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Robin Paula Clement

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Joseph N. Anthony
Major professor

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ACCOUNTING CHANGES AND THE DETERMINANTS OF SYSTEMATIC RISK: THE CASE OF FAS NO. 36: DISCLOSURE OF PENSION INFORMATION

By

Robin Paula Clement

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ABSTRACT

ACCOUNTING CHANGES AND THE DETERMINANTS OF SYSTEMATIC RISK: THE CASE OF FAS NO. 36: DISCLOSURE OF PENSION INFORMATION

By

Robin Paula Clement

A primary motive behind standardizing the accounting and reporting of pension disclosures is to enhance intercompany comparability of disclosures. Comparably computed disclosures can presumably reveal differences among companies regarding the size of their pension obligation and their provision for the pension obligation (plan assets). Indeed, the market appears to value separately pension obligations and assets reported under FAS 36 requirements (Landsman (1986)) and under FAS 87 requirements (Barth (1991)).

This study investigates the effect of FAS 36 disclosures on the market's assessment of systematic risk. Pension obligations are considered to be part of company financial leverage and have been documented to be associated with the level of systematic risk (Dhaliwal, 1986). FAS 36 first emphasized the need to report comparably computed pension obligations and to more fully disclose the financial position of pension plans at the corporate level. If the market perceived this comparable information as informative, then the market's expectation regarding the size of the pension obligation and pension assets should be altered. If FAS 36 disclosures altered the market's perception of the pension obligation's effect on leverage, an association between the change in the reported obligation and systematic risk should be detected upon availability of FAS 36 disclosures.

The results indicate that systematic risk changes are positively associated with the funded pension status at statistically significant levels for one subgroup of firms, those which are relatively highly overfunded according to FAS 36 disclosures and which reported no unfunded

vested benefit information in the APB 8 era. The change in risk is not associated with the funded status change for any other group of firms.

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I look forward to continuing my development as an accountant, teacher and, most of all, a child of God.

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Chapter One

INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

In his review and critique of capital markets research in accounting on the anniversary of Ball and Brown (1968), Lev (1989) attributes the small R-square reported in studies examining the relation between abnormal stock returns and earnings and other financial variables to "biases induced by accounting measurement and valuation principles and in some cases to manipulation of reported data by management." (p. 185). He concludes that "[capital] market research should, therefore, shift its focus to the examination of the role of accounting measurement rules in asset valuation". In addition, he concludes that positive research should be "aimed at understanding the use of information by investors, that is, a thorough investigation of the financial statement analysis process." (p. 186).

One purpose of financial statement analysis is to select portfolios of investments which meet investors' particular expected return and risk criteria. The predominant paradigm used in the finance literature to explain asset pricing is the Sharpe (1964)-Lintner (1965) Capital Asset Pricing Model [hereafter CAPM]. The CAPM assumes that the parameters used by investors to price assets are the assets' expected return and its nondiversifiable or systematic risk [also known as beta]. Systematic risk represents the relative sensitivity of a firm's cash flow stream to economic conditions compared to the weighted average return of all assets. The use of financial statements in explaining the present level of systematic risk and forecasting future systematic risk has been the subject of many theoretical and empirical studies in the past quarter century. This line of research is summarized in the next section of this chapter. Given the considerable body of research which exists regarding the economic determinants of systematic risk, this valuation parameter provides an opportunity to better define the unique role of accounting information in

valuation. In addition, using models of valuation parameters such as systematic risk may aid in identifying inconsistencies between finance theory and accounting measures and possible directions for reconciling such differences.

This study extends Dhaliwal (1986) by focusing upon the effect of a mandated change in accounting measurement, Statement of Financial Accounting Standards No. 36: "Disclosure of Pension Information" (Financial Accounting Standards Board [hereafter FASB], May, 1980), on the market's perception of systematic risk. FAS 36 supersedes, in part, Accounting Principles Board [hereafter APB] Opinion No. 8, "Accounting for the Cost of Pension Plans", (APB, June, 1966). Under APB 8, pension obligations could be computed using one of several commonly used actuarial pension funding methods. Only unfunded vested benefits were required to be reported under APB 8. In contrast, FAS 36 required that all firms report separately their vested and nonvested pension benefit obligation balances computed using the same method as well as plan asset balances.

As documented by Dhaliwal (1986), the market apparently considered the unfunded vested benefit obligation reported under APB 8 to be part of company's debt structure in the market's assessment of systematic risk. The relation documented by Dhaliwal regarding APB 8 provides an opportunity to determine if the market considered FAS 36 disclosures relevant in assessing systematic risk. Specifically, FAS 36 presents an opportunity to determine 1) if the market considered the new measurement method relevant for determining the risk of firms reporting unfunded vested benefits under APB 8 and 2) the affect of FAS 36 disclosures on firms which previously reported no unfunded vested benefit obligation.

The dependent variable in this study is the difference between systematic risk measured in the period before FAS 36 disclosures are available and the period immediately following FAS 36 disclosure availability. The independent variable in this study is the change in the reported pension liability in the two time periods.

I find that risk changes **are not associated** with reported liability changes for firms which 1) had previously reported unfunded vested liabilities and 2) firms which previously reported either zero unfunded vested liabilities or indicated more than adequate funding, but which were relatively less well-funded than other firms in the same category under FAS 36. I find that risk changes **are strongly negatively associated** with pension plan asset balances and **are strongly positively associated** with plan obligations for firms which previously reported either zero unfunded vested liabilities or indicated more than adequate funding, but which were relatively better funded than other firms in the same category under FAS 36 reporting requirements.

The primary documented effect of FAS 36 on systematic risk assessments appears to be the requirement that all firms report pension related data. Information regarding the existence and magnitude of overfunded plans was apparently unknown by the market until FAS 36 disclosures. As discussed in the conclusion chapter, a potential reason for the market's apparent ignorance in this matter is pension funds are a potential harbor for financial slack. Myers and Majluf (1984) argue that management is disinclined to disclose the existence of financial slack because of potential market value penalties. FAS 36 disclosures eliminated this opportunity for asymmetric information.

The results also suggest that the criticisms regarding the actuarial method choice required by FAS 36 were well-founded. FAS 36 was criticized because salary projection is excluded in the calculation of pension obligation under the accrued unit benefit method, FAS 36's prescribed method. The resulting reported obligation is smaller than would ultimately be paid. The reported funded status (Plan Assets less a measure of the obligation) increased upon adoption of FAS 36 for almost all firms in my sample. However, the market's perception of the liability status was not altered except for overfunded plans for which no pension information was required to be reported prior to FAS 36.

These results lay the groundwork for future research in two broad areas. First, the effect

of other accounting measurement changes may be related to theoretical determinants of systematic risk and empirical tests of these relations conducted. Since accounting changes are costly, developing a body of research documenting the effect of these changes on the operating and financial leverage components of systematic risk may aid accounting promulgators in developing a theory regarding what measures the market appears to take seriously. In addition, revisiting early empirical work relating accounting measures and systematic risk in light of the recent developments in theoretical models of systematic risk may provide more insight regarding which aspects of firm's operating and financial leverage financial statement variables and ratios are capturing.

The study also lays the groundwork for examining the economic consequences of providing information about overfunded pension plans which apparently was unknown by the market previously. Given that pension plans are a potential source of financial slack, the disclosure of the existence of overfunded plans may have resulted in takeover attempts, changes in the funding strategy and terminations of plans. Future research into the effect of FAS 36 on such decision making would contribute to the body of research regarding the economic consequences of accounting changes.

The following section briefly reviews the theoretical and empirical literature regarding the economic determinants of systematic risk. Financial leverage is consistently shown to be positively associated with systematic risk in these studies. In particular, Dhaliwal (1986) documents a positive relation between incremental effect on leverage of unfunded vested benefits reported under APB 8 and systematic risk. This analysis provides the background for examining the effect of FAS 36 on systematic risk which is discussed in detail in chapter two. In particular, the method required to be used to measure pension obligations is compared to the accounting theory of a liability. From this analysis, the tests which are conducted are developed.

The second part of chapter two is a review of the extant literature regarding stock market

effect of FAS 36 and other studies which examine the effect of mandated accounting changes on systematic risk. The research design is presented in chapter three. The results are presented in Chapter four. Chapter five contains the limitations, extensions and conclusions.

1.2 SYSTEMATIC RISK

Under the CAPM, systematic risk is defined as:

$$\beta_i = \frac{cov(r_i, r_m)}{var(r_m)} \tag{1.1}$$

where $cov(r_i, r_m)$ is the covariance of firm i's return with the weighted average market portfolio's return and $var(r_m)$ is the variance of the market portfolio's return.

Considerable effort has been exerted to model the economic determinants of systematic risk. Modigliani and Miller (MM) (1958) first proposed that systematic risk is a function of firm leverage. Hamada (1969, 1972) and Rubinstein (1973) use the MM proposition to develop a model of the determinants of systematic risk. The model is further refined by Conine (1980) to include risky debt. The Hamada-Rubinstein-Conine (HRC) model is:

$$\beta_l = \beta_u + [(1-\tau)\frac{D_l}{E_l}] \times (\beta_u - \beta_d) \tag{1.2}$$

where β_l is the stockholders' equity beta of a levered firm, β_u is the stockholders' equity beta of an unlevered firm (or operating risk), τ is the effective tax rate for firm i, (D_l/E_l) is the firm's debt to equity ratio or financial leverage and β_d is the beta of risky debt or $cov(r_{debt}, r_m)/var(r_m)$.

1.2.1 Financial Risk

The positive relation between financial leverage and systematic risk is documented in

several studies including Beaver, Kettler and Scholes (1970), Hamada (1972), Gahlon and Gentry (1982) and Mandelker and Rhee (1984).

As mentioned in the introduction, this study extends Dhaliwal (1986) by examining the effect of FAS 36 disclosures on the market's evaluation of the financial leverage component of systematic risk. Dhaliwal is examined here to establish a relation between the market's assessment of financial leverage and the pension obligation. The tests conducted in this study assume that pension obligation is considered by the market to be a component of financial leverage. Conclusions regarding the market's use of FAS 36 disclosures depend upon the inclusion of pensions in firm valuation.

Dhaliwal (1986) selected fifty-five firms whose debt to equity ratio (averaged from 1976 through 1979) increased by ten percent or more when their unfunded vested benefit obligation as reported in their 10-K reports were included. Systematic risk is estimated using the market model using monthly returns over the period from January, 1976 through December 31, 1979. The three independent variables in the regression are the average debt to equity ratio excluding the unfunded vested benefit obligation, the change in the debt to equity ratio when the unfunded vested benefit obligation is included and accounting beta.

Dhaliwal measures debt using the book value of all liabilities and equity using the market value of common stock. Debt to equity ratio is averaged from 1976 through 1979. In order to compare the coefficients of change in leverage variable and the original debt to equity ratio, the unfunded vested benefit obligation is multiplied by one minus an estimate of the marginal tax rate when calculating the numerator of the leverage when the pension obligation is included. This adjustment is made because all of the contributions to pension funds are generally tax deductible whereas the principal repayment of debt is not. Market value of equity is reduced by the same variable added to the numerator. The change variable included in the regression is the difference between the leverage ratio with unfunded vested benefit obligation and the original leverage ratio.

Accounting beta is computed by determining the covariance of the individual firm's accounting return on assets with the average return on assets of the Standard and Poor's 400. Accounting beta is measured as the $Cov(AR_{it}, AR_{mt})/Var(AR_{mt})$ measured over the twenty year period ending December 31, 1983.

Dhaliwal reports that the debt to equity coefficients and change variable coefficients are approximately the same and marginally significant (t-values ranging from 1.66 to 2.00) in three different regressions using different tax rate calculations. Accounting beta coefficient is marginally significant (t-stats from 1.77 to 1.81) in all three models. The adjusted R square for the models ranges from .20 to .27.

In conclusion, Dhaliwal finds that in the APB 8 era the market appears to include unfunded vested benefit obligations in its assessment of systematic risk in a manner similar to other debt for firms where the unfunded vested benefit obligation has a significant effect on leverage.

1.2.2 Operating Risk

The HRC decomposition does little to explain cross-sectional differences in systematic risk due to causes outside of financial leverage. Theoretical models of the determinants of operating risk have been developed by Rubinstein (1973), Lev (1974), Subrahamyan and Thomadakis (1980), Jose and Stevens (1987) and Sun (1993). These models develop comparative statics based upon assumptions regarding the output market structure (Rubinstein and Lev assume a perfectly competitive structure, Subrahamyan and Thomadakis and Jose and Stevens assume a downward sloping demand curve) or cost structure (Lev and Jose and Stevens assume the firm is a price-taker in the labor market, Sun model assumes a less than perfectly competitive labor market).

Empirically, Sullivan (1978) and Jose and Stevens, among others, document a negative relation between market power and systematic risk.

Lev's analytical and empirical results conflict with Subrahamyan and Thomadakis and Jose and Stevens. Lev posits that the higher the operating risk (fixed costs divided by variable costs), the higher the firm's systematic risk. He documents that the lower the relative variable cost of a firm, the higher the firm's systematic risk for firms in the electric utility and steel industries. The relation is not statistically significant for oil producers.

In contrast, Subrahamyan and Thomadakis and Jose and Stevens analytical results predict that the higher the relative proportion of total cost attributable to labor compared to capital, the higher the company's systematic risk[1]. Jose and Stevens document a positive relation between their measure of operating leverage (number of employees divided by the book value of gross plant, property and equipment) and systematic risk.

Sun (1993) may reconcile these two perspectives by incorporating the firm's "pseudo" elasticity of substitution (PES) in the systematic risk model he develops. He concludes that depending upon the size of the firm's PES and the concavity of its competitor's reaction function, a change in the wage rate may increase, decrease or not change the systematic risk. Lev's industries are purposely quite homogeneous to control for technology differences, however, as a result their PES may be quite different from Jose and Stevens whose sample included firms from a wide range of industries.

In conclusion, financial leverage has been consistently shown to be positively associated with systematic risk and market power have been consistently shown to be negatively associated with systematic risk. Of special interest to this study, unfunded vested benefits appear to be included in the market's assessment of financial leverage.

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[1]Subrahamyan and Thomadakis and Jose and Stevens assume that the only factor inputs are labor and capital.

1.3 SUMMARY

The discussion in section 1.2 establishes two fundamental assumptions of this study. First, changes in financial leverage are related to changes in systematic risk. Second, the market includes pension obligations in its assessment of financial leverage and therefore in determining systematic risk. Chapter two discusses, in detail, the change in disclosure of pensions occasioned by FAS 36. From this discussion, the hypotheses tested in this study are developed.

Chapter Two

LITERATURE REVIEW

This chapter begins with the FASB's Conceptual Framework Project's definition of a liability, hereafter referred to as the **accounting liability**. The methods used to measure pension expense and pension obligation prior to FAS 36 and the FAS 36 requirements are contrasted with this definition. The conclusion of this discussion is FAS 36 disclosures, while not totally consistent with this definition, are closer to an accrual accounting based liability than the methods employed before FAS 36. From this discussion, the tests which are conducted are developed.

Statement of Financial Concepts No. 6 (FASB, 1985) defines a liability as the anticipated future sacrifice of assets, incurrence of a liability or rendering of service as the result of a past transaction or event. Employees are compensated for their efforts through immediate payment (salaries and current health insurance benefits, for example) and deferred payment (pensions and postretirement health insurance benefits, for example). The FASB's liability definition suggests that the liability owed an employee for pension benefits is incurred as the employee provides his services to the corporation.

