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THE EFFECT OF REGULATORY COMMISSION
MANDATED ACCOUNTING CHANGES ON
PUBLIC UTILITY STOCK PRICES

by

A. LEONARD ROSENTHAL

A dissertation submitted to the Graduate Faculty in Business
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy, the City University of New York.

This manuscript has been read and accepted for Graduate School of Business in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	iii
LIST OF TABLES	vii
LIST OF FIGURES	xii
Chapter	
I. INTRODUCTION	1
Overview	
Background--Depreciation	
II. LITERATURE REVIEW	6
Research on Utilities	
Research on Non-Utility Firms	
III. IMPLICATIONS OF FLOW THROUGH VERSUS NORMALIZATION..	21
Cash Flow	
Single Plant, No Growth	
Multiple Vintage Plant, Growth	
Risk Differentiation	
Market Efficiency	
Hypotheses to Be Tested	
IV. EMPIRICAL EVALUATION	37
Methodology	
Sample and Data Used	
Empirical Results	
Selection of Time Periods	
Residuals	
Test on Interaction Between Valuation and Growth	
Under Flow Through and Normalization	
Interpretation of Results	
Implications For Public Policy	
Tests on Risk Factor	
V. CONCLUSION	61
APPENDIX	65
BIBLIOGRAPHY	67

LIST OF TABLES

Table	Page
1 -- Cash Flows Under Steady State Growth	29
2 -- Relationship Between Growth Rate and Age of Plant For Which Accelerated Depreciation Per Dollar Investment Exceeds Straight Line Depreciation Per Dollar Investment	32
3 -- Residuals - Flow Through	47
4 -- Residuals - Normalization	48
5 -- T-Test on $\bar{\beta}_M$	59

LIST OF FIGURES

Figure	Page
1 -- Average Residuals - Flow Through	49
2 -- Average Residuals - Normalization	50
3 -- Cumulative Average Residuals - Flow Through	51
4 -- Cumulative Average Residuals - Normalization	52

Abstract

THE EFFECT OF REGULATORY COMMISSION
MANDATED ACCOUNTING CHANGES ON
PUBLIC UTILITY STOCK PRICES

by

A. Leonard Rosenthal

Advisor: Professor Gerald Pogue

A controversy has developed over the impact of flow through versus normalization accounting with respect to the tax savings from accelerated depreciation on the public utilities. This study represents an attempt to examine both theoretically and empirically the effect of these two accounting techniques on the cash flow, risk, and stock prices of electric utilities.

The theoretical cash flow implications of flow through and normalization were examined under conditions of a single plant, no growth and multiple vintage plant, steady state growth. In the case of the former, there is no clear-cut basis for favoring either flow through or normalization using present value of cash flow as a criterion. In the case of the latter, if investors expect the growth rate of normalization utilities to increase relative to the growth rate of flow through utilities, then the value of the normalization utility should increase relative to the value of the flow through utility after the accounting switch.

Due to increased regulatory risk and reduced interest coverage, the risk of the flow through utilities should be greater than the risk

of normalization utilities. As with any publicly announced event, the switch to flow through or normalization should be quickly impounded into the stock price so that it should not be possible to make extraordinary profits after the announcement of the switch.

The empirical tests relied on a two index variant of the market model to isolate the effect of the accounting switch on utility stock returns. Those months before and after the accounting switch which could bias the estimates of the parameters were systematically excluded. Separate estimates of the regression parameters were calculated for the period before and after the announcement of the accounting switch. The finding can be summarized as follows:

- 1) There does not appear to be any interaction between growth, valuation and accounting technique.
- 2) Flow through utilities have significantly greater systematic risk than normalization utilities after the accounting switch.
- 3) The overall impact of the switch appears to be largely discounted by the market before it occurs. There is some slight indication of market inefficiency in the period after the switch.

Two possible problems in interpreting the results arise from the small sample used for the empirical tests and from the effect of tax-free dividends. With these points in mind, the results of this study are inconsistent with those who believe that flow through accounting immediately increases the cost of capital to these utilities. On the other hand, the increased systematic risk and drastically reduced interest coverage accruing to flow through utilities as well as the elimination of tax-free dividends means that the cost of capital to

these utilities must eventually increase. A number of areas for future research are suggested.

Chapter I

Introduction

In a review article dealing with the effects of accounting techniques on capital market equilibrium, Gonedes and Dopuch¹ indicated that the public utility industry may be one industry of the economy "where the deferred vs. flow through issue does have direct substantive economic implications...."² The two researchers were referring to the fact that some utilities are required or induced by their respective regulatory agency to adopt normalization (also known as deferral) or flow through accounting with respect to the savings arising from the use of accelerated depreciation for tax purposes. Under flow through, the tax savings are immediately passed on or flowed through to earnings, making it possible to reduce rates to present customers. Under normalization, the tax savings are put into a reserve account. This reserve is deducted from the rate base for rate-making purposes. As a result, the company is able to retain the tax savings, but pass it on to the customers over the life of the plant, rather than immediately as in the case of flow through.

The issue of flow through vs. normalization for public utilities has created a controversy in the academic world, the utility industry,

¹Nicholas J. Gonedes and Nicholas Dopuch, "Capital Market Equilibrium, Information Production, and Selecting Accounting Techniques: Theoretical Framework and Review of Empirical Work," Empirical Research in Accounting: Selected Studies, 1974. Supplement to Journal of Accounting Research, XI, 49-129.

²Ibid., p. 99.

and on Wall Street. While previous studies on utility stock prices, cost of capital and accounting technique have attempted to resolve the controversy, the issue remains unanswered, largely because many of these studies use questionable testing procedures (see Literature Review). This study uses a dual index variant of the market model, and announcement dates of the switch to flow through or normalization in order to answer the following questions:

1) Do normalization utilities show abnormal or residual returns in excess of flow through utilities?

2) Is there an interaction between changes in valuation based on the accounting switch to flow through or normalization and the level of the expected growth rate of the utility?

3) Do the capital markets quickly assimilate the news of the accounting switch to either flow through or normalization?

4) Are flow through utilities more risky than normalization utilities?

A description of flow through and normalization accounting will be provided next. In Chapter II, the literature involving accounting changes and their effect on stock prices, with particular emphasis on previous studies dealing with electric utilities, will be examined. In Chapter III, the implications of flow through versus normalization accounting will be discussed. The hypotheses to be tested will be presented. In Chapter IV, the methodology used in this study and the results obtained will be discussed. Chapter V will sum up the results and attempts to draw conclusions.

