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Quality of accounting earnings under alternative pension accounting methods

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Quality of Accounting Earnings under Alternative Pension Accounting Methods

by

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Abstract

QUALITY OF ACCOUNTING EARNINGS UNDER ALTERNATIVE PENSION ACCOUNTING METHODS

by

Kyungjoo Park

Adviser: Professor In-Mu Haw

The purpose of this study is to examine differential stock market reactions to earnings releases under alternative pension accounting measurement rules. In addition, this study examines the impact of off-balance sheet pension items required by SFAS No. 87 on the market participants' assessments of a firm's market risk.

This study hypothesizes that earnings response coefficients are: (i) greater in the SFAS No. 87 period than in the APB No. 8 period, (ii) a function of firm size, (iii) a function of the timing of the SFAS No. 87 adoption period. Empirical findings are consistent with the argument that earnings response coefficients are a function of: (i) differential quality of earnings determined under alternative pension accounting rules, (ii) firm size, (iii) the timing of SFAS No. 87 adoption periods. Also, the findings are consistent with the argument that investors consider off-balance sheet pension items in assessing a firm's systematic risk.

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My family deserves the greatest thanks for their emotional support and financial assistance during the course of my study. My greatest debt is owed to my loving mother without whose generous and unfailing support the dissertation would not have been completed. To my mother, Sook-Ney Choi, I dedicate this dissertation.

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CHAPTER I

INTRODUCTION

A variety of studies have documented a contemporaneous association between accounting earnings announcements and security price reactions. (See, for example, Ball and Brown [1968]; Foster [1977]; Hagerman, Zmijewski, and Shah [1984].) Stock price changes around earnings release dates established the evidence that the accounting earnings signal is a significant determinant of firm valuation. These studies are based on the implicit assumption that the earnings response coefficient mapping earnings releases into stock price is constant across firms or over time.

Recently, numerous empirical studies have noted significant intertemporal and cross-sectional differences in earnings response coefficients. (See, for example, Burgstahler [1981]; Freeman [1987]; Collins, Kothari and Rayburn [1987]; Collins and Salatka [1988]; Collins and Kothari [1989]; Easton and Zmijewski [1989]; Collins and DeAngelo [1990].) Also, a theory has been developed which explores the possible linkages between earnings signals and security valuations (Garman and Ohlson [1980]; Ohlson [1983]; Miller and Rock [1985]; and Lanen and Thompson [1988]). For example, Miller and Rock [1985] presented the determinants (i.e., forecast error, persistence of the shock, and capitalization rate) of the earnings/return relation.

The firm's stochastic earnings generating process is determined by its production, investment, financing , and marketing policies. Given the firm's production, investment, and

financing policies, the above links which map earnings releases into stock price, provide information environment interpretations of cross-sectional differences in the earnings response coefficients. Most studies in this subject are concentrated on underlying properties or characteristics of information interpretations of cross-sectional differences in earnings-price mappings such as the firm-size differential information, persistence and growth, and riskiness of earnings (e.g., Atiase [1985]; Easton and Zmijewski [1988]; Kormendi and Lipe [1987]; and Collins and Kothari [1988]).

Holthausen and Verrecchia [1988] and Choi and Salamon [1988] have provided a theoretical framework that the characteristic of the information system/signal affects the level of expected price. The variance of noise in the accounting information system influences, in part, the valuation of firms. Their model implies that this value-relevant characteristic of information system is not associated with the income level impact of the accounting methods implanted in the system. This introduces the important notion that security prices behave as though they can see through the impacts of accounting method on the income level.

1.1 Objective of This Study

The purpose of this study is to examine the cross-sectional variation in stock price response under alternative accounting measurement rules (i.e., APB No. 8 and SFAS No. 87). Accounting earnings measurements are not equally informative in assessing the

future cash flows and dividend paying ability of firm. This study assumes that reported accounting earnings are contaminated by different levels of noise or garbling associated with the particular set of accounting measurement rules. Noise or garbling is defined as the bias in accounting earnings measurement process relative to the true economic earnings or cash flows. The reciprocal of the variance of noise indicates the quality or informativeness of the accounting earnings information signal. Hence, earnings response coefficient (ERC) is inversely associated with the noise or garbling in the signal of earnings. Also, the magnitudes of noise in the reported earnings may change when the characteristics of a firm's external reporting system change due to a mandatory accounting change, even if there is no change in the firm's production/investment decisions. By providing further evidence on factors that contribute to differential ERCs, the study intends to increase the validity of the information interpretation of cross-sectional difference in ERC.

The second purpose of this research is to provide empirical evidence of the informativeness of a highly controversial pension accounting method. Due to the complexities of revenue/expense recognition related to pension plans, investors might not understand fully the income effects of the funding levels in the footnote disclosures. Recognizing the controversy and the technical complexity of APB Opinion No. 8, the FASB issued SFAS No. 87, "Employers' Accounting for Pensions," which supersedes APB Opinion No. 8 and SFAS No. 36. SFAS No. 87 contains significant economic and reporting implications. SFAS No. 87 requires a more

uniform and consistent measurement of the annual pension costs in contrast to the various calculations under APB No. 8. Thus, the new pension accounting method may change the characteristics of the reported accounting system. In other words, investors may perceive the earnings quality under SFAS No. 87 higher than the quality under APB No. 8. This study hypothesizes that the ERCs under SFAS No. 87 are greater than the ERCs under APB No. 8 employing Choi and Salamon's [1988] model.

The third purpose of this study is to provide empirical evidence of the differential ERCs associated with the adoption period of a mandatory accounting change. Due to the rather long transition periods, security analysts and investors would have learned the adoption effects of SFAS No. 87 on earnings of firms that delayed the adoption of the accounting change until the required date (late adopters) from those of firms which adopted the accounting rule prior to the required date (early adopters). Thus, even though late adopters have not yet adopted SFAS No. 87, their stock prices would have been affected, if any, by the early adopters' earnings releases which contain the adoption effects of SFAS No. 87. This study tests the differential ERCs depending upon different adoption periods of SFAS No. 87.

Finally, this study explores the controversial issue of whether investors perceive unfunded pension liability as equivalent to corporate liability under the new pension accounting rule. In SFAS No. 87, the FASB appears to support the notion that unfunded pension obligations are corporate liabilities by requiring firms to recognize the additional minimum liabilities on

a firm's statement of financial position. Also, SFAS No. 87 requires to use the projected benefit obligation in measuring pension liabilities and to disclose its components in the notes to the financial statements. Under APB No. 8, the vested benefit measure played a central role in determining pension obligations. Thus, different measurement rules of pension liabilities and extensive and detailed disclosures of pension plans enable this study to test the impacts of pension liabilities under the new pension accounting on firms' systematic risk.

1.2 Research Methodology

To implement the objectives of this study, two methodologies are used. First, the differential ERCs are examined using cross-sectional multiple regression analysis. The ERC is estimated as the slope coefficient from a regression estimate of abnormal stock returns on a measure of unexpected earnings. Using dummy variables, each sample firm's earnings are categorized into earnings under APB No. 8 (for the year prior to the adoption of SFAS No. 87) vs. SFAS No. 87 (for the adoption year). The residual returns are measured via the market model, and two days cumulative abnormal returns are computed. The unexpected earnings are used as independent variables and the cumulative abnormal return are used as the dependent variable.

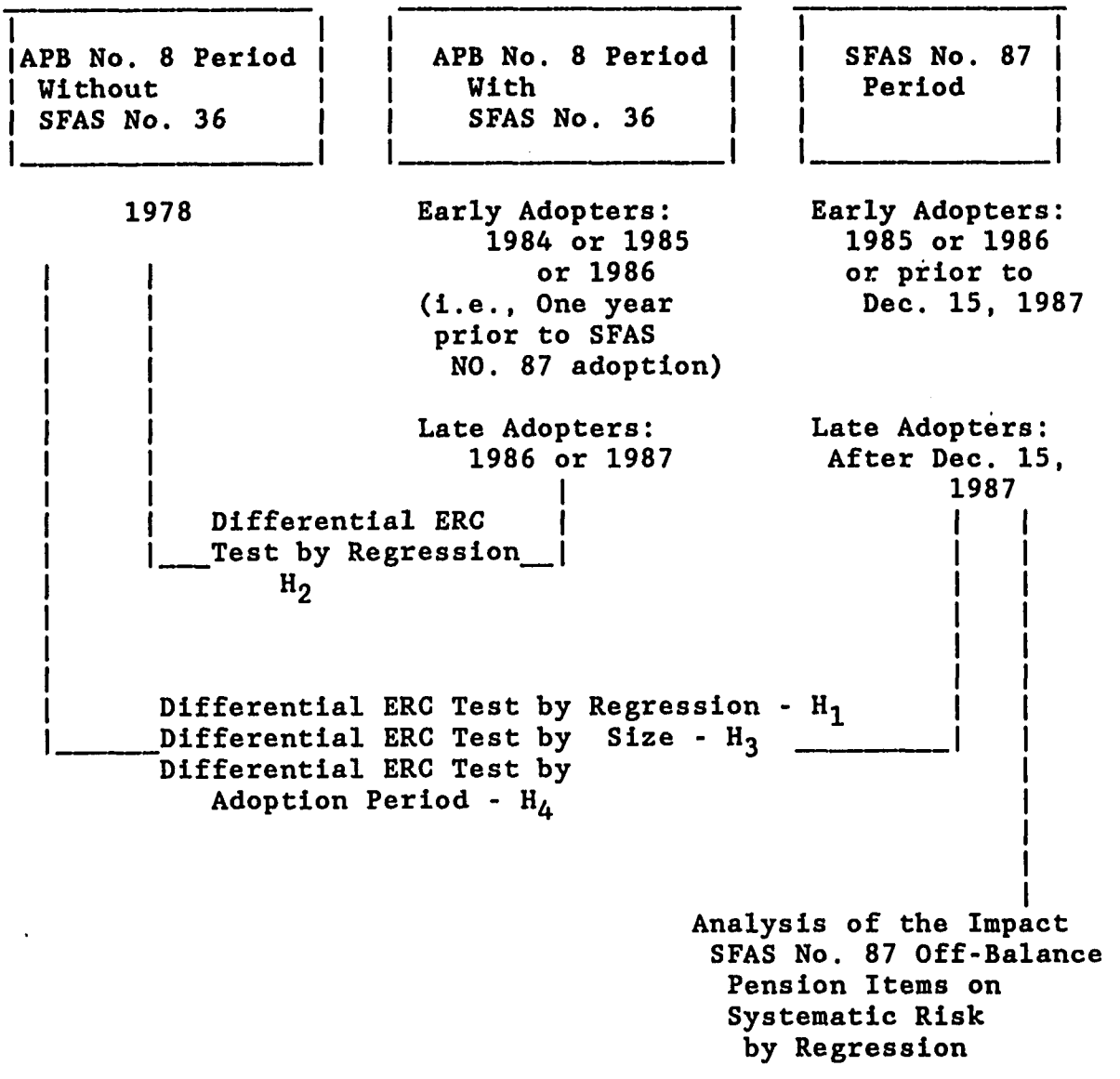
Second, the relationship between market-based systematic risk and liabilities under APB No. 8 and SFAS No. 87 is examined using the same sample. The CAPM model indicates that systematic risk of a stock is a sufficient firm-specific characteristic

determining an expected stock return. The underlying rationale of this methodology is that if SFAS No. 87 is assumed to improve assessments of future operation and financial risk, there may exist an association between SFAS No. 87 accounting information and systematic risk.

The next chapter reviews prior literature related to differential market reactions to the releases of accounting signals. Chapter III briefly describes the conceptual framework. In Chapter IV, earnings quality under APB No. 8 vs. SFAS No. 87 is discussed. Chapter V states specific hypotheses tested, describes the sample selection, defines the variables, and develops the empirical models to be tested. Also, the empirical results of differential ERCs under old pension accounting rule vs. new one are reported. Chapter VI develops the hypothesis and empirical model to investigate the impact of financial leverage on the market risk. Also, the results of the effects of off-balance sheet pension items on the firms' systematic risks are presented in this section. Chapter VII concludes this study with a brief summary of findings.

Table I-1

Profile of the Methodology Design



CHAPTER II

LITERATURE REVIEW

This chapter reviews prior research related to differential market reactions to earnings releases.

2.1 Studies Examining the Determinants of the Differential Market Reactions to Accounting Earnings Releases

Numerous empirical studies have provided evidence that earnings are a significant determinant of firm valuation (for example, Ball and Brown [1968], Beaver. Clarke, and Wright [1979], Foster [1977], and Hagerman, Zmijewski, and Shah [1984].) Furthermore, cross-sectional differences in stock price responses to earnings releases have been noticed. One group of studies have attributed these cross-sectional ERCs to differential firm information environments. Grant [1980] reveals a larger market reaction to OTC firms' annual earnings releases than to reports of NYSE firms. McNichols and Manegold [1983] test the linkage between changes in a firm's disclosure environment and its security price behavior. They compare the variance of returns upon release of annual reports in the 'annual-report-only' and 'annual-plus-quarterly-reports' environments. They found that variability is significantly greater in the 'annual-report-only' environment. Bamber [1986] observed that abnormal trading volume of smaller firms around annual earnings announcement dates are significantly higher than those of larger firms. Atiase [1985] provides evidence of significant systematic differences in the

security price reactions to earnings releases of firms which are associated with specific firm characteristics that lead to differential amounts of predisclosure information. He argues a "size-related differential information hypothesis" that the amount of private predisclosure information production and dissemination is an increasing function of firm size. The results provide evidence that the degree of unexpected security price changes in response to earnings reports is inversely related to the capitalized value (size) of firms.

Freeman [1987] provides evidence that the information supporting common stock prices systematically differs between large and small firms. He reveals that the magnitude of abnormal returns associated with good or bad news from a common class of signals is inversely related to firm size.

Using valuation models, Easton and Zmijewski [1989] test whether ERCs relating earnings to security prices vary cross-sectionally. They hypothesize that ERCs are (a) positively associated with revision coefficients and (b) negatively associated with expected rates of return. Their random coefficient regression model provides evidence consistent with their hypotheses.

Collins and Kothari [1989] predict and document evidence that the ERC is a function of riskless interest rates, the riskiness, and growth and/or persistence of earnings. The ERC also varies cross-sectionally with the holding period return interval. Their results provide evidence consistent with the previous studies that ERC varies with respect to size. Also, the empirical

specification of the earnings/return relation is significantly improved when they include the above factors.

Financial literature also investigates differential earnings response coefficients. Barry and Brown [1984] examine a model of market equilibrium in which there is less information available about some of the securities in the market than about others. They use the period of listing as a proxy for quantity of information. Results reveal an association between the period of listing and security returns that cannot be accounted for by firm size and which is not reduced by an elimination of January returns data from their sample. Barry and Brown [1985] show that parameter uncertainty, or estimation risk can have an effect upon market equilibrium. Under reasonable conditions, securities for which there is relatively little information are shown to have relatively higher systematic risk when that risk is properly measured. They provide theoretical support for the empirical examination of at least three proxies for relative information: period of listing, number of security returns observations available, and divergence of analyst opinion.

Kormendi and Lipe [1987] test and report that the magnitude of the effect of unexpected earnings on stock returns is correlated with the present value of revisions in expected future earnings (i.e., earnings persistence) derived from a univariate time series model. They also observe no evidence that the reactions of stock returns to unexpected earnings are excessively volatile.

2.2 Studies Examining the Differential Market Reactions to Alternative Qualities of Accounting Earnings Signals

Another group of studies have argued that the capital markets react differentially to accounting information releases, and have attributed these differences to the different levels of noise or garbling depending upon the particular set of accounting measurement rules used to delineate the underlying economic events. For example, Collins and Salatka [1988] provide evidence of differential earnings response under SFAS No. 8 as compared to SFAS No. 52 for a set of multinational firms vis-a-vis a set of non-multinational firms. Recognizing the alleged deficiencies and/or distortions associated with SFAS No. 8, Collins and Salatka hypothesized that earnings reported under this standard will have less impact on investors expectations with respect to future cash flows comparing to SFAS No. 52 earnings and will show a lower earnings response coefficient. They found a smaller relative price adjustment for a given amount of unexpected earnings for multinational firms vis-a-vis non-multinationals during the SFAS No. 8 period.

Collins and DeAngelo [1990] examine stock market and analyst reactions to earnings of listed firms both (a) during a proxy contest for board seats, and (b) after a proxy contest-induced management change. They find a more pronounced market and analysts reactions during a proxy contest than in prior period, despite indications of earnings management during a proxy contest. They interpret the results that earnings released during a proxy contest are more informative than usual, perhaps because earnings

are used in the corporate governance process through which incumbent managers' efficiency is challenged.

In sum, the results of most studies reveal consistent evidence that the capital markets react differentially to accounting earnings releases depending upon the firm-specific information environment and earnings quality.

CHAPTER III

CONCEPTUAL FRAMEWORK

The purpose of this chapter is to explore the theoretical relationship between differential earnings response coefficients and stock market reactions. This provides a theoretical framework for the empirical studies presented in Chapter V.

Traditional studies of the information content of earnings releases have assumed that the ERC is intertemporally and cross-sectionally constant. Recently, Holthausen and Verrecchia (HV) [1988] and Choi and Salamon (CS) [1988] developed theoretical models which clarify the determinants of the magnitudes of price reaction to firm specific information releases by relaxing the assumption of constant ERC . This study employs the HV's and CS's models to establish the conceptual theoretical underpinning for the hypothesis to be developed in Chapter V.

Each of the HV and CS models is constructed based upon slightly different assumptions, but both models identify that the earnings response coefficient is inversely related to the noise or garbling in the earnings signal. Based upon a risk-neutral market assumption, the HV model demonstrates that the relation between the variance of price changes and a sequence of two public information releases on two risky assets. They show that the unexpected price changes at the time of second information releases are associated of the market's priors about the liquidating dividends and the realized signals with respect to the

information releases in conjunction with the market's information about the noise in the information signals. Since the implications of garbling in earnings signals on ERC are similar for both models, only CS's model is discussed.

CS adopt the pre-decision information view that the role of accounting information is to change the investors' beliefs rather than that of ex post measurement of wealth change. The beliefs about the vector of the random production/investment outcomes, $X=(X_1,...X_n$; cash earnings), are assumed to be represented by an n-variate nonsingular normal distribution with n means u_j, n variances s_j^2, and n(n-1)/2 pairwise covariances s_{ji} (j-i).