2.1 ACCOUNTING AND REPORTING REQUIREMENTS PRIOR TO FAS 36

Prior to FAS 36, firms were required by APB 8 to report unfunded vested liability which is the difference between the actuarially computed obligation for vested benefits and the plan fund balance. As the following discussion suggests, only in limited circumstances, is this liability consistent with the FASB's liability definition.[2]

Benefit allocation methods determine the liability at a point in time based upon service credited to date. The FASB's liability definition requires that the liability is based on past

[2]For a more detailed discussion of actuarial cost methods, see Appendix A.

transactions or events. Credited service is a function of past years of service, therefore, benefit allocation methods result in liabilities which are theoretically close to the FASB's definition. Under cost allocation methods, the total projected liability is computed (including both credited service to date and expected future credited service) and funding is based upon a constant dollar or percentage of salaries. The liability reported under these methods is the present value of the allocated funding payments. The cost allocation methods do not attempt to relate service credited to date with the amount funded annually. The purpose of funding methods is to accumulate sufficient assets to settle the liability as it comes due. The cost allocation methods result in funding payments which are relatively constant (either absolutely or as a percentage of payroll). Benefit allocation methods tend to result in funding which increases over time.

In APB 8, the APB showed no theoretical preference for benefit allocation over cost allocation methods. In addition, firms generally reported pension expense and the unfunded actuarial liability based upon the method used for funding purposes (Francis and Reiter (1987)).

While benefit allocation methods are closest to the FASB's liability definition, most companies used cost allocation methods for both funding and accounting reporting purposes in the APB No. 8 era (Vanderhei and Joanette (1988)). Appendix B provides a discussion of the pension reporting requirements of the Accounting Principles Board, Securities and Exchange Commission and the Department of Labor prior to FAS 36 requirements.

2.2 FAS 36 REPORTING REQUIREMENTS

Following its endorsement of the accrued benefit method during Department of Labor hearings in 1978 (discussed in more detail in Appendix B), the FASB required the use of the accrued unit benefit method for reporting by individual plans (Statement of Financial Accounting Standards No. 35) and companies (FAS 36) in 1980. This section describes the FAS 36 reporting requirements and contrasts these with the APB 8 requirements.

FAS 36 requires disclosure of the pension liability calculated using one method for all

firms, the accrued unit benefit method--a benefit cost allocation method, which results in a liability entitled the accumulated benefit obligation. The accumulated benefit obligation is defined as:

"The actuarial present value of benefits (whether vested or nonvested) attributed by the pension benefit formula to employee service rendered before a specified date and based on employee service and compensation (if applicable) prior to that date. (FAS 87, Glossary)."

The disclosures that FAS No. 36 requires are:

a) The actuarial present value of vested accumulated plan benefits.
b) The actuarial present value of nonvested accumulated plan benefits.
c) The plans' net assets available for benefits.
d) Assumed rates of return used in determining the actuarial present value of vested and nonvested accumulated plan benefits.
e) The benefit information determination date.

FAS 36 does not have a direct income effect since it does not require the method used to compute pension expense to be changed.

While the accrued benefit method results in an estimate of the present value of benefits earned by employees at the valuation date, a criticism of the estimate is that the real liability is understated since future salary increases are not included in calculating the benefits credited. These benefits are used to compute the obligation's present value. Since defined benefit plans may base the benefit formula on a percentage of final pay or average career pay, the accumulated benefit obligation will consistently understate the liability at the plan valuation date.

In conclusion, while FAS 36 required more information to be reported regarding the liability and funding status of the pension obligation, the estimate itself is a biased one. Tests are conducted to document the direction of the change for firms which previously reported unfunded vested benefit obligations.

The existence of bias may not render FAS 36 disclosures useless since analysts apparently applied adjustment techniques to pension disclosures available prior to FAS 36. In its February 20, 1978, issue, Moody's Bond Survey (pp. 1613-1619), discusses the effect of

ERISA on the liability status of pension obligations and describes the measure of pension liability used in determining bond ratings. The wage inflation factor and the pension asset rate of return are "... two of the most important actuarial assumptions" (p. 1616) according to Moody's because the liability is highly sensitive to changes in either one. Moody's describes the public disclosure of these assumptions as "at best, minimal" prior to FAS 36 (p. 1616).

Prior to the issuance of FAS 36, Moody's used unfunded past service cost as reported in the annual report or SEC form 10-K as the basis for its pension liability calculation. The publicly available information was supplemented with "pertinent actuarial information [wage and interest assumptions] from corporate management on a continuous basis." (p. 1616). The information was used to "reveal whether or not the firm has realistically provided for its pension burden which, in turn, affects the quality of reported (current) earnings." (p. 1616). This article suggests that the market was adjusting the reported liability to a comparable basis, as much as possible.

FAS 36 disclosures may have exasperated the wage inflation information problem since wage inflation is not included in the accrued unit credit method computation. However, FAS 36 did provide information regarding assumed rates of return as well as information about the specific components of pension obligations and assets. As a result, it is unclear whether FAS 36 data would prove to be more useful than APB 8 data in assessing the size of a company's pension burden.

One set of tests documented below focuses upon firms which had established pension burdens according to APB 8 to determine the effect of requiring a uniform computation for all firms. If the market views the benefit allocation cost methods as measuring the liability accrued at a point in time better than the cost allocation methods, the observed change in systematic risk should be positively related to the change in the reported pension liability for firms which previously reported unfunded vested benefit obligations.

The second effect of FAS 36 was to provide pension related data for firms which previously reported no unfunded vested benefit obligation. These firms were either adequately or overfunded with respect to their pension plans. Given that the effect of FAS 36 is likely to reduce the reported pension obligation, these firms are likely to be overfunded under FAS 36. If FAS 36 provides information regarding firm assets which differs from the market's perception prior to FAS 36, then the market's assessment of financial leverage will be adjusted accordingly since the size of the firm's asset base (that is its total equity) differs from expectations. If assets are larger than expected, leverage declines and if they are smaller than expected, leverage increases. Tests are conducted for this subgroup to determine if the market considered this information relevant in assessing systematic risk.

2.3 LITERATURE REVIEW

This section reviews capital market research regarding the effect of FAS 36 disclosures and studies of the effect of other mandated accounting changes on systematic risk.

2.3.1 Studies of the Capital Market Effect of FAS 36 Disclosures

Durkee, Groff and Boatsman (1988) test the effect of FAS 36 on the stock market valuation of the liability. They frame the question being studied as examining the effect of providing publicly information which was previously only available privately at a cost. As discussed in Appendix B, the accrued unit benefit method based obligation was required to be reported to the government via form 5500 beginning in 1979. However, form 5500 is available to the public at a cost two or three years after filing[3]. Thus, during 1980, the information was only available privately from companies even though Durkee, et al. assume it was available

[3]The availability of form 5500 data was determined from discussions with officials of the Department of Labor's Disclosure Division. Form 5500 data is also disaggregated. Each plan submits a separate report. To determine the reported liability and asset balances at the corporate level, all plans for all corporate subsidiaries must be identified and copies of plan reports analyzed. Since corporations may establish separate plans for salary and hourly employees for each plant site, this is potentially a very time consuming task.

publicly at a cost. Durkee, et al. test for a structural change in the coefficients relating plan assets and vested and nonvested plan obligations between 1980, when they assume it was publicly available at a cost, and 1981 through 1983 when FAS 36 disclosures are available.

Abnormal returns are calculated monthly for 1980 through 1983 using the market model. Using the residual of this regression, the authors run the following regression for each year (p. 189),

$$u_{ij} = \delta_{j1} + \delta_{j2} ASSETS_{j1} + \delta_{j3} UB_{ij} + \delta_{j4} VB_{ij} + r_{ij} \qquad (2.1)$$

δ_{jk} is the regression parameter for year j, j= 1980-83.

$ASSETS_{ij}$ is the fair market value of plan assets of firm i disclosed in year j standardized by the value for firm i's equity at the beginning of year j.

UB_{ij} is the actuarial present value of nonvested accumulated plan benefits of firm i disclosed in year j, standardized by the value of firm i's equation at the beginning of the year j.

VB_{ij} is the actuarial present value of vested accumulated plan benefits of firm i disclosed in year j, standardized by the value of firm equity at the beginning of year j.

r_{ij} is the residual relating to firm i in year j.

The Chow test is conducted comparing 1980-1981, 1981-1982, etc. The 1980-81 results indicate that a structural change did occur from 1980 (when only form 5500 disclosures are available) to 1981 (when FAS 36 disclosures are available). The Durkee, et al. study indicates that something occurred between 1980 and 1981 which appears related to the pension disclosures available under FAS 36. Systematic risk and expected cash flow changes could account for the documented structural shifts in the parameters.

2.3.2 Studies Relating Accounting Pronouncements and Systematic Risk Changes

The purpose of this section is to review the major research papers which investigate the effect of an accounting pronouncement on market or systematic risk. The methodology and

results of these studies are related to the current study's research design issues.

Line of Business Disclosures

Collins and Simonds (1979) use the Rubinstein (1973, p. 178) model of the determinants of systematic risk to identify arguments supporting the possibility that reporting segmental revenue and profit assists investors in evaluating systematic risk. They conclude that the segmental revenue and profit disclosures required by the SEC could, albeit imperfectly, provide information regarding each of the determinants of segmental market risk.

Collins and Simonds (1979) test if 1970 SEC line of business disclosure requirements result in a change in systematic risk. Their work is inspired by perceived deficiencies in the testing procedures of Horwitz and Kolodny's (1977) study of the same issue. Horwitz and Kolodny found no effect on multisegment firms' market riskiness. Collins and Simonds correct for the Horwitz and Kolodny deficiencies by controlling for firms which disclosed segmental revenue and profit data prior to the 1970 SEC requirements and by employing a more powerful statistical procedure than Horwitz and Kolodny's.

The Chow or ANCOVA test results suggest a structural change in beta. The largest change is beta is documented for the group of firms which first reported segmental data under the SEC requirements. A smaller change is noted in the group which disclosed some of the information required by the SEC before the requirement. Little change in beta is documented for firms which reported segmental data before the SEC requirement and those without segmental disclosures before or after the requirements. Collins and Simonds (1979) results suggest that on average firm riskiness declined, consistent with their statement that "while LOB disclosures may induce upward revisions in assessed relative risk of certain firms, one might expect the average level of market risk for affected firms to be diminished overall because of reduced investor uncertainty about such firms" (p. 363).

Dhaliwal, Mboya and Barefield (1983) test whether operating risk changes occurred upon

adoption of FAS 14 "Financial Reporting for Segments of a Business" (FASB, December, 1976) which requires segmental asset disclosure, not required by the SEC. Using the Rubinstein (1973) model, Dhaliwal, et al. (1983) argue that segmental asset data, if not previously known by the market, would inform investors of the approximate proportion of firm wealth invested in each segment and would reduce the uncertainty regarding the output of each segment per dollar of wealth invested in the segment.

Dhaliwal, et al. (1983) focus on operating risk derived by rearranging Hamada (1972)'s equation. Dhaliwal, et al. (1983) empirically observe systematic risk, the effective tax rate and the debt to equity ratio and calculate operating risk. They summarize: "our results lend no support at all to the hypothesis that FAS 14 segmental disclosures caused market to reassess the operating risk of multisegmental firms" (p.95).[4]

The results suggest that the initial SEC line of business disclosure yielded more information useful in evaluating systematic risk than did FAS 14. Once segments are identified, analysts may be able to construct the segments' assets through observation. FAS No. 14 states that a need for segmental asset disclosure arose because "many business enterprises have broadened the scope of their activities into different industries, foreign countries, and markets" (para. 1). Dhaliwal, et al. (1983) may have found more compelling results if they had focused upon firms whose segmental assets are more difficult to observe (for example, research and development firms, firms with many foreign segments, etc.).

Leases

Finnerty, Fitzsimmons and Oliver (1980) investigate whether systematic risk "of the

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[4]Dhaliwal, et al. (1983)'s results may in part be due to the use of beta measured at the individual firm level instead of at a portfolio level since beta at that level exhibits nonstationarity. Shifts in beta may be difficult to measure because of this. In addition, the variables used to measure operating risk are subject to measurement error. A relatively small shift in operating risk may not be perceptible due to the measurement error.

companies that used leasing extensively was affected by ASR 147, the FASB's August, 1977, exposure draft on lessee accounting, and FAS 13 (Accounting for Leases)" p. 631. The authors report "Neither the SEC's ASR No. 147 nor the FASB's pronouncement had any effect" on systematic risk (p.637). The authors concede the methodology may not be powerful enough to detect a "small" shift in beta, but conclude such a shift "would probably have little economic significance for the capital markets" (p. 638). As suggested by Collins and Simonds (1979), beta non-stationarity may be a significant problem. The size of the measurement error of beta and its effect on the test results is an empirical question. Another problem with the study is the choice of test periods. As Collins and Simonds (1979) note, the market's adjustment of beta to particular information releases may overlap the periods over which beta is calculated if the time frame is uninterrupted. In addition, the period's are so long that firm's may adjust other aspects of their debt structure to compensate for leasing information as Imhoff and Thomas's (1989) results suggest.

Finnerty, et al. (1980) suggest that prior knowledge by financial analysts of the affect of leases on firms' capital structure may have resulted in lease information being incorporated within systematic risk before ASR 147 was issued. If this is the case, from an informational perspective, the study suggests the usefulness of such required disclosures is limited.

The current study includes control variables which may explain intertemporal changes in systematic risk or beta "nonstationarity".

Chapter Three

RESEARCH DESIGN

The research design section begins with a discussion of systematic risk measurement. In section 3.2, tests examining the effect of FAS 36 on systematic risk are described and the approach undertaken to control for the level of FAS 36 information already acquired and used by the market before the issuance of FAS 36 is discussed.

3.1 THE RETURN GENERATING PROCESS

The market model is used to compute estimated systematic risk or beta. The market model is:

$$R_{it} = a_i + b_i \tilde{R}_{mt} + \tilde{e}_{it} \tag{3.1}$$

where:

R_{it} is the daily return reported by CRSP adjusted for dividends.

R_{mt} is the value weighted daily market return reported by CRSP adjusted for dividends.

This model is estimated twice: once prior to FAS 36 data availability and then immediately after FAS 36 data availability. The model is estimated using the 200 daily returns ending on March 31, 1980, to estimate beta prior to FAS 36 disclosures. Since FAS 36 was effective for years ending after December 15, 1980, the annual report for firms reporting under FAS 36 is first available on or before March 31, 1981, the 10-K report deadline for December 31 year-end firms. FAS 36 data should be reflected in stock prices after March 31, 1981. Accordingly, post-change beta is computed using the market model with 200 daily returns beginning on March 31, 1981.

3.2 EMPIRICAL ADAPTATION OF THE HAMADA-RUBINSTEIN-CONINE MODEL

This section presents a model which attempts to control for factors other than FAS 36 which could influence systematic risk and describes the empirical measures used to implement the model.

The model used to test the effect of FAS 36 disclosures on systematic risk is:

$$DIFF_i = \delta_1 + \delta_2 FSLR_i + \delta_3 CR_i + \delta_4 SA_i + \delta_5 CGS_i + \delta_6 PE_i + e_i \qquad (3.2)$$

where:

DIFF is the change in beta from the pre to post FAS 36 period.

FSLR is the change in the reported pension obligation divided by total assets.

Control variables [CR, SA, CGS and PE] are defined in more detail in section 4 represent variables which could result in a shift in beta according to the economics and finance literatures.

The following summarizes the measurement and rationale for including each variable in the model.

