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Author(s): Michael J. Alderson and K. C. Chen

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Excess Asset Reversions and Shareholder Wealth

MICHAEL J. ALDERSON and K. C. CHEN*

ABSTRACT

The ownership of pension assets in a defined benefit pension plan is an unresolved issue in corporate finance. The issue is important because it defines the appropriate investment policy for a pension fund. In this paper, we summarize the ownership debate in the form of two mutually exclusive theories. We then focus on a recently popular event in pension finance, excess asset reversions. Our paper demonstrates the valuation effects associated with this event in a stochastic dominance framework. Under certain conditions, a reversion constitutes an expropriation of wealth from the participants and beneficiaries of the plan to the firm. Using data provided by the Pension Benefit Guaranty Corporation and the Center for Research in Security Prices tape, we examine the returns to the shareholders of 58 companies which conducted excess asset reversions between 1980 and 1984. Our results show that large abnormal returns accrued to these shareholders around the time of the reversion. These findings have implications both for the appropriate investment policy of pension funds and for public policy with respect to plan terminations.

THE EMPLOYEE RETIREMENT INCOME Security Act of 1974 (hereafter ERISA) has impacted financial management in two important ways. It installed vested pension obligations as a legal liability of the firm and requires companies to contribute assets to their pension funds on a regular basis. In the years following the enactment of the Act, two competing viewpoints have emerged concerning the appropriate investment policy for pension assets. The first was proposed by Sharpe [18], who showed that firms should simultaneously maximize the investment risk of the pension assets and minimize additional contributions to the fund. This "Maximum Risk" prescription follows from the regulatory environment of pension plans which allows firms to both recapture excess assets and pay underpriced insurance premiums. Together these privileges constitute an "insurance effect" that provides for a transfer of wealth from the Pension Benefit Guarantee Corporation (hereafter the Pension Corporation) to the sponsoring firm.¹ It follows that the optimal investment mix for the pension fund is 100% equity securities.

* Assistant Professor, Department of Finance, Texas A&M University and Assistant Professor, Department of Finance, University of Illinois at Urbana-Champaign, respectively. We thank D. Dubofsky, S. Lummer, A. Mahajan, R. Taggart, and an anonymous referee for helpful comments. All errors remain our own.

¹ ERISA provided for the establishment of the Pension Corporation and empowered it to assess premiums from sponsoring firms in order to provide insurance coverage on employee benefits. As a rough approximation, 85% of an individual employee's benefits are insured against default by the employer. Firms pay a premium of \$2.60 per plan participant per year and are liable for unfunded liabilities to the extent of 30% of their net worth. The "insurance effect" exists because companies can increase their exposure to the upside risk of the pension assets while paying a risk neutral insurance premium.

More recently, both Black [3] and Tepper [19] have suggested a diametrically opposite policy: firms should maximize contributions to the fund and invest all of the contributed assets in bonds. The "All Bonds" policy is motivated by the tax arbitrage profit that is available when shareholders receive the pre-tax return on bonds (from the pension fund) at the favorable tax rate on equity. If the Miller [16] model of capital structure is superimposed, the "tax effect" is augmented by the bondholder surplus which exists in a "Debt and Taxes" world. A number of firms have recently committed their pension funds fully to bond investments.² Nevertheless, the majority of pension funds are invested roughly equally in both stocks and debt securities. Proponents of the "All Bonds" policy suggest that this practice results from a general lack of awareness among financial managers regarding the profitability of their approach. Advocates of the "Maximum Risk" policy raise a similar argument.³

The Sharpe and Black/Tepper approaches are founded on the principle that the assets and liabilities of the pension fund are part of the sponsoring firm. Increasingly, this traditional view of the relationship between the pension assets and the firm is being re-examined. In its place, a more complex theory based on the contractual arrangements between labor and the firm is being suggested. Our purpose is to test this new hypothesis by analyzing the economic effects of a recently popular pension termination strategy. In the following section, both the emerging viewpoint and the traditional thinking will be summarized in two mutually exclusive hypotheses (hereafter ownership hypotheses). Section II then examines the valuation effects which are associated with excess asset reversions and explains how this event can be employed to test the ownership hypotheses. The third section describes the sample selection, methodology, and results of the study. Based on a sample of 58 companies which conducted excess asset reversions over the 1980–1984 period, we find evidence which shows that terminations of overfunded plans have resulted in windfall gains to the shareholders of sponsoring firms. This is an important finding, as it is consistent with the hypothesis that the assets of the pension fund are separate from other corporate assets. Section IV summarizes the paper and concludes with a discussion of its implications for both pension asset management and public policy.

I. Alternate Ownership Hypotheses

In this section, we summarize the two predominant ownership hypotheses which have evolved in the pension literature. Each carries a different set of implications for pension fund investment policy. Their mutually exclusive nature allows us to test each hypothesis, and we do so later in the paper.

² Examples include the Federal Paper Board Company, which switched to a *dedicated* bond portfolio, and the LaSalle National Bank, which established an immunized bond fund. A dedicated bond fund is one in which bond maturities coincide with benefit payments.

³ These two policies are not mutually exclusive. Bicksler and Chen [2] show that they can be reconciled in an eclectic model which optimizes the joint benefits of the "tax effect" and the "insurance effect." Any particular investment mix and/or funding policy can be rationalized in such a framework.