An information system n_k is formalized as a function which stochastically transforms the outcome X_k into a signal $y_k=n_k(X_k)$. Also, informativeness of a signal is determined by the characteristics of the information system perceived by investors. The inverse of the variance can be considered as the sign of the quality of the accounting earnings information signal. Thus, investors perceive the information signal from the system n_k as communication of the outcome $Y_k = X_k$ disturbed by some bias d_k and noisy e_k.

In the disclosure environment, if investors can observe an actual signal from the system at time 1, they will use the content of the signal and the characteristics of information system, n_k, to revise their beliefs about the vector of $X=(X_k, X_{m-k})$. The investors' time 0 expectancy of signal disclosure that will be released at time 1 systematically reduces their estimation at time 0 of firm risks, although the content of the signal itself

is unknown.

From the above arguments, several important characteristics of the return/earnings relation can be derived. First, an earnings release by a particular firm k impacts the announcing firm's price as well as the prices of other firms in the market. Second, only the unexpected earnings affects prices at the time of the announcement. Third, the relation between unexpected earnings and unexpected price changes depends on the ERCs that reflects the announcing firm's specific characteristics. Both ERCs cause differential price reactions to earnings signals beyond the differential price reaction associated with differential unexpected earnings.

The CS's model indicates that for a given amount of unexpected earnings: (1) the more the perceived firm specific uncertainty in the announcing firm's production/investment activities, the larger the effect of the firm's unexpected price change: and (2) the greater the magnitude of noise in an announcing firm's reporting system, the smaller impact of its unexpected price change. The primary interest of this research is to test the empirical implication of the above result (2).

CHAPTER IV

EARNINGS QUALITY UNDER APB No. 8 VS. SFAS NO.87

Recently, the economic implications of pension plans have increased in importance since pension plans have been growing in size, and swelling stock and bond prices have significantly boosted the assets of most pension plans. Also, falling interest rates have increased the present value of pension plan liabilities much more rapidly than assets. The pension assets controlled and invested by retirement plans are immense, and represent a substantial portion of the potential investment capital in our economy. The pension fund industry now administers $1 trillion.

In this Chapter, APB No. 8 and SFAS No. 87 are reviewed to examine the differential ERCs under the two different pension accounting rules. The differences in measuring pension assets and liabilities which are associated with the alternative pension accounting rules are critical because these differences may cause differential qualities of reported earnings signals. Thus these might cause differential ERCs.

The first section reviews the background of the pension accounting evolution. The earnings quality under APB No. 8 and SFAS No. 87 are discussed and compared in the second and third sections, respectively.

4.1 The Evolution of Pension Accounting

Since 1966, the Accounting Principles Board (APB) Opinion No. 8, "Accounting for the Cost of Pension Plans," provided the

guidelines for pension accounting. It provided for a range of acceptable amounts which could be charged as pension expense. However, individual board members differed substantially in their opinion of the various measurement methods of the annual cost of a pension plan. As a result, the APB allowed a great deal of latitude for employers in the measurement of the cost of a particular pension plan, and also in the matching of costs with revenue.

The Employees Retirement Income Security Act of 1974 (ERISA), federal legislation, has had a significant effect on the funding and administration of pension plans. This act requires employers with defined benefit plans to fund the future benefits. Prior to this act, employers had the option of funding or not funding in advance. In December 1974, the Board issued Interpretation No. 3, "Accounting for the Cost of Pension Plans subject to ERISA," to clarify the accounting for employers' obligations for pension plans covered by the Act. Later, Congress passed the Multiemployer Pension Plan Amendment Act of 1980. This legislation required increased employer obligations for multiemployer plans and mandated PBGC coverage of multiemployer plans. Both acts limited the flexibility of private pension plans and made funding mandatory.

An FASB Exposure Draft, "Accounting and Reporting by Defined Benefit Pension Plans", was issued in April, 1977. The Board received approximately 700 comment letters, which indicated the need for reconsideration of pension accounting.

In March 19, 1980, the FASB issued SFAS No. 35 "Accounting and

Reporting by Defined Benefit Pension Plans." It addressed financial reporting by plans, rather than by the sponsoring employer. This statement required measurement of net pension assets available for benefits at their fair value at the end of the plan year. Accumulated plan benefits are to be computed on the basis of employees' history of pay and service and other relevant factors as of the benefit information date.

SFAS No. 36, "Disclosure of Pension Information," was issued on May 9, 1980, as an interim step to improve disclosure in employers' financial statements, pending completion of the project on accounting by employers for pensions. This statement amended Opinion No. 8 to require disclosure of certain information based on the requirements of Statement No. 35. Statement No.36 retained the basic provisions of Opinion No. 8 that dictated measurement of pension assets and pension liabilities.

In February 19, 1981, the FASB issued a Discussion Memorandum, "Employers' Accounting for Pensions and Other Postemployment Benefits." The Discussion Memorandum analyzed basic issues regarding accounting and reporting requirements for single-employer, noninsured, defined benefit pension plans in the United States. The FASB questioned whether some part of an employer's obligation for future pensions should be recognized on the balance sheet.

In April 1982, the Board issued Statement No. 59, "Deferral of the Effective Date of Certain Accounting Requirements for Pension Plans of State and Local Governmental Units." The Statement amended Statement No. 35 and deferred that Statement's effective

date for plans sponsored by state or local governments.

On March 22, 1985, the FASB issued an Exposure Draft, "Employers' Accounting for Pensions." It proposed the standards of financial accounting and reporting for an employer. The Board received over 400 comment letters.

In July and August 1985, the Board held a public hearing on the issues which were covered in the March 1985 and June 1985 Exposure Drafts. Fifty-six presentations were made at the hearing. In December 30, 1985, the Board released Statement No. 87, "Employers' Accounting for Pensions." The Board concluded that this Statement is in a transitional stage even if it represents a worthwhile improvement in financial reporting.

4.2 Overview of Pension Accounting under APB Opinion No. 8

Under old pension accounting rule, Pension plan provisions vary from company to company. Furthermore, there exists considerable uncertainty in estimating the present cost of the employees' future pension benefits. Accountants confront the problem of estimating and allocating the employer's pension costs over the periods in which the associated services are performed by the employees.

APB No. 8, "Accounting for the Cost of Pension Plans," was criticized for not reflecting the underlying economic substance. The FASB has been aware of the problems: (1) annual pension costs were improperly measured (measurement problem), (2) significant pension assets and liabilities were not recognized in the statement of financial position, (3) information about pension

expense items and funding status was not sufficiently disclosed (disclosure problem). These problems stem from the APB's inadequate assumptions: (1) defined contribution pension plans and defined benefit pension plans have equivalent impacts on the employer, and (2) the defined benefit pension fund trust is a separate entity from the employer.

The most serious problem of the standard was that annual pension costs were inappropriately measured. Under APB No. 8, total pension expense for any reporting period was the sum of four different components: (1) normal pension cost, (2) amortization of past service cost, (3) amortization of prior service cost, and (4) amortization of actuarial gains and losses. One reason for the inappropriate measurement is that the opinion allowed firms to use any "acceptable actuarial cost methods", which results in different amounts of periodic pension expense that falls between a maximum and a minimum. The primary differences between the defined minimum and maximum limits originate from their different treatments of past service costs, prior service costs, and vested benefits.

Under APB No. 8, accounting for prior service cost was the same as accounting for past service cost since the two types of pension cost conceptually are the same. The difference between past service and prior service cost is that the former arises from the adoption of a pension plan. Prior service cost occurs each time an existing pension plan is amended. The prior service cost was allowed to be recognized over future periods, using a variety of acceptable methods. The cost was reported as the amount that

the employer agrees to fund each year. Also, management was allowed to elect to fund prior service costs at a different measurement from the one used to recognized the expense. The total pension cost eventually equaled the amount funded but differed in each year. These treatments were controversial since employers could spread the original cost and the subsequent interest expense as a level amount over the desirable funding period instead of more objective and meaningful periods.

APB Opinion No. 8 defined actuarial gains and losses as "the effects on actuarially calculated pension cost of (1) deviations between actual prior experience and the actuarial assumptions used or (2) changes in actuarial assumptions as to future events." Actuarial assumptions used in estimating pension funding and expenses are based on estimates of future events. The opinion allowed any resulting actuarial gain or loss to be treated as an adjustment of the gain or loss from that occurrence, and not as an adjustment of pension expense for the year. It required that usual actuarial gains and losses should be allocated to the current and future periods either by spreading or averaging them using the actuarial cost method, or by separately amortizing them over periods of 10 to 20 years. Also, resulting experience gains/losses from the changes in assumptions could be amortized differently.

Another reason for the improper pension expense measurement was that APB No. 8 allowed a wide range of actuarial assumptions to compute pension expense and valuing promised benefits, and these practices resulted in diminished comparability. The

opinion had not specified the method of actuarial assumptions. Therefore, a firm could use both explicit and implicit actuarial assumptions. Especially, the wide range of rates of return or discount assumptions were controversial because of their significant impacts on accumulated benefit computations. For example, Throwbridge and Farr [1977] showed a rule of thumb used by actuaries which accounts for a 20 percent decrease in the accumulated benefit obligation due to a 1 percent increase in the discount rate.

A second major problem of APB No. 8 was that substantial amounts of assets and liabilities were omitted from the balance sheet. APB No. 8 emphasized periodic pension expense rather than an employer's pension obligations and plan assets. The opinion required a pension liability to be recorded only if the employer's contribution to the plan is less than the cumulative pension expense determined under an acceptable actuarial cost method. Conversely, a pension asset is recognized only if that contribution is more than the recorded pension expense. Pension assets and liabilities may be an alternative measure of future pension cost if the value of the security reflects the present value of future cash flows.

Third, users of financial reports could not fully understand and assess net periodic pension cost and the funded status of the employer's obligation since pension items were inadequately disclosed in the financial statements. For example, the recognition of actuarial gains and losses were not required to be disclosed. APB No. 8 did not sufficiently reflect economic

reality.

In sum, APB No. 8 allowed employers a great latitude that provides for the desired series of pension expense over time and income smoothing. In addition, employers can choose from the range of acceptable discount rates for determining the present value of pension obligations. These implies that the reported periodic pension expenses and assets under APB No. 8 could not fully reflect and so distorted the economic reality of reported earnings. In addition, the lack of sufficient disclosure of pension plans diminished the comparability of pension information between firms in the same year and over time for the same firm. Then, the reported earnings under APB No. 8 might be a garbled or noisy version of the true underlying economic performance of the firm. This implies that the ERC under APB No. 8 would reflect the noisy signal if investors perceived that the reported earnings are contaminated.

4.3 Overview of Pension Accounting under SFAS No. 87

SFAS No. 87, "Employer's Accounting for Pensions," was issued in an attempt to improve pension accounting. The statement substantially changed the financial accounting and reporting procedures for defined benefit pension plans. The impact of the standard varied depending on plan design, the age of the workforce, actuarial assumptions, and the plan's initial status (Stone and Ingram [1988]; and Norton [1988]). Prior to SFAS 87, the ratio of pension expense to pretax profits for major U. S. corporations averaged 9.6 percent and as a percentage of payroll

cost averages 4.8 percent. Stone and Ingram [1988] report that the average decrease in pension expense due to SFAS No. 87 for early adopters was $22.49 million that translated into an increase in after-tax income of approximately $14.39 million or 18 cents per share. However, the effects of the adoption on the balance sheet and the minimum liability were minimal.

The purposes of SFAS 87 are: (1) to provide a measure of net periodic pension cost that is more representationally faithful than those used in past practice because it reflects the terms of the underlying plan and because it better approximates the recognition of the cost of an employee's pension over that employee's service period, (2) to provide a measure of net periodic pension cost that is more understandable and comparable and is, therefore, more useful than those in past practice, (3) to provide disclosures that will allow users to understand better the extent and effect of an employer's undertaking to provide employee pensions and related financial arrangements, and (4) to improve reporting of financial position.

SFAS 87 retained three aspects of pension accounting from previous requirements which are considered fundamental to the proper accounting for pension plans. First, the delayed recognition feature allows for certain changes in pension obligation (i.e., prior service costs) to be recognized gradually over subsequent periods. Second, the net cost feature allows an amount for net pension cost to be reported that is the aggregate of at least three items: the compensation cost of benefits promised; the interest cost from deferred payments of benefits;

and the results of investing pension fund assets. Third, the offsetting feature allows a single amount to be reported that is the aggregate of the pension plan assets offset by the liability of participants.

Even if some basic features of pension accounting have been retained, the changes have been quite significant. The most important changes of SFAS No. 87 are as follows.

First, SFAS No. 87 provides a more uniform and consistent measurement of the annual pension cost in contrast to the various calculation methods under APB No. 8 using the following devices: 1) A single actuarial method (the benefit/years of service approach) has been adopted and provides a standardized method. SFAS No. 87 requires the employers to drop many of the actuarial methods and some of the techniques for smoothing out plan earnings that they have used in the past. As a substitute, employers must use a single method, the Project Unit Credit method, and a single, market-determined rate for calculating plan liabilities. This generally results in a lower annual cost than cost oriented actuarial methods. It also invariably results in a lower accumulated benefit obligation.

The components of pension expense can be divided into two categories: basic cost and cost-smoothing. Basic costs consist of costs for service currently earned, changes in assumptions and demographics, the passage of time and the investment performance of plan assets.

Cost-smoothing components are designed to reduce the volatility of annual pension expense resulting from plan

amendments and wide swings in market performance. SFAS No. 87 requires the Prior service cost to be amortized over the remaining service life of the active work force, which will often be considerably shorter than the APB No, 8 amortization period. It also allows for the consistent use of a simplified amortization (e.g., straight-line amortization) as long as such costs are recognized at least as rapidly as under the more precise method. This requirement will improve the comparability of periodic pension expense, and reduce management discretion to choose the desirable amortization periods.

SFAS No. 87 requires that all actuarial gains and losses be accounted for on a combined basis. Employers can amortize the gains and losses by any systematic and rational method as long as the amortization of the accumulated gains and losses is greater than the minimum bases in the "corridor approach." This approach, in effect, would result in a "smoothing" of pension expense first by offsetting gains and losses and then by spreading the excess over the average service period.

2) Another device is used under SFAS No. 87 to provide a more uniform and consistent measurement of annual pension cost. SFAS No. 87 decreases the range of acceptable actuarial assumptions. Employers are required to elect an assumed interest rate based on the rate at which the pension obligation could effectively be settled or eliminated at the balance sheet date. Previously, companies had considerable leeway in choosing interest rate assumptions. Now they have to use a long-term market interest rate to determine the value of these liabilities. As a result,

the disclosed value of pension liabilities could become more volatile. However, the notion of a settlement rate is a positive step because it means the use of the economic concept of time value of money to measure the present value of cash flows. The new standard also requires the use of an explicit approach so that each significant actuarial assumption reflects the best estimate with respect to that individual assumption.

Second, beginning in 1989, SFAS No. 87 requires immediate recognition of a liability (referred to as the minimum liability) in circumstances where the accumulated benefit obligation exceeds the fair value of plan assets. An intangible asset, for an amount not exceeding unrecognized prior service cost, will be recorded in association with recognition of this unfunded obligation. Stockholders' equity will be reduced for any excess, net of the tax benefit. This requirement resolves the controversy of whether users of financial statements perceive pension obligations as an ordinary liability.

Third, SFAS No. 87 greatly improves disclosure of pension information. The issuance of SFAS No. 36 attempted to improve footnote disclosure, but it was not sufficient to give needed detailed pension information to users. SFAS No. 87 requires extensive improved footnote disclosure about the pension plan: (1) the components of the annual pension cost, (2) a reconciliation of various measures, and (3) the funding status of the company's pension plan. In addition, the standard requires the disclosure of individual assumptions (e.g., the discount rate, the expected rate of return on plan assets, and the expected annual increase in

salaries). The lack of disclosure of these items was criticized because it diminished the comparability of financial statements and pension liability in particular.

Fourth, the FASB mandates a certain way to measure the risk that pension plan sponsors have always had to live with. Over the short term, liabilities suffer volatility as a result of changes in interest rates. Over the long term, the liabilities are also volatile due to changes in a company's work force and changes in the provisions of its pension plan. Pension liabilities are not unlike bond portfolios since they are timed cash flows representing a future stream of benefits and because they are sensitive to interest rates. Since SFAS No.87, plan sponsors are computing market values of obligations as well as market value of assets, SFAS No. 87 has helped put pension risk in its proper perspective. In the past, companies tended to focus only on the rate of return on their assets. They assumed incorrectly that pension obligations did not have any volatility.

SFAS No. 87 may cause more volatility of pension cost than under APB No. 8 mainly due to the requirement of the recognition of pension liabilities at market value each year. However, pension cost volatility can be controlled by shielding from amortization actuarial gains and losses falling within a "corridor." A market-related assets value approach may also reduce pension cost volatility by deferring gain or loss recognition. Employers can use amortization of transition amounts to offset increases in liabilities produced by declining interest rate assumptions. Also, changes in actuarial assumptions

such as the settlement rate, the salary scale, and the return on assets can be used.

The above discussion indicates that SFAS No. 87 greatly reduces the latitude for employer's discretion in pension accounting. Employers may no longer select an actuarial cost method and some of the techniques for smoothing out plan earnings that they have used in the past. Also they cannot choose an acceptable discount rate for determining the present value of pension liabilities. Thus, it can be claimed that SFAS No. 87 allegedly reduces or eliminates the distortions of economic realities in reported income which resulted from APB No. 8. Hence, SFAS No. 87 may improve the quality of reported earnings or reduce noise in the accounting earnings information signal. Then, according to the theoretical model in Chapter III, the ERC under SFAS No. 87 would be greater than the ERC under APB No. 8 if investors perceive the quality of the earnings signal under SFAS No. 87 to be higher compared to that disclosed under APB No. 8. In other words, excess returns associated with unexpected earnings in the SFAS No. 87 time period would be greater than those under APB No. 8.

CHAPTER V

RESEARCH DESIGN AND TEST RESULTS FOR EARNINGS QUALITIES UNDER ALTERNATIVE PENSION ACCOUNTING RULES

This chapter describes the research design and methodology to be used in examining the differential earnings response coefficients under APB No. 8 and SFAS No. 36 vs. SFAS No. 87. It delineates in detail the derivation of hypotheses, the sample selection procedure, the development of the empirical model, and the estimation of ERCs.

5.1 Hypotheses Development

The hypotheses derivation is based on the discussions in Chapters III and IV. This study concentrates on the differential ERCs under alternative pension accounting measurement and disclosure rules.