3.2.1 Pension Liability Measurement Issues

This section describes the measurement of the change in reported pension liability to equity ratio and the other debt to equity ratios which when combined equal the total change in financial leverage used in the model. First, measurement of the change in the reported pension liability is discussed, then the measurement of the change in other debt is described and, finally, measurement of the denominator, equity, is described.

3.2.2 Pension Obligation

As discussed in Chapter 2, APB 8 required reporting the "excess, if any of the

actuarially computed value of vested benefits over the total of the pension fund and any balance sheet pension accruals, less any pension prepayments or deferred charges" (para. 46) in the financial statement footnotes. APB 8 did not require an adequately funded or overfunded firm to report the amount of overfunding. Using the data contained in FAS 36 disclosures, the funded status of the pension obligation is computed for all firms with defined benefit pension plans including those which did not report an obligation under APB 8.

To control for changes in the pension obligation aside from adopting FAS 36, Pension Expense to Number of Employees (PE) ratio is included in the regression. As Francis and Reiter (1987) note, pension expense did not differ from cash contributions to the pension fund for a majority of their firms. Accordingly, the change in pension expense scaled by the number of employees between the two time periods is included in the model to control for changes in the obligation due to expense changes.

3.2.3 Other Liability Measures

As discussed in more detail in the comments on the results of Tables 5 through 7, the coefficient of financial leverage (measured using the total of creditor and preferred stockholder claims superior to common stockholders) is positive and significant when used in models attempting to explain the level of systematic risk, but changes in financial leverage measured in this way are not significantly associated with changes in systematic risk. The change in the current ratio is used to measure short term changes in liquidity which may affect systematic risk.

3.2.4 Firm Value

Firm value is measured as the book value of total assets. Theoretically, the denominator in the leverage calculation is total firm market value (equity and debt). Debt market value is difficult to measure because most company debt is private. Equity market values are inappropriate because systematic risk is endogenous to equity market value. By including equity market value in the denominator of the financial leverage ratios, systematic risk is in effect

included in both the dependent and independent variable which could result in a spurious correlation. Market value can differ from book value because historical cost is used to value inventories and plant, property and equipment and because intangible assets (such as expected growth opportunities) which are either not reported on the books or significantly underreported.

Inventory and plant, property and equipment book values could be adjusted for inflation through FAS 33 disclosures; however, intangible asset values would still be missing. In addition, only large firms were required to report FAS 33 data, such data is only available for a subsample of firms. While the book value of assets is a biased estimate of asset value, it is subject to less estimation error that FAS 33 disclosures.[5] Accordingly, the book value of total assets is used here as to measure total firm value because the cost of hand collecting FAS 33 data is considered to be much greater than the potential modest improvement in measuring firm value.

3.3 SAMPLE SELECTION CRITERIA

The principal data sources for this study are the Center for Research of Security Prices (CRSP) Daily Returns Tapes (NYSE and AMEX, and NASDAQ) and Standard and Poor's Compustat Annual and Research Tapes (1989 version). The preliminary sample includes firms with sufficient returns to estimate systematic risk using the market model in the two time frames. Compustat must report sufficient data to compute variables included in the various models which are tested. Since some models require fewer variables, the number of firms included in the models varies. The preliminary sample for each time period is reported in Table 1, Panel A. In the transition period, 1,533 firms have sufficient returns to estimate systematic risk for the 200 day period ending March 31, 1980 and the 200 day period beginning March 31, 1981. As reported in Table 1, Panel B, 767 of the 1,533 firms first reported the present value of vested benefits, a variable required to be reported under FAS 36, in their 1980 annual report. Another

[5]In 1986, the FASB rescinded most of FAS 33 requirements due to the cost of the disclosures exceeding the perceived benefit.

259 firms began reporting under FAS 36 guidelines during 1981. The remaining 507 firms did not report FAS 36 data in 1980 through 1982.

Table 1
Panel A
CRSP Firm Selection Screens

	Maximum no. of firms on 1990 CRSP daily and 1989 Compustat tapes	Firms Meeting CRSP date requirements
Annual Compustat (1989)	2332	1135
Research Compustat (1989)	1605	455
Total	3937	1590

CRSP Date Requirements:
To ensure adequate returns to estimate the market model for the test period, firms with beginning CRSP dates later than 1/1/76 and ending dates earlier than 12/31/82 are eliminated from the sample.

Table 1
Panel B
Compustat Firm Selection Screen

	Firms with Sales on Compustat for 76-85. and 1989 Compustat tapes	December 31 year-end firms
Annual	1087	675
Research	430	216
Total	1517	891

Compustat Requirements:
To compute averages for variables, firms for which no data is reported from 1976 through 1983 are deleted. Since sales is a variable most firms must report, it is used as the initial screen.

Table 1
Panel C
Firms Reporting PBVB*
vs. Firms Not Reporting PBVB

	No. of Firms
PBVB Reported in 1980	767
PBVB first reported after 1980 (in 1981)	259
PBVB not reported in 80-82	507
Total	1533

* PBVB is the present value of the vested benefit pension obligation which is required to be reported by FAS 36.

The firms are further divided into groups based upon the amount of pension information available prior to FAS 36. Firms which adopted FAS 36 are divided into three categories: 1) firms whose average reported unfunded vested benefits for the period 1975 through 1979 was positive (Group 1) 2) firms whose average reported unfunded vested benefits were zero for the period 1975 through 1979 (Group 2) and 3) firms for which Compustat reported missing values for unfunded vested benefits for the period 1975 through 1979 (Group 3). The non-adopters are divided into two categories: 1) firms which reported pension expense in each year from 1975 through 1979 and reported no unfunded vested benefits (Group 4) and 2) firms which did not report pension expense in any year from 1975 through 1979 (Group 5).

Since the five categories require firms to either report or not report pension expense and / or unfunded vested benefits in each year from 1975 through 1979, 237 of the original sample are excluded from this initial screen.

Chapter Four

RESULTS

The analyses reported in Tables 2 through 14 are discussed here. A positive and statistically significant relation is documented between FAS 36 disclosures and the change in systematic risk during the adoption time period for relatively overfunded firms previously reporting zero or not reporting unfunded vested benefits. No significant relation is documented for firms previously reporting unfunded vested benefits under APB 8 which suggests that the method used to compute pension obligations was not considered relevant in determining systematic risk for these firms.

4.1 DESCRIPTIVE DATA ON SAMPLE FIRMS

This section discusses Table 2: Means and Medians of Descriptive Statistics. The table reports the means (Panel A) and medians (Panel B) for operating, investment and financing variables for the five subgroups of firms. Recall that Groups 1 through 3 are the FAS 36 adopters grouped according to the level of pension funding status information available prior to FAS 36 disclosures, Group 4 includes firms which reported pension expense prior to FAS 36, but whose FAS 36 data is reported as missing by Compustat and Group 5 are firms which reported no pension expense prior to FAS 36 and whose FAS 36 data is reported as missing by Compustat. Panel C reports the industry distribution of each subgroup.

Table 2
Panel A
Means of Descriptive Statistics

Variable	Group 1 (a)	Group 2 (b)	Group 3 (c)	Group 4 (d)	Group 5 (e)
BETA1	.919 d	.969 d	.915 d	.589 a,b,c,e	1.053 d
BETA2	.780 d,e	.843 d	.810 d	.590 a,b,c	.966 a,d
DIFF	-.138 d	-.126 d	-.105 d	.002 a,b,c	-.087 d
EPS	2.130 b,c	2.039 a	1.749 a	1.633 e	.930 a,b,c,d
SALES (in millions)	1703.5 b,c,d,e	1281.5 a,e	1111.7 a,e	757.4 a,e	302.0 a,b,c,d
ASSETS (in millions)	1315.3 b,c,e	970.1 a,d,e	784.4 a,d,e	1551.1 b,c,e	269.2 a,b,c,d
MARKET VALUE (in millions)	755.1 c,e	670.7 e	492.4 a,d,e	423.1 c,e	215.6 a,b,c,d
DEBT/TA	.504 d	.505 d	.503 d	.562 a,b,c,e	.499 d
EE/PLANT	.062 d,e	.064 d,e	.055 d,e	.031 a,b,c,e	.097 a,c,d
MSHARE	.160 b,c,d,e	.100 a,d	.128 a,d,e	.037 a,b,c,e	.080 a,c,d
PENSION EXP./SALES	.014 b,c,d	.008 a,d	.010 a	.010 a,b	NA
R&D/SA	.018 (N=169)	.024 (N=71)	.020 (N=111)	.018 (N=20)	.017 (N=39)
ADV. EXP/SA	.026 (N=117)	.025 (N=60)	.032 (N=95)	.032 (N=30)	.035 (N=51)
CAPITAL EXP. (in millions)	138.4 c,d,e	113.1 d	79.2 (N=234) a,d,e	180.8 a,b,c,e	32.6 a,c,d
NUMBER	289	140	235	165	121

Table 2
Panel B
Medians of Descriptive Statistics

Variable	Group 1 (a)	Group 2 (b)	Group 3 (c)	Group 4 (d)	Group 5 (e)
BETA1	.879 d	.873 d	.783 d	.416 a,b,c,e	.984 d
BETA2	.720 d,e	.741 d	.737 d	.470 a,b,c,e	.937 a,d
DIFF	-.148 d	-.141 d	-.105 d	.006 a,b,c	-.072
EPS	1.654 b,c,e	1.180 a,d,e	1.217 a,d,e	1.521 b,c,e	.673 a,b,c,d
SALES (in millions)	1703.5 b,c,d,e	255.4 a,e	298.2 a,e	398.2 a,e	88.2 a,b,c,d
ASSETS (in millions)	384.1 b,c,d,e	205.5 a,d,e	205.4 a,d,e	753.8 a,b,c,e	53.6 a,b,c,d
MARKET VALUE (in millions)	192.6 c,e	134.1 e	125.3 a,d,e	238.7 c,e	30.6 a,b,c,d
DEBT/TA	.499 d	.515 d	.500 d	.590 a,b,c,e	.511 d
EE/PLANT	.049 d,e	.050 d	.047 d,e	.003 a,b,c,e	.065 a,c,d
MSHARE	.068 b,c,d,e	.025 a	.041 a,d,e	.016 a,c	.016 a,c
PENSION EXP./SALES	.011 b,c,d	.007 a,d	.008 a	.009 a,b	NA
R&D/SA	.013 (N=169)	.017 (N=71)	.012 (N=111)	.005 (N=20)	.009 (N=39)
ADV. EXP/SA	.017 (N=117)	.019 (N=60)	.020 (N=119)	.016 (N = 30)	.017 (N=51)
CAPITAL EXP.	30.9 c,d,e	19.4 d	18.8 (N=234) a,d,e	78.9 a,b,c,e	3.6 a,c,d
NUMBER	289	140	235	165	121

Table 2 (continued)

Note: The lower-case letters under the medians and means reported in Panels A and B indicate that the difference between the variable values for that group of firms (for example, Group 1) and another group of firms is significant at or below .01. The Wilcoxon Two Sample Test was used for the means (Panel A) and the Median Two Sample Test was used for the medians (Panel B). Both are nonparametric tests.

a-Group 1-UVB greater than zero in APB 8 era
b-Group 2-UVB equal to zero in APB 8 era
c-Group 3-UVB missing in APB 8 era
d-Group 4-Pension expense reported in both eras, FAS 36 data not reported
e-Group 5-Pension expense not reported in either era

For example, in Panel A, DIFF under Group 1 the letter "d" appears. This indicates that according to the Wilcoxon Two sample test, the mean change in beta (or DIFF) for this group is different from the Pension Expense (Group 4) only group at the .01 level.

Table 2 Variable definitions

DIFF: BETA2 - BETA1

BETAJ: the estimated coefficient resulting from regressing R_{it}, firm i common stock return for day t, on R_{mt}, the value weighted stock market index return for day t, using a 200 day estimation period.
J=1 for the 200 day period ending March 31, 1980.
J=2 for the 200 day period beginning March 31, 1981.

The three-year averages (1978 through 1980) of the following variables are reported in TABLE 2.

EPS: EARNINGS PER SHARE = (INCBEXT - DIVP)/COMMON SHARES OUTSTANDING where INCBEXT is income before extraordinary items and DIVP is preferred dividends.

SALES: book value of sales, in millions

ASSETS: book value of total assets, in millions

MARKET VALUE: MARKET VALUE OF COMMON SHARES AT YEAR-END which is computed by multiplying the market price per common share at year-end by the common shares outstanding at year-end.

DEBT/TA: FINANCIAL LEVERAGE = (CL + LTD + DFT + CD + PFSTK)/TA where CL is current liabilities, LTD is long-term debt, DFT is deferred taxes, CD is convertible debt, PFSTK is preferred stock and TA is total assets. The book value is used to measure all of these variables.

EE/PLANT: Number of employees divided by the gross book value of total plant, property and equipment.

MSHARE: Market share which is computed by dividing net sales by the total net sales of the 3 digit SIC Code industry the firm is included in.

PENSION EXP/SA: Total pension expense divided by sales.

Table 2 (continued)

R&D/SA:	Research and development expense divided by sales.
ADV EXP/SA:	Advertising expense divided by sales.
CAPITAL EXP:	Capital expenditures, in millions.

Table 2
Panel C
Descriptive Statistics: Two Digit SIC Distribution

Industry Description	Group 1	Group 2	Group 3	Group 4	Group 5
Agriculture, Forestry and Fish Products (SIC 0-9)	0%	0%	.3%	0%	0%
Mining (SIC 10-14)	2.4	5.7	8.1	3.6	9.9
Construction (15-19)	0	0	.7%	1.2	3.3
Manufacturing (20-39)	77.8	58.6	69.4	17	52.9
Transportation and Utilities (40-49)	5.2	7.1	6.5	65.5	6.6
Wholesale Trade (50-51)	2.1	2.9	5.1	1.8	5
Retail Trade (52-59)	6.9	12.9	5.1	6.1	9
Financial Institutions, Insurance, and Real Estate (60-69)	2.8	5.7	3.4	1.8	5
Services (70 +)	2.8	7.1	1.4	3	7.5
Totals	100%	100%	100%	100%	100%

Note: The percentage of firms in each 2 digit SIC code classification is presented here for each subgroup of firms.

The latter two groups are included in this discussion to assess the merits of including them in analyses as control firms and to determine the relative similarity of the three adopter groups with respect to their operating and financing characteristics. The results of the analysis, detailed below, suggest that adopters operating, investment and financing characteristics are similar while the nonadopters are dissimilar with respect to these variables from each other and from the adopters. This provides assurance that reported differences in the association of risk changes with FAS 36 data documented in subsequent analyses is due to FAS 36 data rather than a correlated operating or financing characteristic not directly controlled. Unless otherwise noted, each variable's median is discussed.

4.1.1 Risk

BETA2 is systematic risk estimated for the adoption year and is calculated using the market model over the 200 day trading period beginning March 31, 1981. BETA1 is calculated for the 200 day trading period ending March 31, 1980. DIFF, the difference between BETA1 and BETA2 measures the change in estimated risk during the period in which FAS 36 is adopted.

Systematic risk decreased over the FAS 36 adoption period in Groups 1,2,3 and 5. Group 4's risk increase is negligible. The adoption groups' mean and median risk are not statistically different from one another in either time period. Group 5's risk while not generally statistically different from the adopter groups in either regime, is higher on average in both time periods than the adopter groups. Group 4's average systematic risk is .589 and .590 in the before and after FAS 36 time periods suggesting that these firms operating characteristics are quite different from the other four groups. Approximately, 65% of Group 4 firms are utilities compared to between 5.2 and 7.1 percent of the other four groups according to Table 2, Panel C. The systematic risk documented here is consistent with utilities. Given that utilities production, operating and financing characteristics are quite different from the other groups, Group 4 is discussed in a limited fashion subsequently. Group 5 firms are also considerably

different from the adopter groups in sales, profit, total assets and market value. The discussion of the remaining firm operating, investment and financing variables focuses upon the adopter groups.