A. The Integration Hypothesis

The integration hypothesis states that the assets of the pension fund are inseparable from the assets of the firm which is sponsoring the defined benefit plan. This relationship was first proposed by Treynor [20] and is at the foundation of most of the early research on pension funds. The hypothesis is derived from Title I of ERISA, which makes sponsoring firms liable for vested pension benefits. Because pension liabilities are obligations of the sponsoring firm, it follows that both the liabilities and the assets available to pay them should be included on the corporate balance sheet. The “augmented” balance sheet concept is supported by the empirical results of Feldstein and Seligman [8]. They found that share prices impound the value of unfunded pension liabilities on a dollar-for-dollar basis.⁴ Their market-based results are consistent with the notion that pension assets and liabilities are an integral part of the company.

Both the “All Bonds” and “Maximum Risk” directives are logical consequences of this relationship. In the Black/Tepper analysis, this is because pension fund investments constitute a pro rata portion of the personal portfolios of individual shareholders. Within this framework, the optimal location for a bond investment by any stockholder is the corporate pension fund. By following such a strategy, the shareholder earns the pre-tax bond return, but is only taxed at the (lower) equity rate.

The “Maximum Risk” policy proposed by Sharpe originates from a different perspective. ERISA gives firms which sponsor defined benefit plans a stake in both the upside and downside risk of the pension assets. This is accomplished by allowing them to recapture surplus assets in a termination and holding them liable for unfunded vested benefits. When Pension Corporation insurance premiums are incorrectly priced, the downside exposure is truncated. Firms consequently hold a net position which is equivalent to a call option on the pension assets and have an incentive to maximize its value.

The integration hypothesis carries implications for the behavior of share prices in an efficient market. If pension assets and liabilities are indistinguishable from the sponsoring corporation, events occurring between the two should have no effect on share prices. This is because any such event would represent a rearrangement of value between the asset groups and not a net gain to the consolidated entity. Thus, under this particular hypothesis, the observed excess returns to shareholders around an excess asset reversion should not differ significantly from zero.

B. The Separation Hypothesis

The separation hypothesis holds that the assets of the pension fund are distinct from the assets of the sponsoring firm. This model has emerged in recent years, as the finance profession has recognized a more complex role for pension assets in the contractual relationship between labor and the sponsoring firm. The

⁴ Feldstein and Seligman [8] found that this result was obtained when pension assets and vested liabilities were broken out separately or netted together as an under (over)-funded obligation.

rationale for the hypothesis is derived from both ERISA and the implications of recent events in the pension area.

ERISA unquestionably imposes a legal liability on sponsoring firms for the vested benefits which they have granted. There are, however, several sections of the Act which suggest that corporations at most *share* in the ownership of the assets which they have contributed to finance their pension obligations. For example, Section 4044(d) provides that residual assets from a plan termination may be recovered by the sponsoring firm only in the event that the plan covenant allows for such a recovery. Further, the termination which triggers the excess asset reversion is subject to the approval of the Pension Corporation [Section 4041(a)]. These two provisions together allow for significant limitations on the firm's control of its pension assets.

The degree of control exerted by all firms is limited further by the provisions of Section 404(a), which requires that the pension assets be managed in the interest of the participants and beneficiaries. The management of assets is required to be: (1) for the exclusive purpose of providing benefits; (2) conducted with the care and diligence of the "prudent man"; (3) under adequate diversification; and (4) in accordance with the terms of plan covenant. This restriction is strengthened by Section 409, which stipulates that the plan administrator may be held liable for any breach of this fiduciary obligation. Finally, Section 407 augments the degree of separation between the pension fund and the firm by prohibiting the fund from investing more than 10% of its assets in the securities of the sponsor.

The sections of the Act which we have referred to severely limit the sponsoring firm's control over the assets in the pension fund. It follows that shared control is ultimately founded in shared ownership. By implication, the other parties with ownership rights must be current and prospective beneficiaries. Section 4045 provides that in a plan termination, payments from the plan to an employee, which commenced within the three-year period immediately preceding the time of termination, are recoverable by the Pension Corporation, to the extent which they are in excess of the amount which would have been received as an annuity. This section presumably applies to lump sum payments and early retirement packages. It supports the separation hypothesis by implying that the beneficiaries *as a group* have an ownership interest in the pension assets.⁵

The basis of the separation hypothesis in statutory law has been reinforced by several important court decisions. These court actions have come in response to separate lawsuits filed against the sponsors of three different pension plans. In 1981, a retiree of the Grumman Corporation filed a suit against the plan trustees for violating the provisions of Section 404(a), by using pension assets to fight a takeover attempt. The courts later ruled in favor of the plaintiff. In another case, the Great Atlantic and Pacific Tea Company was temporarily prevented from

⁵ The recovery rights stated in Section 4045 are similar to Section 2035 of the Internal Revenue Code, which provides that gifts given within three years of death are to be considered part of the (deceased) donor's gross estate. Section 4045 is also analogous to provisions of the Federal Bankruptcy Code which allow excessive actual or proforma dividend payments to be recovered from shareholders, if the payments came from the company itself, and if the transaction left the company technically insolvent, inadequately capitalized, or excessively leveraged.

recapturing the excess assets in its plan by a suit filed on behalf of the plan participants. The termination proceeded only after the company agreed to share 20% of the surplus with employees. Separately, the Charter Company has recently faced a similar suit over its proposed \$5 million excess asset reversion. The separability of pension assets is reinforced by these lawsuits, the threat of which constitutes an implicit cost of voluntary termination.