As was discussed in Chapter III, Holthausen and Verrecchia [1988], and Choi and Salamon [1988] showed that the degree of price reactions associated with earnings announcements varies with the magnitude of noise or garbling in the accounting signal relative to the "true" underlying economic earnings or cash flows. In other words, the ERC is inversely related to the noise in the reported accounting earnings. As was discussed in Chapter IV, APB No. 8 had been used as a principle for measuring pension expense prior to SFAS No. 87. However, its determination of pension expense and earnings allegedly distorted economic realities in reported earnings. It also omitted material pension assets and

liabilities from the balance sheet. The new standard substantially narrows the employer's discretion to smooth income and to generate a desirable pension expense stream. Thus, the measurement of pension accounting under SFAS No. 87 allegedly reflects the economic reality of pension expense, hence improves the quality in reported accounting earnings. As a consequence, the ERC under SFAS No. 87 would be greater than ERC under APB. No 8. Thus, the first alternative hypothesis posits:

H_1: The ERC under SFAS No. 87 is greater than the ERC under APB No. 8 with SFAS No. 36.

The APB No. 8 period with SFAS No. 36 is defined as the year prior to the adoption of SFAS No. 87. During this period, APB No. 8 was used as an accounting principle to measure pension expenses, assets, and liabilities, but SFAS No. 36 was used for the disclosure of pension plans in addition to the APB No. 8 disclosure requirements. The pure APB No. 8 period is defined as the year prior to the adoption year (i.e., 1978) of SFAS No. 36. Prior to the adoption of SFAS No. 36, APB No. 8 was applied for measurement and disclosure of pension plans.

APB No. 8 was criticized because users of financial statements could not sufficiently understand and assess pension information. One major reason for the problem was the lack of detailed pension information disclosure. As mentioned before, APB No. 8 did not fulfill the users' needs for disclosure. Therefore, the FASB required an extensive disclosure of pension plans in SFAS No. 36 and furthermore in SFAS No. 87. Users under SFAS No. 87

can access more refined pension information as compared to APB No. 8 when SFAS No. 36 was not required. In other words, SFAS No. 87 allegedly improves the quality of the accounting information signal by improving measurement of pension expenses and requiring extensive information disclosure. It is possible to examine whether SFAS No. 87 improved the earnings quality as compared to APB No. 8 when additional pension disclosures under SFAS No. 36 were not required. Thus, the second alternative hypothesis is set forth:

H_2: The ERC under SFAS No. 87 is greater than the ERC under APB No. 8 when SFAS No. 36 was not applied.

The earnings/returns relation is affected by the cross-sectional variations in information environments. Firm size may be a crude proxy for the prior information with respect to cash earnings and differential information environment. Then different size firms would show differential security reactions to firms' earnings announcements conditioned on information environments. Atiase [1985], Holthausen and Verrecchia [1988], and Lobo and Mahmoud [1989] imply that the variance of price adjustment that varies with an accounting information release is inversely associated with the prior information signals to the extent that these signals are correlated with cash earnings and the firm's accounting earnings signal. Choi and Salamon [1988] suggest that firm size may be more than just a proxy for the omitted variable. A portion of the observed "size effect" may be the result of

interim information that reduces investors' prior uncertainty about large firms. Then large firms would have smaller earnings response coefficients than small firms along with smaller amounts of unexpected earnings. Collins and Kothari [1989] suggest that using a constant earnings expectation model and cumulative return period across all firms in an association study can result in a spurious correlation between firm size and ERC because of differences in the lead-lag structure in the earnings/return relation resulting from the differential information environment for large vs. small firms. Investors and security analysts can more easily access the new pension information for large firms than those of small firms. Therefore, the availability of information for the adoption effects of SFAS No. 87 prior to earnings announcements could be greater for larger firms than for smaller firms. Then, the differences in ERCs under SFAS No. 87 vs. APB No. 8 are larger for small firms than for large firms.

Also, the alternative argument is valid. Security analysts can forecast earnings more accurately for large firms than for small firms when firms adopt new pension accounting rules due to more available information about large firms. Then, given unexpected earnings, the quality of the signal from UE_{it} would be higher for large firms compared to that of small firms. Therefore, the differential ERCs of large firms under the SFAS No. 87 period vs. the APB No. 8 with SFAS No. 36 period would be larger than the ERCs of small firms. The third alternative hypothesis posits:

H_{3a}: The ERCs of small firms and large firms are different.

H_{3b}: The differential ERCs under APB No. 8 vs. SFAS No. 87 between small firms and large firms are different.

Stone and Ingram [1988] provide evidence that the early adopters in applying SFAS No. 87 were favorably or less adversely affected by the new pension accounting rules. Some firms might delay the adoption of the new rule because they were adversely affected or they could not estimate their pension assets and liabilities. Then, the price response may be different for early adopters as compared to later adopters.

Choi and Salamon [1988] theoretically proved that the release of an earnings signal by one firm has the potential to systematically affect the prices of all other firms in the market in a multiperiod version of the capital asset pricing theory. Previous studies (Firth [1976]; Foster [1981]; Clinch and Sinclair [1985]) have documented a non-disclosing firm's stock price reactions to the information release of similar firms. SFAS No. 87 allows a rather long transition period (i.e., 1985, 1986, 1987). There may have been some sort of "learning effect period." Security analysts and investors could have learned the impact of SFAS No. 87 from early adopters' earnings releases and then could have been able to revise their ability to forecast the pension effects of later adopters even though they did not adopt the standard yet. The fourth alternative hypothesis is:

H_4: **The ERCs of the adopters in the earlier transition period of SFAS No. 87 differ from ERCs of the adopters in the later transition period.**

5.2 Sample Selection and Data Collection

One hundred eighty eight early adopters and one hundred ten late adopters are initially identified from the National Automated Accounting Research System (NAARS). This study covers 1978, 1985, 1986, 1987, and 1988 time periods that include early adopters and later adopters of SFAS No. 87. The sample selection criteria are: the firm has to (1) be a member of the NYSE or AMEX, (2) be on 1988 version of the Compustat tape, (3) be on the 1988 version of the IBES tape, and (4) have earnings announcement dates available in the Compustat tape or the Wall Street Journal Index (WSJ). Both annual report and 10-K footnotes are then used to obtain the adoption effect on reported earnings and off-balance sheet pension information. Net income and other financial data are obtained from the Compustat tape. Preliminary earnings disclosure dates are acquired from the WSJ or Compustat tape. Daily stock returns are obtained from the CRSP tape. Early adopters are defined as firms which adopt SFAS No. 87 in the period 1985, 1986 or prior to December 15, 1987. Later adopters are the ones that adopt the new pension accounting after December 15, 1987. Twenty three firms were dropped due to insufficient data in Compstat and CRSP tapes. Forty five firms were deleted because absolute value of their earnings forecast error deflated by price is more than 200%. This deletion of extreme value is consistent with prior studies (Collins and Kothari [1989]; Collins and DeAngelo [1990]). Thus,

the final sample consists of 230 firms.

5.3 Estimation of Variables

5.3.1 Estimation of Unexpected Earnings

Monthly IBES analysts' forecasts are used as a proxy for market expected earnings. Annual earnings forecasts at the fiscal year end just prior to the earnings announcement are used. Both the mean and the median forecasts are used.

There are several reasons to use IBES security analysts' forecasts. Previous studies, for example, Brown, Foster, and Noreen [1985], and Brown, Griffin, Hagerman, and Zmijewski [1987a] indicate that security analysts' forecasts are more accurate than forecasts which are obtained from alternative univariate time-series models, due to a timing advantage. They also showed in the following study [1987b] that security analysts' forecast was a better proxy for the market's earnings expectation than a time series model. Furthermore, IBES forecasts are more frequently (i.e., monthly) made than Value Line forecasts (i.e., quarterly).

Unexpected earnings, UE_{it}, are defined as the difference between the actual earnings and forecasted earnings deflated by price as follows:

$$UE_{it} = \frac{E_{it} - FE_{it}}{P_{t-1}}$$

where:

E_{it} = a firm's fiscal year end actual annual earnings per share,

FE_{it} = IBES security analysts' annual earnings per share forecasts prior to the earnings announcements,

P_{t-1} = the market price of a firm's security at the beginning of fiscal year end,

i = individual firm i,

t = time period t.

Two kinds of UE_{it} are used: one which includes gain effects of SFAS No. 87 adoption, and another which excludes gain effects of SFAS No. 87 adoption (in this case the gain divided by price will be an additional independent variable). Griffin and Castanias [1987] report that security analysts considered the SFAS No. 52 adoption effects when they forecasted earnings around the fiscal year end. This study assumes that security analysts considered the SFAS No. 87 adoption effects for annual earnings forecast when UE_{it} including gain effects is used as an independent variable.

5.3.2 Estimation of Unexpected Security Returns

Cumulative abnormal return is used as a dependent variable. Daily expected returns are computed from a one-factor market model:

$$R_{it} = a_i + b_i R_{mt} + e_{it}$$

where a_i and b_i are the firm specific intercept and covariance with the market, respectively[1]. The stochastic disturbance term, e_{it}, is assumed to have a zero mean and be uncorrelated across firms.

Unexpected security returns, $\hat{u}_{it}$, are estimated as follows:

$$\hat{u}_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{mt})$$

where:

R_{it} = the return of firm i in day t,

$\hat{a}_i$ and $\hat{b}_i$ = the intercept and slope coefficients, respectively, which are estimated from a market model regression using 200 daily returns up to -30 days prior to the annual earnings announcements day. The Scholes & Williams [1977] procedure is used to adjust for the nonsynchronous trading problem, and

R_{mt} = the return on the CRSP value-weighted market index.

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[1]For 1987 firms, intercept and systematic risk, a_i and b_i, were estimated using the 200 days prior to the end September until the end of September of 1987 to avoid the impact of market crash in October, 1987.

Expected return is an ex ante concept. However, most studies use an ex post measure of expected return because it is difficult to obtain ex ante measures of the risk free rate and risk premia. Therefore, unexpected return from the market model is conditioned on ex post market return which may bias the coefficient estimate, thus introducing error into the return metric.

5.3.3 Error in Measuring Unexpected Earnings

Measurement error in unexpected earnings weakens the ERC, thus this makes it difficult to detect the impact of noise in earnings on the ERC (Collins and Kothari [1989]). The empirical proxies for unexpected earnings are measured with errors due to the factors (i.e., the risk free interest rate, earnings persistence, a firm's systematic risk, and a firm's information environment) that affect the return/earnings relation other than noise or garbling in reported earnings.

Another reason for the error-in-variables problem results from estimation timing of market expected earnings. The perfect situation would be to measure unexpected earnings conditioned on the market's expectations of earnings right before the earnings release. However, the forecasts gathered by IBES are not all made on the day before earnings announcements but at various times throughout the year. The return window cannot reflect the true forecast period for the IBES forecast, thus there is measurement error in the estimated independent variable UE_{it}. This might cause bias in an estimated ERC.

One method to reduce the measurement error is to vary return windows to match approximately with market earnings expectations (Easton and Zmijewski [1989] and Collins and Kothari [1989]). However, there exists a trade-off in using available analysts' forecasts when employing the above method. A short/long holding period results in fewer/more confounding events that impact the abnormal return, but more/less measurement error in the unexpected earnings measure. To reduce the error-in-variables problem and to assess the effect of these trade-offs, this study will use both a short holding period association model (i.e., one day or two days prior and the WSJ earnings announcement date, day 0) and several long holding period association models (i.e., from IBES forecast dates to earnings announcement day)[2].

A short holding period (i.e., day -2, -1, 0) may reduce the confounding events, but the error in the expected earnings still remains since the forecasts are not made just before the earnings announcements. One solution to mitigate this measurement error is to add an independent variable that is correlated with the measurement error in unexpected earnings, but not correlated with the dependent variable in the regression model (see Brown et al. [1987b] and Easton and Zmijewski [1989]). Hence, this study adds an additional independent variable, $RIBES_{it}$, in the regression models in Section 5.4. $RIBES_{it}$ is estimated as the security

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[2]The test results are insignificant. Therefore, the results are not reported in this study.

return from the day after the IBES report date through three days prior to the earnings announcement. $RIBES_{it}$ would be positively correlated with measurement error if earnings forecast revisions occurring during the estimation period of $RIBES_{it}$ are positively associated with the security return over the same period. If this additional variable reduces the measurement error successfully, its coefficient should be negative.

5.4 Empirical Model

A cross-sectional regression analysis is used to test whether SFAS No. 87 improves the quality of accounting signals by pooling data across firms and over time. The focus of the test is whether there exist differential ERCs for a specific time period/firm under different pension accounting rules.

To test H_1 of the differential ERCs under different measurement and disclosure rules of SFAS No. 87 vs. APB No. 8 with SFAS No. 36, the following cross-sectional regression model is used:

$$CAR(n,0)_{it} = a_0 + a_1 UE_{it} + a_2[M * UE_{it}] + a_3 RIBES_{it} + e_{it} \quad (1)$$

where:

t = the adoption year of SFAS No. 87 (SFAS No. 87 period) or the year prior to the adoption of SFAS No. 87 (APB No. 8 period with SFAS No. 36)[3],

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[3]For example, if the company IBM adopted SFAS No. 87 in 1987, then the year 1987 is defined as the adoption year of SFAS No. 87 and the year 1986 is defined as the APB No. 8 peroid with SFAS No. 36.

$CAR(n,0)_{it}$ - the prediction error from a market model cumulated from n day to the day of firm i's annual earnings announcement (i.e., day 0) for year t,

UE_{it} - unexpected earnings of firm i for year t,

M - 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

$RIBES_{it}$ - the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement, and

e_{it} - the random disturbance term.

Note that the above model (1) is estimated by pooling two year data over the combined APB No. 8 with SFAS NO. 36 and SFAS No. 87 time periods. The abnormal returns of the same firm for the adoption period of APB No. 8 with SFAS No. 36 and SFAS No. 87 period are separately estimated for each firm around <u>each year's</u> earnings announcement. The independent variable UE_{it} is deflated by stock price at time t-1 (see Christie [1987]). Using a simple dividend capitalization model, Collins and Kothari [1989] theoretically prove that the coefficient on unexpected earnings scaled by price is the ERC when unexpected returns are regressed on unexpected earnings.

The H_1 predicts that a_1 is positive and statistically significant and a_2 is negative and statistically significant. This indicates that there is significant improvement in the informativeness of the earnings signals under SFAS No. 87 with respect to signals under APB No. 8 with SFAS No. 36.

For the H_2 test of the differential ERCs due to differential pension measurement rules under SFAS No. 87 vs. APB No. 8

measurement without SFAS No. 36 disclosure, the following model is used:

$$CAR(n,0)_{it} = a_0 + a_1 UE_{it} + a_2 [D_1 * UE_{it}] + a_3 RIBES_{it} + e_{it} \quad (2)$$

where:

t = the adoption year of SFAS No. 87 or the year of APB No. 8 but prior to the adoption of SFAS No. 36, and[4]

D_1 = 1 if in APB No. 8 period without SFAS No. 36, 0 if in SFAS No. 87 adoption time period.

The H_2 expects $a_1 > 0$ and $a_2 < 0$. This implies that SFAS No. 87 improves the informativeness of pension accounting when compared to APB No. 8 (not including SFAS No. 36 disclosure rule). Model (2) is estimated by pooling two years data over the combined SFAS No. 87 and APB No. 8 without SFAS No. 36 time period for each firm.

For the test of H_3 that the magnitudes of differential ERCs under APB No. 8 vs. SFAS No. 87 are a function of firm size, the following model is used:

$$AR(n,0)_{it} = a_0 + a_1 UE_{it} + a_2*[M * UE_{it}] + a_3*[S * UE_{it}] + a_4*[M * S * UE_{it}] + a_5 RIBES_{it} + e_{it} \quad (3)$$

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[4]For example, if the company IBM adopted SFAS No. 87 in 1987, then the year 1987 is defined as the SFAS No. 87 period and the year 1978 is defined as the APB No. 8 without SFAS No. 36 period. For all the sample firms, the year 1978 is defined as the APB No. 8 without SFAS No. 36 period since SFAS No. 36 required firms to adopt the standard for fiscal years beginning after December 15, 1979.

where:

t = the adoption year of SFAS No. 87 (SFAS No. 87 period) or the year prior to the adoption of SFAS No. 87 (APB No. 8 period with SFAS No. 36),

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period, and

S = 1 if large firm,
0 if small firm.

An interactive dummy variable, M*S, is constructed for interaction of firm size, and the differential ERCs under APB No. 8 vs. SFAS No. 87. Firms are partitioned according to total assets in each regression period (Grant [1980]; Atiase [1985]; Collins et al. [1987]). If a firm is above the median total asset, it is defined as a large firm. A Firm below or equal to the median value of total asset is defined as a small firm. The coefficient a_3 is predicted to be positively significnat if the quality of signal from unexpected earnings are more accurate for larger frims than for smaller firms. Alternatively, a_3 is expected to be nagatively significant if there are more uncertainty in samller firms. Also, the H_3 predicts that the differential effects of ERCs between APB No. 8 and the SFAS No. 87 adoption varies by different size firms if a_4 is not zero. If $|a_2| > |a_4|$, then the differential effects of ERCs between APB No. 8 and SFAS No. 87 is smaller for large companies than for small companies. Alternatively, if $|a_2| < |a_4|$, then the differential effects of ERCs between APB No. 8 without SFAS No. 36 and SFAS No. 87 is larger for large companies than for small companies.

To test H_4 that there exist differential ERCs between early

adopters and late adopters of SFAS No. 87 due to the firm characteristics or possible learning effect during transition periods, the following model is used:

$$CAR(n,0)_{it} = a_0 + a_1 UE_{it} + a_2*[M * UE_{it}] + a_3*[T * UE_{it}] + a_4*[M * T * UE_{it}] + a_5 RIBES_{it} + e_{it} \quad (4)$$

where:

t = the adoption year of SFAS No. 87 (SFAS No. 87 period) or the year prior to the adoption of SFAS No. 87 (APB No. 8 period with SFAS No. 36),

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period, and

T = 1 if late adopter,
0 early adopters.

There are two contradictory arguments regarding the effects of early adoption of accounting change on ERCs. According to the information transfer studies, H_4 predicts that $|a_2| > |a_4|$ due to possible "learning effects". However, the quality of earnings for early adopters may be more garbled because it is difficult to understand the adoption of a new accounting rule in the earlier time period. If $|a_2| < |a_4|$, then it implies that there exists more garbling in early adopters' reported earnings compared to those of later adopters when companies adopt SFAS No. 87.

To adjust for potential omitted variables related to unrealized pension assets/liabilities, all the above regression equations are reestimated separately within 3 portfolios partitioned by the sum of unrecognized pension assets/liabilities (i.e., the sum of prior service costs, unrecognized gain (loss),

and the unrecognized transition assets (liabilities)).