4.1.2 Size Differences

Three alternative size measures are employed: Sales, book value of assets and market value of common stock. Group 1 firms are the largest according to all three size variables. Median sales and total assets are statistically larger than Groups 2 and 3. Groups 2 and 3 are similar to each other with respect to size. Their median total assets are nearly identical at $205.5 and $205.4 million. Median sales are $255.4 and $298.2. Median common stock market value is $134.1 and $125.3.

4.1.3 Profitability

Group 1's median earnings per share, $1.65, is statistically significantly larger than Groups 2 and 3, $1.18 and $1.22.

4.1.4 Financial Leverage

Debt is defined as the book value of all claims to net assets which are superior to common stock. On this basis, Group 2 is the most highly levered at 51.5% of the book value of total assets compared to Groups 1 and 3 which are nearly identical at 49.5% and 50%.

4.1.5 Operating Leverage

This variable is used by Pinches, et al. (1987) to represent operating leverage. In this context it provides information regarding the relative importance of labor compared to capital in the company's production technology. The three adopter groups are similar with respect to employees per million dollars of gross plant investment. Group 1 has 49 employees per million, Group 2 has 50 employees per million and Group 3 has 47 employees per million. In contrast, Group 4 has 3 only employees per million and Group 5 has 65 employees per million. The Pension Expense/Sales ratio is greatest for Group 1 at 1.1% of sales compared to .7% and .8%

for Groups 2 and 3. Given the operating leverage number, either Group 1 employees are paid more overall because of different required skill levels and/or receive more of their total wages in the form of deferred compensation than the two other groups.

4.1.6 Market Share

Market share is computed by dividing the firm's sales by the total sales of the firm's 3-digit SIC code. Group 1's median market share is 6.8% compared to 2.5% for Group 2 and 4.1% for Group 3.

Market share is a surrogate measure for output market power. As Jose and Stevens (1987) demonstrate analytically and empirically, market power is inversely related to systematic risk. Companies with market power can attenuate the influence of economic fluctuations compared to similar companies without such market power. As Anthony, et. al. (1993) demonstrate, firms which are in the mature stage of the firm's life cycle tend to have higher market share and relatively lower systematic risk. Using data supplied by Anthony and Ramesh (1992), for 182 out of the 201 Group 1 firms included in the regressions (Tables 3 through 8), mean (median) age is 73.4 (71) years. For 82 of 103 Group 2 firms mean (median) age is 57.6 (53) years. For 156 of 176 Group 3 firms, mean (median) age is 64.7 (64.5) years. The market share numbers are consistent the Anthony, et. al. results. Group 1, the oldest firms, have the largest median market share, 6.8%, Group 3, the middle age firms, have a median market share of 4.1% and Group 2, the youngest firms, have the lowest median market share, 2.5%.

Group 1 firms also report the largest EPS of any of the groups. A portion of the difference could be due to the historical cost principle since these older firms may have older equipment purchased when the price level was lower which are either fully depreciated, but still in service, or whose depreciation is lower due to the lower initial purchase price. The ratio, (PPETG - PPETN)/PPETG, or DEPNET is computed which represents the proportion of total book plant and equipment book value depreciated. Group 1 median DEPNET is .425, Group 2's

is .37 and Group 3's is .39. This data supports the notion that Group 1 firms may have relatively more plant which is either fully depreciated or nearly fully depreciated. Thus, EPS could be inflated because of this accounting artifact. However, it is unlikely to be the sole reason for the 48 cent and 44 cent difference per share compared to Groups 2 and 3.

If EPS is reflective of future cash flows, one would expect that the systematic risk of such a firm would, ceteris paribus, be lower than other similar firms. The market share result also would suggest that risk should be lower for Group 1 than Groups 2 and 3. However, BETA1 is slightly higher for Group 1 than Groups 2 and 3 and BETA2 is slightly lower. While the exact effect of higher EPS and market share on systematic risk is not known, the risk of Group 1 firms is expected to be lower than the other two groups. An explanation of the difference may be related to the existence of large levels of unfunded pension liabilities.

Table 3 reports the pension obligation, asset and expense variable results of the three groups. Group 1 firms have the largest unfunded vested benefits as a function of the book value of total assets.

4.1.7 Research and Development and Advertising

None of the differences is statistically significant among the five groups. Interestingly, firms rarely report both Research and Development Expense and Advertising Expense. 58.5% of Group 1 firms report R&D and 40.5% report Advertising. Fewer Group 2 and 3 firms report R&D (50.7% and 47.2%). More Group 2 and 3 firms report Advertising Expense (42.9% and 50.6%). These results suggest that the product concentration of the groups may be different. For example, consumer product firms typically spend more on Advertising than do durable goods manufacturers. These results suggest that more Group 3 firms are consumer products firms than the other two groups.

While more Group 1 firms report research and development, Group 2 firms median spending is 1.7% of sales compared to 1.3% and 1.2% for Groups 1 and 3. This suggests that

Group 2 firms are relatively more technology oriented or have more money to spend on research and development. Even though these firms EPS is the lowest of the three adopter groups, they have the highest financial leverage ratio (51.5%), suggesting that they may have more growth investment opportunities than the other two groups which may require loans. Notice that Group 2 firms risk is approximately the same as the other two groups in both time frames, despite relatively higher financial leverage and lower earnings per share and market share. Higher financial leverage is associated with higher risk and lower market share suggests lower market power and therefore higher risk. Relatively higher research and development costs suggest that excess cash may be generated. The size of the overfunded pension plan may also be an avenue for "storing" financial slack to invest in future growth opportunities.

Group 2 firms also have the highest median capital expenditure to sales ratio, 6.8% compared to 5.8% for Group 1 and 5.5% for Group 3.

4.1.8 Summary

In summary, Groups 1 through 3 are quite similar with respect to their operating, investment and production characteristics. Among these three groups, Groups 2 and 3 are the most similar. The analyses which follow usually combines Groups 2 and 3 because of their similar underlying economic characteristics.

4.2 TEST OF HAMADA-RUBINSTEIN MODEL ADAPTATION

Table 3 reports the results of regressing BETA2 (beta estimated when FAS 36 data is available) on several variables which surrogate for various aspects of systematic risk as described below. The purpose of this regression is to determine how well the model without pension related data explains systematic risk levels. The model explains approximately the same amount of variation in systematic risk for both groups, Adjusted R^2 for Group 2 and 3 is 9.4 % compared to 9.1% for Group 1. The variable coefficients and significance levels are similar.

Table 3
Test of Systematic Risk Model

$$BETA2_i = \delta_1 + \delta_2 DE_i + \delta_3 DET_i + \delta_4 MSAVG_i + \delta_5 MS^2{}_i + \delta_6 CE_i + \delta_7 PE_i + e_i$$

Variable (Predicted Sign)	Groups 2 and 3 Coefficient (T-STAT) (N=270)	Group 1 Coefficient (T-STAT) (N=199)
Intercept	.705*** (7.528)	.413*** (3.408)
DE (+)	.512 ** (2.851)	.756*** (3.564)
DET (-)	-.455 (-1.489)	.032 (.342)
MS (-)	-.241 (-.593)	.022 (.057)
MS^2 (+)	.314 (.668)	.069 (.147)
CE (?)	.0005*** (4.582)	.0002** (3.214)
PE (?)	-7.782 * (-2.329)	-3.667 (-1.159)
ADJUSTED R^2	.094	.091

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Variable Descriptions

BETA2: Market model estimate of systematic risk measured after FAS 36 adoption. The model is estimated using 200 daily stock returns provided by CRSP beginning on March 31, 1981. A value-weighted market index is used.

DE: Debt to Equity Ratio = (CL + LTD + DTITC + CSPRSTK)/TA where CL is current liability balance, LTD is long-term debt, DTITC is the balance sheet balances of deferred taxes and investment tax credit and CSPRSTK is the total convertible debt and preferred stock book value balance). TA is the book value of total assets. In this model, the DE ratio is the average of 1978, 1979 and 1980 DE ratios measured using annual report data provided by Compustat.

DET: Debt to Equity Ratio * Tax Rate Interaction = DE average * TAXRATE. TAXRATE = Total Income Tax (Federal, State and Local)/(Income before Extraordinary Items + Income Tax) measured using 1980 numbers.

Table 3 (continued)

MS:	Market Share = SA/(SIC3 Total SA) averaged over 1978 through 1980 where SA is net sales, SIC3 Total SA is the total sales for the three digit SIC code for the same year that firm SA is reported.
MS^2:	Market Share Squared.
CE:	Capital Expenditure on PPE averaged over 1978 through 1980.
PE:	Pension Expense/Sales averaged over 1978 through 1980.

Debt to equity ratio (DE) is the financial leverage surrogate variable. Debt is defined as the book value of all claims to company resources which are superior to common stock. Current and long-term liabilities, deferred taxes, convertible debt and preferred stock are included in the numerator of DE. Equity is defined as the book value of total assets.

Hamada (1972) measures financial leverage using market values. In this study, book values are used for practical and modelling reasons. First, market values of most debt securities are not available and gathering preferred stock market values, if available, is very time consuming. Since particularly with respect to debt, analysts would not have ready access either to these market values, this measure of debt is a reasonable surrogate. Second, the book value of total assets is used to represent the market value of the firm instead of combining the book value of debt and market value of common stock. Since beta is a determinant of the level of a common stock's market value, a spurious correlation could result in regressions with beta as the dependent variable and DE as an independent variable.

Since DE is a noisy measure of leverage, the results should be biased against finding an association. The Hamada model predicts a positive association between leverage and systematic risk. In Table 3, DE's coefficient is positive and statistically significant for the combined Groups 2 and 3 and Group 1 as predicted.

DET is the interaction term of DE and the 1980 tax rate. The tax rate is a constructed number: total income tax expense reported by Compustat divided by the sum of income before extraordinary items and total income tax expense. According to the Hamada (1972) model, the effect of debt on risk is attenuated by the deductibility of interest. A negative coefficient is predicted by the model. For combined Groups 2 and 3, DET's coefficient is negative, however, not statistically significant. For Group 1, the coefficient positive, but very small and statistically insignificant.

MS represents market share and is measured by dividing net sales by the total sales of

the applicable three digit SIC-Code. While MS is an imperfect measure of market share because SIC classifications may not provide an accurate market definition, the variable may still capture overall market power. Market power attenuates systematic risk according to Jose and Stevens (1987) analytical and empirical results.[6] Jose and Stevens (1987) document that the market power / systematic risk relation is not monotonic, but is best modeled by including a squared term as well, hence MS^2 is included in the model.

For Groups 2 and 3, the MS and MS^2 coefficients' signs are negative and positive, as predicted, although not statistically significant. For Group 1, MS and MS^2 appear to explain little of systematic risk level.

The capital expenditures (CE) coefficient is positive and statistically significant for both groups. This result suggests that firms which are more heavily invested in tangible, plant assets are riskier. A possible explanation for this result is since such an investment is not very liquid, such firms are locked into their investment strategies for longer time frames than other firms with more liquid and therefore more flexible investment strategies.

The pension expense to sales (PE) coefficient is negative and statistically significantly associated with risk for Groups 2 and 3, and negative, but not significant for Group 1. Pension expense may be inversely associated with the level of systematic risk due to a combination of factors. First, firms which are more labor intensive (and have higher pension expense as a percentage of sales) may have more flexibility to adjust their investment strategies than firms which are relatively more capital intensive. Secondly, pension expense is typically paid in the period in which it is expensed because of the tax benefits associated with pension funding. If a company chooses to fund its expense immediately, its future obligation is lower and therefore its

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[6]Utilities may be near monopolies in their geographic areas and this is not recognized in the SIC codes, MS is likely to be a poor measure of market power for utilities. As a result, utilities are excluded from the further analyses.

risk would be lower.

In summary, approximately the same degree of variation in the level of systematic risk is explained by the model for the two groups examined. These groups appear to be matched reasonably well with respect to the variables influencing systematic risk. When FAS 36 data is added to the models, differences in the FAS 36 obligation coefficient direction and significance levels are likely to be due to the pension related information being disclosed.

4.3 PENSION OBLIGATION, ASSET AND EXPENSE VARIABLE DESCRIPTIVE STATISTICS

Table 4 reports the mean and median pension obligation, asset and expense variables for 1980 (FAS 36 adoption year) and 1979. All variables are expressed deflated by total assets except for pension expense which is deflated by net sales. Data reported for variables $VBLR_t$ through $PESA_{t-1}$ are the means and medians for reported pension data for 1980 (t) and 1979 (t-1). Data reported for $FSCHG_t$, $VGSCHG_t$, and $PECHG_t$ are the means and medians for differences in reported total benefit funded status, vested benefit funded status and pension expense to net sales from 1979 to 1980.

Table 4
Descriptive Statistics
Pension Obligation, Asset and Expense Variables
1980 and 1979

Variable	Group 1 Mean (Median) N=201	Group 2 Mean (Median) N=108	Group 3 Mean (Median) N=179
$VBLR_t$	.157 (.126)	.057 (.042)	.103 (.070)
$NVBLR_t$	.014 (.010)	.010 (.005)	.012 (.007)
NAR_t	.148 (.122)	.077 (.061)	.101 (.081)
$FSLR_t$	.023 (.013)	-.011 (-.008)	.014 (.001)
$VFSLR_t$	.009 (.005)	-.020 (-.015)	.002 (-.004)
$UVBLR_{t-1}$	.040 (.020)	0 (0)	N/A
$PESA_t$	.015 (.013)	.009 (.007)	.011 (.008)
$PESA_{t-1}$	.015 (.013)	.009 (.008)	.011 (.009)
$FSCHG_t$	-.017 [a] (-.004)[a]	-.011 [a] (-.008)[a]	N/A
$VFSCHG_t$	-.031 [a] (-.014)[a]	-.02 [a] (-.015)[a]	N/A
$PECHG_t$	-.00004 (.00002)	.00002 (-.00004)	-.00038 [a] (-.00020) [a]

Notes:

1. Group 1 includes firms which reported Unfunded Vested Benefits in each year from 1977 through 1979. Group 2 includes firms whose Unfunded Vested Benefits were zero in each year from 1977 through 1979 according to Compustat. Group 3 includes firms whose Unfunded Vested Benefits were missing in each year from 1977 through 1979 according to Compustat, but which adopted FAS 36 in 1980.

2. Tests of the significance of the difference of the CHG variables (FSCHG, VFSCHG and PECHG) from zero are conducted. The parametric (t-test) and non-parametric (Wilcoxon sign rank test) test results agreed qualitatively in all cases.
P-value significance is denoted as follows: .001 is denoted by a, .01 denoted by b, and .05 denoted by c.

Table 4 (continued)

Variable Definitions

General Note: t refers to 1980, t-1 is 1979.

$VBLR_t$: Vested Benefit Obligation Leverage Ratio = PBVB/TA where PBVB is the vested benefit obligation reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year-end.

$NVBLR_t$: Nonvested Benefit Obligation Leverage Ratio = PBNVB/TA where PBNVB is the nonvested benefit obligation reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year-end.

NAR_t: Pension Asset Ratio = PBNA/TA where PBNA is the pension net asset balance reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year-end.