Background--Depreciation

Depreciation is a non-cash expense representing the write-off of the cost of a fixed asset due to wear, tear, and obsolescence. Basically, there are two major methods of calculating depreciation--straight line and accelerated. Under straight line depreciation, the charge-off of the fixed asset occurs in equal annual installments. With the latter, a greater proportion of the asset's cost is charged off in the earlier years of the asset's life. Most public service commissions require that straight line depreciation be used for both rate-making purposes and book purposes (that is, reporting to stockholders). In 1954, Congress authorized the use of accelerated depreciation for tax purposes for all corporations.³ The intent of this legislation was to provide greater cash flow to firms via the savings in taxes. However, in presenting the income statement to stockholders, the question arises as to whether the tax expense should reflect the actual taxes that were paid, or should reflect the difference between the expense as shown on the tax statement and that shown on the stockholder's statement. The former method is called the flow through approach, while the latter is called the normalization approach.

An example⁴ will illustrate the difference between the two methods. Assume a company with pre-tax, pre-depreciation income equal to \$100,000,000 uses accelerated depreciation for tax purposes, giving a

³"Internal Revenue Code," United States Code, Title 26, Sec. 167.

⁴Jerome B. Cohen, Edward D. Zinbarg, and Arthur Zeikel, Investment Analysis and Portfolio Management (Homewood, Illinois: Richard D. Irwin, Inc., 1973), pp. 210-213.

charge-off of \$4 million annually. However, under rules prescribed by regulatory commissions, the utility reports to stockholders as if it were depreciating at the straight line rate of \$2 million annually. Presented below are the tax statements of net income and stockholder statements of net income for the flow through and normalization firms.

	<u>Tax Statement</u>	<u>Flow Through Stockholder's Statement</u>	<u>Normalization Stockholder's Statement</u>
Pre-tax depreciation income	\$100,000,000	\$100,000,000	\$100,000,000
Less: depreciation	<u>4,000,000</u>	<u>2,000,000</u>	<u>2,000,000</u>
Net before taxes	96,000,000	98,000,000	98,000,000
Less: taxes @ 50%	48,000,000	48,000,000	48,000,000
deferred taxes	---	---	<u>1,000,000</u>
Net income	<u>\$ 48,000,000</u>	<u>\$ 50,000,000</u>	<u>\$ 49,000,000</u>

The flow through company has reported to its stockholders the taxes it actually paid. These taxes have been reduced by the use of accelerated depreciation. If the flow through utility had paid taxes at the 50% rate on pre-tax income as shown in the stockholder's statement, it would have netted \$49 million. As a result of flow through accounting, a tax savings of \$1 million has been pushed through to the bottom line of the stockholder's statement. When normalization accounting is used, the firm has to reconcile the difference between the tax statement and stockholder's statement. This is done through the use of a "deferred tax" charge. While it does not represent a cash outgo, it does reduce net income. It should be pointed out that this deferred tax is put on the liability side of the balance sheet and accumulated over time. This account is the reserve or normalization account referred to earlier.

Rate-making agencies require both types of utilities to pass on to customers the tax savings arising from the use of accelerated depreciation. The difference arises over the method by which the tax savings are passed on. In the case of flow through, the reduction in taxes is treated as an increase in earnings, making it possible to reduce rates. Looked at in another way, if the utility uses flow through, it will exceed the allowed rate of return prescribed by the regulatory agency due to the increase in earnings. Under normalization, no return is earned on the normalization reserve. This is accomplished by subtracting the reserve from the rate base. As will be shown later (see Chapter III, Cash Flow), the normalization utility's revenue requirements will be less, so its rates will also be cut.

It should be noted that non-utility firms do not use flow through accounting.⁵ Thus, the issue of flow through versus normalization as it relates to the tax savings arising from the use of accelerated depreciation for tax purposes does not arise for non-utility firms. Even if these firms used flow through, the controversy as it relates to public utilities would not exist, for non-utility firms can and do retain the tax savings. For public utilities, the regulators have determined that it belongs to the customer--the crucial difference being the method by which it is passed on.

⁵Under Accounting Principles Board Opinion No. 11, non-utility companies are prohibited from using flow through accounting with respect to tax savings arising from the use of accelerated depreciation.

Chapter II

Literature Review

A review of previous research can be divided into two areas: those dealing directly with the effect of flow through versus normalization accounting on public utility stock prices, and those involving the effect of accounting events on the stock prices of non-utility firms. In discussion the latter, a look at the methodology used to test for efficient capital markets is necessary.

Research on Utilities

O'Donnell's¹ research sought to determine if the capital markets differentiate between flow through and normalization utilities on the basis of price-earnings ratios. His sample consisted of 37 electric utilities which had revenues of at least \$20 million in 1956 and derived at least 60% of their revenues from electric sales. The sample was divided into 3 groups: 12 with no change in depreciation policy (that is, continued use of straight line), 18 which adopted normalization, and 7 which adopted flow through. The average P/E for each group was computed on an annual basis from 1949-1962. An examination of these averages revealed that since 1954 (the first year in which the Internal Revenue Service allowed accelerated depreciation), flow through utilities had P/E's which were 95% of those of normalization utilities. He concluded that investors do differentiate

¹J. L. O'Donnell, "Relationship Between Reported Earnings and Stock Prices in the Electric Utility Industry," Accounting Review, XXXX (January 1965), 135-143.

between flow through and normalization. Nevertheless, he failed to consider such variables as growth and risk, so his results are subject to question.

Mlynarczyk² was interested in determining if the principal accounting methods for federal income taxes influenced the common stock prices of electric utility companies during the period 1957-1961. He proposed a multiplicative model in the form:

$$(1) \quad P_{it} = b_{0t} E_{it}^{b_{1t}} G_{it}^{b_{2t}} R_{it}^{b_{3t}} C_{it}^{b_{4t}} \exp(b_{5t} M_{it} + b_{6t} A_{it}) e_{it}^*$$

where P_{it} = price of the i^{th} company's stock in period t

E_{it} = latest 12-month reported accounting earnings available at the time of estimation t

G_{it} = an index for expected future growth of earnings per share of the i^{th} company at time t (5-year average growth rate in earnings per share)

R_{it} = latest reported annual revenues for the i^{th} firm in period t

C_{it} = proportion of common equity in long-term capital structure of the i^{th} company at time t

M_{it} = market where the shares of the i^{th} company are traded at time t (dummy variable with 1 = New York Stock Exchange, 0 = other markets)

²F. A. Mlynarczyk, "An Empirical Study of Accounting Methods and Stock Prices," Empirical Research in Accounting: Selected Studies, 1969, Supplement to Journal of Accounting Research, 63-81.