Recent research in pension finance has reflected the principles of the separation hypothesis. This contrasts sharply with earlier work which was based on the integration hypothesis. For example, Bulow and Scholes [4] develop a model in which labor uses pension assets to transfer implicit equity in the firm from senior to junior employees. Both Harrison and Sharpe [9] and Langetieg [14] have developed models of pension investment policy which are based on the assumption of shared gains and losses on pension assets between labor and the sponsoring firm. Empirical work by Pesando [17] suggests that pension plans contribute to a significant deferral of employee compensation, thereby implying a substantial ownership interest in the pension assets on behalf of the labor pool. Finally, Bicksler and Chen [2] have identified the erosion of employee morale and interference from both the Pension Corporation and the Internal Revenue Service as factors which, in addition to legal expenses, might prevent some firms from terminating their plans.

The separation hypothesis, like its counterpart, also carries implications about the behavior of securities prices in an efficient market. If pension assets are, in fact, separate from those of the sponsoring firm, unanticipated events occurring between the two would be expected to have an effect on share prices. In particular, a voluntary plan termination and subsequent recapture of surplus assets would be expected to affect the returns to the securityholders of the sponsoring firm. In the next section, we demonstrate the valuation effects associated with such an event. We then examine the returns to the shareholders of 58 companies which have recently conducted excess asset reversions.

II. Excess Asset Reversions and Shareholder Wealth

There are a number of events which occur between a pension fund and its sponsor that affect the wealth of both parties. Arnott and Gersowitz [1] show how the sponsoring firm's capital structure can influence the risk of unfunded vested liabilities. Firms can also use spin-offs and/or dividends in order to transfer pension collateral out of the company. In this section, we employ a simple stochastic dominance model to show the valuation effects of another such event, an excess asset reversion.

Excess asset reversions occur when sponsoring firms terminate their pension plans, satisfy all liabilities, and recapture any residual assets.⁶ The event is governed by the provisions of Title IV, Subtitles C, of ERISA. Per Section 4041(a), a sponsoring firm is prohibited from terminating a plan without the approval of the Pension Corporation. If the plan termination is approved, assets in excess of liabilities are recoverable by the firm only if the plan covenant

⁶ In voluntary terminations, nonvested benefits which have accumulated vest immediately.

provides for such under the circumstances [Section 4044(d)]. Firms terminate their pension plans for a variety of reasons: (1) to eliminate a pool of liquid assets which might invite an unfriendly takeover attempt; (2) to provide the company with a much needed inflow of funds; (3) as a consequence of a switch from a defined benefit plan to a defined contribution plan; (4) as a result of a recent merger or acquisition; and/or (5) as part of any general corporate restructuring. Whatever the reason, over 400 firms have received approval for excess asset reversions between 1980 and 1984 alone, making it one of the most important pension issues of the decade.

A. The Valuation Effects of a Plan Termination

The model assumes that the recapture of surplus assets is benefit neutral; i.e., the plan which is being terminated is replaced by an identical one, so that benefits accruing to labor are unchanged by the event. Under this assumption, any changes in the wealth of the firm's securityholders are derived strictly from the asset recovery and not from a rearrangement of labor costs. The neutrality condition is consistent with observed practice in many terminations.⁷

In what follows, we consider a multiperiod setting where the values of all securities depend only upon the distribution of cash earnings which they confer upon their owners. At time, t , the firm has decided on its value-maximizing future investment strategy for all periods which will generate a stochastic value of $\tilde{X}_{t+1}$ at time $t + 1$. $\tilde{X}_{t+1}$ is the sum of the firm's cash earnings between t and $t + 1$ and the market value at time $t + 1$ of all future earnings that will be generated from current as well as future investments. The firm has both stocks and bonds outstanding from time $t - 1$. Bonds will mature at $t + 1$ with total debt obligation of D_{t+1} . At time $t + 1$, if the firm remains solvent, stockholders receive $\tilde{X}_{t+1} - D_{t+1}$; otherwise, they receive nothing. On the other hand, bondholders receive their total debt obligation, D_{t+1} , if the firm is solvent. When default occurs, they simply take over the firm and receive $\tilde{X}_{t+1}$.⁸ Thus, the gross returns to the firm's stockholders and bondholders at $t + 1$ are:

$$\tilde{Y}_{t+1}^S = \begin{cases} \tilde{X}_{t+1} - D_{t+1} & \text{if } \tilde{X}_{t+1} > D_{t+1} \\ 0 & \text{if } \tilde{X}_{t+1} \leq D_{t+1} \end{cases} \quad (1)$$

$$\tilde{Y}_{t+1}^B = \begin{cases} D_{t+1} & \text{if } \tilde{X}_{t+1} > D_{t+1} \\ \tilde{X}_{t+1} & \text{if } \tilde{X}_{t+1} \leq D_{t+1} \end{cases} \quad (2)$$

where the superscripts, S and B , denote stockholders and bondholders.