$FSLR_t$: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested and nonvested benefit obligations and PBNA is the pension fund net asset balance reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year-end.

$VFSLR_t$: Vested Benefit Funded Status Leverage Ratio = (PBVB - PBNA)/TA. PBVB and TA are defined above.

$UVBLR_{t-1}$: Unfunded Vested Benefit Leverage Ratio = $(UVB/TA)_{t-1}$ where UVB is the Unfunded Vested Benefit balance reported under APB 8 requirements in 1979. TA is the book value of total assets measured at 1979 fiscal year-end.

$PESA_{t,\,t-1}$: Pension Expense to Net Sales Ratio = $(PE/SA)_{t,t-1}$ where PE is Pension Expense and SA is net sales at t=1980 and t-1=1979.

$FSCHG_t$: Change in Reported Pension Funded Status = $FSLR_t$ - $UVBLR_{t-1}$.

$VFSCHG_t$: Change in Reported Unfunded Vested Benefit Status = $VFSLR_t$ -$UVBLR_{t-1}$.

$PECHG_t$: Change in Reported Pension Expense from 1979 to 1980 = $PESA_t$ - $PESA_{t-1}$.

In 1980 (FAS 36 adoption year), Group 1's reported vested benefit obligation is 12.6% of the book value of total assets compared to Group 3, 7%, and Group 2, 4.2%. The nonvested benefit obligation is 1.4%, .7% and .5% of total assets for Groups 1, 2 and 3. Group 1's net assets, 12.2% of total assets, are relatively larger than Group 2, 6.1% and Group 3, 8.1%. Group 1 is the least well-funded of the three groups. The median net obligation, total benefits (vested and nonvested) minus net assets, is 1.3% of total assets. The net vested benefit obligation is .9% of total assets. Group 2 is the best funded according to FAS 36 data. Its median net funding (net assets exceed total pension obligation) is .8% of total assets and median net funding of vested benefits is 1.5% of total assets. Group 3 falls in the middle. Its median net total obligation is .1% of total assets and its median net vested benefit funding (assets exceed vested benefit obligation) is .4% of total assets.

Groups 1 and 2 reported unfunded vested benefits prior to FAS 36. These groups are analyzed to determine the change in the reported vested benefit status upon adoption of FAS 36. In 1979, Group 1's median unfunded vested benefit status was 2% of total assets, Group 2's was 0%. Consistent with the criticisms of FAS 36's accrued unit credit method, the reported pension funded status increased for most firms upon adoption of FAS 36. Reported financial leverage resulting from pensions declined by 1.4% for Group 1 and as discussed earlier, Group 2 reported that net overfunding of pensions was 1.5% of total assets.

The mean and median change in pension expense to sales ($PECHG_i$) is small for each group and similar among the groups. However, Group 3's median decline was .02% compared to an increase of .002% for Group 1 and a decrease of .004% for Group 2. The .02% is significantly different from zero at the .05 significance level. Since a relation between pension expense and the level of systematic risk is documented in Table 3, pension expense is included as a control variable in the regressions. A reported association between the change in systematic risk and the FAS 36 data may be due to pension funding strategy changes. The inclusion of

pension expense aids in controlling for this possibility.

In summary, using FAS 36 data, the three groups differ with respect to their pension obligation funded status. Group 1 firms are still underfunded according to FAS 36 disclosures, but the underfunding is less than under APB 8 disclosures. Group 2 firms are overfunded, both totally and with respect to vested benefits, according to FAS 36 disclosures. Group 3 firms are less well-funded than Group 2 firms, but better funded than Group 1 firms.

4.4 REGRESSION RESULTS OF DIFF ON FUNDED STATUS RATIO FOR GROUPS 2 AND 3

Tables 5 and 6 report the results of the regression of DIFF on the pension obligation funded status leverage ratio (FSLR) and the control variables in Panel A for the combined Groups 2 and 3 (UVB = 0 and UVB = missing) and in Panel B for Group 1 (UVB > 0). The firms are partitioned into two groups: those whose funded status is equal to or below the median FSLR (relatively overfunded firms) and those whose funded status is above the groups' median FSLR (relatively underfunded firms). The median funded status ratio is -.00154 for the combined grouping and .013 for Group 1. This means that pension assets exceed the total pension obligation and this excess is approximately .15% of total assets for the combined grouping. Total pension obligations exceed pension assets by 1.3% of total assets for Group 1 firms. Based on FAS 36 measures, about half the combined group firms are either fully funded or overfunded and about half are less than fully funded or underfunded.

Table 5 presents the results of two models using the partitioned sample. The first model regresses the change in beta between the two regimes (DIFF) against the funded status leverage ratio (FSLR) only. The second model regresses the change in beta (DIFF) against the funded status ratio and four control variables: the change in the current ratio (CR), sales growth (SA), the change in the cost of goods sold to sales ratio (CGS) and the change in the pension expense to sales ratio (PE).

The control variables used in Model 2 reported in Tables 5, 6 and 7 differ from those used in the systematic risk level model of Table 4 because changes in the level variables performed poorly (very small coefficients are noted and small R^2) in explaining changes in the level of systematic risk. The pension obligation and asset variables coefficients are qualitatively the same regardless of the control variables used. Since this study is motivated in part to explore the behavior of systematic risk, I selected on an intuitive basis, three variables which seem to be associated with aspects of the determinants of systematic risk as explained below.

The debt to equity ratio is a measure of the long-term financial leverage of the firm. However, its usefulness in explaining short-term fluctuations in systematic risk is not confirmed when it is regressed against DIFF. Current liabilities, included in the debt to equity ratio denominator, is probably the debt variable which would be most subject to short-term economic fluctuations. In financial statement analysis, the ratio of current assets to current liabilities, the current ratio (CR), is typically used to measure short-term liquidity. Thus, the change in the current ratio is included as a variable intended to explain a portion of the change in systematic risk over approximately one year.

In the Rubinstein (1973) model of operating risk, four components of operating risk are identified: the covariance of firm's contribution margin with the market's weighted average contribution margin, variable to fixed cost proportion, production technology and the uncertainty of operational efficiency. On a wide-scale short-term basis, firms are unlikely to change their variable to fixed cost investment proportion, production technology and the uncertainty of operational efficiency. In the short-run, the relation between the firm's contribution margin and the market's weighted average contribution margin may change. The contribution margin is the difference between the marginal price received for a product and the variable costs of the product. The price received is a result of general market conditions as is the variable cost of materials and labor. Systematic risk may shift because of short-run business cycle changes which

induce a change in the covariance of contribution margin and the market's weighted average contribution margin. Accordingly, SA which is the percentage change in sales and CGS which is the percentage change in the cost of goods sold to sales ratio are included as explanatory variables.

Table 5
Panel A
Partitioned Combined Groups 2 and 3
Regression Results with FSLR

Model 1: $DIFF_i = \delta_1 + \delta_2 FSLR_i + e_i$

Model 2: $DIFF_i = \delta_1 + \delta_2 FSLR_i + \delta_3 CR_i + \delta_4 SA_i + \delta_5 CGS_i + \delta_6 PE_i + e_i$

	Model 1 Overfunded	Model 1 Underfunded	Model 2 Overfunded	Model 2 Underfunded
Intercept	.034 (.740)	-.144*** (-2.871)	.036 (.584)	-.288*** (-4.459)
FSLR	5.070 ** (3.027)	-.108 (-.121)	5.099 ** (2.935)	.858 (.941)
CR			-.004 (-.076)	.181 ** (3.050)
SA			.033 (.175)	.748 ** (3.266)
CGS			-1.966 (-1.797)	-.041 (-.031)
PE			-1.371 (-.102)	7.326 (.507)
Adjusted R^2	.057	-.007	.052	.077

Note:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, -.00154.
There are 136 overfunded and 134 underfunded firms.

See Table 6 Panel B for control variable (CR, SA, CGS and PE) definitions.

Table 5
Panel B
Partitioned Group 1
Regression Results with FSLR

$$\textit{Model 1:}\quad DIFF_i = \delta_1 + \delta_2 FSLR_i + e_i$$
$$\textit{Model 2:}\quad DIFF_i = \delta_1 + \delta_2 FSLR_i + \delta_3 CR_i + \delta_4 SA_i + \delta_5 CGS_i + \delta_6 PE_i + e_i$$

	Model 1 Overfunded	Model 1 Underfunded	Model 2 Overfunded	Model 2 Underfunded
Intercept	-.117 ** (-2.691)	-.188** (-3.010)	-.105 (-1.959)	-.184* (-2.535)
FSLR	.421 (.320)	.594 (.702)	.555 (.409)	.738 (.866)
CR			.023 (.902)	-.032 (-.396)
SA			-.097 (-.320)	-.162 (-.525)
CGS			-1.764 (-1.064)	3.370 (1.852)
PE			-16.516 (-1.045)	-36.760 (-1.846)
Adjusted R^2	-.009	-.005	-.020	.014

Note:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, .013.
There are 101 overfunded and 100 underfunded firms.

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

DIFF: Beta Difference = BETA2 - BETA1 where BETA2 is the market model estimate of systematic risk measured after FAS 36's adoption and BETA1 is the systematic risk estimate measured the year before FAS 36's adoption.

FSLR: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

Combined Grouping Better Funded Firms

The FSLR coefficient is positive and significantly related to the change in beta at the .01 level in both models. The sign is as expected since leverage is positively associated with systematic risk.

Combined Grouping Less Well-Funded and Underfunded Firms

The coefficient of FSLR is negative, very small and not statistically significant at conventional levels in either model. The FSLR-only model adjusted R^2 is -.007 for this group compared to .057 for the overfunded firm portfolio. The contrast is striking. The market apparently only adjusted risk for firms which previously reported either UVB = 0 (Group 2) or reported that their funding (Group 1) was adequate, but which under FAS 36 are disclosed to be overfunded. FAS 36 data does not appear to affect the market's assessment of firms which are relatively underfunded.

In the expanded model, the FSLR coefficient is positive and again quite small. In addition, CR and SA coefficients are both positive and significant at .01 level. When contrasted to the expanded model for overfunded firms, it appears that different variables are used by the market to assess the riskiness of the over and under funded groups. Since these firms appear to be using different pension funding strategies, the underlying investment opportunity sets may also differ.

Group 1

The FSLR coefficient is positive, but statistically insignificant for both the overfunded and underfunded groupings in both models.

Table 6 reports the results of the same models and firms included in Table 5 except the funded status leverage ratio is decomposed into the obligation leverage ratio and the ratio of plan assets to total assets. The results are qualitatively the same as in Table 5.

Table 6
Panel A
Partitioned Combined Groups 2 and 3
Regression Results with OBLR and ASR

$$\textit{Model 3:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \epsilon_i$$
$$\textit{Model 4:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \delta_4 CR_i + \delta_5 SA_i + \delta_6 CGS_i + \delta_7 PE_i + \epsilon_i$$

	Model 3 Overfunded	Model 3 Underfunded	Model 4 Overfunded	Model 4 Underfunded
Intercept	.024 (.473)	-.161 ** (-2.650)	.020 (.294)	-.322*** (-4.317)
OBLR	5.720 * (2.508)	-.559 (-.447)	5.958 * (2.586)	.111 (.091)
ASR	-5.668 ** (-2.838)	.871 (.506)	-5.609 ** (-2.864)	.423 (.254)
CR			-.004 (-.073)	.184 ** (3.050)
SA			.045 (.235)	.764 ** (3.323)
CGS			-2.013 (-1.830)	-.124 (-.093)
PE			-2.922 (-.169)	6.313 (.489)
Adjusted R^2	.051	-.013	.047	.076

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, -.00154.
There are 136 overfunded and 134 underfunded firms.

Table 6
Panel B
Partitioned Group 1
Regression Results with OBLR and ASR

$$\textit{Model 3:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \epsilon_i$$
$$\textit{Model 4:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \delta_4 CR_i + \delta_5 SA_i + \delta_6 CGS_i + \delta_7 PE_i + \epsilon_i$$

	Model 3 Overfunded	Model 3 Underfunded	Model 4 Overfunded	Model 4 Underfunded
Intercept	-.107 (-1.650)	-.184 * (-2.373)	-.082 (-1.117)	-.196 * (-2.166)
OBLR	.125 (.065)	.632 (.649)	-.100 (-.051)	.638 (.660)
ASR	-.226 (-.139)	-.667 (-.534)	-.139 (-.085)	-.538 (-.432)
CR			.024 (.939)	-.034 ** (-.413)
SA			-.103 (-.340)	-.152 ** (-.484)
CGS			-1.699 (-1.017)	3.391 (1.852)
PE			-19.128 (-1.136)	-37.245 (-1.850)
Adjusted R^2	-.081	-.015	-.028	.004

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, .013.
There are 101 overfunded and 100 underfunded firms.

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

OBLR: Pension Obligation Ratio = (PBVB + PBNVB)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

ASR: Pension Asset Ratio = PBNA/TA where PBNA is the pension asset fund balance reported under FAS 36 requirements in 1980.

Table 6-Panel B (continued)

CR: Current Ratio Difference = $(CA/CL)_t$ - $(CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t$ - $(CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t$ - $(PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

Overfunded Firms

As predicted by the systematic risk model, the obligation leverage ratio (OBLR) coefficient is positive and significant at the .05 level in the pension variable only model and at the .01 level in the expanded model for the overfunded combined group firms. The asset ratio (ASR) coefficient is negative and significant at the .01 level in both models. This result is also expected since the availability of more assets to cover future pension obligations reduces the riskiness of the firms future cash flows.

The coefficients of the control variables are approximately the same as reported in Table 5.

Underfunded Combined Group Firms and Group 1 Firms

The results are qualitatively the same as in Table 5. The coefficients on the two pension measures are small.

Summary Comments

The results of Tables 5 and 6 suggest that the market only reassessed systematic risk for firms which were relatively overfunded and previously reported zero or did not report unfunded vested benefit obligation. Since prior to FAS 36, firms were only required to report the extent to which they were unfunded, the market's expectation regarding firms reporting that they were adequately or fully funded prior to FAS 36 does not appear to include information about the level of overfunding which existed. In effect, firms were able to successfully hide the level of overfunding that existed in their plans.

FAS 36's principal contribution appears to be requiring symmetry in reporting the financial status of pensions. The accrued benefit method does not appear to affect the risk assessment of any other firms except the relatively overfunded ones. This is not surprising since the accrued benefit method does not include salary projection in the calculation of the obligation. The actual obligation is understated. The market apparently recognized this weakness resulting

in no risk adjustment.

The expanded model results suggest some interesting avenues for future research. Table 7 reports the results of DIFF regressed on the control variables only for the two subgroups. The coefficient signs and significance levels are approximately the same as in the expanded models reported in Tables 5 and 6. For the combined grouping, the adjusted R^2 of the model for the overfunded group is .038 versus .075 for the underfunded group. As mentioned above, different coefficients are significant in each model. With further refinement and examination of the specific characteristics of each of the groups, insight regarding what variables are used by the market to adjust risk may be determined. Section 4. discusses the coefficients of these explanatory variables and avenues for research in more detail.

Table 7
Panel A
Partitioned Combined Groups 2 and 3
Regression Results: No Pension Obligation Variables

$$Model\ 5:\quad DIFF_i = \delta_1 + \delta_2 CR_i + \delta_3 SA_i + \delta_4 CGS_i + \delta_5 PE_i + \epsilon_i$$

	Model 5 Overfunded	Model 5 Underfunded
Intercept	-.064 (-1.358)	-.253*** (-4.879)
CR	-.024 (-.436)	.173 ** (2.916)
SA	-.020 (-.104)	.667 ** (2.990)
CGS	-2.062 (-1.873)	-.199 (-.150)
PE	-40.714 * (-2.400)	-.632 (-.042)
Adjusted R^2	.038	.075

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, -.00154.
There are 136 overfunded and 134 underfunded firms.