A_{it} = accounting method of the i^{th} firm at time t (dummy variable
with 1 = normalization, 0 = flow through)

e_{it}^* = error term

This was linearized in logs to obtain:

$$(2) \ln P_{it} = \ln b_{0t} + b_{1t} \ln E_{it} + b_{2t} \ln G_{it} + b_{3t} \ln R_{it} + b_{4t} \ln C_{it} \\ + b_{5t} M_{it} + b_{6t} A_{it} + e_{it}$$

where $e_{it} = \ln e_{it}^*$

The model was run cross-sectionally once for each of the years 1957-1961 using data as of the third week of January in succeeding years, that is, January 1958-January 1962.

The results indicated that b_6 was significant at the 5% level or better for 1959-1961. In other words, normalizing companies enjoyed premiums over the flow through companies of about 10%, 9%, and 7% for 1959, 1960, and 1961, respectively. On the basis of these results, Mlynarczyk was able to say that during the 1959-1961 period, some investors did take into account the alternative accounting methods for tax savings available in the electric utility industry. He was unable to clearly explain why results were insignificant in the years 1957 and 1958. This study suffers from shortness of time (only five years were covered), failure to consider risk, and problems in measuring some of the variables, especially the growth variable. There is no theoretical reason for use of a multiplicative model.

Robichek, Higgins and Kinsman³ tested the effect of flow through accounting on the cost of equity of a large sample of electric utilities over the period 1962-1970. Cost of equity capital was derived using both finite and infinite growth horizons, while leverage, measured in book and market terms, was included in the model. Using a dummy variable to indicate the presence of flow through accounting, they found that flow through utilities had a cost of equity on average .4% lower than non-flow through utilities. Since these results were unexpected, the researchers urged caution, saying that their results could be due to misspecification error.

Linhart⁴ examined the effect of flow through and normalization for public utilities under conditions of growth and no-growth on the public, the tax collector and the investor. Under the more interesting case of growth, Linhart shows that a utility which adopts flow through will at first experience decreasing unit capital costs and therefore rate cuts (see Chapter III). After approximately the mean half-life of the plant expires, unit capital costs will increase, necessitating rate increases. The higher the growth rate of the utility, the smaller the increase in unit capital costs. A utility which switches to normalization from straight line will also experience decreasing unit costs and rate cuts, but unit capital costs will level off after the average half-life of the plant expires. Thus, there is no need for rate

³Alexander A. Robichek, Robert C. Higgins and Michael Kinsman, "The Effect of Leverage on the Cost of Equity Capital of Electric Utility Firms," Journal of Finance, XXVIII (May 1973), 353-367.

⁴Peter B. Linhart, "Some Analytical Results on Tax Depreciation," Bell Journal of Economics and Managerial Science, I (Spring 1970), 82-112.

increases. The implication of this is that flow through utilities are exposed to more regulatory risk than normalization utilities, due to the former's need to seek rate increases. Linhart also shows that flow through utilities can expect to experience a drop in interest coverage relative to normalization utilities. Flow through accounting can also lead to tax-free dividends, while normalization is less likely to do so.

Brigham and Nantell⁵ ran simulations for a prototype utility using three different methods of depreciation: straight line, normalization, and flow through. The researchers were interested in the effect of the accounting method on customers and on investors. Assuming no regulatory lag, the same cost of capital and no differential growth (admittedly unrealistic assumptions), market prices for the stocks of the three firms are equal. When regulatory lag is introduced, the price of the normalization firm's stock rises above that of the straight line firm with the flow through firm ending up with the lowest price. This is due to the lower realized rate of return that the flow through utility experiences, and the need to request rate increases at some point to make up for earlier revenue deficiencies. The flow through utility is then exposed to the risk that the regulators may not grant rate relief in a large enough amount.

⁵Eugene F. Brigham and Timothy J. Nantell, "Normalization and Flow Through For Utilities," Accounting Review, XLIX (July 1974), 436-447.

Research on Non-Utility Firms

The development of the market model⁶

$$(5) \quad \tilde{R}_{it} = a_i + b_i \tilde{R}_{Mt} + \tilde{u}_{it}$$

where \tilde{R}_{it} = return on security i in period t

\tilde{R}_{Mt} = return on the market in period t

a_i = intercept term

b_i = systematic risk of security i

\tilde{u}_{it} = residual term

provides an excellent means of testing the efficiency of capital markets. One can look at the residual term as incorporating the unexpected return on a security due to some factor affecting that security. If the markets are efficient, the expected value of the residual term after some event should equal 0. For many purposes, particularly those relevant to accounting, the use of the market model permits the researcher to pool data from differing time periods, resulting in a substantial increase in the number of observations. The first use of the market model to test for market efficiency was by Fama, Fisher, Jensen and Roll⁷ (FFJR). Quite a few studies have since been conducted using the basic methodology laid out by FFJR. While their research does not deal with the effect of accounting changes, the methodology they employed is of such importance as to make it necessary to discuss it.

⁶William F. Sharpe, "A Simplified Model For Portfolio Analysis," Management Science, IX (January 1963), 277-293.

⁷Eugene F. Fama, Lawrence Fisher, Michael C. Jensen and Richard Roll, "The Adjustment of Stock Prices to New Information," International Economic Review, X (February 1969), 1-21.

FFJR's work dealt with the effect of stock splits and dividend announcements on stock prices. The researchers were interested in isolating the effect of these events on individual stock returns. It was necessary to abstract from general market effects in examining the returns on an individual security during the months surrounding split dates. FFJR used the market model in log form for securities experiencing splits. The resulting coefficients for each security were used to calculate residuals for 30 months before and after the split date. Since individual securities might be subject to eccentricities, FFJR decided to cross-sectionally average the residuals. Defining month 0 as the month in which the split occurs, the average residual is

$$(4) \quad AR_t = \frac{1}{N} \sum_{i=1}^N \hat{u}_{it}$$

where N = number of splits for which data are available in month t . In other words, the average residual is the average deviation in month t of the returns of split stocks from their normal relationship with the market relative to the months of the splits. They also defined a cumulative average residual

$$(5) \quad CAR_t = \sum_{i=-n}^t AR_i$$

which shows the cumulative effects of deviation returns of the split stocks relative to their normal relationship with the market. The CAR implies a portfolio in which there is an equal dollar investment in each security at the start of each period.