5.5 Empirical Analysis

This section reports the results of the empirical tests. Descriptive statistics for the sample are presented in Section 5.5.1. In Section 5.5.2, the test results of the first part regarding the quality of earnings measured under alternative pension accounting rules are discussed.

5.5.1 Descriptive Statistics

The distribution of industries and adoption years for sample firms is presented in Table V-1. All the sample firms are, in general, distributed evenly across industries. Thus, there should be no serious industry impact on the test results of this study. The trends of industry distribution are almost similar for both early and late adopters. Approximately 36% of early adopters and 41% and late adopters are in the chemical, machinery, electrical equipment, and transportation industries. Approximately 28% of early adopters in the are paper, petroleum, and printing industries, but only 6% of late adopters are in those industries.

Table V - 1

Industry and Adoption Year Distrubution
(N = 230)

SIC Industry Code No.	Industry Name	Number of Firms Adopting SFAS No. 87 by Fiscal Year: 1986	1987	1988
Less than 2-digit		2		
13	Oil and Drilling	2	2	1
15	General Building Contractor	1		
16	Construction	2		
20	Food & Kindred Products	8	5	3
21	Tobacco	2		
22	Textile	2	1	
23	Textile-Apparel Mfrs	2	1	
24	Forest Products	2	1	
26	Paper & Allied Products	12	1	1
27	Printing & Publishing	7	1	
28	Chemicals	18	9	
29	Petroleum Refining	9	1	
30	Rubber	2		
31	Shoes	1		
32	Stone Clay, Glass & Concrete	3	1	
33	Primary Metals	6		
34	Fabricated Metals	9		
35	Machinery	10	4	2
36	Electrical Equipment & Supplies	13	2	4
37	Transportation Equipment	14	6	2
38	Professional, Scientific Equipment	5	2	1
39	Toys	2	1	
40	Transportation-Composite	2		
42	Motor Freight Transportation	2		
45	Air Transport	2	1	
47	Transportation Service		1	
48	Telephone & Broadcast Media	1	2	
49	Electric & Gas	4	7	
50	Durable Goods Wholesale		2	
51	Wholesale Trade - Undurable Goods	2		4
53	Retail Store	2		1
54	Ratail Stores-Food Chain	1		
58	Restaurants	1		
60	Banking & Financial Institutions	1	1	
61	Savings & Loan Holding Cos	1		
63	Insurance	3		
73	Business Services	3	1	
	Total	159	53	18

Table V-2 presents the pension information for the sample firms. The firm's funded status is the most significant disclosure for financial statement users. The funded status is the difference between projected benefit obligations (PBO) and pension plan assets (PA) at their fair market value. Panels A and B of Table V - 2 report the pension items for all sample firms. On average, plan assets exceed PBO by $116.2 million for all sample firms. The average amount of positive funded status is approximately 3% of firm's market value. This ratio implies that pension assets are a significant portion of firm value (ie., the average PV of plan assets is 34% of firm's market value). The average off-balance sheet pension plan assets is $119 million which is 4% of firm value. Most of off-balance sheet pension assets are consisted of transition assets which is on average 4% of firm value. The average adoption effect of SFAS No. 87 is $9.3 million which is 0.5% of the firm's market value.

Panels C and D of Table V-2 present the pension items according to the adoption periods. For the early adopters, plan assets exceed PBO by an average of $123.5 million which is 4% of the firm's market value. This implies that they apparently had the incentives of adopting SFAS No. 87 early despite significant bookkeeping costs of accumulating pension related information. However, the average of funded status for the 71 later adopters is $99.7 million plan assets (i.e., 1% of firm's market value) which is lower than that of early adopters.

Off-balance sheet pension liability is the sum of accrued pension related liabilities (assets) and remaining off-balance

sheet amounts. Early adopters have accrued an average of $10.9 million in pension liabilities resulting from contributions to the pension plans which were less than provisions for pension expense. The additional $134.4 million (i.e., 5% of market value) is disclosed in the accompanying footnote as a form of unrecognized pension plan assets, which will reduce future provisions for pension expense. Late adopters had accrued an average of $15.2 million in pension assets which result from contributions to the pension plans exceeding pension expense provisions. The remaining $84.5 million (i.e., 2% of market value) is provided in footnote disclosure. The adoption effect of SFAS No. 87 for early adopters is $10.6 million which is 0.7% of market value on average. While the adoption effect for late adopters is lower than for early adopters. The average gain effect of late adopters is $6.3 million which is 0.1% of market value.

Table V - 2

Summary Statistics for Pension Related Variables

Panel A: Pension Related Variables For All Sample firms[1]

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Pension Assets	$813.4	$267.5	0.335	0.204
Projected Benefit Obligation (PBO)	697.2	247.4	0.307	0.176
Funded Status[2]	116.2	21.2	0.028	0.020
Gains[3]	6.7	1.6	0.003	0.002

N = 223

Panel B: Break-Down of Funded Status

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Prepaid Pension Assets	($2.8)	($0.6)		
Off-Balance Sheet Assets	119.0	25.2	0.041	0.025
- Unamortized Transition asset	112.3	33.3	0.041	0.026
+ Unamortized Deferred gains	18.7	-0.1	0.002	-0.000
- Unamortized Prior Service Costs	12.09	0.0	0.001	0.000

N = 223

Panel C: Pension Related Variables by Adoption Period

Early Adopters:

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Pension Asset	$792.4	$267.3	0.336	0.217
Projected Benefit Obligation (PBO)	668.9	238.8	0.300	0.184
Funded Status[2]	123.5	26.4	0.036	0.027
Gains[3]	7.4	3.0	0.004	0.002
		N = 152		

Late Adopters:

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Pension Asset	$860.2	$271.4	0.333	0.163
Projected Benefit Obligation (PBO)	760.6	273.8	0.323	0.127
Funded Status[2]	99.7	13.0	0.010	0.008
Gains[3]	5.3	0.0	0.001	0.000
		N = 71		

Panel D: Break-Down of Funded Status by Adoption Period

Early Adopters:

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Prepaid Pension Assets	$(10.9)	$(0.6)		
Off-Balance Asset				
- Unamortized Transition asset	123.4	7.1	0.049	0.033
+ Unamortized Deferred gains	19.9	0.0	0.001	-0.001
- Unamortized Prior Service Costs	8.8	0.0	0.001	0.000
		N = 152		

Late Adopters:

	Not Deflated		Deflated by Market Value	
Variable	Mean	Median	Mean	Median
Prepaid Pension Assets	$15.2	$(0.2)		
Off-Balance Asset				
- Unamortized Transition asset	87.6	20.9	0.024	0.020
+ Unamortized Deferred gains	16.2	(0.1)	0.003	-0.000
- Unamortized Prior Service Costs	19.3	0.0	0.003	0.000
		N = 71		

[1]All dollar amounts are in millions.
[2]Pension assets minus Projected Benefit Obligations.
[3]After tax income effect from adopting SFAS No. 87

SFAS No. 87 requires, for the first time, disclosure of each component of off-balance sheet pension liabilities as unrecognized transition costs or gain, unrecognized gains or losses, and unrecognized prior service costs. The transition amount is the difference in the beginning year of adopting SFAS No. 87 between the PBO and the net sum of fair value of the plan assets and any previously recognized unfunded accrued pension cost, or any previously recognized prepaid pension cost. The average amounts of transition assets are $123.4 million (i.e., 5% of market value) and $87.6 million (i.e., 2% of market value) for early adopters and later adopters, respectively. This difference between early and later adopters is important because one objective of this study is to assess whether ERCs are a function of voluntary or mandatory adoption of pension accounting. These transition assets will be amortized over a period of about 15 years reducing future pension provisions regardless of any subsequent pension related events.

Unrecognized gains or losses result from the difference between the expected return on plan assets and the actual return on plan assets and/or the changes of the PBO due to changes in assumptions. In the adoption year of SFAS No. 87, these unaccrued gain amounts are $19.9 million and $16.2 million for early adopters and later adopters, respectively. These amounts affect income via a corridor amortization technique which likely spreads any recognition over significant time periods.

Finally, unrecognized prior service cost is incurred by a provision to give pension benefits to employees for services

rendered before the pension plan was initiated, or plan amendments that give increased pension benefits based on employee services rendered in prior periods. The average amounts for both early and later adopters are $8.8 million and $19.3 million, respectively. These will be amortized over employee service life using a declining balance type amortization indicating improvements in employee benefits.

In summary, almost all sample firms have positive fund status and they have positive gain effect from the adoption of SFAS No. 87. Furthermore, early adopters are more favorabley or less adversely affected affected by the adoption of the new pension accounting rules.

Table V-3 presents the ratio of transition gains/costs to the absolute net income for the sample firms and by adoption period. Approximately four percent of all sample firms have a negative transition gain. Twenty six percent of all sample firms have transition gain exceeding 10% of net income. Four percent of sample firms show a transition gain exceeding 50% of net income. Two percent of the firms' transition gains have exceed their net income.

Approximately 2 percent of early adopters have negative transition gains. Thirty five percent of early adopters have trasition gain exceeding 50% of net income. Three percent of early adopters have transition gains exceeding net income. Seven percent of late adopters have negative transition gains. Sixteen percent of late adopters have transition gains exceeding 50% of net income. Only one firm has a transition gain exceeding

net income.

Table V - 3

Distribution of the Ratio of Transition Gain to Absolute Net Income Including Gain Effect of SFAS No. 87 adoption

	All Sample Firms		Early Adopters		Late Adopters	
	Number of Firms	%	Number of Firms	%	Number of Firms	%
-1.70 less than 0.00	8	3.6	3	2.0	5	7.0
0.00 less than 0.01	73	33.5	30	20.4	43	60.6
0.01 less than 0.20	12	5.5	11	7.5	1	1.3
0.02 less than 0.30	17	7.8	17	11.6	0	0.0
0.03 less than 0.40	23	10.5	20	13.6	3	4.2
0.04 less than 0.50	23	10.6	15	10.2	8	11.3
0.05 less than 0.60	9	4.1	5	3.4	4	5.6
0.06 less than 0.70	4	1.8	4	2.7	0	0.0
0.07 less than 0.80	6	2.8	5	3.4	1	1.3
0.08 less than 0.90	6	2.8	4	2.7	2	2.9
0.09 less than 0.10	4	1.8	4	2.7	0	0.0
0.10 less than 0.20	15	6.9	11	7.5	4	5.6
0.20 less than 0.30	4	1.8	4	2.7	0	0.0
0.30 less than 0.40	4	1.8	4	2.7	0	0.0
0.40 less than 0.50	3	1.3	3	2.0	0	0.0
greater tahn 0.50	8	3.7	7	4.8	1	1.3
	N = 218		N = 147		N = 71	
	Mean = 0.28		Mean = 0.37		Mean = 0.083	
	Median = 0.03		Median = 0.04		Median = 0.000	

Table V-4 provides the off-balance sheet deferred pension amounts to the total debt of firms. The average mean value of all sample firms' off balance sheet pension aseets is 30.1 % of firm's long term debt. For both early and late adopters, the average mean values of off-balance sheet pension assets are 42.3% and 3% of firms' total debt, respectively. For all sample firms, ninety eight firms' off-balance sheet deferred pension amounts exceed 10% of firms' total debt.

Table V - 4

Distribution of the Ratio of Off-balance Sheet Assets to Total Debt

	All Sample Firms		Early Adopters		Late Adopters	
	Number of Firms	%	Number of Firms	%	Number of Firms	%
-2.63 less than 0.00	38	17.7	21	14.2	17	25.4
0.00 less than 0.01	17	7.9	11	7.4	6	8.9
0.01 less than 0.02	9	4.2	6	4.1	3	4.5
0.02 less than 0.03	4	6.6	2	1.3	2	3.0
0.03 less than 0.04	14	6.5	8	5.4	6	8.9
0.04 less than 0.05	5	2.4	3	2.1	2	3.0
0.05 less than 0.06	6	2.8	5	3.3	1	1.5
0.06 less than 0.07	3	1.4	3	2.1	0	0.0
0.07 less than 0.08	11	5.1	8	5.4	3	4.5
0.08 less than 0.09	4	1.8	2	1.3	2	3.0
0.09 less than 0.10	6	2.8	5	3.4	1	1.5
0.10 less than 0.20	26	12.1	19	12.8	7	10.4
0.20 less than 0.30	15	7.0	9	6.1	6	9.0
0.30 less than 0.40	12	5.6	8	5.4	4	6.0
0.40 less than 0.50	12	5.6	11	7.5	1	1.5
0.50 less than 1.00	16	7.4	12	8.1	4	6.0
1.00 less than 2.00	14	6.5	12	8.1	2	3.0
greater than 2.00	3	1.4	3	2.0	0	0.0
	N = 215		N = 148		N = 67	
	Mean = 0.301		Mean = 0.423		Mean = 0.030	
	Median = 0.083		Median = 0.102		Median = 0.040	

Table V-5 reports the ratio of the net transition deferred amounts to the total off-balance sheet amounts. One hundred ninety three firms show a ratio of positive transition assets to firms' total off-balance sheets amounts of 50% or greater.

Table V - 5

Distribution of the Ratio of Unamortized Transition Assets to Total Unarmortized Off-Balance Sheet Amounts

	All Sample Firms		Early Adopters		Late Adopters	
	Number of Firms	%	Number of Firms	%	Number of Firms	%
-39.80 less than 0.00	20	8.7	14	8.8	6	8.5
0.00 less than 0.10	4	1.7	4	2.5	0	0.0
0.10 less than 0.20	2	0.9	0	0.0	2	2.8
0.20 less than 0.30	3	1.3	2	1.3	1	1.4
0.30 less than 0.40	1	0.4	1	0.6	0	0.0
0.40 less than 0.50	7	3.1	7	4.4	0	0.0
0.50 less than 0.60	11	4.8	6	3.8	5	7.0
0.60 less than 0.70	12	5.2	8	5.0	4	5.7
0.70 less than 0.80	20	8.7	15	9.4	5	7.0
0.80 less than 0.90	20	8.7	15	9.4	5	7.0
0.90 less than 1.00	21	9.1	14	8.8	7	8.9
1.00 less than 1.50	70	30.4	46	28.9	24	33.8
1.50 less than 2.00	15	6.6	12	7.6	3	4.2
2.00 less than 3.00	9	3.9	6	3.7	3	4.2
greater than 3.00	15	6.5	9	5.7	6	8.5
	N = 230		N = 159		N = 71	
	Mean = 1.306		Mean = 1.192		Mean = 1.563	
	Median = 0.950		Median = 0.924		Median = 1.0	

Table V-6 presents the descriptive statistics for the distribution of total assets, market value, and equity for the sample firms by the alternative period of pension accounting rules. Due to the availability of data, only firms listed on the NYSE and AMEX are included in the sample. Therefore, the sample firms are relatively large firms. The average market values for both the adoption year of SFAS No. 87 and the SFAS No. 36 period

are $3,119.7 million and $2,835.3 million, respectively. The average total assets for both periods are $4,874.1 million and $4,439.9 million, respectively. Nevertheless, a considerable variation in firm size within the sample suggests there are substantive differences among sample firms. For example, the range of market value varies from $39.2 million to $72,710.7 million in the SFAS No. 87 period. This is important since one of the hypotheses examines whether ERCs are a function of the interaction of firm size and the pension accounting methods.

Table V - 6

Summary Statistics for Market Value of Equity, Total Common Equity, Total Assets, and Total Sales

Variable	SFAS No. 87 Period[1] (N = 230) Mean	Range	SFAS No. 36 Period[2] (N = 230) Mean	Range
Total Assets	$4,874.1	$85.8 - $39,412.0	$4,439.9	$56.9 - $76,039.0
Common Equity	1,674.9	28.9 - 34,374.0	1,535.3	8.3 - 31,999.0
Market Value	3,119.7	39.2 - 72,710.7	2,835.3	45.3 - 95,774.4
Sales	4,534.3	95.3 - 71,634.4	4,203.1	75.4 - 62.715.7

[1]For early adopters: 1986 or before Dec. 15, 1987; for late adopters: after Dec. 15, 1987 or 1988
[2]One year prior to the SFAS No. 87 Adoption year
[3]All dollar amounts are in millions.

Table V-7 provides summary statistics for the unexpected annual earnings per share. The average earnings per share are negative $0.12 and $0.54 for the SFAS No. 87 adoption period and SFAS No. 36 period, respectively. The average unexpected annual earnings deflated by price (UE_{it}) are -0.012 and -0.025 for the SFAS No. 87 adoption period and the SFAS No. 36 period, respectively.[5] It should be noted that the forecast errors are less than half as large, on average, in the SFAS No. 87 period compared to SFAS No. 36 period. The mean difference test of absolute value of UE_{it} by size shows t-value of 2.09 which is

[5]Firms with |UE|>200% are excluded from this study. The 200% criteria is consistent with previous studies, though it may be arbitrary. The IBES median earnings forecasts are used as the market's expectation of earnings. However, the magnitudes of UE_{it} are almost the same as UE_{it} when the mean IBES forecast is used.

significant at 0.05 probability level. This test result is consistent with the prior literature that small firms' UE_{it} are larger than those of large firms. Table V-8 presents the correlation matrix among independent variables used in the regression models.