At time t , the firm has a pension plan outstanding. If the firm decides to terminate its pension plan at time $t + 1$, the firm will recapture the value of the assets in the pension fund, $\tilde{A}_{t+1}$, net of the present value of benefits payable, P_{t+1} . The recaptured excess assets in the amount $\tilde{A}_{t+1} - P_{t+1} > 0$ becomes part

⁷ If a firm does not replace the terminated plan with an identical one, it often substitutes a defined contribution plan instead. It is possible that minor valuation effects could result from such a switch, because the investment risk of the pension assets would shift to the plan participants and beneficiaries.

⁸ For the sake of simplicity, bankruptcy is assumed to be costless. For an excellent discussion of costly bankruptcy, see Kim [12].

of the pool of funds available to satisfy the debt obligations of the firm.⁹ Any amount which remains after debt service accrues to the stockholders. Thus, the gross returns to stockholders and bondholders after pension plan termination are:

$$\hat{Y}_{t+1}^{S*} = \begin{cases} \tilde{X}_{t+1} - D_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) & \text{if } \tilde{X}_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) > D_{t+1} \\ 0 & \text{if } \tilde{X}_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) \leq D_{t+1} \end{cases} \quad (3)$$

$$\hat{Y}_{t+1}^{B*} = \begin{cases} D_{t+1} & \text{if } \tilde{X}_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) > D_{t+1} \\ \tilde{X}_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) & \text{if } \tilde{X}_{t+1} + (\tilde{A}_{t+1} - P_{t+1}) \leq D_{t+1}. \end{cases} \quad (4)$$

The difference in gross returns to the securityholders resulting from the excess asset reversion is found by subtracting (1) from (3), and (2) from (4):

$$\hat{Y}_{t+1}^{S*} - \hat{Y}_{t+1}^S = \begin{cases} (\tilde{A}_{t+1} - P_{t+1}) & \text{if } \tilde{X}_{t+1} \geq D_{t+1} \\ (\tilde{A}_{t+1} - P_{t+1}) - (D_{t+1} - \tilde{X}_{t+1}) & \text{if } D_{t+1} - (\tilde{A}_{t+1} - P_{t+1}) < \tilde{X}_{t+1} < D_{t+1} \\ 0 & \text{if } \tilde{X}_{t+1} \leq D_{t+1} - (\tilde{A}_{t+1} - P_{t+1}) \end{cases} \quad (5)$$

$$\hat{Y}_{t+1}^{B*} - \hat{Y}_{t+1}^B = \begin{cases} 0 & \text{if } \tilde{X}_{t+1} \geq D_{t+1} \\ D_{t+1} - \tilde{X}_{t+1} & \text{if } D_{t+1} - (\tilde{A}_{t+1} - P_{t+1}) < \tilde{X}_{t+1} < D_{t+1} \\ (\tilde{A}_{t+1} - P_{t+1}) & \text{if } \tilde{X}_{t+1} \leq D_{t+1} - (\tilde{A}_{t+1} - P_{t+1}). \end{cases} \quad (6)$$

Expression (5) shows that the recapture of excess assets will never diminish the returns to stockholders. Likewise, from (6), it is evident that the excess asset reversion will only augment, and never reduce, the cash returns to the bondholders. Nevertheless, the precise nature of the associated valuation effects are dependent upon the relationship between the pension fund and the sponsoring firm.

B. Testable Hypotheses

Under the separation hypothesis, both bond and stock prices may react to the recovery of surplus assets. This is because potential barriers exist to prevent management from piercing the "pension veil" at will. The threat of a lawsuit, pension covenant terms, the relative financial position of the sponsoring firm, and/or other facts combine to make the recovery of surplus assets an uncertain event. The behavior of securities prices around the time of an excess asset reversion will depend on how accurately the event can be forecast. If plan terminations cannot be perfectly predicted, an excess asset reversion would cause changes in both bond and stock prices.

The situation is different if the integration hypothesis is assumed to hold, given that securities prices should impound the value of the recoverable assets. Under this scenario, the quantity $(\tilde{A}_{t+1} - P_{t+1})$ is indistinguishable from $\tilde{X}_{t+1}$. Stockholders recognize the value maximizing nature of excess asset reversions and accordingly see the pre-terminating distribution $\hat{Y}_{t+1}^S$ as identical to the post-termination $\hat{Y}_{t+1}^{S*}$. Bondholders understand that shareholders will terminate the

⁹ From the firm's perspective, it would be irrational to terminate the plan if $(\tilde{A} - P) < 0$. The Pension Corporation is, however, empowered to do so in the event that such a forced termination would preserve the collateral necessary to cover the sponsoring firm's 30% liability.

pension plan any time that it is profitable to do so and likewise see no difference between their prospective returns before and after a potential reversion.

Excess asset reversions under the separation hypothesis represent an expropriation of wealth from plan participants and beneficiaries to the firm. Other examples of wealth expropriation have been studied in the literature. Kim, McConnell, and Greenwood [13] found that shareholders benefit at the expense of bondholders when the firm creates a captive finance subsidiary. Hite and Owers [10] examined the same issue with respect to spin-offs, and Eger [7] did likewise for mergers. Following these studies, we test for gains to shareholders around the time of a plan termination. The mutually exclusive nature of the ownership hypotheses implies that the test results can be used to make inferences about the relationship between the pension assets and other corporate assets. A finding of significant excess returns would be consistent with the separation hypothesis. If no excess returns are present, we will infer that the integration hypothesis is applicable. The methodology and results of our tests are described in the following section.