The first accounting-related study to apply FFJR's methodology was by Ball and Brown.⁸ They were interested in examining the relationship between unexpected changes in earnings and their impact on stock prices. The researchers used the same basic methodology as FFJR, and in addition, they developed an abnormal price index (API) defined as:

$$(6) \quad API_t = \frac{1}{N} \sum_{i=1}^N \sum_{t=-11}^T (1 + a_{it})$$

The API traces out the value of one dollar invested in equal amounts in each security in the portfolio at the end of month -12 (that is, 12 months prior to the month of the annual report), and held to the end of some arbitrary holding period ($t = -11, -10, \dots, T$), after abstracting the market effect. A buy-and-hold policy is being assumed.

Ball and Brown found that most of the information contained in reported income is anticipated by the market before the annual report is released. Some 85-90% of the net effect of the information about income is already reflected in security prices by the month of its announcement. In other words, no abnormal returns can be earned once the annual report is released.

The study by Roll and Kaplan⁹ examined the effect of changes in depreciation (from accelerated to straight line for book purposes) and in accounting for the investment tax credit (flow through or normalization) for industrial companies. Their assumption was that

⁸Ray Ball and Phillip Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, VI (Autumn 1968), 159-78.

⁹Robert A. Kaplan and Richard Roll, "Investor Evaluation of Accounting Information: Some Empirical Evidence," Journal of Business, XXXV (April 1972), 225-257.

sophisticated investors should be able to understand detailed financial statements and properly interpret the accounting conventions used by a company to describe its operations. Thus, a company should not be able to affect its stock price by changing its accounting method. Kaplan and Roll used the date of the earnings announcement as the base date for measuring the effect of accounting changes.

Rather than using the market model to isolate the effect of the accounting changes, these researchers used the following model:

$$(7) \quad R_{it} = \gamma_i R_{Ft} + \beta_i R_{Mt} + \epsilon_{it}$$

Regressions for individual securities were run using weekly prices covering the period 7/5/62 - 9/25/69. Observations 30 weeks before and 30 weeks after the announcement date were arbitrarily omitted from the regressions so as not to bias the regression coefficients. Average residuals and cumulative average residuals were calculated, and the latter were tested for significance in terms of a non-parametric measure, since evidence indicates that stock prices conform to a non-normal symmetric stable distribution. Roll and Kaplan calculated U_{Tp} , the portion of individual securities with positive cumulative

abnormal returns in week T , and $U_{Ti} = \sum_{t=1}^T \hat{u}_{it}$, where \hat{u}_{it} = individual abnormal returns of stock i in week t . Thus, $U_{Tp} = \frac{1}{N} \sum_{i=1}^{N_T} \max(0, \text{sign } U_{Ti})$.

N_T = number of stocks available in week T . If the \hat{u}_{it} 's are mutually independent, then $N_T U_{Tp}$ can be described by a binomial distribution.

The tests indicated that with respect to the investment tax credit, flow through companies experienced a decline in their residuals in

weeks 39-53 (where week 31 is the announcement week). Roll and Kaplan were unable to explain these results. In the case of the depreciation switch, the average residuals were not significantly different from 0, so this accounting change had no effect on stock prices. In sum, the study indicates possible short-run inefficiencies in the market.

The study by Archibald¹⁰ was also an attempt to ascertain the effect of depreciation switch-back. His study covered the period 1/52 - 12/67, and used the announcement date of the switch-back when possible. In his regressions, using the market model in log form, observations for the two-year period on either side of the announcement date were deleted. The parameters were used in turn to calculate residuals for a 48-month period surrounding the announcement date. Again, the residuals were averaged to eliminate individual firm fluctuations. The standard deviation of the average residuals was also calculated.

Archibald's results indicated that on average, in the two-year period prior to the announcement of the change, the switch-back firms were performing at a level below their normal relationship. He found that in the month of the announcement, the average residual was positive, and in the post-change months, there were 12 negative and 12 positive months. Interpretation was difficult, but Archibald concluded that switch-back depreciation has no immediate substantial effect on stock market performance.

¹⁰T. Ross Archibald, "Stock Market Reaction to Depreciation Switch-Back," Accounting Review, XLVII (January 1972), 22-30.

Meyers¹¹ has raised the question of whether the estimates of the regression coefficients of systematic risk for individual securities can be assumed to be stationary over time. For example, for 50% of the stocks in Archibald's study, the stationary assumption was unwarranted. Meyers suggests two alternatives for getting around this problem. One is to screen the sample and eliminate those stocks whose betas cannot be shown to be stationary. The other would limit applications of the market model to portfolios, since it is known that portfolio betas are stable over time.

The most comprehensive study of the effect of accounting changes on stock prices has been conducted by Ball.¹² His sample consisted of 365 non-utility firms which reported 517 accounting changes over the period 1947-1960. These changes were in accounting for inventory, depreciation, revenue recognition, subsidiaries, and inclusion in net income. Ball used two different models to remove the general market effect from individual stock returns. He started off with the market model.

¹¹Stephen L. Meyers, "The Stationarity Problem in the Use of the Market Model of Security Price Behavior," Accounting Review, XXXVIII (April 1973), 318-322.

¹²Ray Ball, "Changes in Accounting Techniques and Stock Prices," Empirical Research in Accounting: Selected Studies 1972, Supplement to Journal of Accounting Research, 1-38.

The regressions revealed that the data violated the ordinary-least-squares assumptions. That is, since OLS forces the mean residual to be 0, any average market adjustment for a security over the regression period would be impounded into the intercept and not into the residual term. Another way of looking at this is to realize that the market model in removing $a_i + b_i R_{Mt}$ from R_{it} has removed the a_i component of the stock's rate of return which might be part of the market behavior which is correlated with the accounting change. Thus, if a firm has systematically good or bad market behavior over a long period of time, the market model will not pick up this fact. The problem can be overcome by excluding from the regression those months in which the residual is suspected of having a non-zero expectation. The regressions are run and the residuals are inspected for abnormal behavior. This procedure is done repeatedly until the adjustment to the accounting change seems to be entirely contained in the residuals from the excluded period.