Table V - 7

Summary Statistics for Forecast Error(UE_{it})

Mean difference test by SFAS No. 87 period vs. SFAS No. 36 period:

UE_{it}/P_{t-1}:

SFAS No. 87 Mean= $(0.012); SFAS No. 36 Mean= $(0.025)

t-value = 1.17 (p=0.24)

$|UE_{it}|/P_{t-1}$:

SFAS No. Mean= 0.033; SFAS No.36 Mean=0.038

t-value = -0.46 (p=0.67)

Mean difference test by size (Total Asset):

UE_{it}/P_{t-1}:

Small Firm mean = $(0.023); Large firm mean = $(0.014)

t-value = -0.71 (p=0.48)

$|UE_{it}|/P_{t-1}$:

Small Firm Mean = 0.047; Large Firm Mean = 0.24

t-value = 2.09 (p=0.038)

U_{it} = unexpected earnings

P_{t-1} = stock price at prior year

Table V - 8

Correlation Matrix of Independent Variables Used in Regression Model

Panel A: PEARSON CORRELATION COEFFICIENTS - H_3

	S	UE	M*UE	S*UE	M*S*UE
S	1.00000	0.02028	0.02972	-0.18421	-0.14637[1]
	(0.0000)	(0.6640)	(0.5244)	(0.0001)	(0.0016)
	508	461	461	461	461
UE		1.00000	0.55896	0.33935	0.27716
		(0.0000)	(0.0001)	(0.0001)	(0.0001)
		461	461	461	461
M*UE			1.00000	0.41976	0.50057
			(0.0000)	(0.0001)	(0.0001)
			461	461	461
S*UE				1.00000	0.81576
				(0.0000)	(0.0001)
					461
M*S*UE					1.00000
					(0.0000)
					461

Panel B: SPEARMAN CORRELATION COEFFICIENTS - H_3

	S	UE	M*UE	S*UE	M*S*UE
S	1.00000	-0.01938	-0.01733	-0.11113	-0.15061
	(0.0000)	(0.6781)	(0.7106)	(0.0170)	(0.0012)
	508	461	461	461	461
UE		1.00000	0.67302	0.63135	0.40430
		(0.0000)	(0.0001)	(0.0001)	(0.0001)
		461	461	461	461
M*UE			1.00000	0.58305	0.67361
			(0.0000)	(0.0001)	(0.0000)
			461	461	461
S*UE				1.00000	0.67912
				(0.0000)	(0.0001)
				461	461
M*S*UE					1.00000
					(0.0000)
					461

Table V - 8 Continued

Panel C: PEARSON CORRELATION COEFFICIENTS - H_4

	T	UE	M*UE	T*UE	M*T*UE
T	1.00000	-0.06848	0.01070	-0.15324	-0.15765
	0.0000	(0.1421)	(0.8187)	(0.0010)	(0.0007)
	508	461	461	461	461
UE		1.00000	0.55896	0.75799	0.26247
		(0.0000)	(0.0001)	(0.0001)	(0.0001)
		461	461	461	461
M*UE			1.00000	0.15783	0.47127
			(0.0000)	(0.0007)	(0.0001)
			461	461	461
T*UE				1.00000	0.35295
				(0.0000)	(0.0001)
				461	461
M*T*UE					1.00000
					(0.0000)
					461

Panel D: SPEARMAN CORRELATION COEFFICIENTS - H_4

	T	UE	M*UE	T*UE	M*T*UE
T	1.00000	-0.03156	0.01547	-0.10454	-0.11796
	(0.0000)	(0.4990)	(0.7404)	(0.0248)	(0.0113)
	508	461	461	461	461
UE		1.00000	0.67302	0.48701	0.32898
		(0.0000)	(0.0001)	(0.0001)	(0.0001)
		461	461	461	461
M*UE			1.00000	0.37590	0.53156
			(0.0000)	(0.0001)	(0.0001)
			461	461	461
T*UE				1.00000	0.70491
				(0.0000)	(0.0001)
				461	461
M*T*UE					1.00000
					0.0000
					461

UE = unexpected annual earnings,

M = 1 if in the APB No. 8 period with SFAS No. 36,
  = 0 if in the SFAS No. 87 period,

S = 1 if large firm,
  = 0 if small firm,

T = 1 if late adopter,
  = 0 if early adopter.

5.5.2 Empirical Results

The empirical models in section 5.4 are implemented by pooling data across firms and over time to maximize the power of the tests.

A. Total Sample

Table V - 9 presents the results of the H_1 test for the differential market reactions to earnings surprises under different measurement and disclosure rules of the SFAS No. 87 vs. the APB No. 8 period with SFAS No. 36 (hereafter SFAS No. 36 period). The F-value for the over-all regression is 4.858 which is statistically significant ($p = 0.003$) when $CAR_{-2,1}$ is used as a dependent variable. The low explanatory power of adjusted R^2 of 0.031 implies that there may exist other factors that attribute to cross-sectional and intertemporal differences in the return/earnings relation[6]. The intercept coefficient is 0.005 and the null hypothesis that $a_0 = 0.0$ is rejected at the 0.01 probability level. This indicates that there may exit a variables problem in equation (1). The coefficient of UE_{it}, a_1, is 0.0629 and the alternative hypothesis that $a_1 > 0.0$ is not rejected at the 0.01 probability level. Coefficients a_1s in periods of $CAR_{-1,1}$ and $CAR_{-2,-1}$ show similar results. It should be noted that coefficient a_2 shows the difference between the ERCs under SFAS No. 87 vs. SFAS No. 36. Thus, the predicted sign of a_2 is

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[6]For more detailed discussions, see Collins and Kothari [1989] and Easton and Zmijewski [1989].

negative since the expected slope of the returns/earnings relation is lower in the SFAS No. 36 period than in the SFAS No. 87 period due to the alleged garbling in the reported earnings under old pension accounting rules. Coefficient a_2 is -0.061 and the null hypothesis that $a_2 > 0.0$ is rejected at the 0.05 probability level. Coefficient a_2 in the period of $CAR_{-1,1}$ shows a similar result, but a_2 in the $CAR_{-2,-1}$ period is negative but insignificant. The coefficient on RIBES, a_3, is -0.166 and cannot reject the null hypothesis that $a_3 < 0.0$. The other two a_3s in the two different CAR periods show similar results. This implies that forecast revisions between the IBES forecast date and the WSJ earnings announcement date were not significant[7].

In summary, the above results indicate that SFAS No. 87 significantly improves the quality of earnings compared to earnings informativeness during the SFAS No. 36 period. The results are consistent with the alternative hypothesis that the ERC under SFAS No. 87 is greater than the ERC in the SFAS No. 36 period for the periods of $CAR_{-1,1}$ and $CAR_{-2,1}$.

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[7]Alternatively, a regression model was run using a holding period from the IBES forecast announcement date to the earnings announcement date. The test results were insignificant. Thus, the test results support the conclusion that the forecast revision was minimal.

Table V - 9

Summary Regression Results for Differential ERCs
Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 (H_1)[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3 RIBES_{it} + e_{it}$$

predicted sign	?	+	-	-			F-value
	a_0	a_1	a_2	a_3	N	Adj.R^2	(p-value)
$CAR_{-1,1}$	0.0043 (2.498)**	0.0477 (2.994)***	-0.0631 (-2.263)**	0.005 (0.196)	454	0.014	3.160 (0.024)
$CAR_{-2,-1}$	0.0031 (2.320)**	0.0643 (3.501)***	-0.151 (-0.699)	-0.002 (-0.013)	454	0.025	4.898 (0.003)
$CAR_{-2,1}$	0.0052 (2.913)***	0.0629 (3.800)***	-0.061 (-2.114)**	-0.166 (-0.687)	454	0.031	4.858 (0.003)

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0,

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis (one-tailed test),

Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

To test the second hypothesis that the differential ERCs are a function of the different measurement rules of pension accounting under SFAS No.87 vs. APB No.8 period before SFAS No. 36 (hereafter APB NO. 8 period), the regression model (2) was tested. Table V - 10 presents the test results of H_2. The F-value is 4.480 and it is statistically significant ($p = 0.004$) for the $CAR_{-2,-1}$ period. Coefficient a_1 is 0.043 and the null hypothesis that $a_1 = 0$ is rejected at the 0.01 probability level. The periods of $CAR_{-1,1}$ and $CAR_{-2,1}$ show the similar results. Coefficient a_2 shows the difference between the ERCs under SFAS No. 87 vs. APB No. 8. Thus, the predicted sign of a_2 is negative since the expected slope of the returns/earnings relation is lower in the APB No. 8 period than in the SFAS No. 87 period due to the alleged noise or garbling in the reported earnings under old pension accounting rules. Coefficient a_2 is -0.130 and rejects the null hypothesis that $a_2 > 0.0$ at the 0.10 probability level. However, a_2s in the periods of $CAR_{-1,1}$ and $CAR_{-2,1}$ show negative but insignificant coefficients a_2. Coefficient a_3 is -0.009 and statistically insignificant.

In summary, the test results are consistent with the H_2 that the quality of signals from the announcement of reported earnings in the SFAS No. 87 period is improved compared to that of the APB No. 8 period for the period of $CAR_{-2,-1}$.

Table V - 10

Summary Regression Results for Differential ERCs Under SFAS No. 87 vs. APB No. 8 (H_2)[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[D*UE_{it}] + a_3 RIBES_{it} + e_{it}$$

predicted sign	?	+	-	-			F-value
	a_0	a_1	a_2	a_3	N	Adj.R^2	(p-value)
$CAR_{-1,1}$	0.003 (1.983)**	0.048 (3.211)***	-0.093 (-1.026)	0.024 (0.688)	436	0.017	3.533 (0.0149)
$CAR_{-2,-1}$	0.003 (2.089)**	0.043 (3.393)***	-0.130 (-1.702)*	-0.009 (-0.013)	436	0.025	4.480 (0.0043)
$CAR_{-2,1}$	0.004 (2.046)**	0.064 (3.963)***	-0.113 (-1.152)	0.045 (-1.153)	436	0.036	5.421 (0.0013)

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No. 36,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0,

UE_{it} = unexpected earnings of firm i for year t,

D = 1 if in APB No. 8 period without SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis (one-tailed test),

Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

The test results of the H_{3a} and H_{3b} that the differential ERCs under SFAS No. 87 vs. SFAS No. 36 are a function of firm size are reported in Table V - 11. The sample firm's total assets are used to partition sample firms into large firms and small firms[8]. The F-value of the $CAR_{-2,1}$ period is 5.51 and very significant ($p < 0.001$). The adjusted R^2 is 0.047. The coefficient of unexpected earnings, a_1, is 0.062 and statistically significant at 0.01 level and the other two CAR periods ($CAR_{-1,1}$ and $CAR_{-2,-1}$) show similar results. The hypothesis H_{3a} predicts that a_3 is negatively significant because small firms have more uncertainty than large firms. However, the a_3s in all the three CAR periods are insignificant. According to H_{3b} if $|a_2| > |a_4|$, then it indicates that the impact on security returns of differential earnings surprise under the alternative pension accounting rules is greater for small firms than for large firms and vice versa. The absolute value of a_2 is 0.11, and the absolute value of a_4 is 0.18. The F-test for the difference between $|a_2|$ and $|a_4|$ can reject the null hypothesis that $|a_2| = |a_4|$ at a significant level of 0.003 (F-value=9.21). The period of $CAR_{-1,1}$ shows the similar results. But, the period of $CAR_{-2,-1}$ shows insignificant results.

In summary, the test results show that, given unexpected earnings, the differential ERCs under the SFAS No. 87 period vs. the SFAS No. 36 period are greater for large firms than for small

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[8]The sample firms sales, market value, and total common equity are alternatively used to partition sample firms. All the regression results are similar to the above results.

firms. It implies that the quality of the signal from unexpected earnings for large firms is higher than for small firms because security analysts can forecast earnings more accurately for large firms due to more available information about them.

Table V - 11

Summary Regression Results for Differential ERCs Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 is the Function of Firm Size (H_{3a} and H_{3b})[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3[S*UE_{it}] + a_4[M*S*UE_{it}] + a_5 RIBES_{it} + e_{it}$$

predicted sign	?	+	-	-	?	-
	a_0	a_1	a_2	a_3	a_4	a_5
$CAR_{-1,1}$	0.005 (2.818)**	0.045 (2.797)***	-0.106 (-3.490)***	0.035 (0.503)	0.152 (1.762)*	0.002 (0.095)
	N = 454	F-value=4.613 (p=0.0005)		R^2 = 0.038		
$CAR_{-2,-1}$	.003 (2.384)**	0.043 (3.459)***	-0.031 (-1.296)	-0.011 (-0.200)	0.071 (1.047)	-0.001 (-0.040)
	N = 454	F-value=3.398 (p=0.005)		R^2 = 0.026		
$CAR_{-2,1}$	.001 (3.167)***	0.062 (3.781)***	-0.110 (-3.426)***	0.009 (0.119)	0.180 (2.003)**	0.015 (0.612)
	N=454	F-value=5.510 (p=0.0001)		R^2 = 0.047		

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through the earnings announcement, day 0.

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

S = 1 if large firm,
= 0 if small firm.

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

Table V - 11 Continued

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table V - 12 reports the test results of H_4 that the differential ERCs under the SFAS No. 87 period vs. the SFAS No. 36 period are a function of the timing of the SFAS No. 87 adoption. The F-value for $CAR_{-2,1}$ is 5.334 and statistically significant at $p = 0.0001$. The coefficient on unexpected earnings a_1 is insignificant in the periods of $CAR_{-1,1}$ and $CAR_{-2,1}$, but a_1 in the $CAR_{-2,-1}$ period is significant at the 10 percent level. The hypothesis H_4 predicts that $|a_2| < |a_4|$ if there is more noise in early adopters reported earnings measurement. If $|a_2| > |a_4|$, then it implies that there is some sort of "learning effect." The absolute value of a_2 is 0.074 and the absolute value of a_4 is 0.154. The result of the F-test can reject the null hypothesis that $a_2 = a_4$ at the probability level of 0.06 (F-value=3.57). The $CAR_{-1,1}$ period shows similar results. The results of the $CAR_{-2,-1}$ period are insignificant.

In summary, the above results indicate that the differential ERCs under the SFAS No. 87 period vs. the SFAS No. 36 period are much greater for late adopters than for early adopters for the $CAR_{-2,1}$ and $CAR_{-1,1}$ periods. This implies that more uncertainty existed in the early adopters' net income measurement because it is difficult to understand the new accounting applications in the earlier time period.

Table V - 12

Summary Regression Results for Differential ERCs Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 is the Function of Adoption Period (H_4)

$$+CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3[T*UE_{it}] + a_4[M*T*UE_{it}] + a_5 RIBES_{it} + e_{it}$$

Predicted sign	?	+	-	?	?	-
	a_0	a_1	a_2	a_3	a_4	a_5
$CAR_{-1,1}$	0.004 (2.294)**	0.014 (0.449)	-0.072 (-1.780)*	0.046 (1.293)	0.193 (2.866)***	0.035 (1.475)
	N = 454	F-value=5.734 (p=0.0001)		R^2 = 0.056		
$CAR_{-2,-1}$	0.003 (2.353)**	0.044 (1.751)*	-0.012 (-0.384)	-0.002 (0.059)	0.008 (0.145)	0.001 (0.006)
	N=454	F-value=3.228 (p=0.007)		R^2 = 0.0240		
$CAR_{-2,1}$	0.005 (2.741)**	0.040 (1.222)	-0.074 (-1.736)*	0.035 (0.928)	0.154 (2.185)**	0.041 (0.103)
	N=454	F-value=5.334 (p=0.0001)		R^2 = 0.0456		

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0,

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

T = 1 if late adopter,
= 0 if early adopter,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

Table V - 12 Continued

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

All the above test results are implemented using UE_{it} assuming that security analysts have considered the adoption effects of SFAS No. 87 when they forecast earnings. Alternatively, all the above tests are repeated using UE_{it} unconditional to the analysts' consideration of the adoption effects. The test results reveal lower explanatory powers compared to the results which are conditioned on earnings forecasts. Thus, it may indicates that when analysts forecast earnings, they already considered the adoption effects of the new pension accounting rules. It may imply that the earnings forecast conditioned on the knowledge of the adoption effects may be the market's expected earnings.

B. Partitioned Sample

Also, all the above tests are repeated separately within 3 portfolios partitioned by the sum of unrecognized pension assets/liabilities, which are deflated by market value, for the consideration of potential omitted variables associated with unrecognized pension assets/liabilities. The test results are presented in the appendix.

The test results of the H_1, H_2, and H_4 are not consistent with the hypotheses for any portfolios. The test results of H_3 for the group of the middle range of off-balance sheet pension assets firms show that the differential ERCs under SFAS No. 87 vs. SFAS No. 36 are greater for small firms than for large firms (the $CAR_{-1,1}$ and $CAR_{-2,-1}$ period). This result is the opposite of the findings when all sample firms are used. However, the results of

small and large groups are insignificant.

CHAPTER VI

THE IMPACT OF OFF-BALANCE SHEET PENSION LIABILITIES UNDER SFAS NO. 87 ON SYSTEMATIC RISK

6.1 Introduction

Prior to SFAS No. 87, one of the controversial issues was whether unfunded pension liability is indeed a liability of the firm and whether the security price reflects this off-balance sheet itemS. The main reasons for the controversy are: (1) the importance of pension plans in the economy, (2) the fact that the significance of pension assets and liabilities in firms' capital structures is increasing, (3) the potential for the mispricing of corporate securities, and (4) the misallocation of capital resources due to inadequate pension disclosure. The economic impact of unfunded pension liabilities relies significantly on the ability of investors to see through the accounting device.

SFAS No. 87 is an attempt to resolve these problems by explicitly requiring recognition of the additional minimum liabilities and extensive disclosures. The motivation for the requirements is that unfunded pension liabilities are debt equivalent to corporate liabilities, thus should be recognized on a corporation's statement of financial position. Despite the efforts of the FASB, the accounting profession shows diverse opinions regarding whether unfunded pension obligations should appear on the balance sheet and to what extent they should be recognized (see Miller [1987] for more details). Previous

empirical studies (Feldstein and Seligman [1981]; Feldstein and Mock [1982]; Daley [1984]) provide evidence that the market participants perceive unfunded pension obligations as corporate liabilities, but value them less than a dollar for each marginal dollar of unfunded pension liabilities. However, Dhaliwal [1986] and Landsman [1986] show that investors assess pension assets and liabilities as equivalent to corporate liabilities.

Previous studies (see for example, Beaver, Kettler, and Scholes [1970]; Mandelker and Rhee [1984]; and Dhaliwal [1986]) suggest that an alternative method to examine the impact of the disclosure of accounting information is to examine the impact of such disclosures on the stock market's assessment of the systematic risk measure. They have provided evidence of correlation between the betas of common stock and various accounting variables or accounting betas. The impact of pension plans on the share prices depends on the extent to which share prices correctly reflect unfunded pension obligations. In efficient capital markets, if the markets perceive unfunded pension obligation as a component of corporate liabilities, it would affect the market value of the firm and market perceived risk.

The primary objective of this section is to provide further evidence whether unfunded pension assets/obligations under SFAS No. 87 are perceived by investors as a component of financial leverage. However, unlike the previous study, the focus will be on the separate impacts of the components of unfunded pension obligations (rather than the net difference of pension assets and

liabilities) on systematic risk because each component has different characteristics. Prior to SFAS No. 87, the accumulated benefit obligation (ABO), in which employers are obligated only for benefits based on the current salaries, was the fundamental measure of the pension liabilities. Prior studies (Dhaliwal [1986] and Landsman [1986]) only examine the net effect of unfunded vested benefit obligation. In SFAS No. 87, the projected unit credit method, which considers salary progression for pay-related plans, is applied in measuring service cost, prior service cost, and the interest components of annual pension expense. The PBO is also used in measuring the status of pension plans in footnote disclosure. Thus, SFAS No. 87 enables one to examine the effects of each component of unfunded pension liabilities (i.e., unrecognized transition assets (liabilities), unrecognized prior service cost, and unrecognized gain (loss)). SFAS No. 87 also requires disclosure of additional minimum liabilities on the balance sheet after 1989. However, the effect of this part of SFAS No. 87 cannot be examined, because very few companies reported the liabilities in their balance sheet in my test period.