III. Share Price Reaction to the Completion of an Excess Asset Reversion

An excess asset reversion is an economic event which occurs when a sponsoring corporation terminates its pension plan and recaptures assets which are in excess of accumulated liabilities. The action is governed by Section 4041(a) of ERISA. This section prohibits firms from conducting a termination without the approval of the Pension Corporation. The chief responsibility of the Pension Corporation is to ensure that the allocation of assets occurs in accordance with both the letter and spirit of the Act.

A. Sample Selection and Characteristics

The initial population of excess asset reversions was drawn from a list provided to us by the Public Disclosure Unit of the Pension Corporation. It contained the details on 435 terminations involving over 400 different firms, which conducted excess asset reversions in amounts of one million dollars or more, between 1980 and 1984.

Pension plan terminations which are conducted for the purpose of asset recapture are seldom announced in the financial press. This is presumably because the event can generate unfavorable publicity for the terminating firm. In the absence of an announcement date, we employ the statutory date of termination as the event date. This date is determined in accordance with the provisions of Section 4048 of the Act, and was supplied to us by the Pension Corporation. To our knowledge, it is publicly available on an ex-post basis only.

From the 435 initial observations, 58 plan terminations were included in the final sample. Firms were excluded because: (1) the terminating firm was not traded on either the New York or American Stock Exchanges, and/or (2) the

firm did not have complete return data on the daily CRSP (Center for Research in Security Prices) tape. In order to ensure that the behavior of shareholder returns is not influenced by nontermination factors around the event date, we examined the *Wall Street Journal Index* for two months around the Section 4048 termination date. If the terminating firm had an event such as a merger, divestiture, or adverse earnings announcement chronologically close to the reversion, it was also excluded.

Table I contains the names, termination dates, and reversion amounts of the sample firms. The fourth column reports the size of the reversion relative to the market value of the terminating firm's equity 51 days before the termination (the last day of the estimation period). The majority of the returns from the reversion are significant in relation to the market value. The average ratio is 0.1055, with individual figures ranging from 0.0004 to 0.6384.

Table II details the sample observations by termination year and shows the quartile ranges for the returns from the reversion. As shown in the table, the reversion ratio exceeds 0.064 for roughly one-half of the sample firms.

B. Methodology

Following Dodd and Warner [6], we used the market model to compute the daily prediction error (*PE*) for each security in the sample:

$$PE_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{mt}).$$

R_{jt} is the actual daily return for the j^{th} security on day t , and R_{mt} is the corresponding return on the CRSP value-weighted index. The regression coefficients $\hat{\alpha}_j$ and $\hat{\beta}_j$ are the ordinary least-squares estimates of the market model parameters. They are calculated over the period from $t = -200$ to $t = -51$, where $t = 0$ is the official date of termination.

Daily prediction errors were calculated for each firm in the sample over the interval from $t = -50$ to $t = +20$. For the j^{th} firm, the cumulative daily prediction error is calculated from day d_{1j} to day d_{2j} , and is defined as:

$$CPE_j = \sum_{t=d_{1j}}^{d_{2j}} PE_{jt}.$$

The average daily prediction error across N firms is calculated as:

$$\overline{CPE} = \frac{1}{N} \sum_{j=1}^N CPE_j.$$

We calculated the mean cumulative prediction error for various intervals around the date of termination. When there are no factors present to cause abnormal performance, the CPE statistic has a zero expected value. This allows us to test for the significance of any excess returns. The statistic, the mean standardized cumulative prediction error, is used and computed in a two-stage procedure. First, the daily prediction error is standardized by its estimated standard deviation:

$$SPE_{jt} = PE_{jt}/S_{jt},$$

Table I
Names, Termination Dates, and Reversion Amounts of the Sample Firms

Company Name	Date of Termination	Reversion of Asset	Reversion of Asset (%) of Equity
1. AMAX, Inc.	8/19/83	124,000,000	6.93
2. American Hoist & Derrick Co.	5/15/84	8,596,000	11.67
3. Bankers Trust Co.	3/31/84	1,270,334	0.09
4. Beneficial Corp.	10/01/83	45,139,474	6.98
5. Bethlehem Steel Corp.	12/31/82	1,200,000	0.15
6. Black & Decker, Inc.	7/19/84	1,016,317	0.10
7. Celanese Corp. & Controlled	1/23/84	325,797,000	26.80
8. Chicago Rivet & Machine Co.	7/02/84	1,446,166	11.95
9. CMI Corp.	9/30/82	1,857,327	8.26
10. Commercial Metal Co.	1/31/84	3,470,026	2.52
11. Cooper Industries, Inc.	7/18/83	4,483,797	0.29
12. Cooper Industries, Inc.	1/06/84	3,790,982	1.92
13. Crane Co.	11/05/84	6,828,635	2.05
14. Crompton & Knowles Corp.	12/25/82	3,200,000	6.50
15. Crompton & Knowles, Corp.	4/15/84	7,375,241	10.31
16. Electronic Memories & Magnet	12/31/82	2,294,675	7.67
17. Emerson Electric Corp.	3/31/81	2,184,449	0.09
18. Esmark	7/31/80	1,031,139	0.16
19. Fedders Corp.	2/28/83	2,651,000	6.37
20. Federal Paper Board Co., Inc.	2/03/84	18,329,132	6.95
21. Fischer & Porter Co.	8/31/82	2,906,810	14.32
22. GAF Corp.	12/31/82	56,000,000	30.60
23. Graniteville Co.	5/06/83	15,370,791	30.13
24. Great Atlantic & Pacific Tea Co.	4/06/82	2,000,000	1.34
25. Great Atlantic & Pacific Tea Co.	5/31/84	272,935,287	52.50
26. Gulf & Western Industries, Inc.	4/15/83	15,602,517	0.48
27. Harnischfeger Corp.	8/01/84	38,009,982	29.83
28. Humana, Inc.	12/31/82	49,581,000	2.20
29. IC Industries, Inc.	4/30/83	4,300,000	0.83
30. Ingredient Technology Corp.	9/06/83	2,322,012	7.24
31. International Banknote Co., Inc.	3/31/83	3,113,296	3.72
32. Interstate Bakeries Corp.	12/31/83	39,525,706	63.84
33. Kaufman and Broad Co.	12/31/83	3,307,879	44.45
34. Lone Star Industries, Inc.	5/31/84	41,969,442	12.68
35. Marriott Corp.	5/20/82	4,500,230	0.47
36. Mattel, Inc.	9/22/83	13,992,000	6.86
37. Mead Corp.	8/01/83	10,331,554	1.32
38. National Education Corp.	1/01/84	2,403,091	1.29
39. Occidental Petroleum Corp.	6/01/83	362,778,000	20.63
40. Pennsylvania Engineering Co.	7/30/84	2,385,608	6.41
41. Procter & Gamble Co.	6/30/84	3,534,504	0.04
42. Research Cottrell, Inc.	3/02/84	4,120,366	5.43
43. Rexnord, Inc.	10/31/84	16,668,228	4.86
44. Reynolds Metals Co.	8/22/83	126,000,000	13.37
45. Robins (A. H.), Co.	12/14/80	1,142,179	0.49
46. Scovill Manufacturing Co.	4/30/83	1,278,696	0.57
47. Sharon Steel	12/15/80	1,999,673	0.36
48. Sheller-Globe Co.	5/12/81	1,914,880	4.26
49. Sheller-Globe Co.	8/31/84	1,729,251	1.12

Table I—Continued

Company Name	Date of Termination	Reversion of Asset	Reversion of Asset (%) Equity
50. Swank, Inc.	11/30/82	7,504,743	20.97
51. Texas Air Corp.	10/31/82	21,762,810	59.35
52. Thermo-Electron Co.	2/06/84	2,961,091	2.62
53. TRW, Inc.	4/30/83	1,750,000	0.07
54. Triangle Industries	1/04/82	1,917,239	8.06
55. UNC Resources	6/30/83	8,173,988	10.97
56. United Foods, Inc.	2/24/83	5,119,080	15.64
57. Western Air Lines, Inc.	4/29/82	11,840,377	22.03
58. Whirlpool Corp.	12/30/82	1,099,509	0.08

Note: Precise reversion amounts are subject to minor revision by the Pension Benefit Guaranty Corporation.

Table II

Characteristics of the Sample of 58 Terminations by Termination Year and Proportion of Equity Market Value Terminated

A. Observations by Termination Year	
Year	Terminations
1980	3
1981	2
1982	13
1983	19
1984	21
	Total 58
B. Distribution by Fraction of Equity Market Value Terminated	
Quartile	Range of Fraction Terminated
1	0.0004 to 0.0057
2	0.0083 to 0.0637
3	0.0642 to 0.1268
4	0.1337 to 0.6384

where

$$(S_{jt} = (S_j^2 (1 + \frac{1}{\Delta_j} + (R_{mt} - R_m)^2 / \sum_{\tau=1}^{\Delta_j} (R_{m\tau} - R_m)^2))^{1/2}$$

S_j^2 = the residual variance for the j^{th} security,

Δ_j = the number of observations during the estimation period,

R_{mt} = the rate of return on the market index for day t ,

R_m = the mean rate of return on the market index over the estimation period,

$R_{m\tau}$ = the rate of return on the market index for day τ of the estimation period.

Next, the standardized cumulative prediction error ($SCPE_j$) over the interval d_{1j} to d_{2j} is computed as:

$$SCPE_j = \sum_{t=d_{1j}}^{d_{2j}} SPE_{jt} / \sqrt{d_{2j} - d_{1j} + 1}.$$

For a sample of N securities, the appropriate test statistic is:

$$Z = \sum_{j=1}^N SCPE_j / \sqrt{N}.$$

In the absence of abnormal performance, SPE_{jt} and Z are distributed in a unit normal fashion.