Average residuals and cumulative average residuals were calculated based on the market model. The results seem to indicate that the average residuals after the event are not significantly different from 0, meaning that the market is efficient. However, Ball claims that the market model is flawed for this kind of analysis, so that any conclusions must be tempered. He suggests the use of the two-factor model. Here, the systematic risk of individual securities, β_i , is estimated by the market model using data from even-numbered months. Stocks are ranked by their β_i 's and portfolios are formed on the basis of these ranked β_i 's. Estimates of portfolio risk, β_p , are then made

using the market model and data for odd-numbered months. Then the following model is used:

$$(8) \quad R_{Pt} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t} \hat{\beta}_P + \hat{\mu}_{Pt}$$

$\hat{\gamma}_0$ represents the return on the zero-beta factor (an asset with zero systematic risk which is uncorrelated with the market) developed by Black¹³ and tested by Black, Jensen, and Scholes.¹⁴ Finally, the residual is removed according to:

$$(9) \quad \hat{\mu}_{it} = R_{it} - \hat{\gamma}_{0t} - \hat{\gamma}_{1t} \hat{\beta}_i$$

It is likely that firms which change their accounting techniques may not be of constant risk. Since accounting techniques are grouped by industries, and since industries differ in average risk, changes in accounting technique could be associated with change in industry composition and in the average systematic risk of the firms in the sample. Therefore, Ball decided to use the two-factor model with risk changes. To accomplish this, he ran regressions on a moving series of 100 observations in which the β_i 's are estimated from data for $t - 50$ months through $t + 50$ months, excluding month t . (For example, to find the residuals for month -47 , data from months -97 through $+3$, excluding month -47 , are used.)

¹³Fischer Black, "Capital Market Equilibrium with Restricted Borrowings," Journal of Business, XXXV (July 1972), 444-455.

¹⁴Fischer Black, Michael Jensen and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Results," Studies in the Theory of Capital Markets, Michael Jensen (ed.). New York: Praeger, 1972, 79-121.

Results indicated that the monthly average residuals are small. The cumulative average residual reveals no strong pattern of market behavior. The average residual in the month of the accounting change is less than 1/20 of 1%, not significantly different from 0. Ball concluded that "there seems little reason to believe that accounting changes catch the market by surprise."¹⁵

Sunder¹⁶ examined the effect on stock prices of firms that switched to LIFO accounting from FIFO accounting and vice versa. He started with the assumption that the capital markets are semi-strong efficient, and tested to see if there was an association between the accounting changes and stock prices. He hypothesized two relationships: 1) the stock market reacts to changes in the true value of the firm, and to the extent the accounting changes affect valuation, stock prices will respond; and 2) the market reacts to changes in reported earnings. To the extent accounting changes affect reported earnings, stock prices adjust even if there is no impact on the value of the firm. Using the market model, Sunder found that stock prices reacted favorably to switches to LIFO, but due to small sample size he could obtain no meaningful results for those companies that switched to FIFO. Since his LIFO sample was overrepresented by steel companies (19% of the sample), he removed this group and repeated the analysis in order to remove any biases. Again, the LIFO group showed positive abnormal

¹⁵Ball, p. 25.

¹⁶Shyam Sunder, "Relationships Between Accounting Changes and Stock Prices: Problems of Measurement and Some Empirical Evidence," Empirical Research in Accounting: Selected Studies, 1973. Supplement to Journal of Accounting Research, XI (1973), 1-45.

returns, although less so than before. A problem arose because the securities in his sample underwent risk changes after the switch. He tested for the effect of the accounting switch using separate risk estimates from before and after the switch. Previous patterns held up, although the magnitude of the abnormal returns was somewhat changed. Sunder concluded that the switch to LIFO caused an increase in valuation, and this resulted in a positive adjustment by the market. There was no pattern in the abnormal returns after the announcement date, a result consistent with market efficiency.

Foster¹⁸ attempted to determine the stock market's reaction to statutory income reporting by insurance companies versus adjusted income reporting as done by the various insurance services and now required by the accounting profession. This study is different than most previous studies in two respects--it uses over-the-counter securities (almost all other studies have used NYSE securities), and it uses a double index model to isolate the effect of the accounting techniques. That is, a market factor and an orthogonalized industry factor are used. Results indicate that the market does not distinguish between the two methods of accounting. Rather, the market reacts before the announcement date of earnings to positive or negative earnings changes. One possible problem with Foster's study is his somewhat arbitrary determination of the announcement date of earnings. It was assumed that the announcements were made in the third month of the calendar year, as insurance companies are required to file their annual report with the state insurance commissions in that month.

¹⁷George Foster, "Accounting Earnings and Stock Prices of Insurance Companies," Accounting Review, L (October 1975), 686-675.

Chapter III

Implications of Flow Through vs. Normalization

Cash Flow

In order to determine the effect of a switch from straight line accounting to either flow through accounting or normalization accounting, one must look at the cash flows under the two alternatives. This may be approached under two conditions: single plant, no growth; and multiple vintage plant, growth. The former is an unrealistic case but an examination of it will help to understand the nature of the accounting treatments. For purposes of this analysis, the growth case will be steady state growth. That is, a new vintage of plant sufficiently larger than the plant installed in the previous year is put in operation each year so that the utility grows at a constant rate every year.

Single Plant, No Growth

The following assumptions are made for this case:

- 1) The utility is all equity financed. (This allows for abstraction from question of financial leverage.)
- 2) The utility earns a known allowed rate of return.
- 3) The tax rate is constant, and the same under all accounting treatments.

Under both flow through and straight line, required revenues (essentially capital costs which are recovered from customers) are:

$$(1) \quad RR_t = rX_t + IT_t + D_{B_t}$$

where RR_t = required revenues in year t

r = allowed rate of return

X_t = rate base in year t

IT_t = income taxes paid in year t

D_{B_t} = depreciation for book purposes in year t

Income taxes for the flow through utility are:

$$(2a) \quad IT_t = T(RR_t - D_{T_t})$$

where T = tax rate

D_{R_t} = depreciation for tax purposes (that is, accelerated depreciation)

while taxes for the straight line utility are:

$$(2b) \quad IT_t = T(RR_t - D_{B_t})$$

Equations (1) and (2a) can be rewritten as:

$$(3a) \quad RR_t = \frac{1}{1-T} (rX_t - TD_{T_t} + D_{B_t})$$

and

$$(4a) \quad IT_t = \frac{T}{1-T} (rX_t - D_{T_t} + D_{B_t})$$

For the straight line utility, book and tax depreciation are the same,

so the required revenues and taxes can be rewritten as:

$$(3b) \quad RR_t = \frac{1}{1-T} rX_t + D_{B_t}$$

$$(4b) \quad IT_t = \frac{T}{1-T} rX_t$$

Since cash flow is merely required revenues less taxes paid, the cash flows of both the flow through and straight line utilities are given by:

$$(5) \quad CF_{FT_t} = rX_t + D_{B_t}$$

It would appear that the cash flows of the flow through and straight line utilities are the same. This would only be true if the allowed rate of return of the two utilities is the same. Since adoption of flow through leads to rate decreases, this is an unrealistic assumption.