This study also differs from the previous studies of the pension area with respect to both the theoretical model and the empirical methodology. Unlike Dhaliwal [1986] and Bowman's [1980] models which use accounting beta to proxy for operating risk, this study directly developed an empirical model from Hamada's [1972] and Rubinstein's [1973] models to avoid a measurement problem in accounting beta. Also, a variety of econometric issues such as measurement errors in regressors and

omitted variables problems will be considered in conducting the empirical tests.

6.2 Literature Review

Several researchers such as Ball and Brown [1969], Beaver, Kettler, and Scholes [1970], Beaver and Manegold [1975], Foster [1978], and Gonedes [1973] tested and documented the association between market-determined and accounting-determined risk measures. Furthermore, these studies have provided insight to improve the form of specification in order to reduce measurement errors in estimating accounting betas. Foster [1978] criticized these studies for not choosing accounting variables based upon theoretical models relating the firm's financing, investment, and production decisions with its common stock beta.

Several studies have attempted to construct an empirical test design that is more conforming with the definition of beta in the capital asset pricing model. For example, Bowman [1980] showed that leases were a significant component of market risks when proper measures were taken to control for collinearity between leverage and leases. Finnerty, Fitzsimmons, and Oliver [1980] found that the SEC's ASR No. 147 and the FASB's pronouncement had little effect on the market's assessment of systematic risk.

Prior studies of pension accounting concentrated on the impact of unfunded pension obligations on security values and the effects of specific funding policies and assumptions. This field of study is a particularly interesting since it examines

the influences of unrecognized de facto liabilities and to what extent the off-balance sheet items are reflected in security prices. For example, Oldfield [1977] shows that unfunded vested benefit obligation (UVBO) caused security prices to decline in a dollar-for-dollar reduction and the coefficient of the UVBO variable was negative and statistically significant. Feldstein and Seligman [1981] and Feldstein and Mock [1982] focused on the association between pension practices and national savings. They show that UVB is the value relevant determinant to security pricing.

Daley [1984] finds that pension expense is the "most consistent" cost measure. Landsman [1986] provides evidence that the market prices pension fund assets and liabilities as corporate assets and liabilities. Dhaliwal [1986] provides evidence that unfunded pension obligations that are not recorded on corporate balance sheets are viewed as a form of debt by the capital markets when assessing a firm's market risk.

6.3 Liability Effect

SFAS No. 87 significantly affects the liabilities of firms. First, the requirement that firms should report liabilities at market value may cause volatility in pension expense. The volatility of pension expense is most feared because it makes the firm appear more risky. However, SFAS No. 87 has formalized this risk. The concern for the problem in part generates the 'corridor amortization' method for the unrecognized gains (losses).

Second, SFAS No. 87 resolves the controversy over what items should be recognized and how they should be measured on the employer's statement of financial position. Under APB. No. 8, a prepaid or accrued expense appears when the funding amount is not the same as the expense. The new rule retains the above account and requires an additional minimum liability. Recognizing the unfunded pension liability as an corporate liability would immediately and adversely affect a firm's debt-to-equity ratio. It should be noted that, under SFAS No. 36, unfunded pension liability was disclosed only in a footnote. Finally, SFAS No. 87 requires more detailed disclosures of pension plans so that users may better understand the various economic effects of the pension plan. Therefore, a reconciliation of unfunded liability between on- and off-balance sheet liabilities can be obtained. The off-balance sheet liability/asset consists of three items: unamortized net transition assets/liabilities, unamortized deferred gain/loss, and unarmotized prior service cost.

6.4 Model Development

6.4.1 Theoretical Model

The theoretical relationship between pension liabilities as a form of debt and market risk can be explained in the context of capital asset pricing theory. Hamada [1972] and Rubinstein [1973] decompose systematic risk into operating risk and financial risk as follows:

$$b_i = d_{oi} + d_{oi}(1-t_i)D_i/E_i \qquad (5)$$

where:

b_i = the levered firm's common stock beta, defined as $b_i = Cov(R_i,R_m)/Var(R_m)$, where R_i and R_m denote one period return on common stock and on the market portfolio, respectively,

d_{oi} = the unlevered firm's common stock beta,

t_i = the corporate income tax rate,

D_i = the market value of the debt, and

E_i = the market value of common equity.

Coefficient d_{oi} represents operating risk that is the systematic risk of the unlevered firm, while $d_{oi}(1-t_i)D_i/E_i$ measures the financial risk of common stock. Rubinstein [1973] indicates that operating risk reflects the combined effects of the degree of operating leverage, the pure systematic impact of economy-wide events, and the uncertainty related to the firm's operating efficiency. As a firm adds leverage, it intensifies operating risk to produce financial risk.

The research issue of this Chapter is the debt equivalence of pension liabilities under the new pension accounting rule. Model (5) incorporates a measure of financial leverage. If investors perceive unfunded pension obligations as debt, they should be included in the measurement of financial leverage. The inclusion of pension liabilities in the measurement of financial leverage will increase the explanatory power of model (5). However, if pension liabilities are perceived as debt but are not perceived as strictly equivalent to other corporate debt, their effects on

systematic market risk will differ. If pension liabilities are introduced as separate independent variables, then their coefficients will differ from the coefficients on the other leverage variable. Furthermore, the coefficients on each component of pension liabilities will differ from each other, if markets perceive them differently when they assess pension liabilities.

Due to the potential measurement problem in operating risk, other variables and techniques are considered to capture the effect of operating risk. Modigliani and Miller [1958] designates the possible differential business risk across industries. Thus, a portion of market risk could be explained by systematic industry effects. If dummy variables, IND, based upon industries are included in the context of multiple regression analysis, the intercept dummy variable will capture that portion of market risk which varies systematically between industries. Hence, the theoretical model incorporates the pension liabilities, PL_i, and can be defined as follows:

$$b_i = f(d_{oi}, IND, D_i/E_i, PL_i/E_i) \qquad (6)$$

6.4.2 Empirical Test Design

A. Sample Selection

The same sample firms including underfunded and overfunded firms from Chapter V are used. The test period is the adoption year of SFAS No. 87 for both early adopters (i.e., either 1985 or 1986) and later adopters (i.e., 1987). The components of pension

liabilities are obtained from a firm's footnotes in the annual report. To obtain operating risk and market risk proxies, the 1988 version of Compustat Industrial tape and the 1988 version of CRSP tape are used, respectively.

B. Empirical Model

Cross-sectional regression models are used to test whether and how off-balance sheet pension liabilities, and each component of them under SFAS No. 87 are perceived as a form of corporate debt in assessing the systematic risk of the market. The regression models are as follows (subscript firm i is dropped):

$$b = a_0 + a_1 b_o + a_2 b_o(1-t)D/E + a_3 b_o(1-t)(TRAN/E + DEF/E + PSV/E) + e \quad (7)$$

$$b = c_0 + c_1 b_o + c_2 b_o(1-t)D/E + c_3 b_o(1-t)TRAN/E + c_4 b_o(1-t)DEF/E + c_5 b_o(1-t)PSV/E + e \quad (8)$$

where:

b = systematic risk,

b_o = operating risk,

D/E = debt to equity ratio net of pension obligation,

TRAN = PV of transition liability(assets),

DEF = PV of deferred loss(gain),

PSV = PV of prior service costs,

Note that individual variables are estimated using SFAS No. 87 adoption year data. Model (7) examines the aggregate effects of off-balance sheet pension liabilites and model (8)

investigates the effect of each component of them on systematic risk.

The employer's contribution to a pension plan is tax-deductible, while the principal payment of debt is not tax-deductible. Hence, unfunded pension liabilities multiplied by (1-t) are appropriate measures of the debt equivalence of firm i's pension obligations (Daley [1984]; Dhaliwal [1986]).

If unfunded pension obligations are perceived as a form of debt by investors, the coefficient a_3 in model (7) and the coefficients of c_3 to c_5 in model (8) are predicted to be positive and statistically significant. Also, if the market participants perceive unfunded pension liabilities as equivalent to firms' other debt and liabilities, then a_2 is expected to be equal to a_3, and c_2 be equal to the sum of c_3 to c_5. If investors consider unfunded pension obligations as a form of debt that is not equivalent to other forms of debt, then a dollar of pension liabilities may affect the systematic risk of firms differently relative to a dollar of debt. If investors weigh value differently among components of pension liabilities when they assess pension liabilities, the coefficients on c_3, c_4, and c_5 would be differ from each other.

To examine the incremental effect of the measurement of unfunded pension liabilities under SFAS No. 87 compared to under APB No. 8, the following regression model is developed:

$$b = f_0 + f_1 b_o + f_2 b_o(1-t)D/E + f_3 b_o(1-t)(PA-PBO)/E + f_4 b_o(1-t)(PBO-ABO)/E + e \qquad (9)$$

where:

ABO = PV of accumulated benefit obligation,

PBO = PV of projected benefit obligation, and

PA = market value of plan assets.

If the markets perceive the additional liability measurement under SFAS No. 87 as a form of firm's debts, the coefficient f_4 is predicted to be positive and statistically significant. Also, the coefficient of f_3 is expected to be positive and statistically significant if off-balance sheet pension obligations under APB. No. 8 are perceived by markets as a form of firm's liabilities.

C. Measurement Issues

Systematic risk, b_i, is not directly observable in the context of capital pricing theory. The "market model" is used empirically to obtain a surrogate.

$$R_{it} = a_i + b_i X_{mt} + u_{it}$$

where:

R_{it} = return on stock i during period t,

X_{mt} = return on the market index,

u_{it} = a randomly distributed residual,

a_{it} = a constant term that makes the (prior) expectation of u_{it} equal to zero, and

b_{it} = the regression coefficient for stock i in period t, the surrogate for the systematic risk.

Systematic risk is measured for the one or two year period

ending on the WSJ earnings announcement date subject to disclosure of SFAS No. 87 adoption using a daily value weighted market index.

Previous studies (Ball and Brown [1969]; Gonedes [1973, 1975]; and Beaver and Manegold [1975]) suggest that the accounting beta is contaminated by considerable measurement error however they are measured. Therefore, this study does not use accounting beta as a proxy for operating risk. The estimation of the degree of operating risk is obtained from the following time-series regressions from 20 years prior to and the SFAS No. 87 adoption year as follows (subscript firm i is dropped):

$$LnE = d + b_o LnS + u \qquad (10)$$

where:

E = earnings before interest and taxes,
S = sales,
u = stochastic disturbance term.

The estimated regression coefficients, b_{oi}, represent the degree of operating leverage. Following Lev [1974] and Mandelker and Rhee [1984], sales is used as an independent variable.

The focus of this study is leverage in terms of the debt equivalence of pension liabilities. Leverage is measured at the balance sheet date of the year of adoption SFAS No. 87. The theoretical value of leverage is the ratio of market value of debt to market value of common equity. Previous studies show that the leverage measures are sensitive whether market value or accounting value are used for common equity, but are insensitive to which measurement is used to value debt for the association test between market risk and leverage variables (Bowman [1978, 1980]).

Accounting value of debt and market value of equity are used to measure leverage.

Due to the requirements of SFAS No. 87, the value of pension liabilities are closer to the theoretical model developed before. Under SFAS No. 87, pension liabilities are determined by current interest rather than previously used interest assumptions which were based on a long-range expectation of pension fund earnings. Theoretically, the prevailing interest rate should be used to obtain a market value measurement. Hence, the pension data to be used in this study is less subject to measurement error compared to previous studies of pension accounting. Pension liabilities at the adoption year of SFAS No, 87 will be used in this study.

Two different measurements of the effective tax rate are used in this study. The first measurement is computed as follows (Dhaliwal [1986]):

$$t = \frac{\text{Income tax expense excluding changes in deferred taxes}}{\text{Pretax income}}$$

Another measure of tax rate is the total tax expense divided by pre-tax income.

For the sensitivity analysis, models, (7), (8), and (9), are reestimated separately within high/low debt to equity ratio portfolio groups (Duke and Hunt [1989]), and high/low portfolios are partitioned by the sum of unrecognized pension liabilities in footnote disclosures.

6.5 Empirical Results of Financial Leverage on Systematic Risk

6.5.1 Descriptive statistics

Descriptive statistics of the variables used in the regression models are presented in Table VI-13. Table VI-14 provides the Pearson correlation matrix of the independent variables. The possible existence of multicollinearity between independent variables makes it difficult to interpret the coefficients in models (7),(8), and (9) in section 6.4. According to Judge et al. [1980, p.459], if the correlations among independent variables are higher than 0.8, it may cause a serious multicollinearity problem. In general, the correlation matrix shows that multicollinearity is not a serious problem in interpreting the coefficients of the aforementioned equations. However, the high correlation (i.e., 0.87) between $TRAN/E_{it}$ and DEF/E_{it} may cause a multicollinearity problem in estimating model (8).

Table VI - 13

Descriptive Statistics - Variables Used in the Regression Model (N = 248)

Variable	Mean	Median	Standard Deviation	Range
b	1.006	1.030	0.337	0.067 - 1.765
D/E	0.464	0.284	0.734	0.003 - 8.456
b_o	0.937	0.932	0.279	0.035 - 1.754
TRAN/E	0.036	0.029	0.176	-2.420 - 0.658
DEF/E	-0.006	0.000	0.140	-2.090 - 0.316
PSV/E	0.001	0.000	0.005	-0.006 - 0.052
D/E_a	0.056	0.406	0.764	-1.200 - 5.290
D/E	-0.066	-0.037	0.154	-1.434 - 0.830
(PA-ABO)/E	0.019	0.048	0.162	-1.224 - 0.968
(PBO-ABO)/E	0.062	0.020	0.459	-0.058 - 7.232

b = systematic risk,
D/E = long-term debt/ market value,
b_o = operating risk,
TRAN/E = PV of transition assets/market value,
DEF/E = PV of deferred assets/market value,
PSV/E = PV of prior service costs/market value,
D/E_a = [long-term debt - (1-tax rate)(off-balance sheet pension assets)] / [market value + (1 - tax rate)(off-balance sheet pension assets)],
$D/E = D/E_a - D/E$,

PA = market value of plan assets,
ABO = PV of accumulated benefit obligation,
PBO = PV of projected benefit obligation.

Table VI - 14

Correlation Matrix of Independent Variables

	b_o	D/E	OFF/E	TRAN/E	DEF/E	PSVC/E	(PA-ABO)/E	(PBO-ABO)/E
b_o	1.00000	-0.13788	0.03616	0.04307	0.02285	-0.01417	0.13019	0.02114
	(0.0000)	(0.0300)	(0.5732)	(0.4996)	(0.7203)	(0.8253)	(0.0405)	(0.7405)
D/E		1.00000	0.05594	0.05703	0.05013	-0.02989	0.07810	0.05241
		(0.0000)	(0.3833)	(0.3712)	(0.4319)	(0.6415)	(0.2203)	(0.4112)
OFF/E			1.00000	0.97557	0.95957	-0.00116	0.96462	-0.74096
			(0.0000)	(0.0001)	(0.0001)	(0.9856)	(0.0001)	(0.0001)
TRAN/E				1.00000	0.87430	-0.00451	0.95991	-0.89353
				0.0000)	(0.0001)	(0.9441)	(0.0001)	(0.0001)
DEF/E					1.00000	0.03602	0.94983	-0.97723
					(0.0000)	(0.5748)	(0.0001)	(0.0001)
PSVC/E						1.00000	-0.00473	-0.00966
						(0.000)	(0.9413)	(0.8936)

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b_o - operating risk,
D - long-term debt
E - market value of a firm,
OFF - off-balance sheet pension assets,
TRAN - PV of transition assets,
DEF - PV of deferred assets,
PSVC - PV of prior service costs,
PA - market value of plan assets,
ABO - PV of accumulated benefit obligations,
PBO - PV of projected benefit obligations.

6.5.2 Test Results of Empirical Study

A Total Sample

This section discusses the test results of equations (7), (8), and (9) in section 6.4. Panel A of Table VI-15 reports the results of model (7) which examines the aggregate effect of off-balance sheet pension assets in assessing systematic risk using beta which is estimated over 250 days prior to the adoption of SFAS No. 87 until the WSJ earnings announcement date[9]. The test results are insignificant whatever tax rate is used.

Panel B of Table VI-15 reports test results which use a longer term beta (i.e., 500 days estimation period) as a dependent variable. When the effective tax rate, which is the ratio of tax expenses to pre-tax income, is used, the F-value for the over-all regression is 4.48 and statistically significant ($p = 0.005$). The test results using the alternative effective tax rate (i.e., the ratio of tax expenses net of the change in deferred taxes to pre-tax income) shows similar results. The intercept a_0 is 0.95 and rejects the null hypothesis that $a_0 = 0$ at probability 0.01 level. The coefficient of operating risk a_1 is expected to be positive because operating risk reflects the uncertainty related to the firm's operating efficiency. The coefficient is 0.08 and statistically insignificant for both alternative tax cases.

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[9]For the sensitivity analysis, all the models were tested using beta which is estimated one year prior to adoption of SFAS No. 87 to fiscal year end. The test results were similar to the results which use the 250 days beta as a dependent variable. However the explanatory power is slightly stronger than the 250 days beta results.

Coefficient a_2 is predicted to be positive. Coefficient a_2 is 0.015 and cannot reject the null hypothesis that $a_2 = 0.0$. But test results using the alternative effective tax rate shows that a_2 is 0.03 and rejects the null hypothesis that $a_2 = 0$ at the probability level 0.01. The coefficient of total off-balance sheet pension assets, a_3, is predicted to be negative if investors consider these unamortized off-balance pension assets in assessing a firm's market risk. Coefficient a_3 is -0.97 and rejects the null hypothesis that $a_1 = 0.0$ at the 0.01 probability level. The alternative tax case reports the similar results.

In summary, the test results which use a longer term beta (i.e., 500 days estimation period) are consistent with the argument that the market participants consider off-balance sheet pension assets/liabilities when assessing firms' systematic risk.