Table 7
Panel B
Partitioned Group 1
Regression Results: No Pension Obligation Variables

$$Model\ 5:\ DIFF_i = \delta_1 + \delta_2 CR_i + \delta_3 SA_i + \delta_4 CGS_i + \delta_5 PE_i + e_i$$

	Model 5 Overfunded	Model 5 Underfunded
Intercept	-.110 * (-2.110)	-.141** (-2.666)
CR	.022 (.884)	-.032 (-.393)
SA	-.103 (-.345)	-.177 (-.577)
CGS	-1.782 (-1.080)	3.401 (1.871)
PE	-15.197 (-.986)	-34.772 (-1.760)
Adjusted R^2	-.011	.017

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, .013.
There are 101 overfunded and 100 underfunded firms.

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

CR: Current Ratio Difference = $(CA/CL)_t - (CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t - (CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t - (PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

4.5 REGRESSION RESULTS FOR RELATIVELY OVERFUNDED AND UNDERFUNDED FIRMS

This section reports the results of regressions of DIFF, the change in systematic risk upon adoption of FAS 36, on FSLR, the pension obligation funded status leverage ratio and control variables for Group 2 (Table 8) and Group 3 (Table 9) separately.

Table 8
Panel A
Partitioned Group 2
Regression Results with FSLR

Model 1: $DIFF_i = \delta_1 + \delta_2 FSLR_i + e_i$

Model 2: $DIFF_i = \delta_1 + \delta_2 FSLR_i + \delta_3 CR_i + \delta_4 SA_i + \delta_5 CGS_i + \delta_6 PE_i + e_i$

	Model 1 Overfunded	Model 1 Underfunded	Model 2 Overfunded	Model 2 Underfunded
Intercept	.069 (.868)	-.173*** (-2.871)	.128 (1.361)	-.257 ** (-2.818)
FSLR	5.786 * (2.344)	.898 (.266)	5.161 * (2.086)	2.533 (.737)
CR			-.153 * (-2.143)	.152 (1.626)
SA			-.438 (-1.341)	.446 (1.476)
CGS			-2.051 ** (-1.406)	.884 (.686)
PE			-29.345 * (-1.576)	21.280 (.583)
Adjusted R^2	.084	-.018	.152	.025

Note:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, -.00773.
There are 50 overfunded and 53 underfunded firms.

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

DIFF: Beta Difference = BETA2 - BETA1 where BETA2 is the market model estimate of systematic risk measured after FAS 36 adoption and BETA1 is the systematic risk estimate measured the year before FAS 36 adoption.

FSLR: Funded Status Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

Table 8-Panel A (continued)

CR: Current Ratio Difference = $(CA/CL)_t - (CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t - (CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t - (PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

Table 8
Panel B
Partitioned Group 2
Regression Results with OBLR and ASR

Model 3: $DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + e_i$

Model 4: $DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \delta_4 CR_i + \delta_5 SA_i + \delta_6 CGS_i + \delta_7 PE_i + e_i$

	Model 3 Overfunded	Model 3 Underfunded	Model 4 Overfunded	Model 4 Underfunded
Intercept	.033 (.364)	-.192 * (-2.647)	.104 (.937)	-.300 ** (-2.852)
OBLR	8.814 (2.011)	-.253 (-.059)	6.768 (1.567)	.423 (.099)
ASR	-7.651 * (-2.297)	.665 (.134)	-6.132 (-1.865)	.354 (.072)
CR			-.152 * (-2.114)	.159 (1.690)
SA			-.421 (-1.266)	.484 (1.577)
CGS			-1.094 (-1.202)	.804 (.619)
PE			-28.050 (-1.476)	26.026 (.702)
Adjusted R^2	.078	-.035	.136	.018

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, -.00773.
There are 50 overfunded and 53 underfunded firms.

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

OBLR: Pension Obligation Ratio = (PBVB + PBNVB)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

ASR: Pension Asset Ratio = PBNA/TA where PBNA is the pension asset fund balance reported under FAS 36 requirements in 1980.

Table 8-Panel B (continued)

CR: Current Ratio Difference = $(CA/CL)_t - (CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t - (CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t - (PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

Consistent with the results reported in Tables 5 and 6, the FSLR coefficient in Panel A of Table 8 is positive and statistically significant at the .05 level in both the univariate and multivariate regression models for the relatively overfunded firms. The coefficient is not significant in either model for underfunded firms.

For overfunded firms, FSLR alone explains 8.4% of the variation in DIFF. In combination with the current ratio change (CR), sales change (SA), cost of goods sold ratio change (CGS) and pension expense ratio change (PE), it explains 15.2% of the variation.

In contrast, for underfunded firms, adjusted R^2 of the FSLR only model is -1.8% suggesting FSLR explains little of the variation in risk for underfunded firms. The full model with control variables adjusted R^2 is 2.5%.

Similar to the results for Groups 2 and 3 combined reported in Table 6, while only ASR is statistically significant in the OBLR and ASR only models, the coefficients and t-statistics of the variables are much larger than the coefficients of OBLR and ASR in the underfunded firm models.

The results for Group 3 firms alone (reported in Table 9) are qualitatively similar to Table 8's results. The relatively overfunded firms FSLR (Panel A), OBLR and ASR (Panel B) coefficients and t-statistics are much larger than the underfunded firms.

Table 9
Panel A
Partitioned Group 3
Regression Results with FSLR

$$\textit{Model 1:}\quad DIFF_i = \delta_1 + \delta_2 FSLR_i + \epsilon_i$$
$$\textit{Model 2:}\quad DIFF_i = \delta_1 + \delta_2 FSLR_i + \delta_3 CR_i + \delta_4 SA_i + \delta_5 CGS_i + \delta_6 PE_i + \epsilon_i$$

	Model 1 Overfunded	Model 1 Underfunded	Model 2 Overfunded	Model 2 Underfunded
Intercept	.036 (.575)	-.126 (-1.803)	-.081 (-.967)	-.194 * (-2.064)
FSLR	5.163 * (2.035)	-.309 (-.301)	3.949 (1.623)	.062 (.057)
CR			.029 (.350)	.155 (1.798)
SA			.498 * (2.079)	.330 (.878)
CGS			-5.426 ** (-2.803)	-1.628 (-.697)
PE			-.313 (-.012)	6.231 (.409)
Adjusted R^2	.037	-.011	.163	.022

Note:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, .00106.
There are 82 overfunded and 85 underfunded firms.

Table 9-Panel A (continued)

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

DIFF: Beta Difference = BETA2 - BETA1 where BETA2 is the market model estimate of systematic risk measured after FAS 36's adoption and BETA1 is the systematic risk estimate measured the year before FAS 36's adoption.

FSLR: Funded Status Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

CR: Current Ratio Difference = $(CA/CL)_t$ - $(CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t$ - $(CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t$ - $(PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

Table 9
Panel B
Partitioned Group 3
Regression Results with OBLR and ASR

$$\textit{Model 3:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \epsilon_i$$
$$\textit{Model 4:}\quad DIFF_i = \delta_1 + \delta_2 OBLR_i + \delta_3 ASR_i + \delta_4 CR_i + \delta_5 SA_i + \delta_6 CGS_i + \delta_7 PE_i + \epsilon_i$$

	Model 3 Overfunded	Model 3 Underfunded	Model 4 Overfunded	Model 4 Underfunded
Intercept	.036 (.507)	-.151 (-1.715)	-.114 (-1.215)	-.236 * (-2.167)
OBLR	5.153 (1.546)	-.733 (-.532)	5.531 (1.747)	-.648 (-.454)
ASR	-5.148 (-1.782)	1.071 (.552)	-4.896 (-1.799)	1.213 (.611)
CR			.029 (.346)	.155 (1.798)
SA			.519 * (2.146)	.325 (.862)
CGS			-5.619 ** (-2.872)	-1.901 (-.802)
PE			-5.684 (-.216)	4.458 (.289)
Adjusted R^2	.025	-.021	.159	.017

Notes:
***, ** and * denote significance levels of .001, .01 and .05, respectively.

General Note: Overfunded (Underfunded) firms are those firms where FSLR is equal to or below (above) FSLR's median, .00106.
There are 82 overfunded and 85 underfunded firms.

Table 9-Panel B (continued)

Variable Definitions

Note: t refers to 1980, t-1 refers to 1979.

OBLR: Pension Obligation Ratio = (PBVB + PBNVB)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit obligations reported under FAS 36 requirements in the year of FAS 36 adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

ASR: Pension Asset Ratio = PBNA/TA where PBNA is the pension asset fund balance reported under FAS 36 requirements in 1980.

CR: Current Ratio Difference = $(CA/CL)_t$ - $(CA/CL)_{t-1}$ where CA is the current asset balance and CL is the current liability balance.

SA: Sales Growth = $(SA_t - SA_{t-1})/SA_t$ where SA is net sales.

CGS: Cost of Goods Sold to Sales Ratio Difference = $(CGS/SA)_t$ - $(CGS/SA)_{t-1}$ where CGS is cost of goods sold and SA is net sales.

PE: Pension Expense to Sales Ratio Difference = $(PE/SA)_t$ - $(PE/SA)_{t-1}$ where PE is pension expense and SA is net sales.

In summary, Tables 8 and 9 show that the shift in systematic risk over the period that FAS 36 was adopted is positively related to the size of the overfunded pension plan revealed through FAS 36 disclosures.

4.6 AN EXPLORATION OF THE REDUNDANCY OF FAS 36 DISCLOSURES

The results documented in Tables 5 through 9 indicate that the systematic risk shift which occurred coincident with FAS 36 data is related to the magnitude of pension overfunding disclosed by FAS 36 for relatively overfunded firms which had previously reported either a zero unfunded vested benefit status or adequate funding. The test results reported in Tables 10 through 13 attempt to determine the extent to which FAS 36 disclosures were redundant for firms for which no association between FAS 36 disclosures and systematic risk shifts are detected.

Tables 10 and 11 report the results of regressions of the level of systematic risk against the FAS 36 disclosure variables and the systematic risk control variables included in the regression reported in Table 3. Table 10 reports the regression results for BETA2, the FAS 36 era systematic risk. Table 11 reports the regression results for BETA1, systematic risk estimated over the 200 day period ending March 31, 1980. Although FAS 36 data is not available publicly until the 1980 annual report, the market may have privately acquired information regarding the particular aspects of firm's pension plans prior to FAS 36 release. The presence of reported unfunded vested benefits prior to FAS 36 release may have motivated this private information search. BETA1 is regressed against the information made publicly available later when annual reports containing FAS 36 data were released. If an association is noted, then apparently at least some of the information available publicly with FAS 36 was acquired earlier privately.

Table 10
Panel A
Post FAS 36 Systematic Risk Regressed Against FSLR

$$BETA2_i = \delta_1 + \delta_2 DE_i + \delta_3 FSLR_i + \delta_4 DET_i + \delta_5 MS_i + \delta_6 MS^2{}_i + \delta_6 EPS_i + \delta_7 CE_i + \delta_8 PE_i + e_i$$

Variable (Predicted Sign)	Groups 2 and 3 Coefficient (T-STAT) (N=270)	Group 1 Coefficient (T-STAT) (N=199)
Intercept	.691*** (7.400)	.401*** (3.252)
DE (+)	.431 * (2.396)	.734*** (3.534)
FSLR (+)	.277 (.387)	-1.767** (-3.002)
DET (-)	-.382 (-1.259)	.039 (.429)
MS (-)	-.220 (-.547)	-.133 (-.341)
MS^2 (+)	.300 (.646)	.266 (.574)
EPS (?)	.017 ** (2.868)	.027 (1.663)
CE (?)	.0005*** (4.360)	.0001 * (2.262)
PE (?)	-7.462 * (-2.194)	-2.391 (-.762)
ADJUSTED R^2	.1154	.1325

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 10 - Panel A (continued)

Variable Descriptions

BETA2: Market model estimate of systematic risk measured after FAS 36's adoption. The model is estimated using 200 daily stock returns provided by CRSP beginning on March 31, 1981.

DE: Debt to Equity Ratio = (CL + LTD + DTITC + CSPRSTK)/TA where CL is current liability balance, LTD is long-term debt, DTITC is the balance sheet balances of deferred taxes and investment tax credit and CSPRSTK is the total convertible debt and preferred stock book value balance). TA is the book value of total assets. In this model, the DE ratio is the average of 1978, 1979 and 1980 DE ratios measured using annual report data provided by Compustat.

FSLR: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit pension obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption, 1980.

DET: Debt to Equity Ratio * Tax Rate Interaction = DE average * TAXRATE. TAXRATE = Total Income Tax (Federal, State and Local)/(Income before Extraordinary Items + Income Tax) measured using 1980 numbers.

MS: Market Share = SA/(SIC3 Total SA) averaged over 1978 through 1980 where SA is net sales, SIC3 Total SA is the total sales for the three digit SIC code for the same year that firm SA is reported.

MS^2: Market Share Squared.

EPS: Earnings per Share = (INCBEXT - DIVP)/CS where INCBEXT is income before extraordinary items, DIVP is preferred dividends and CS is common shares outstanding at year-end.

CE: Capital Expenditure on PPE averaged over 1978 through 1980.

PE: Pension Expense/Sales averaged over 1978 through 1980.

Table 10
Panel B
Post FAS 36 Systematic Risk Regressed Against OBLR and ASR

$$BETA2_i = \delta_1 + \delta_2 DE_i + \delta_3 OBLR_i + \delta_4 ASR + \delta_5 DET_i + \delta_6 MS_i + \delta_7 MS^2{}_i + \delta_8 EPS_i + \delta_9 CE_i + \delta_{10} PE_i + e_i$$

Variable (Predicted Sign)	Groups 2 and 3 Coefficient (T-STAT) (N=270)	Group 1 Coefficient (T-STAT) (N=199)
Intercept	.764*** (7.916)	.401*** (3.243)
DE (+)	.328 (1.800)	.734*** (3.521)
OBLR (+)	.762 (1.040)	-1.767 ** (-2.994)
ASR (-)	-1.859 * (-1.994)	1.758 * (2.583)
DET (-)	-.273 (-.901)	.039 (.426)
MS (-)	-.146 (-.365)	-.132 (-.339)
MS^2 (+)	.190 (.411)	.265 (.572)
EPS (?)	.017 ** (2.898)	.027 (1.665)
CE (?)	.0004*** (4.088)	.0001 * (2.244)
PE (?)	-2.015 * (-.509)	-2.320 (-.562)
ADJUSTED R^2	.135	.128

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 10 - Panel B (continued)

Note: See Table 10, Panel A for variable definitions.

Additional Variables

OBLR: Pension Obligation Ratio=(PBVB + PBNVB)/TA where PBVB and PBNVB are the vested and nonvested benefit pension obligations reported under FAS 36 requirements in the year of adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

ASR: Pension Asset Ratio=(PBNA)/TA where PBNA is the pension asset fund balance reported under FAS 37 requirements in 1980.