In the case of the normalizing utility, required revenues are:

$$(6a) \quad RR_t = rY_t + IT_t + D_{B_t} + T(D_{T_t} - D_{B_t})$$

where $Y_t = X_t - N_t$

$$N_t = \sum_{t=1}^K T(D_{T_t} - D_{B_t})$$

where $K =$ life of the plant

$T(D_{T_t} - D_{B_t})$ is the deferred tax arising from the use of accelerated depreciation for tax purposes. That is, since accelerated depreciation results in a larger charge-off in the earlier years of plant life, taxes will be less than if straight line depreciation were used. In order to take into account the possibility that the tax saving will eventually have to be paid back (as soon as $D_{B_t} > D_{T_t}$), deferred tax provision is made. N_t is the so-called normalization reserve. It represents the accumulated deferred tax. In calculating the rate base of the normalization utility, the public service commissions deduct the normalization reserve from the rate base. As a result, the utility earns no return on this account, and the tax savings from accelerated depreciation are spread over the life of the plant that gave rise to that tax savings. Under flow through, the tax savings are taken as they arise.

Taxes under the normalization are the same as (2a). Required revenues and taxes can then be rewritten as:

$$(6b) \quad RR_t = \frac{1}{1-T} rY_t + D_{B_t}$$

and

$$(7) \quad IT_t = \frac{T}{1-T} rY_t + T(D_{T_t} - D_{B_t})$$

Thus, cash flow for the normalization utility is:

$$(8) \quad CF_{N_t} = rY_t + D_{B_t} + T(D_{T_t} - D_{B_t})$$

The differential cash flows between flow through and normalization are:

$$(9) \quad \Delta CF_{FT_t} = rN_t - T(D_{T_t} - D_{B_t})$$

The point at which rN_t exceeds $T(D_{T_t} - D_{B_t})$ is a positive function of the life of the plant. Thus, if the investor has a high time rate of discount, he would prefer the cash flow of the normalization utility, while if his time preference for money is low, he would prefer the flow through utility. In the one plant case, there is no clear cut basis for favoring either flow through or normalization, using valuation as the criterion.

Multiple Vintage Plant, Growth

In addition to assumptions (1), (2), and (3) of the single plant case, the following are used:

1) The utility grows at a constant rate, determined exogenously by growth in the utility's service area.

2) Plant existing at the time of the switch to either flow through or normalization is not affected by the switch. This assumption

allows for the isolation of the effect of the alternative accounting techniques on cash flows from new investment under steady state growth.

3) The allowed rate of return is the same for both flow through and normalization.

The following symbols are used in addition to the ones previously used:

NP_t = net plant in year t

I_{t-K} = investment in the first year of the steady state growth period (assumed to be installed in the beginning of the year)

g = steady state growth rate

t = time in years

K = life of the plant (in years)

$d = \frac{1}{K}$ = straight line depreciation rate

d' = accelerated depreciation rate, where $d' > d$.¹

PV_0 = present value of cash flows at time 0, the beginning of the first year of steady state growth.

¹The method accelerated depreciation used here is a multiplicative, asymptotically declining process. An example of this would be the double declining balance method. For a single vintage of plant, the accelerated depreciation is given by:

$$\begin{array}{ll}
 D_{T_1} = d'I & NP_1 = I(1-d') \\
 D_{T_2} = d'NP_1 = d'I(1-d') & NP_2 = NP_1(1-d') = I(1-d')^2 \\
 D_{T_3} = d'NP_2 = d'I(1-d')^2 & NP_3 = NP_2(1-d') = I(1-d')^3 \\
 \vdots & \vdots \\
 D_{T_t} = d'NP_{t-1} = d'I(1-d')^{t-1} & NP_t = NP_{t-1}(1-d') = I(1-d')^t \\
 D_{T_K} = d'NP_{K-1} = d'I(1-d')^{K-1} & NP_K = NP_{K-1}(1-d') = I(1-d')^K \approx 0
 \end{array}$$

The following notation is used to describe the various accounts:

$I_{\tau-K}^G$ = gross plant

$I_{\tau-K}^J$ = accumulated straight line depreciation

$I_{\tau-K}^H$ = net plant under straight line depreciation

where:

$$G = \sum_{t=0}^{K-1} (1+g)^t \quad (\text{see note 2})$$

$$H = \sum_{t=0}^{K-1} (1+g)^t [1 - ((K-1)-t)d]$$

$$J = \sum_{t=0}^{K-1} (1+g)^t [(K-1)-t]d$$

so that $H = G - J$ (see note 3).

² G is the formula for the future value of an annuity which can also be expressed as:

$$\left[\frac{(1+g)^K - 1}{g} \right]$$

³ H , J , and G are constants. Since $NP_t = I_{\tau-K}^H$, NP_t is proportional to $I_{\tau-K}$. Thus, they both grow at rate g .

Under accelerated depreciation, the net plant is:

$$\begin{aligned}
 (10) \quad NP_t &= I_{\tau-K} [(1-d')^{K-1} + (1-d')^{K-2}(1+g) + (1-d')^{K-3}(1+g)^2 + \dots + (1+g)^{K-1}] \\
 &= I_{\tau-K} (1-d')^{K-1} \left[1 + \frac{1+g}{1-d'} + \left(\frac{1+g}{1-d'}\right)^2 + \dots + \left(\frac{1+g}{1-d'}\right)^{K-1} \right] \\
 &= I_{\tau-K} (1-d')^{K-1} \left[\frac{1 - \left(\frac{1+g}{1-d'}\right)^K}{1 - \frac{1+g}{1-d'}} \right] = I_{\tau-K} \left[\frac{(1-d')^K - (1+g)^K}{-d'-g} \right]
 \end{aligned}$$

$$\text{Let } L = \left[\frac{(1-d')^K - (1+g)^K}{-d'-g} \right] \quad (\text{see note 4})$$

Then, the accelerated depreciation charge

$$= d' I_{\tau-K} L$$

Accumulated accelerated depreciation = gross plant-net plant

$$= I_{\tau-K} G - I_{\tau-K} L$$

$$= I_{\tau-K} (G-L)$$

Deferred Tax = T (Accelerated depreciation charge - straight line depreciation charge)

$$= T(d' I_{\tau-K} L - d I_{\tau-K} G)$$

$$= T[I_{\tau-K} (d'L - dG)]$$

Normalization reserve = $\frac{\text{Deferred tax}}{g}$

Let $M = \frac{1}{g}$, so that the normalization reserve = $MT[I_{\tau-K} (d'L - dG)]$

$$\text{Flow through rate base } RB_{FT_t} = I_{\tau-K} H$$

Normalization rate base =

$$RB_{N_t} = I_{\tau-K} H - MT[I_{\tau-K} (d'L - dG)] = I_{\tau-K} [H - MT(d'L - dG)]$$

⁴L is a constant just like G, H, and J.