Table VI - 15

Summary Regression Results for the Impact of Off-Balance Sheet Pension Assets/Liabilities on Market Risk[1]

$$b = a_0 + a_1 b_o + a_2 b_o (1-t) D/E + a_3 b_o (1-t)[TRAN/E + DEF/E + PSV/E] + e \quad (7)$$

PANEL A: Market risk is estimated 250 days prior to WSJ earnings announcement of SFAS No. 87 adoption year to WSJ announcement day.

Predicted sign	?	+	+	-
	a_0	a_1	a_2	a_3
	0.94	0.08	-0.006	-0.23
	(12.20)***	(1.02)	(-0.17)	(-1.37)

N=244 F-value = 0.889 (p=0.45)
t = total tax expenses/pre-tax income

0.92	0.08	0.01	-0.18
(11.94)***	(1.08)	(0.12)	(-1.10)

N=237 F-value = 0.74 (p=0.53)

$$t = \frac{\text{total tax expense - change in deferred taxes}}{\text{pre-tax income}}$$

PANEL B: Market risk is estimated 500 days prior to the WSJ earnings announcement of SFAS No.87 year to the WSJ announcement date.

0.95	0.08	0.015	-0.92
(13.76)***	(1.06)	(0.49)	(-3.63)***

N=240 F-value = 4.48 (p=0.005) R^2 =0 .053
t = total tax expense/pre-tax income

Table VI - 15 Continued

Predicted sign	?	+	+	-
	a_0	a_1	a_2	a_3
	0.94 (13.60)***	0.07 (1.05)	0.03 (2.96)***	-0.78 (-3.24)***

N=236 F-value = 3.60 (p=0.014) R^2 = 0.044

$$t = \frac{\text{total tax expense - change in deferred taxes}}{\text{pre-tax income}}$$

b = systematic risk,
D/E = long-term debt/ market value,
b_o = operating risk,
TRAN/E = PV of transition assets/market value,
DEF/E = PV of deferred assets/market value,
PSV/E = PV of prior service costs/market value.
t = tax rate

[1]t-value in parenthesis, Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Panel A of Table VI-16 presents the test results of model (8) which examines the separate effect of each component of off-balance sheet pension assets on firms' market risks using the 250 days beta as a dependent variable. When the effective tax rate is used (i.e., total tax expenses divided by pre-tax income), the F-value for the over-all regression is 2.70 which is statistically significant (p = 0.021). Coefficients a_3 and a_4 are predicted to

be negative if market participants consider transition assets and deferred gains when assessing a firm's systematic risk. The coefficient of transition assets c_3, is -0.83 and the null hypothesis that $c_3 = 0.0$ is rejected at the 0.01 probability level. The coefficient of deferred assets, c_4, is 1.23 and the null hypothesis that $a_4 = 0.0$ is rejected at the 0.05 probability level. However, the sign is opposite to the expected sign. The coefficient of prior service costs, c_5, is expected to be positively significant. The coefficient is -2.28 and cannot reject the null hypothesis that $c_5 = 0.0$. The F-test of the null hypothesis, $c_3 - c_4 = 0$, shows the F-value of 10.73 ($p = 0.001$) and rejects the null hypothesis that $c_3 = c_4$. This implies that investors weight transition assets more than deferred assets in assessing the firm's systematic risk. The test results using the alternative tax rate with the 250 days beta and using a 500- days systematic risk support all the test results. Furthermore, the 500 days beta model shows correct sign of a_4 although it is statistically insignificant. Furthermore, the explanatory power of model is stronger when using 500 days beta compared to the test results using the 250-days beta.

In summary, the sample firms' transition assets affect significantly the investors' assessment of market risk. In the 250-days market risk model, the test results are insignificant when aggregated off-balance sheet pension assets is used as a independent variable in model (7). While each component of the off-balance sheet items is used separately as an independent variable in model (8), the test results are significant and

increase the explanatory power of the model. This implies that the disclosure requirements of SFAS No. 87 significantly improved the ability of market participants to assess pension liabilities, thus the assessment of the firm's systematic risk. The test results are consistent with prior studies (Daley [1984]; Dhaliwal [1986] Feldstein and Seligman [1981]; Oldfield [1976]) that off-balance sheet pension liabilities impact the market value of firm's equity. However, the results of this study should be interpreted cautiously because there may be a serious omitted variables problem and misspecification problems as evidenced by the high coefficient of the intercept term.

Table VI - 16

Summary Regression Results for the Impact of Off-Balance Sheet Pension Assets/Liabilities on Market Risk[1]

$$b = c_0 + c_1 b_o + c_2 b_o(1-t)D/E + c_3 b_o(1-t)TRAN/E + c_4 b_o(1-t)DEF/E + c_5 b_o(1-t)PSV/E + e \qquad (8)$$

PANEL A: Market risk is estimated 250 days prior to the WSJ earnings announcement of the SFAS No. 87 adoption year to WSJ announcement date.

Predicted sign	?	+	+	-	-	+
	c_0	c_1	c_2	c_3	c_4	c_5
	0.92	0.11	0.001	-0.83	1.23	-2.28
	(12.63)***	(1.46)	(0.29)	(-3.38)***	(2.53)**	(-0.30)

N=239 F-value = 2.70 (p=0.02) R^2 = 0.053

t = total tax expense/pre-tax income

	0.94	0.11	-0.08	-1.08	1.48	-2.41
	(12.48)***	(1.40)	(-1.29)	(-2.53)**	(2.52)**	(-0.32)

N=239 F-value = 2.05 (p=0.071) R^2 = 0.0412

$$t = \frac{\text{total tax expense - change in deferred taxes}}{\text{pre-tax income}}$$

PANEL B: Market risk is estimated 500 days prior to the WSJ earnings announcement of the SFAS No. 87 adoption year to WSJ announcement date.

	0.95	0.08	0.02	-0.93	-0.20	-1.32
	(13.70)***	(1.09)	(0.49)	(-3.50)***	(-0.18)	(-0.27)

N=238 F-value = 2.82 (p=0.017) R^2 = 0.056

t = total tax expense/pre-tax income

Table VI - 16 Continued

Predicted sign	?	+	+	-	-	+
	c_0	c_1	c_2	c_3	c_4	c_5
	0.94	0.08	0.03	-0.79	-0.69	0.45
	(13.51)***	(1.05)	(2.91)***	(-3.16)***	(-0.81)	(0.10)

N=234 F-value = 2.15 (p=0.0600) R^2 = 0.044

$$t = \frac{\text{total tax expense} - \text{change in deferred taxes}}{\text{pre-tax income}}$$

b = systematic risk,
D/E = long-term debt/market value,
b_o = operating risk,
TRAN/E = PV of transition assets/market value,
DEF/E = PV of deferred assets/market value,
PSV/E = PV of prior service costs/market value.
t = tax rate

[1]t-value in parenthesis, Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

For the comparison with Dhaliwal's [1986] model, the following model is used to repeat the above analysis.

$$b_{it} = c_0 + c_1 b_o + c_2 b_o (1-t) D/E_{it} + c_3 b_o (1-t) / \backslash D/E_{it} + e_{it} \quad (10)$$

where

$$D/E = (D/E)_a - D/E,$$

$$(D/E)_a = \frac{D_i - (1-t_i)(\text{Unfunded pension assets})}{E_i + (1-t_i)(\text{Unfunded pension assets})},$$

D = firm's total debts,

E = firm's market value.

Panel A of Table VI-17 presents the test results of equation (10) using the 250-days beta. While Dhaliwal [1986] used only unfunded vested pension liabilities, this study uses all the off-balance sheet pension assets. All the test results are insignificant.

Table VI - 17

Summary Regression Results for the Impact of Off-Balance Sheet Pension Assets/Liabilities on Market Risk Equation (11)[1]

$$b = c_0 + c_1 b_o + c_2 b_0 (1-t) D/E + /\backslash c_3 b_o (1-t) D/E + e$$

PANEL A: Market risk is estimated 250 days prior to the WSJ earnings announcement of the SFAS No. 87 year to the WSJ announcement date.

Predicted sign	?	+	+	-
	c_0	c_1	c_2	c_3
	0.97	0.04	-0.03	-0.04
	(12.81)***	(0.57)	(-1.43)	(-1.49)

N=249 F-value = 1.720 (p=0.16) R^2 = 0.021

t = total tax expenses/pre-tax income

D/E = total debt/market value

0.95	0.04	0.00	0.01
(12.72)***	(0.57)	(0.61)	(1.23)

N=249 F-value = 0.57 (p=0.64) R^2 = 0.007

$$t = \frac{\text{total tax expenses - change in deferred taxes}}{\text{pre-tax income}}$$

D/E = total debt/market value

PANEL B: Market risk is estimated 500 days prior to the WSJ earnings announcement of SFAS No. 87 adoption year to the WSJ announcement date.

1.01	0.01	-0.03	-0.03
(14.42)***	(0.14)	(-1.76)	(-1.35)

N=248 F-value = 1.94 (p=0.12) R^2 = 0.023
t = total tax expenses/pre-tax income
D/E = total debt/market value

Table VI-17 Continued

Predicted sign	?	+	+	-
	c_0	c_1	c_2	c_3
	0.98	0.01	0.00	0.01
	(14.40)***	(0.12)	(0.45)	(1.02)

N=244 F-value = 0.35 (p=0.79) R^2 = 0.004

$$t = \frac{\text{total tax expenses - change in deferred taxes}}{\text{pre-tax income}}$$

D/E = total debt/market value

b = systematic risk,
b_o = operating risk,
D/E_a = [long-term debt - (1-tax rate)(off-balance sheet pension assets)] / [market value + (1 - tax rate)(off-balance sheet pension assets)]
$D/E = D/E_a - D/E$

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table VI-18 reports the test results of model (9) which examines the incremental effect of the disclosure of off-balance sheet pension assets/liabilities under SFAS No. 87 compared to those under APB No. 8. Panel A reports the test results using a 250-days beta as a dependent variable. When the effective tax rate (i.e., the ratio of total tax expenses to pre-tax income) is used, the F-value is 3.50 and statistically significant at the 0.001

probability level. The coefficient of D/E, f_2, is 0.01 and insignificant. However, the alternative tax rate is used, f_2 is 0.03 and statistically significant at the 0.05 probability level. The coefficient of (PA - ABO)/E, f_3, is -0.95 and rejects the null hypothesis that $f_3 = 0.0$ at the probability level of 0.01. The coefficient of the incremental effect, (PBO - ABO)/E, f_4 is predicted to be positive if market participants take into consideration off-balance sheet pension obligations, which are based upon future compensation levels, in addition to ABO when assessing a firm's systematic risk. Coefficient f_4 is -0.73 and the null hypothesis that $f_4 = 0.0$ is rejected at the 0.01 probability level. But, the resulting sign is opposite to the expected sign for both tax cases. When the 500-days betas are used, the test results show the similar results. But the explanatory power of the model is lower than the 250-days beta models.

In summary, these findings imply that investors consider off-balance pension items measured under APB No. 8 when they assess a firm's market risk. However, the findings are not consistent with the argument that SFAS No. 87 enhances the investors assessment of pension information regarding the valuation of firm's market risk.

Table VI - 18

Summary Regression Results for the Impact of Incremental effect of Off-Balance Sheet Pension Assets/Liabilities on Market Risk Under SFAS No. 87[1]

$$b = f_0 + f_1 b_o + f_2 b_0(1-t)D/E + f_3 b_o(1-t)(PA-ABO)/E + f_4 b_o(1-t)(PBO-ABO)/E + e \quad (9)$$

PANEL A: Market risk is estimated 250 days prior to the WSJ earnings announcement of the SFAS No. 87 adoption year to the WSJ announcement.

	f_0	f_1	f_2	f_3	f_4
Predicted sign	?	+	+	-	+
	0.93	0.13	0.01	-0.95	-0.73
	(11.23)***	(1.59)	(0.24)	(-3.32)***	(-3.60)***

N=196 F-value = 3.50 (p=0.009) R^2 = 0.068
t = tax expense/pre-tax income

0.92	0.12	0.03	-0.63	-0.52
(10.91)***	(1.45)	(2.49)**	(-2.33)**	(-2.62)**

N=193 F-value = 2.04 (p=0.090) R^2 = 0.041

$$t = \frac{\text{(tax expense-changes in deferred taxes)}}{\text{pre-tax income}}$$

PANEL B: Market risk is estimated 500 days prior to the WSJ earnings announcement of the SFAS No. 87 adoption year to the WSJ announcement day.

0.92	0.13	0.02	-0.60	-1.16
(12.09)***	(1.62)	(0.50)	(-2.03)**	(-2.37)**

N=195 F-value = 3.35 (p=0.011) R^2 = 0.065
t = tax expense/pre-tax income

Predicted sign	?	+	+	-	+
	f_0	f_1	f_2	f_3	f_4
	0.92 (11.90)***	0.12 (1.48)	0.03 (2.52)**	-0.43 (-1.71)*	-0.88 (-1.74)*

N=192 F-value = 1.83 (p=0.125) R^2 = 0.038

$$t = \frac{\text{(tax expense-changes in deferred taxes)}}{\text{pre-tax income}}$$

b = systematic risk,
D/E = long-term debt/ market value,
b_o = operating risk,
PA = market value of plan assets,
ABO = PV of accumulated benefit obligation,
PBO = PV of projected benefit obligation,
t = tax rate

[1]t-value in parenthesis.

Significance levels are:

* Significant at a = 0.10,

** Significant at a = 0.05,

*** Significant at a = 0.01.

B. Partitioned Sample

All the above tests are repeated using partitioned samples which are grouped by the high or low off-balance sheet pension assets. The test results are presented in Appendix 2.

The test results of model (7) which examines the impacts of the aggregated off-balance sheet pension assets on the firm's systematic are consistent with the hypothesis that investors consider off-balance sheet pension assets in assessing the firm's market risk for only high pension assets group firms with a 250 days beta. The test results of model (8) are not consistent with the hypothesis for any other portfolio groups. The test results of model (9) are similar to the test results of all sample firms for both the high and the low assets groups with a 250-days beta, and low assets group with a 500-days beta.

CHAPTER VII

SUMMARY AND CONCLUSIONS

This chapter provides a brief summary of the findings of this study and the implications that can be drawn therefrom. Also, some limitations of the study are explored. Finally, the contribution of this study and possible future extensions are discussed.

7.1 Summary and Conclusions

This study extends the empirical study on the cross-sectional differences in the relationship between reported earnings and security returns. Based upon Holthausen and Verrecchia [1988]'s and Choi and Salomon [1988]'s model, this study posits that the relative informativeness of earnings signals is a function of the quality of reported earnings under alternative pension accounting rules. Furthermore, this study examines whether the detailed disclosure of off-balance pension assets/liabilities which are newly required by SFAS No. 87 affect the market participants' assessment of systematic risk.

APB No. 8 was criticized because users of financial statements could not understand and fully assess pension plans due to the insufficient pension information disclosure and the employers' great latitude that provides for the desired series of pension expenses over time. Therefore, reported earnings under old pension accounting rules might be a garbled or noisy version of the true underlying economic performance of firms.

The new pension accounting rules are claimed to provide a more uniform and consistent measurement of the annual pension cost and detailed off-balance sheet pension information. Thus, SFAS No. 87 allegedly improves the quality of earnings. Hence, Hypothesis 1 and Hypothesis 2 posit that earnings response coefficients under the new pension accounting are greater than the ERCs under old accounting rules. Hypothesis 3 proposes that the differential earnings response coefficients under alternative pension accounting rules are a function of firm size. Hypothesis 4 examines whether the differential earnings/returns relationship is affected by the timing of the new pension accounting adoption.

The empirical evidence that earnings response coefficients in SFAS No. 87 period are greater than ERCs in the SFAS No. 36 or APB No. 8 period is consistent with the argument that SFAS No. 87 allegedly reduces garbling or noise in reported earnings. The findings that the differential ERCs for larger firms are greater than for smaller firm support the argument that, given unexpected earnings, the differences in ERCs under the alternative pension accounting rules are larger for large firms than for small firms because the quality of signal from the unexpected earnings are higher than those of small firms. The empirical result that differential ERCs under alternative pension accounting rules are greater for late adopters than for early adopters is consistent with the argument that there may have been more noisy in the early adopters' income measurement. Also, the empirical findings support the argument that a firm's

off-balance sheet pension items disclosed by the SFAS No. 87 requirements impact the market participants assessment of a firm's systematic risk.

7.2 Limitations and Implications for Future Research

Although this study explores whether noise or garbling in reported earnings generated under alternative sets of accounting methods impact cross-sectional and intertemporal variations in the informativeness of earnings signals , it has many empirical problems. Some of these limitations are as follows.

Factors other than differences in income determination rules affect the returns/earnings relation. The factors include riskless interest rates, the riskiness, growth and/or persistence of earnings (Collins and Kothari [1989]), revision coefficient relating current earnings to future earnings, and systematic risk (Kormendi and Lipe [1987]; Easton and Zmijewski [1989]). Ignoring these factors may causes an omitted variables problem. The results of this study should be interpreted with caution since this study did not control for the information environment differences. Information environments may differ cross-sectionally due to the number and quality of competing information sources.

One possible extension of the study is to incorporate all the above factors in the empirical model to control the information environment differences. Another possible extension of the study is to include explanatory variables that predict the changes of interest rates since a differential

earnings/returns relation is associated with interest differences over time. Collins and Kothari [1989] suggest money supply, inflation, trade deficit, and federal budget deficits as possible explanatory variables.

Another problem in assessing the returns/earnings relation under alternative pension accounting rules is the timing and selection of the empirical proxy for market expected earnings. When analysts' forecasts are used as a proxy, the forecasts may already be adjusted for the adoption effects of new accounting rule. In that case the empirical proxy for market expected earnings may decrease substantially the earnings surprise because of greater accuracy in the forecasts.

Another limitation is a self-selection sampling problem for early adopters whose sample is twice as large as late adopters. The characteristic of nonrandomness implies that outlier observations in terms of analysts forecast error and stock returns may be produced by firms earnings management.

One of the most serious econometric problems of models in examining the impact of pension items on systematic risk is multicollinearity between leverage and pension liabilities. The more significant the multicollinearity between variables, the less dependable are the estimated coefficients. Also, the existence of multicollinearity affects the statistical tests of significance. The standard errors of the estimated coefficients are very large when there is multicollinearity. As a result, lower t-values may lead researchers to eliminate a variable as not significantly different from zero when it should be

included. The specification error such as omitted variables, or errors in the measurement of the variable may cause a multicollinearity problem. The existence of non-zero and statistically significant intercept term indicates that the empirical model might be misspecified. More specifically, the omitted variable that originates from the systematic mismeasurement of non-pension variables may be correlated with the pension variables. If so, the intercept term may have been capturing the impact of a possible correlated omitted variable.

