms can benefit two ways from termination. If there are excess assets in the plan once benefit obligations have been satisfied, those assets revert to the firms. In addition, money previously earmarked for plan contributions is now available to the firms for other uses. As a result, if potential investment opportunities play a role in plan terminations, a positive relationship is expected. The results of the models including the P-E ratio are fairly consistent with the results of the original models. The two differences are: (1) leverage becomes significant only at the 10 percent level in the full minus-one model, and (2) the P-E ratio variable is significant and positive in the minus-two early sub-period model. This second result offers limited support for the hypothesis that firms with more investment opportunities are more likely to terminate plans in order to take advantage of those opportunities.

CONCLUSION

As discussed earlier, the Enron crisis resulted in a significant depletion of the retirement income of more than 10,000 workers. Approximately \$1 billion of the workers' assets were lost when the company's stock plummeted over a period of several weeks. Since then, a great deal of attention has been given to the financial security of the retirement savings of workers and how they can be protected. This has resulted in increased interest in the continuation of defined benefit pension plans as well as the creation of new defined benefit pension plans, for several reasons. First, a worker's benefit is typically defined by a formula so retirement income is certain and generally provided for the remainder of the worker's lifetime. Second, the worker does not make investment decisions and does not bear the investment risk. Finally, the benefits are guaranteed, to some maximum level, by the Pension Benefit Guaranty Corporation, removing some of the uncertainty of benefit security if a firm goes bankrupt.

The results of this study indicate that the terminations of fully funded defined benefit pension plans are partially motivated by firms' ability to access capital. This result is consistent with those found for overfunded defined benefit plans. However, none of the other motives are consistently supported. There are some differences observed when examining motives for termination by firm size. These results suggest that the ability to access capital is a motive for termination only for large firms. In addition, there is support for the expropriation hypothesis for small firms.

Since the results of the study do not find support for the majority of the motives examined, additional research in this area is warranted. The results of this study do provide some insight into the aspects of defined benefit plans that may discourage their use as well as factors that do not appear to influence the decision to terminate fully funded plans. For example, since the external capital motive for termination is supported, one way in which legislators may reduce terminations resulting from this motive may be to encourage firms to consider settlement instead of termination. Per FAS No. 88, firms can purchase annuities for retired or inactive liabilities which could result in two major benefits: (1) a portion of the gains could be immediately recognized as income, and (2) administrative costs would be reduced since the company issuing the annuity would take over administration of beneficiaries and firms would no longer be required to pay PBGC premiums for those participants. As a result, a firm's overall financial position could be immediately improved, thereby affecting its ability to access external capital as well as the costs associated with obtaining it. For regulators and legislators who have long attempted to revive interest in defined benefit plans, this information may be used to help design legislation that would make defined benefit plans more attractive. If successful, the trend away from defined benefit plans may slow.

NOTES

¹Workers are entitled to the vested portion of their accrued benefits if they terminate employment before reaching retirement age. However, because of the design of most pension plans (e.g., the fact that benefits are generally based on compensation in the last few years of employment), the most valuable benefits are generally earned in the last several years of employment. Termination of a pension plan prevents employees from benefiting from this back-loaded benefit structure.

²Total administrative cost is used instead of PBGC premiums because, starting in 1988, the premiums were included in the salary and allowances category of expenses instead of being listed as a separate category. By using total administrative cost, the study also is able to capture the effect of other legislation that has increased the cost of maintaining a defined benefit plan that was passed during the sample period.

³A summary of some of the key legislation that occurred during the 1980s and the effects of the legislative changes can be found in the study conducted by Hay/Huggins Company, Inc.

(1990). Participation and vesting requirements, non-discrimination testing, and pension valuation procedures are examples of some of the areas in which legislative change has occurred. For example, the Retirement Equity Act of 1984 lowered both the age and service requirements for plan participation and vesting, and it instituted added notification requirements in specific cases. In addition, the Tax Reform Act of 1986 lowered maximum vesting time requirements and changed the structure of coverage tests pension plans were required to use to determine if plans were non-discriminatory. Finally, FASB 87 altered rules regarding the discount rate used and the amortization of prior service costs. During the 1990s, an important topic for legislative change was notification and disclosure requirements. For example, the Retirement Protection Act of 1994 required that underfunded plans send notices to plan participants advising them of the funding status and the benefits available through the PBGC.

⁴The rediscounting procedure is that of Feldstein and Morck (1982). This procedure was used in several prior termination studies, including those of Stone (1987), Mittelstaedt (1989), and Petersen (1992).

⁵These firms were commonly screened out in overfunded termination studies.

⁶In addition to taking a cursory look at funding ratios and the independent variables, it also would be interesting to examine the reported reason for termination and successor plan information. This is not possible, however, as the majority of firms do not report this information.

⁷As discussed in more detail later, if plan assets are not sufficient to honor liabilities and a firm wishes to complete a standard termination, the PBGC will allow the firm to make a contribution at that time so that plan assets are exactly equal to plan liabilities.

⁸There were two differences in the results of the models including the tax variables and those excluding the tax variables. First, the leverage variable is no longer significant. Additionally, the tax loss carryforwards is significant and positive in the early sub-period minus-one model. This result indicates that, even for fully funded plans, the presence of tax loss carryforwards can increase the probability of termination. An examination of the excess assets in the plan indicates that more than half of the firms receive some reversion amount upon termination. So even though these plans are not considered overfunded, tax loss carryforwards may still have value with regard to plan termination.

⁹At the time a firm petitions the PBGC for termination, plan assets are rediscounted using a common rate. If, after rediscounting, the plan assets are not sufficient to honor liabilities, firms are allowed to contribute the funds necessary to complete the standard termination at that time.

¹⁰The year dummies are not included in the models with the excise tax dummies because of orthogonality issues.

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