The cash flows of the flow through utility are:

$$\begin{aligned}
 (11) \quad CF_{FT_t} &= rRB_t + D_{B_t} \\
 &= rI_{\tau-K}H + dI_{\tau-K}G \\
 &= I_{\tau-K}(rH + dG)
 \end{aligned}$$

while the cash flows for the normalization utility are:

$$\begin{aligned}
 (12) \quad CF_{N_t} &= rRB_{N_t} + D_{B_t} + \text{Deferred Tax}_t \\
 &= rI_{\tau-K}[H - MT(d'L - dG)] + dI_{\tau-K}G + TI_{\tau-K}(d'L - dG) \\
 &= I_{\tau-K}\{r[H - MT(d'L - dG)] + dG + T(d'L - dG)\}
 \end{aligned}$$

An example of the generation of cash flows under steady state growth is presented below. The following assumptions are used:

- 1) Items appear as of the beginning of the year.
- 2) Sum-of-the-year digits depreciation is used.
- 3) Plant life = 5 years.
- 4) Growth rate = .10.
- 5) Allowed rate of return = .08.
- 6) Tax rate = .5.

TABLE 1
CASH FLOWS UNDER STEADY STATE GROWTH

Flow Through

T	I_t	Gross Assets _t	D_{B_t}	Accumulated D_{B_t}	RB_t	rRB_t	CF_t
1	1000	1000	200	---	1000	80.0	280.0
2	1100	2100	420	200	1900	152.0	572.0
3	1210	3310	662	620	2690	215.2	877.2
4	1331	4641	928	1282	3359	268.7	1196.7
5	1464	6105	1221	2210	3895	311.6	1532.6
6	1610	6715	1343	2431	4284	342.7	1685.7
7	1771	7386	1477	2674	4712	377.0	1854.0
8	1948	8124	1625	2941	5183	414.6	2039.6
9	2143	8936	1788	3235	5701	456.1	2244.1
10	2357	9829	1966	3559	6270	501.6	2467.6

Normalization

T	I_t	Gross Assets _t	D_{B_t}	Accumulated D_{B_t}	D_{T_t}	$T(D_{T_t} - D_{B_t})$	N_t
1	1000	1000	200	---	333	66.5	---
2	1100	2100	420	200	634	107.0	66.5
3	1210	3310	662	620	896	117.0	173.5
4	1331	4641	928	1282	1120	96.0	290.5
5	1464	6105	1221	2210	1299	39.0	386.5
6	1610	6715	1343	2431	1427	42.0	425.5
7	1771	7386	1477	2674	1569	46.0	467.5
8	1948	8124	1625	2941	1727	51.0	513.5
9	2143	8936	1788	3235	1900	56.0	564.5
10	2356	9829	1966	3559	2090	62.0	626.5

\underline{RB}_t	\underline{rRB}_t	\underline{CF}_t
1000.0	80.0	346.5
1833.5	146.7	673.7
25.6.5	201.3	980.3
3068.5	245.5	1269.5
3508.5	280.7	1540.7
3858.5	308.7	1693.7
4244.5	339.6	1862.6
4669.5	373.6	2049.6
5136.5	410.9	2254.9
5643.5	451.5	2479.5

Since the aim of this paper is to see if the alternative accounting techniques affect valuation, it is necessary to find the respective present value of cash flows. For the flow through utility, the present value of cash flows⁵ is:

$$(13) \quad PV_{FT_0} = I_{-K} \left(\frac{rH + dG}{i-g} \right) \quad i > g$$

where i = cost of capital.

For the normalization utility, the present value is:

$$(14) \quad PV_{N_0} = I_{-K} \frac{\{r[H-MT(d'L-dG)] + dG + T(d'L-dG)\}}{i-g} \quad i > g$$

⁵The present value of future cash flows at time period 0, PV_0 , is derived as follows:

$$\begin{aligned} PV_0 &= \sum_{t=1}^{\infty} \frac{CF_t}{(1+i)^t} = \sum_{t=1}^{\infty} I_{-K} (rH+dG) (1+i)^{-t} \\ &= \sum_{t=1}^{\infty} I_{-K} (1+g)^t (rH+dG) (1+i)^{-t} \\ &= I_{-K} \left(\frac{rH+dG}{i-g} \right) \quad i > g \end{aligned}$$

Finally, the differential present value is:

$$(15) \quad \Delta PV_0 = PV_{FT_0} - PV_{N_0}$$

$$= I_{-K} \left(\frac{[T(d'L-dG)(rM-1)]}{i-g} \right) \quad i > g$$

All of this has been done in an attempt to evaluate the sensitivity of the differential present value to changes in the rate of growth.

Taking the first derivative of ΔPV_0 with respect to growth gives:

$$(16) \quad \frac{\partial \Delta PV_0}{\partial g} = \frac{\frac{-(i-g)rI_{-K}[T(d'L-dG)]}{g^2} + I_{-K}[T(d'L-dG)(\frac{r}{g} - 1)]}{(i-g)^2}$$

$$= I_{-K} \frac{\{T(d'L-dG)[\frac{r}{g}(1-(\frac{i-g}{g}))]-1\}}{(i-g)^2}$$

Two things are of interest: 1) under what conditions will

$[\frac{r}{g}(1-(\frac{i-g}{g}))]-1]$ be negative; 2) under what conditions will $T(d'L-dG)$ be positive. If both (1) and (2) occur, the present value of the cash flows of the flow through utility will decrease relative to that of the normalization utility as the growth rate increases. With respect

to condition (1), $\frac{\partial \Delta PV_0}{\partial g}$ will be negative if:

$$(17) \quad g < \frac{2r - \sqrt{4r^2 - 4ri}}{2}$$

Looking at (17), it is clear that r must be at least equal to or greater than i , otherwise an imaginary number will result from the radical. It might seem unusual for r to be greater than i . However, i , the investor's discount rate (or cost of capital), is also the actual rate

of return, and it is not unusual for utilities to earn less than their allowed rate of return. Note that if $r = i$, $g < r$, which is the usual condition under growth.