Another problem in models investigating the impact of pension variables on systematic risk is the assumption that the effect of the independent variables on market risk is linear and additive. A variety of econometric problems may have been generated from a nonlinear multiplicative effect of financial structure on operating risk to the extent that the effects of operating risk and financial risk upon market risk is interrelated.

The empirical evidence and limitations in this study have implications for future study. When conducting empirical study of the earnings/returns relation, the assumption of constant ERC may produce less accurate parameter estimates and downward biased test statistics on ERC. Furthermore, when other nonearnings explanatory variables are incorporated in a regression model, they may have significant explanatory power only because they are correlated to the cross-sectional variations in ERC.

APPENDIX

Table A.1 - 1

Summary Regression Results for Differential ERC's
Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 (H_1)[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3 RIBES_{it} + e_{it}$$

PANEL A: Low Off-Balance Sheet Pension Assets Firms:

predicted sign	?	+	-	-			F-value
	a_0	a_1	a_2	a_3	N	Adj.R^2	(sig.level)
$CAR_{-1,1}$	0.001 (0.393)	0.054 (0.915)	-0.059 (-0.693)	0.051 (1.616)	155	0.004	1.222 (0.304)
$CAR_{-2,-1}$	0.003 (0.893)	0.021 (0.344)	-0.038 (-0.440)	0.000 (0.007)	155	-0.018	0.066 (0.972)
$CAR_{-2,1}$	0.002 (0.777)	0.104 (1.573)	-0.078 (-0.823)	0.056 (1.602)	155	0.017	1.880 (0.134)

PANEL B: Middle Off-Balance Sheet Pension Assts Firms:

$CAR_{-1,1}$	0.008 (2.683)***	0.045 (2.823)***	0.066 (1.480)	-0.008 (-0.207)	148	0.083	5.474 (0.002)
$CAR_{-2,-1}$	0.003 (1.249)	0.048 (3.771)***	-0.002 (-0.063)	0.002 (0.084)	148	-0.084	5.498 (0.001)
$CAR_{-2,1}$	0.007 (2.173)**	0.064 (3.722)***	0.061 (1.314)	0.018 (0.453)	148	0.113	7.256 (0.0002)

PANEL C: High Off-Balance Sheet Pension Assets Firms:

$CAR_{-1,1}$	0.003 (0.997)	0.006 (0.067)	-0.096 (-1058)	-0.025 (-0.384)	149	0.296	2.517 (0.059)
$CAR_{-2,-1}$	0.003 (0.893)	-0.023 (0.344)	0.052 (-0.440)	0.017 (0.007)	149	-0.004	0.798 (0.500)
$CAR_{-2,1}$	0.006 (1.809)*	-0.041 (-0.476)	-0.032 (-0.358)	-0.023 (-0.365)	149	0.014	1.709 (0.166)

Table A.1 -1 Continued

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0,

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.1 - 2

Summary Regression Results for Differential ERC's Under SFAS No. 87 vs. APB No. 8 (H_2)[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[D*UE_{it}] + a_3 RIBES_{it} + e_{it}$$

PANEL A: Low Off-Balance Sheet Pension Assets Firms:

predicted sign	? a_0	+ a_1	- a_2	- a_3	N	Adj.R^2	F-value (sig.level)
$CAR_{-1,1}$	0.003 (0.952)	0.060 (1.007)	0.188 (1.009)	0.046 (0.946)	130	0.007	1.321 (0.270)
$CAR_{-2,-1}$	0.004 (1.498)	0.026 (0.473)	-0.086 (-0.504)	-0.019 (-0.421)		-0.019	0.171 (0.913)
$CAR_{-2,1}$	0.004 (1.378)	0.110 (1.780)*	0.174 (0.906)	0.063 (1.268)		0.033	2.472 (0.064)

PANEL B: Middle Off-Balance Sheet Pension Assets Firms:

$CAR_{-1,1}$	0.007 (2.322)**	0.042 (2.900)***	-0.095 (-0.503)	-0.073 (-0.956)	107	0.086	4.338 (0.007)
$CAR_{-2,-1}$	0.003 (1.289)	0.043 (3.314)***	-0.214 (-1.272)	-0.069 (-1.011)		0.118	5.755 (0.002)
$CAR_{-2,1}$	0.006 (1.976)*	0.060 (3.506)***	-0.102 (-0.457)	-0.042 (-0.466)		0.106	5.242 (0.002)

PANEL C: High Off-Balance Sheet Pension Assets Firms:

$CAR_{-1,1}$	0.002 (0.923)	0.011 (0.142)	-0.183 (-1.199)**	0.029 (0.383)	197	-0.005	0.668 (0.577)
$CAR_{-2,-1}$	0.002 (0.886)	-0.026 (-0.415)	-0.035 (-0.293)	0.039 (0.638)		-0.01	0.367 (0.78)
$CAR_{-2,1}$	0.002 (0.798)	-0.045 (-0.532)	-0.142 (-0.859)	0.033 (0.393)		-0.003	0.826 (0.483)

Table A.1 - 2 Continued

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No. 36,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0.

UE_{it} = unexpected earnings of firm i for year t,

D = 1 if in APB No. 8 period without SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.1 - 3

Summary Regression Results for Differential ERC's Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 is the Function of Firm Size (H_{3a} and H_{3b})[1]

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3[S*UE_{it}] + a_4[M*S*UE_{it}] + a_5 RIBES_{it} + e_{it}$$

PANEL A: Low Off-Balance Sheet Pension Assets Firms:

	predicted sign	? a_0	+ a_1	- a_2	? a_3	? a_4	- a_5
$CAR_{-1,1}$		0.001 (0.497)	0.161 (1.962)*	-0.038 (-0.240)	-0.215 (-1.846)*	0.056 (0.288)	0.045 (1.410)
		N = 155	F-value=1.641 (p=0.1515)		R^2 = 0.020		
$CAR_{-2,-1}$		0.003 (1.078)	0.095 (1.132)	0.091 (0.561)	-0.146 (-1.235)	-0.107 (-0.544)	-0.009 (-0.273)
			F-value=0.867 (p=0.5062)		R^2 = -0.0043		
$CAR_{-2,1}$		0.003 (0.993)	0.155 (1.702)*	0.118 (0.667)	-0.100 (-0.771)	-0.209 (-0.975)	0.045 (1.289)
			F-value=1.912 (p=0.094)		R^2 = 0.0286		

PANEL B: Middle Off-Balance Sheet Pension Assets Firms:

$CAR_{-1,1}$		0.008 (2.688)**	-0.300 (-1.491)	0.431 (2.086)**	0.346 (1.731)*	-0.395 (-1.819)*	-0.018 (-0.451)
		N = 148	F-value=3.979 (p=0.0022)		R^2 = .0915		
$CAR_{-2,-1}$		0.003 (1.236)	-0.006 (-0.039)	0.054 (0.340)	0.054 (0.351)	-0.060 (-0.361)	0.001 (0.036)
			F-value=3.283 (p=0.0079)		R^2 = 0.0716		
$CAR_{-2,1}$		0.007 (2.164)**	-0.290 (-1.398)	0.429 (1.995)**	0.356 (1.713)*	-0.390 (-1.726)*	0.010 (0.241)
			F-value=4.999 (p=0.003)		R^2 = 0.1190		

Table A.1 - 3 Continued

PANEL C: High Off-Balance Sheet Pension Assets Firms:

predicted sign	?	+	-	?	?	-
	a_0	a_1	a_2	a_3	a_4	a_5
$CAR_{-1,1}$	0.004 (1.285)	0.046 (0.350)	0.057 (0.366)	-0.054 (-0.316)	-0.166 (-0.853)	0.006 (0.097)
	N = 149	F-value=2.662 (p=0.0246)		R^2 = 0.053		
$CAR_{-2,-1}$	0.003 (1.802)*	-0.060 (1.132)	0.161 (0.561)	0.069 (-1.235)	-0.151 (-0.544)	0.030 (-0.273)
		F-value=0.867 (p=0.5062)		R^2 = -0.0043		
$CAR_{-2,1}$	0.007 (2.111)**	0.040 (0.311)	0.065 (0.423)	-0.125 (-0.741)	-0.078 (-0.405)	0.004 (0.056)
		F-value=2.109 (p=0.067)		R^2 = 0.0359		

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through the earnings announcement, day 0.

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

S = 1 if large firm,
= 0 if small firm.

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.1 - 4

Summary Regression Results for Differential ERC's Under SFAS No. 87 vs. APB No. 8 with SFAS No. 36 is the Function of Adoption Period (H_4)

$$CAR(n,1)_{it} = a_0 + a_1 UE_{it} + a_2[M*UE_{it}] + a_3[T*UE_{it}] + a_4[M*T*UE_{it}] + a_5 RIBES_{it} + e_{it}$$

PANEL A: Low Off-Balance Sheet Pension Assets Firms:

	predicted sign	?	+	-	?	?	-
		a_0	a_1	a_2	a_3	a_4	a_5
$CAR_{-1,1}$		0.001	-0.159	0.163	.279	-0.305	0.049
		(0.377)	(-1.317)	(1.146)	(2.027)**	(-1.600)	(1.543)
	N = 155	F-value=1.573 (p=0.170)			R^2 = 0.0181		
$CAR_{-2,-1}$		0.002	-0.213	0.207	0.305	-0.340	-0.003
		(0.883)	(-1.734)*	(1.435)	(2.184)**	(-1.761)*	(-0.080)
	N = 155	F-value=1.008 (p=0.416)			R^2 = 0.0003		
$CAR_{-2,1}$		0.002	-0.051	0.086	0.202	-0.230	0.054
		(0.768)	(-0.377)	(0.542)	(1.314)	(-1.080)	(1.537)
		F-value=1.478 (p=0.199)			R^2 = 0.0152		

PANEL B: Middle Off-Balance Sheet Pension Assets Firms:

$CAR_{-1,1}$		0.007	0.008	0.050	0.052	0.089	0.018
		(2.641)**	(0.232)	(0.773)	(1.314)	(0.947)	(0.448)
	N = 148	F-value=4.22 (p=0.001)			R^2 = 0.1287		
$CAR_{-2,-1}$		0.002	0.066	-0.048	-0.022	0.089	0.014
		(1.032)	(2.450)**	(-0.951)	(-0.731)	(1.229)	(0.446)
		F-value=3.60 (p=0.004)			R^2 = 0.1119		
$CAR_{-2,1}$		0.007	0.039	0.045	0.034	0.069	0.037
		(2.112)**	(1.074)	(0.675)	(0.811)	(0.705)	(0.865)
		F-value=4.75 (p=0.001)			R^2 = 0.1423		

Table A.1 - 4 Continued

PANEL C: High Off-Balance Sheet Pension Assets Firms:

predicted sign	?	+	-	?	?	-
	a_0	a_1	a_2	a_3	a_4	a_5
$CAR_{-1,1}$	0.004	0.026	-0.133	-0.288	0.522	0.011
	(1.125)	(0.294)	(-1.434)	(-0.688)	(1.215)	(0.162)
	N = 149	F-value=2.41	(p=0.039)	R^2 = 0.0772		
$CAR_{-2,-1}$	0.003	-0.013	0.042	-0.261	0.252	0.009
	(1.768)*	(-0.243)	(0.740)	(_1.023)	(0.961)	(0.212)
		F-value=0.69	(p=0.637)	R^2 = 0.0233		
$CAR_{-2,1}$	0.006	-0.015	-0.070	-0.483	0.643	-0.005
	(1.952)*	(-0.172)	(-0.754)	(-1.161)*	(1.505)	(-0.080)
		F-value=1.69	(p=0.140)	R^2 = 0.0554		

t = the adoption year of SFAS No.87, or the year prior to the adoption of SFAS No.87,

$CAR(n,1)_{it}$ = cumulated market model prediction error, cumulated from day n through one day after the earnings announcement day 0,

UE_{it} = unexpected earnings of firm i for year t,

M = 1 if in APB No. 8 period with SFAS No. 36,
0 if in SFAS No. 87 adoption time period,

T = 1 if late adopter,
= 0 if early adopter,

$RIBES_{it}$ = the stock return for firm i from the day after the IBES report date through n-3 days before the earnings announcement date,

e_{it} = random disturbance term,

[1]t-value in parenthesis, Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.2 - 1

Summary Regression Results for the Impact of Aggregate Off-Balance Sheet Pension Assets/Liabilities on Market Risk[1]

$$b = a_0 + a_1 b_o + a_2 b_o(1-t)D/E + a_3 b_o(1-t)[TRAN/E + DEF/E + PSV/E] + e \quad (7)$$

PANEL A: Market risk is estimated 250 days prior to SFAS No. 87 adoption to WSJ earnings announcement.

For the low off-balance sheet pension assets firms:

Predicted sign	?	+	+	-
	a_0	a_1	a_2	a_3
	1.025	0.050	0.006	0.164
	(9.869)***	(0.478)	(0.179)	(0.870)

N=114 F-value = 0.37 (0.78)
Tax=tax expenses/pre-tax income

For the high off-balance sheet firms:

0.84	0.17	-0.01	-0.88
(7.65)***	(1.44)	(-0.07)	(-2.21)**

N=126 F-value = 2.49 (0.06) R^2 = 0.06
t = tax expenses/pre-tax income

PANEL B: Market risk is estimated 500 days prior to SFAS No. 87 adoption to WSJ earnings announcement.

For the low off-balance sheet pension assets firms:

1.00	0.07	0.011	-0.74
(10.63)***	(0.72)	(0.35)	(-1.17)

N=116 F-value = 0.65 (0.59) R^2 = .017

Table A.2 - 1 Continued

For the high off-balance sheet pension assets firms:

0.93	0.04	-0.04	-0.53
(9.25)***	(0.41)	(-0.44)	(-1.42)

N=126 F-value = 1.40 (0.24) R^2 = 0.03

b = systematic risk,

b_o = operating risk,

D = long-term debt,

E = market value of firm,

TRAN = PV of transition assets,

DEF = PV of deferred gais,

PSV = PV of prior service costs.

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.2 - 2

Summary Regression Results for the Impact of Off-Balance Sheet Pension Assets/Liabilities on Market Risk[1]

$$b = c_0 + c_1 b_o + c_2 b_0(1-t)D/E + c_3 b_o(1-t)TRAN/E + c_4 b_o(1-t)DEF/E + c_5 b_o(1-t)PSV/E + e \qquad (8)$$

PANEL A: Market risk is estimated 250 days prior to SFAS No. 87 adoption to WSJ earnings announcement

For the Low off-balance sheet pension assets firms:

predicted sign	?	+	+	-	-	-
	c_0	c_1	c_2	c_3	c_4	c_5
	0.84	0.16	0.001	-0.88	-0.61	6.24
	(9.82)***	(0.75)	(0.29)	(-1.41)*	(1.84)**	(-1.06)

N=117 F-value = 1.02 (0.41) R^2 = 0.044
t = total tax expense/pre-tax income
D/E = long-term debt/market value

For high off-balance sheet pension assets:

	0.84	0.16	0.00	-0.88	-0.61	6.24
	(7.60)***	(1.36)	(0.01)	(-2.14)**	(0.39)**	(0.61)

N=126 F-value = 1.55 (0.18) R^2 = 0.0601

PANEL B: Market risk is estimated 500 days prior to SFAS No. 87 adoption to WSJ earnings announcement.

For low off-balance sheet pension assets firms:

	1.00	0.09	-0.002	-1.50	-1.36	-9.55
	(10.67)***	(0.92)	(-0.33)	(-1.13)	(-0.58)	(-1.05)

N=116 F-value = 0.94 (0.460) R^2 = 0.046
t = total tax expense/pre-tax income

Table A.2 - 2 Continued

For the high off-balance sheet pension assets firms:

0.93	0.02	-0.01	-0.46	1.09	7.13
(9.29)***	(0.18)	(-0.13)	(-1.25)	(0.77)	(0.77)

N=126 F-value = 1.30 (0.27) R^2 = 0.051

---

b= systematic risk,

b_o = operating risk,

D = long-term debt,

E = market value,

TRAN = PV of transition assets,

DEF = PV of deferred gains,

PSV = PV of prior service costs,

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

Table A.2 - 3

Summary Regression Results for the Impact of Incremental effect of Off-Balance Sheet Pension Assets/Liabilities on Market Risk Under SFAS No. 87[1]

$$b = f + f_1 b_o + f_2 b_0 (1-t)D/E + f_3 b_o (1-t)(PA-ABO)/E + f_4 b_o (1-t)(PBO-ABO)/E + e \quad (9)$$

PANEL A: Market risk is estimated 250 days prior to SFAS No. 87 adoption to WSJ earnings announcement.

For the low off-balance sheet pension assets firms:

predicted sign	?	+	+	-	+
	f_0	f_1	f_2	f_3	f_4
If ABO = . then ABO=PBO:					
	1.00	0.09	0.01	-1.82	0.53
	(10.14)***	(0.89)	(0.20)	(-2.82)***	(1.92)

N=120 F-value = 2.76 (0.031) R^2 = .087
t = tax expense/pre-tax income

For the high off-balance sheet pension assets firms:

If ABO = . then ABO=PBO:					
	0.87	0.13	-0.04	-0.79	1.02
	(7.85)***	(1.04)	(-0.43)	(-2.49)***	(1.34)

N=126 F-value = 2.28 (0.065) R^2 = .069
t = tax expense/pre-tax income

Tabel A.2 - 3 Continued

PANEL B: Market risk is estimated 500 days prior to SFAS No. 87 adoption to WSJ earnings announcement.

For the low off-balance sheet pension assets firms:

If ABO= .	then ABO=PBO:			
1.00	0.11	0.01	-1.30	-1.54
(11.17)***	(1.15)	(1.29)	(-1.86)**	(-1.22)**

N=119 F-value = 2.52 (0.045) R^2 = .081
t = tax expense/pretax income

For high off-balance sheet pension assets firms:

If ABO= .	then ABO=PBO:			
0.94	0.04	-0.05	-0.43	0.24
(9.16)***	(0.32)	-(0.63)	(-1.46)*	(0.33)

N=126 F-value = 1.08 (0.37) R^2 = .034
t = tax expense/pre-tax income

b_{it} = systematic risk,

b_o = operating risk,

D = long-term debt,

E = market value,

PA = market value of plan assets,

PBO = PV of projected benefit obligations,

ABO = PV of accumulated benefit obligations.

[1]t-value in parenthesis. Significance levels are:

* Significant at a = 0.10

** Significant at a = 0.05

*** Significant at a = 0.01

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