C. Results

Table III contains the daily average prediction errors ($\overline{PE}$) and cumulative average prediction errors from 50 days before through 20 days after the official date of termination for the 58 firms in the sample. The mean cumulative

Table III
Daily Average Market-Adjusted Prediction Errors
($\overline{PE}$) and Cumulative Sum of the Daily Average
Prediction Error ($\Sigma \overline{PE}$) from 50 Days before
through 20 Days after the Date of Termination for
58 Firms in the Sample

Day	$\overline{PE}$	$\Sigma \overline{PE}$
-50	0.0032	0.0032
-40	0.0039	0.0080
-30	0.0017	0.0387
-20	0.0020	0.0545
-10	0.0015	0.0628
-9	-0.0009	0.0619
-8	0.0017	0.0636
-7	0.0051	0.0687
-6	0.0056	0.0743
-5	-0.0058	0.0685
-4	0.0013	0.0698
-3	-0.0004	0.0694
-2	-0.0013	0.0681
-1	-0.0035	0.0646
0	0.0019	0.0665
1	0.0004	0.0669
2	0.0003	0.0672
3	0.0004	0.0676
4	0.0170	0.0746
5	0.0050	0.0796
6	0.0001	0.0797
7	0.0035	0.0832
8	-0.0034	0.0798
9	0.0125	0.0923
10	0.0025	0.0948
20	0.0007	0.0955

Table IV
Mean Cumulative Prediction Errors ($\overline{CPE}$) for
Various Intervals Around the Date of Termination
(Test Statistics in Parentheses)

Day(s) in Interval	$\overline{CPE}$	Percent Positive
-50 to 0	0.0665 (2.67)	66
-40 to 0	0.0624 (2.79)	69
-30 to 0	0.0296 (1.52)	61
-20 to 0	0.0140 (0.87)	50
-10 to 0	0.0052 (0.45)	47
-5 to 0	-0.0078 (-1.00)	47
-1	-0.0035 (-1.02)	42
0	0.0019 (0.71)	52
+1 to +5	0.0130 (1.68)	52
+1 to +10	0.0282 (2.55)	64
+1 to +20	0.0200 (1.28)	61

prediction errors ($\overline{CPE}$) for various intervals around the date of termination are reported with their corresponding test statistics in Table IV.¹⁰

In general, our results are consistent with the separation hypothesis, which predicts that unanticipated events occurring between the firm and the pension plan will affect share prices. The cumulative excess return to shareholders of the terminating firms averaged 0.0955 from 50 days before the event to 20 days afterward. Table III shows that this return principally accrued in two distinct time periods around the event date. For the period from $t = -50$ to $t = 0$, shareholders receive an average return of 0.0665 with a test statistic of 2.67. Similar returns of comparable significance were found over the interval, from the event date back to 40 days prior. The proportion of firms with positive returns over these intervals ranged from 47 to 69 percent. No significant returns were observed over the interval from 5, 10, 20, and 30 days prior through the event date itself. Within this interval, excess returns on the day immediately preceding the event time averaged -0.0035 , with a test statistic of 1.02. Corresponding figures for the actual termination day were 0.0019 and 0.71, respectively. Significant excess returns were again observed for the five- and ten-day intervals after the event. These returns were, however, noticeably smaller than those

¹⁰ We also ran the mean-adjusted returns methodology as a check of the robustness of our results. As the results are the same for both methods, we have reported on the market-adjusted methodology only.

earned in the intervals prior to the reversion. Our results show that excess returns dropped off after the tenth day following the reversion. The average excess return from $t = 1$ to $t = 20$ was 0.020, with a test statistic of 1.28. The fact that the average return of 0.0955 is smaller than the average ratio of the size of the surplus assets relative to the market value of the terminating firm's equity is not surprising. As shown earlier in Section II, the recapture of excess assets would increase the wealth of both stockholders and bondholders. Since bondholders always take the "first bite" of the termination proceeds, the share which accrues to equity claimants is necessarily smaller. Additionally, both the government and the employees of the terminating firm might share in the gain.

We also examined the behavior of the residuals according to the relative size of the termination. Table V contains the daily average market-adjusted prediction error ($\overline{PE}$) and cumulative sum of the daily average prediction error (ΣPE) from 50 days before through 20 days after the termination date, for firms with both large and small terminations. There are 28 (30) terminations with the size of the reversion relative to the market value of equity less (greater) than 6 percent. Table VI contains the mean cumulative prediction errors (CPE) and their respective test statistics for various intervals around the termination date. Cumulative average prediction errors for both groups are very close as of the event date. But the small termination group exhibits larger abnormal returns than the large termination group from 30 days before the reversion. The figures, however, diverge after the reversion when the large termination group experiences significant abnormal returns. As evidenced in Table VI, these incremental returns are concentrated in the first ten days following the event. These positive abnormal returns for the large termination group reflect some price adjustments which occurred when the market discovered the exceptional magnitudes of the recaptured assets after they were reported to the Pension Corporation. On the other hand, the small termination group reacted favorably from 30 days before the event day, but experienced declines in cumulative average prediction errors from 10 days before the event day and leveled off.¹¹

As mentioned earlier, over the interval $t = -50$ to $t = +20$, the total average excess return accruing to the shareholders was 0.0955. This figure is less than the average ratio of the reversion amount relative to the market value of the terminating firm's equity, 0.1055. By implication, the reaction of share prices to an excess asset reversion might be influenced by factors other than the relative size of the gain on recapture.