Table 11
Panel A
Pre FAS 36 Systematic Risk Regressed Against FSLR

$$BETA1_i = \delta_1 + \delta_2 DE_i + \delta_3 FSLR_i + \delta_4 DET_i + \delta_5 MS_i + \delta_6 MS^2{}_i + \delta_6 EPS_i + \delta_7 CE_i + \delta_8 PE_i + \epsilon_i$$

Variable (Predicted Sign)	Groups 2 and 3 Coefficient (T-STAT) (N=261)	Group 1 Coefficient (T-STAT) (N=198)
Intercept	.695*** (6.816)	.526*** (4.560)
DE (+)	.988*** (4.028)	1.169*** (4.562)
FSLR (+)	.039 (.054)	-1.797 ** (-3.176)
DET (-)	-.868 (-1.872)	-.608 (-1.535)
MS (-)	-.864 * (-2.109)	-.579 (-1.567)
MS^2 (+)	1.101 ** (2.342)	.420 (.952)
EPS (?)	.014 * (2.304)	.027 (1.450)
CE (?)	.0003 (1.919)	.0001 * (1.940)
PE (?)	-7.205 * (-2.132)	-2.277 (-.750)
ADJUSTED R^2	.106	.170

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 11 - Panel A (continued)

Variable Descriptions

BETA1: Market model estimate of systematic risk measured before FAS 36's adoption. The model is estimated using 200 daily stock returns provided by CRSP ending on March 31, 1980.

DE: Debt to Equity Ratio = (CL + LTD + DTITC + CSPRSTK)/TA where CL is current liability balance, LTD is long-term debt, DTITC is the balance sheet balances of deferred taxes and investment tax credit and CSPRSTK is the total convertible debt and preferred stock book value balance). TA is the book value of total assets. In this model, the DE ratio is the average of 1978, 1979 and 1980 DE ratios measured using annual report data provided by Compustat.

FSLR: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit pension obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption, 1980.

DET: Debt to Equity Ratio * Tax Rate Interaction = DE average * TAXRATE. TAXRATE = Total Income Tax (Federal, State and Local)/(Income before Extraordinary Items + Income Tax) measured using 1980 numbers.

MS: Market Share = SA/(SIC3 Total SA) averaged over 1978 through 1980 where SA is net sales, SIC3 Total SA is the total sales for the three digit SIC code for the same year that firm SA is reported.

MS^2: Market Share Squared.

EPS: Earnings per Share = (INCBEXT - DIVP)/CS where INCBEXT is income before extraordinary items, DIVP is preferred dividends and CS is common shares outstanding at year-end.

CE: Capital Expenditure on PPE averaged over 1978 through 1980.

PE: Pension Expense/Sales averaged over 1978 through 1980.

Table 11
Panel B
Pre FAS 36 Systematic Risk Regressed Against OBLR and ASR

$$BETA1_i = \delta_1 + \delta_2 DE_i + \delta_3 OBLR_i + \delta_4 ASR + \delta_5 DET_i + \delta_6 MS_i + \delta_7 MS^2{}_i + \delta_8 EPS_i + \delta_9 CE_i + \delta_{10} PE_i + \epsilon_i$$

Variable (Predicted Sign)	Groups 2 and 3 Coefficient (T-STAT) (N=261)	Group 1 Coefficient (T-STAT) (N=198)
Intercept	.750*** (7.020)	.521*** (4.505)
DE (+)	.908*** (3.644)	1.170*** (4.553)
OBLR (+)	.337 (.449)	-1.799 ** (-3.173)
ASR (-)	-1.021 (-1.090)	1.938 ** (2.975)
DET (-)	-.808 (-1.743)	-.608 (-1.531)
MS (-)	-.808 * (-1.973)	-.583 (-1.576)
MS^2 (+)	1.027 * (2.182)	.420 (.950)
EPS (?)	.014 * (2.301)	.027 (1.455)
CE (?)	.0002 (1.783)	.0002 (1.967)
PE (?)	-4.096 * (-1.064)	-3.327 (-.861)
ADJUSTED R^2	.112	.166

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 11 - Panel B (continued)

Note: See Table 11, Panel A for variable definitions.

Additional Variables

OBLR: Pension Obligation Ratio=(PBVB + PBNVB)/TA where PBVB and PBNVB are the vested and nonvested benefit pension obligations reported under FAS 36 requirements in the year of adoption (1980). TA is the book value of total assets measured at 1980 fiscal year end.

ASR: Pension Asset Ratio=(PBNA)/TA where PBNA is the pension asset fund balance reported under FAS 37 requirements in 1980.

In Panel A of Tables 10 and 11, the FSLR coefficient is positive, but not significant in either the BETA2 or BETA1 regressions for combined Groups 2 and 3. The FSLR coefficient is negative and significant at .01 level for Group 1 firms in the BETA2 and BETA1 regressions. Notice that for Group 1 firms, the coefficients in the BETA2 and BETA1 models are approximately the same magnitude as are the t-statistics.

In Panel B of Tables 10 and 11, the OBLR coefficient is positive and ASR is negative, but both are not significant in either regression for combined Groups 2 and 3. In contrast, for Group 1 firms, the OBLR coefficient is negative and ASR is positive and significant at the .05 or .01 levels in both time periods.

Taken together, the Table 10 and 11 results suggest that for the most underfunded firms (Group 1) the market has included FAS 36 data in its risk assessment before the information was publicly available.

Tables 12 and 13 report the results of regressing FSLR and the control variables on BETA2 and BETA1 using the sample partitioned into the over and underfunded partitions.

Table 12
Post FAS 36 Systematic Risk Regressed Against FSLR
Partitioned Groupings

$$BETA2_i = \delta_1 + \delta_2 DE_i + \delta_3 FSLR_i + \delta_4 DET_i + \delta_5 MS_i + \delta_6 MS^2{}_i + \delta_6 EPS_i + \delta_7 CE_i + \delta_8 PE_i + e_i$$

Variable (Predicted Sign)	Groups 2 and 3 (N=138) Overfunded	Group 2 and 3 (N=132) Underfunded	Group 1 (N=104) Overfunded	Group 1 (N=95) Underfunded
Intercept	.904*** (5.416)	.650*** (5.845)	.360 * (2.157)	.530 * (2.603)
DE (+)	.806*** (2.184)	.243 (1.217)	.762 ** (2.665)	.608 (1.765)
FSLR (+)	6.710 ** (2.905)	-.828 (-.827)	-2.671 (1.661)	-2.529** (-2.695)
DET (-)	-1.232 (-1.629)	-.208 (-.662)	-.037 (-.116)	.087 (.966)
MS (-)	-.351 (-.647)	-.267 (-.455)	.438 (.781)	-1.195* (-2.027)
MS^2 (+)	.382 (.594)	.294 (.447)	-.583 (-.843)	1.591* (2.377)
EPS (?)	-.021 * (-.692)	.012*** (3.439)	.047 (1.578)	.013 (.677)
CE (?)	.0004 ** (3.297)	.0015 *** (3.760)	.0001 (1.627)	.0010** (2.782)
PE (?)	-7.976 (-1.597)	-1.699 (-.347)	-7.452 (-1.476)	-1.362 (-.282)
ADJUSTED R^2	.157	.175	.105	.194

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 12 (continued)

Variable Descriptions

BETA1: Market model estimate of systematic risk measured before FAS 36's adoption. The model is estimated using 200 daily stock returns provided by CRSP ending on March 31, 1980.

DE: Debt to Equity Ratio = (CL + LTD + DTITC + CSPRSTK)/TA where CL is current liability balance, LTD is long-term debt, DTITC is the balance sheet balances of deferred taxes and investment tax credit and CSPRSTK is the total convertible debt and preferred stock book value balance). TA is the book value of total assets. In this model, the DE ratio is the average of 1978, 1979 and 1980 DE ratios measured using annual report data provided by Compustat.

FSLR: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit pension obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption, 1980.

DET: Debt to Equity Ratio * Tax Rate Interaction = DE average * TAXRATE. TAXRATE = Total Income Tax (Federal, State and Local)/(Income before Extraordinary Items + Income Tax) measured using 1980 numbers.

MS: Market Share = SA/(SIC3 Total SA) averaged over 1978 through 1980 where SA is net sales, SIC3 Total SA is the total sales for the three digit SIC code for the same year that firm SA is reported.

MS^2: Market Share Squared.

EPS: Earnings per Share = (INCBEXT - DIVP)/CS where INCBEXT is income before extraordinary items, DIVP is preferred dividends and CS is common shares outstanding at year-end.

CE: Capital Expenditure on PPE averaged over 1978 through 1980.

PE: Pension Expense/Sales averaged over 1978 through 1980.

Table 13
Pre FAS 36 Systematic Risk Regressed Against FSLR
Partitioned Groupings

$$BETA1_i = \delta_1 + \delta_2 DE_i + \delta_3 FSLR_i + \delta_4 DET_i + \delta_5 MS_i + \delta_6 MS^2{}_i + \delta_6 EPS_i + \delta_7 CE_i + \delta_8 PE_i + \epsilon_i$$

Variable (Predicted Sign)	Groups 2 and 3 (N=137) Overfunded	Groups 2 and 3 (N=124) Underfunded	Group 1 (N=105) Overfunded	Group 1 (N=93) Underfunded
Intercept	.916*** (6.404)	.538*** (3.449)	.387 * (2.449)	.680 * (3.691)
DE (+)	.630 * (2.006)	1.346 ** (1.217)	1.266*** (3.837)	1.093 * (2.344)
FSLR (+)	2.039 (.995)	-1.586 (-1.355)	-3.998 * (-2.603)	-2.809** (-3.239)
DET (-)	-.760 (-1.215)	-.895 (-1.284)	-.591 (-1.242)	-.868 (.970)
MS (-)	-.386 (-.781)	-1.410 * (-2.012)	-.022 (-.041)	-.770 (-1.411)
MS^2 (+)	.397 (.678)	1.868 * (2.418)	-.332 (-.494)	.732* (1.182)
EPS (?)	-.009 (-.294)	.013 (1.939)	.076 * (2.298)	.012 (.529)
CE (?)	.0003 (1.849)	.0007 (1.191)	.0001 (1.507)	-.0003 (-.723)
PE (?)	-10.311 * (-2.318)	-1.533 (-.273)	-9.230 (-1.951)	-3.443 (.751)
ADJUSTED R^2	.051	.171	.199	.151

General Note: Statistical significance designations:
*** represents .001, ** represents .01, and * represents .05.

Table 13 (continued)

Variable Descriptions

BETA1: Market model estimate of systematic risk measured before FAS 36's adoption. The model is estimated using 200 daily stock returns provided by CRSP ending on March 31, 1980.

DE: Debt to Equity Ratio = (CL + LTD + DTITC + CSPRSTK)/TA where CL is current liability balance, LTD is long-term debt, DTITC is the balance sheet balances of deferred taxes and investment tax credit and CSPRSTK is the total convertible debt and preferred stock book value balance). TA is the book value of total assets. In this model, the DE ratio is the average of 1978, 1979 and 1980 DE ratios measured using annual report data provided by Compustat.

FSLR: Funded Status Leverage Ratio = (PBVB + PBNVB - PBNA)/TA where PBVB and PBNVB are the vested benefit and nonvested benefit pension obligations and PBNA is the pension fund asset balance reported under FAS 36 requirements in the year of FAS 36 adoption, 1980.

DET: Debt to Equity Ratio * Tax Rate Interaction = DE average * TAXRATE. TAXRATE = Total Income Tax (Federal, State and Local)/(Income before Extraordinary Items + Income Tax) measured using 1980 numbers.

MS: Market Share = SA/(SIC3 Total SA) averaged over 1978 through 1980 where SA is net sales, SIC3 Total SA is the total sales for the three digit SIC code for the same year that firm SA is reported.

MS^2: Market Share Squared.

EPS: Earnings per Share = (INCBEXT - DIVP)/CS where INCBEXT is income before extraordinary items, DIVP is preferred dividends and CS is common shares outstanding at year-end.

CE: Capital Expenditure on PPE averaged over 1978 through 1980.

PE: Pension Expense/Sales averaged over 1978 through 1980.

Consistent with the results reported in Table 8, the FSLR coefficient is positive and significant for Group 2 and 3 firms which are relatively overfunded in the regression with BETA2 as the dependent variable. In Table 13, the coefficient is positive, however, it is not significant at conventional levels. For underfunded Group 2 and 3 firms, the FSLR coefficient is negative, but not significant in either regression.

In contrast, Group 1 underfunded firms' FSLR coefficient is negative and significant in both regressions. Group 1's overfunded firms' FSLR coefficient is negative but not significant in the BETA2 regression and negative and significant in the BETA1 regression.

In summary, the results reported in Tables 10 through 13 reinforce the results reported in Tables 8 and 9. The market's assessment of systematic risk was apparently revised for relatively overfunded firms which reported either zero or adequate unfunded vested benefit obligations prior to FAS 36. For relatively less well funded Group 2 and 3 firms, the market does not appear to include funded status in the assessment of systematic risk in either time frame. Recall that firms included in the less well-funded group reported a net asset balance (net assets less total reported pension obligation) of .154% of total assets or less.

The market appears to include the funded status of pension obligations in its assessment of risk for Group 1 underfunded firms in both time frames. While the t-statistic is not large for relatively overfunded Group 1 firms as it is for the underfunded firms, it is still negative and the coefficient is larger than for Group 2 and 3 underfunded firms.

These results suggest that the market includes the funded status of firms at the extreme ends of the funded status spectrum (the most overfunded, Groups 2 and 3 overfunded firms, and the most underfunded, Group 1 underfunded) in its assessment of systematic risk. The funded status does not appear to be a significant factor in determining systematic risk for firms in the middle of this continuum (Groups 2 and 3 underfunded and Group 1 overfunded).

Another interesting finding is that while the FSLR coefficient for Groups 2 and 3

overfunded is positive as expected in the BETA2 and BETA1 regressions, the FSLR coefficient is negative for all three other categories and significant at the .01 level for the most underfunded of all firms (Group 1 underfunded). Systematic risk is lower for firms with relatively higher unfunded obligations for these firms. To explain this finding, recall the Hamada-Rubinstein-Conine version of the beta decomposition model. Conine added a debt beta term which reduces the total risk of the firm. To the extent that debt is risky, some of the risk that would otherwise be absorbed by the common shareholders is transferred to the debtholders. In this case, the pension obligation debtholders are the government through the PBGC and employees. If the probability of non-payment of some or all of the unfunded obligation is related to the size of the unfunded obligation, then systematic risk may be reduced for these firms compared to other firms with a smaller unfunded obligation.

Table 14
Summary of Control Variable Coefficients
By Group

Coefficent[a]
(t-statistic)

Variable	GR 1 Overfunded	GR 1 Underfunded	GR 2 Overfunded	GR 2 Underfunded	GR 3 Overfunded	GR 3 Underfunded
CR	.023 (.902)	-.032 (-.396)	-.153 (-2.143)	.152 (1.626)	.029 (.350)	.155 (1.798)
SA	-.097 (-.320)	-.162 (-.525)	-.438 (-1.341)	.446 (1.476)	.498 (2.079)	.330 (.878)
CGS	-1.764 (-1.064)	3.370 (1.852)	-2.051 (-1.406)	.884 (.686)	-5.426 (-2.803)	-1.628 (-.697)
PE	-16.516 (-1.045)	-36.760 (-1.846)	-29.345 (-1.576)	21.280 (.583)	-.313 (-.012)	6.231 (.409)

Notes:
a- This table summarizes the control variable coefficients reported in Table 5 Panel B for GR 1 firms in the regression of DIFF against FSLR and the control variables. GR 2 coefficients are found in Table 8 Panel A. GR 3 coefficients are found in Table 9 Panel A.

GR 1 represents firms which reported nonzero unfunded vested benefits during APB 8 era.
Overfunded (underfunded) GR 1 firms are those whose FAS 36 funded status leverage ratio is less than or equal to (greater than) .013.