This finding is not surprising, for several reasons, all of which are compatible with the separation hypothesis. First, the excess asset reversion might signal insight into the company's future, such as a likely general restructuring or the reduction in the probability of an unfriendly takeover. Apart from the recapture of excess assets, a voluntary termination might yield benefits to the sponsoring firm in the form of gains from the pre-mature "wind-up" of liabilities, as discussed

¹¹ One possible explanation might attribute the returns in the first sequence to insider trading, given that the financial press is void of any reference to the event. The second sequence could possibly be a reflection of information distributed by security analysts who learn of the event shortly after the reversion.

Table V
Daily Average Market-Adjusted Prediction Error ($\overline{PE}$) and Cumulative Sum of the Daily Average Prediction Error ($\Sigma \overline{PE}$) from 50 Days before through 20 Days after the Termination Date for Firms with Large and Small Terminations

Day	Small Termination (28 firms)		Large Termination (30 firms)	
	$\overline{PE}$	$\Sigma \overline{PE}$	$\overline{PE}$	$\Sigma \overline{PE}$
-50	0.0055	0.0055	0.0010	0.0010
-40	0.0101	0.0100	-0.0020	0.0058
-30	0.0024	0.0515	0.0008	0.0254
-20	0.0041	0.0743	0.0002	0.0354
-10	0.0016	0.0826	0.0010	0.0430
-5	-0.0081	0.0775	-0.0038	0.0589
-1	0.0002	0.0686	-0.0068	0.0599
0	0.0018	0.0704	0.0014	0.0613
5	0.0031	0.0720	0.0069	0.0838
10	0.0042	0.0712	0.0012	0.1064
20	-0.0006	0.0702	0.0020	0.1000

Table VI
Mean Cumulative Prediction Errors ($\overline{CPE}$) for Various Intervals around the Termination Date (Test Statistics in Parentheses)

Day(s) in Interval	Small Termination ($\overline{CPE}$)	Large Termination ($\overline{CPE}$)
-50 to 0	0.0704 (2.08)	0.0613 (1.78)
-40 to 0	0.0705 (2.33)	0.0535 (1.73)
-30 to 0	0.0212 (0.80)	0.0367 (1.36)
-20 to 0	0.0002 (0.01)	0.0260 (1.17)
-10 to 0	-0.0107 (-0.68)	0.0192 (1.20)
-5 to 0	-0.0152 (-1.43)	-0.0014 (-0.13)
-1	0.0002 (0.03)	-0.0068 (-1.41)
0	0.0018 (0.38)	0.0014 (0.29)
+1 to +5	0.0016 (0.15)	0.0225 (2.07)
+1 to +10	0.0088 (0.59)	0.0451 (2.94)
+1 to +20	-0.0002 (-0.01)	0.0387 (1.78)

by Pesando [17], and/or from an increase in the value of the "pension put," as described by Marcus [15]. The "deadweight" losses referred to by Bicksler and Chen [2] could also influence the share price reactions of certain companies performing a reversion, as could the taxable nature of the gain on termination. Finally, drawing on the work of Jain [11], the reaction of share prices to a reversion termination might be affected should the company use the recaptured assets to adjust its capital structure to a perceived optimum. In addition, it is possible that the observed excess returns to shareholders are not indicative of an expropriation of wealth from the plan beneficiaries, but are instead a windfall gain derived at the expense of senior securityholders. This would be the case if the rearrangement of assets via the termination were tantamount to an asset substitution event in which the riskiness of the firm was increased to the detriment of the bondholders. Although this is possible, we think it is unlikely, given that the recaptured assets could decrease the risk of corporate assets as well. Nevertheless, insofar as the purpose of this research has been to study the ownership of pension assets, the task of exploring the factors affecting the magnitude of the excess returns is left to future research.

IV. Summary and Conclusions

The ownership of pension assets in a defined benefit plan is an open question in corporate finance. The issue is important because it defines the appropriate investment policy for a pension fund. We have summarized the debate in the form of two competing theories: the integration hypothesis and the separation hypothesis. Our paper then focused on a recently popular event in pension finance, excess asset reversions. We showed the valuation effects associated with that event using a stochastic dominance model. Under the separation hypothesis, the reversion constitutes an expropriation of wealth from the participants and beneficiaries of the plan to the sponsoring firm.

The mutually exclusive nature of the hypotheses together with the expropriation potential inherent in the termination makes the separation hypothesis a testable event. Using data provided by the Pension Corporation and the CRSP tape, we examined the returns to shareholders of 58 companies which conducted excess asset reversions between 1980 and 1984. Our results show that large abnormal returns accrued to these shareholders around the event date. Firms with relatively small reversions experienced excess returns prior to the plan termination. Companies with relatively large reversions experienced abnormal gains both before and after the event.

These results are consistent with the separation hypothesis, which implies that an unanticipated excess asset reversion results in a windfall gain to the sponsoring firm. The findings are inconsistent with the integration hypothesis, which holds that a termination merely constitutes a rearrangement of assets within the augmented firm.

A number of implications spring from our study. First, insofar as it supports the separation hypothesis, it implies support for an investment policy which maximizes the potential for an excess asset reversion. Our findings also carry

implications, however, for public policy. The Pension Corporation is currently adhering to a laissez-faire policy with regard to reversion terminations. Our results may tentatively support those who criticize the Pension Corporation for allowing firms to benefit at the expense of both plan participants and beneficiaries. In this regard, further research is needed to study the effects of continued reversions on the financial soundness of the private pension system.

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