GR 2 represents firms which reported zero unfunded vested benefits during APB 8 era.
Overfunded (underfunded) GR 2 firms are those whose FAS 36 funded status leverage ratio is less than or equal to (greater than) -.00773.

GR 3 represents firms which did not report zero unfunded vested benefits during APB 8 era.
Overfunded (underfunded) GR 3 firms are those whose FAS 36 funded status leverage ratio is less than or equal to (greater than) .00106.

4.7 CONTROL VARIABLES

The coefficients and t-statistics of the control variables resulting from the regression of DIFF on FSLR and the control variables for three firms groups are reproduced in Table 14. As noted in Chapter 3, these variables are selected on an intuitive basis to explain changes in systematic risk resulting from short-term financial risk changes (CR-change in current ratio) and short-term operating risk changes (SA-percentage change in sales, CGS-percentage change in cost of goods sold to sales). The change in the pension expense to sales ratio (PE) is included to control for pension changes other than the adoption of FAS 36.

The control variables' coefficients' signs and statistical significance levels varied across groups despite similar three digit SIC industry distributions and financial and operating characteristics. The results suggest that, at a point in time, the market's interpretation of the effect of changes in financial ratios on systematic risk varies cross-sectionally. This suggests that blanket statements regarding association of changes in these financial ratios and changes in risk should be avoided. The results also suggest directions for further research regarding the cross-sectional and intertemporal relation of financial statement ratios and systematic risk.

The patterns of the coefficient signs and significance for each control variable are discussed below.

4.7.1 Current Ratio

The current ratio is used in financial statement analysis to measure liquidity. A negative relation between changes in liquidity and systematic risk is expected since the probability of default is lower if a company has more cash or near-cash assets than current liabilities. A negative, statistically significant relation between current ratio changes and systematic risk is documented for Group 2 overfunded firms. A small, negative, statistically insignificant relation is documented for Group 1 underfunded firms.

The CR coefficient for the other four groups of firms (Group 1 overfunded, Group 2

underfunded and both Group 3 categories) is positive, however, none of the coefficients is statistically significant at conventional levels. However, Group 2 underfunded and Group 3 underfunded coefficients are positive and close to significant (t-statistics are 1.626 and 1.798).

A possible explanation for the positive relation documented in Group 2 and 3 underfunded results may lie in the composition of the current ratio change. If accounts receivable and/or inventory increases account for most of the change in the current ratio, then the current ratio may be an inappropriate measure of liquidity for these firms. This explanation does not suggest that accounts receivable or inventory increases are always improper measures of liquidity. For example, if companies are increasing inventory and receivables due to increased demand, an increase in the current ratio would signal greater cash flows. As a result, inventory turnover and receivable turnover in combination with current ratio changes may better measure liquidity changes. This proposition could be tested empirically, but is not within the scope of the current study.

4.7.2 Sales Changes

The direction of the association of short-term changes in sales with changes in risk depends upon whether the change is associated with changes in financial risk or changes in operating risk. If an increase (decrease) in sales is interpreted by the market as a signal of higher (lower) profits and higher (lower) cash flows, then financial risk and operating risk may both be lower (higher) and systematic risk lower (higher). If this is the case, a negative relation between sales changes and risk is expected. A negative, but statistically insignificant coefficient is reported for both Group 1 groupings and the Group 2 overfunded grouping.

A positive, statistically significant relation is documented for Group 3 overfunded. Positive, but insignificant coefficients are reported for Group 2 and Group 3 underfunded. This suggests that for these firms, the market interprets higher sales growth as riskier than lower sales growth. Recall that Group 2 and 3 firms' median market share is considerably below Group 1

(Table 2, Panel B). As mentioned in section 4.4, these two groups average firm age is less than Group 1. This suggests that these firms markets may be evolving. If new products are being introduced, the sales growth may surrogate for increased product mix riskiness.

4.7.3 Cost of Goods Sold Changes

CGS, the change in cost of goods sold to sales ratio, is included in the model to capture changes in the dynamics of input or cost markets. If the cost of goods sold to sales ratio increases, gross margin would decrease, suggesting either lower profits or increased pressure to cut general and administrative and other non-product costs. A positive relation between CGS and systematic risk changes is expected. A positive, but marginally statistically significant (t-statistic is 1.852) relation is reported for Group 1 underfunded. A positive, but statistically insignificant relation is reported for Group 2 underfunded.

Contrary to expectations, a negative, statistically significant relation is documented for Group 3 overfunded, a negative, but marginally significant relation is documented for Group 1 and 2 overfunded, and a negative, but statistically insignificant relation is documented for Group 3 underfunded.

4.7.4 Pension Expense Changes

As mentioned in chapter 2, in the APB 8 and FAS 36 eras, pension expense is typically equal to contributions. Contributions are determined by the actuarial cost method used for funding and assumptions applied within that method by actuaries. As a result, flexibility exists regarding the size of pension contributions. Since pension asset earnings are tax-advantaged, firms may elect to fund plans up to the maximum allowed by the Internal Revenue Service. Increasing (decreasing) pension expense may signal improving (deteriorating) fiscal health and lower relative risk. A negative relation is expected in this case. A negative, marginally significant relation is reported between the change in the pension expense to sales ratio and systematic risk change for both Group 1 groupings and the Group 2 overfunded grouping. A

negative, insignificant relation is documented for Group 3 overfunded.

A positive, statistically insignificant relation is documented for Group 2 and 3 underfunded firms. A positive relation may indicate that labor costs in general may be increasing for these firms relative to the other groupings, resulting in greater risk.

4.7.5 Summary

The cross-sectional variation across groupings in the direction and significance levels of these control variables suggests that even though their three digit SIC code industry representation is similar (Table 2 Panel C) and mean and median financial and operating characteristics are similar (Table 2 Panels A and B), these variables do not adequately capture their differences with respect to change in systematic risk.

Amit and Livnat (1990) use business cycle indicator variables to group conglomerates into fifteen groupings. Firms which typically lead, are concurrent with or lag the business cycle are grouped together using business cycle indicator variable. They report that their classification scheme produces less within group variation with respect to systematic risk and earnings prediction error than SIC code industry classifications.

In this study, the variation in the signs and significance levels of the control variables across groups suggests that grouping by relative funded status crudely groups firms with similar operating and financing characteristics together. A potential extension to this study is to determine if a relation between business cycle position (ie. leading, concurrent, or lagging) and the signs of financial statement ratios exists. For example, perhaps the market uses financial statement ratios for firms which typically lead other companies to determine the beginning or end of recessions. If this relation is established, one would expect that as firms passed through business cycle stages, the pattern of coefficients of financial statement ratios regressed against systematic risk changes would be predictable. This might explain why systematic risk is nonstationary.

Chapter Five

SUMMARY AND CONCLUDING REMARKS

The effect of FAS 36 on the market's evaluation of risk is documented for firms which are better funded and which previously reported either UVB = 0 or UVB = missing (Groups 2 and 3), and for fully funded or overfunded firms under FAS 36. The sign of the coefficients is consistent with the model of the economic determinants of systematic risk.

The primary effect of FAS 36 appears to be that it required public disclosure of information which was previously only available privately from the company. Apparently, the size of the pension asset and liability for these firms was not known by the market. As the pension funding strategy literature suggests, firms which fully fund or overfund their plans are likely to do so because of the tax-advantaged status of pension plan asset earnings and are firms which have financial slack. The results confirm that firms which have higher funding ratios also have relatively higher tax rates than firms in the same grouping. Since plan assets in excess of the termination liability of the plan revert back to the company, firms which are well-funded may have an incentive to keep the size of their pension plans private. Such firms might be takeover targets or management might be disciplined for building up the plan assets instead of distributing the assets to stockholders in the form of dividends. Thus, FAS 36 seem to confirm that information regarding well-funded plans was not known by the market.

FAS 36 disclosures had no effect on the systematic risk of firms previously reporting non-zero unfunded vested benefit obligations (Group 1 firms) and firms which previously reported zero or did not report unfunded vested benefit obligations under APB 8, but which were less well-funded than other firms in that category. No effect is documented even though the decline in the reported unfunded obligation status was statistically significant. This result suggests that the market's expectation of the size of the obligation was unaltered by FAS 36 disclosures. These results support the criticism of the elimination of salary projection in computing the obligation

under FAS 36's mandated actuarial cost method.

Future extensions of this research include examining the history of well-funded firms relative to less well-funded firms after FAS 36 was disclosed. The frequency, timing and rationale of takeover attempts and mergers will be examined. In addition, covenant clauses and other strategies to thwart takeover attempts will be examined to determine if other presumably more costly means of protecting companies with well-funded pension plans were adopted in response to the required disclosures of FAS 36. As mentioned earlier, while FAS 87 required pension expense and the liability calculated under the projected unit credit method, FAS 36 actually may have had more economic impact due to the increased amount of information required. In examining, the economic consequences of FAS 36, our knowledge of the effect of even seemingly minor requirements on companies is enriched.

The results of the study also suggest that when examining systematic risk changes, the variables relevant in explaining the change may differ depending upon the time horizon. The control variables used in prior studies which explained the level of risk estimated using a five year time horizon did not perform well in the shorter time frame (one year horizon) used here. As a result, variables intended to measure short time frame phenomena selected in an intuitive manner were included and performed much better than the other variables.

From both an academic research and financial statement analysis perspective, empirically testing theories culled from the finance and economic literatures regarding variables affecting risk changes across time would be valuable. Such work would be valuable from a pedagogic perspective as well since a framework of financial statement analysis could be developed from such an effort.

The cross-sectional differences in the signs and significance levels of the control variables across groups suggests that the nonstationarity in beta may be due to differences in firms placement within the business cycle. The examination of business cycle-systematic risk-financial

statement analysis relations may aid in explaining beta nonstationarity.

Additional work includes examining the information contained about the economic determinants of risk in the choice of accounting methods and estimates. For example, the relative sensitivity of firm inputs to changes in market prices may be conveyed in the choice of LIFO instead of FIFO or average. Several studies have confirmed that LIFO is chosen primarily for its tax advantage. If all or part of a firm's inputs are subject to inflation, the firm may be more likely to select LIFO. Compared to other firms, this firm may be riskier because of this sensitivity. The choice of LIFO and the relative weight of LIFO compared to other methods in its inventory may provide information about the firm's operating risk.

This study presents evidence that Lev's prescription regarding investigating further the link between accounting measures and asset valuation, in particular the relation between systematic risk and accounting disclosures, is a fruitful frontier for research.

APPENDICES

APPENDIX A

ACTUARIAL FUNDING METHODS

Before defining the actuarial liability required to be reported by APB 8, the process followed by actuaries to determine a company's annual pension cost charge, the basis for its annual funding of the pension, is discussed. Prior to FAS 36, most companies reported the annual pension fund contribution as its pension expense and the actuarial liability calculated under the method selected by the actuary as its liability.

The basis for the following discussion is McGill and Grubbs (1989) (Chapters 12-14). At the plan valuation date (generally, valuation is performed annually), the actuary forecasts how much each employee will be owed per month upon retirement. This amount is adjusted for decrements such as expected mortality and termination prior to retirement. The present value of these expected benefits is calculated to arrive at the forecasted liability at that date. This "liability" includes what has been earned by the employee as well as the anticipated pension related earnings. An actuarial cost allocation method is selected by the company to establish a pattern of allocation of such costs to time periods. The actuarial liability is the cumulative normal cost (annual cost per the actuarial method), increased by the valuation interest rate, decreased by benefit and expense disbursements and adjusted for actuarial gains and losses. In other words, the actuarial liability is the portion of the total plan valuation "liability" attributed to the past by the cost allocation method. APB No.8 requires reporting the unfunded portion of vested actuarial liability.

Benefit allocation cost methods and cost allocation cost methods are the two categories of methods from which companies can select cost allocation or funding methods. Benefit allocation cost methods determine the amount of benefit earned or credited to individuals during a year. The present value of the annually earned benefits are calculated to the end of the current period to arrive at the normal cost. Cost allocation actuarial methods allocate the total projected

liability for employees at the valuation date to years of service based upon constant dollar amounts or constant percentage of the participant's salary from year to year. The actuarial liability is not directly related to the benefits earned by the employee thus far.

The benefit allocation methods result in reported actuarial liabilities closer to the accounting definition of a liability. However, cost allocation actuarial methods are the most commonly used ones. For example, VanDerhei and Joanette (1988) report that in 1981 only 143 of the 872 plans examined used accrued benefit methods. The choice of actuarial cost allocation methods for most firms appears to be motivated by factors outside of measuring a liability consistent with accrual accounting. Since firms use the pension cost calculated from applying these methods to determine the annual funding amount, funding strategy concerns appear to be the major motivating factors behind method choice.[1]

[1]Tax considerations may affect funding strategy since pension plan fund earnings have special tax status. The earnings are tax deferred until the employee receives his/her pension. In addition, since relatively liberal plan termination requirements existed until recently, firms might be motivated to build financial slack by funding plans quickly. If cash needs arose, the plan could be terminated and excess funds returned to the firm. Both the tax and financial slack motivations have been supported in many studies regarding pension funding. Examples are Friedman (1983), Bodie, Light, Morck and Taggart (1984) and Francis and Reiter (1987).

APPENDIX B

DISCLOSURES UNDER APB 8

During the APB 8 era, pension related information was required to be reported in the Annual Report, Securities and Exchange Commission form 10-K, and the Pension Benefit Guarantee Corporation's form 5500, Schedule B. Each of these sources of pension related information is discussed below.

Annual Report The annual report is prepared under Generally Accepted Accounting Principles. APB 8 required reporting of the unfunded portion of the present value of vested benefits calculated using one of the actuarial methods. Overfunded pension liabilities were not required to be reported. The assumptions and methods used to compute the liability were not required to be reported. The amount of nonvested pension liabilities was not required to be reported.

Form 10-K In 1980, Rule 3-16(g) of Regulation S-X requires disclosure of:

(a) the excess of vested benefit actuarial value over the pension fund at the most recent practical date, and

(b) If not fully funded, the estimated amount that would be necessary to fund or otherwise provide for past service cost of the plan. (in SEC Accounting, Buckley, Buckley and Plank (1980), pp. 144-145).

These requirements are broader than under APB 8 since the present value of unfunded past service cost of the plan must also be reported. Past service cost arises upon initiation of the plan when employees are given credit for past service before the plan is adopted. Past service cost is increased when plan amendments occur for the change in the actuarial liability at the valuation date due to the amendment. The amount of past service cost reported depends upon the actuarial method selected. Again, assumptions and method are not required to be reported. The nonvested benefits are not required to be reported by the SEC.

Pension Benefit Guarantee Corporation (PBGC)

The PBGC began requiring individual plans to report Form 5500 when ERISA was

passed. Defined benefit plans with more than 100 employees were required to file Schedule B, as well. Schedule B provides information regarding the pension plan's actuarial assumptions and until, 1979, the actuarial liability of the plan based upon the method used for funding. For plan years 1979 and beyond, the disclosure of vested and nonvested liabilities calculated using the accrued benefit method was required. The FASB endorsed the requirement of the accrued benefit method in hearings conducted in 1978. As noted earlier, the accrued benefit method is closer to an accounting-based liability than other methods.

In order to determine the pension obligation status of a company, the individual form 5500's for all plans need to be aggregated. Unless, such information was received directly from the company, the form 5500's are generally available two or three years after being filed from the Department of Labor's Disclosure Division.

In summary, the publicly available pension obligation information in the APB 8 era, generally, was determined by the funding method used.

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