With respect to condition (2), it has been specified that d' is greater than d . If $d' = 2d$, as under the double declining balance method, then it would be possible to determine the age of the plant for which $d'L$, accelerated depreciation per dollar investment, exceeds dG , straight line depreciation per dollar investment, for any growth rate. A number simulation was run, and presented below are the values of g and A , where A = age of the plant, for which $d'L$ exceeds dG .

TABLE 2

RELATIONSHIP BETWEEN GROWTH RATE AND AGE OF PLANT
FOR WHICH ACCELERATED DEPRECIATION PER DOLLAR INVESTMENT
EXCEEDS STRAIGHT LINE DEPRECIATION PER DOLLAR INVESTMENT

<u>g (in %)</u>	<u>A (in years)</u>
1	d'L never exceeds dG
2	46.3
3	29.8
4	21.5
5	16.4
6	13.0
7	10.4
8	8.4
9	6.5
10	d'L always exceeds dG

A few points might be noted. For a plant having a life of one year, $d'L = dG$ for any growth rate. This is not unexpected, for if the plant has only one year of life, all depreciation methods must give the same result--the plant must be depreciated away in one year. For a growth rate of 1%, $d'L$ never exceeds dG , no matter what the life the plant is. For growth rates of 10% and beyond, $d'L$ will exceed dG by the second year of plant life. Thus, for growth rates of 2% and beyond, $T(d'L - dG)$ will be positive. In the relevant range of electric utility growth rates (approximately 5 - 8% per year), $T(d'L - dG)$ will be positive.

Equation (16) would indicate that the level of the expected growth rate will affect the valuation of the flow through and normalization utilities if the levels are the same at the time of the accounting switch. Should investors expect the growth rate of normalization utilities to increase relative to the growth rate of flow through utilities (after the accounting switch), then the value of normalization firms should increase relative to flow through firms after the switch.

Risk Differentiation. Linhart⁶ has shown that under conditions of growth and the following assumptions, flow through utilities are more

⁶Peter B. Linhart, "Some Analytical Results on Tax Depreciation," Bell Journal of Economics and Management Science, I (Spring 1970), 82-112.

risky⁷ than normalization utilities:

- 1) constant returns to scale
- 2) perfectly inelastic demand
- 3) a single service with a single unit price
- 4) a rate base that is growing at an exponential rate.

Linhart looks at capital cost per unit of gross plant, defined as required revenues divided by gross plant, as a measure of the price of service. Using integral calculus and Laplace transforms, he shows that for both the flow through and normalization utility, unit capital costs decline up to approximately the weighted average half life of the plant. After that point, unit capital costs for the flow through utility rise, the extent being negatively related to the firm's growth rate. Therefore, unless the growth rate is very high, unit capital costs will increase. Unit capital costs will never increase for the normalization utility on account of using normalization. This means that the flow through utility will be forced to ask for rate increases at some point after the accounting switch, while the normalization utility will not need to ask for a rate increase. Increased riskiness for the flow through utility results from the uncertainty that the regulatory agency may not grant the flow through utility the necessary increases.

⁷Theoretically, under perpetuity conditions, an increase in the riskiness of the debt could lead to an increase in the value of the equity. Since the value of the firm is the capitalized operating income which does not change, the value of the firm will remain the same. However, if the debt becomes more risky, the cost of debt will increase, reducing the value of the debt. Since the value of the firm is unchanged, the value of the equity must increase.

Flow through utilities will also experience increased risk due to reduced interest coverage relative to coverage levels prior to the accounting switch. This reduced interest coverage can be interpreted by the market as increasing the risk to the firm for the following reasons:

- 1) Possibility that earnings will fail to cover interest payments.
- 2) Lowering of bond ratings with a concomitant increase in the cost of debt.
- 3) Increase in the cost of equity associated with the increase in the cost of debt.

Market Efficiency

In general, in an efficient market, prices fully reflect all available information.⁸ Mathematically, this can be expressed as:

$$Z_{j,t+1} = R_{j,t+1} - E(\tilde{R}_{j,t+1} | \phi)$$

then

$$E(Z_{j,t+1} | \phi) = 0$$

where $Z_{j,t+1}$ = return at time t+1 in excess of equilibrium expected return

$R_{j,t+1}$ = observed return in t+1

$E(\tilde{R}_{j,t+1} | \phi)$ = expected return at the t+1 based on the information set ϕ , affecting the price of the security at time t.

⁸Eugene F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, XXXV (May 1970), 383-417.

In other words, if all the information in ϕ is used by the market in assessing future excess returns, the investor cannot use ϕ as the basis of a trading system to generate expected returns in excess of equilibrium expected returns.

The particular type of efficient market hypothesis being examined in this study is known as the semi-strong version. This version says that current prices fully reflect public knowledge about the underlying security, so that it is not possible to make extraordinary profits based on this knowledge. Thus, when a utility switches to either flow through or normalization, one would expect that the effect of this event will have already been discounted into the price of the stock, or will be very soon afterwards.

Hypotheses to Be Tested

On the basis of the implications of the switch to flow through or normalization just presented, this study aims to test the following hypotheses:

1a) Normalization utilities show abnormal returns in excess of flow through utilities.

b) There is an interaction between changes in valuation based on the accounting switch to flow through or normalization and the level of expected growth rate of the utility.

2) The capital markets quickly assimilate the news of the accounting switch to either flow through or normalization.

3) Flow through utilities are more risky than normalization utilities.

Chapter IV
Empirical Evaluation

Methodology

Since the object of this study is to isolate the effect of regulatory mandated accounting changes on electric utility stock prices, it is necessary to find a method for describing the price adjustment process. With the exception of Foster's study (see Literature Review), previous event-oriented studies have only considered a market factor in order to isolate the effect of the event on the security. Since this study concentrates on one industry, it is necessary to include an industry factor in order to remove cross-sectional commonalities of security returns due to the industry factor. In addition, King¹ and Meyers² have shown that for the utility industry, variations in the returns of the industry factor were important in explaining the variation in the returns of the individual securities.

A variant of Sharpe's³ market model that would take into account both the market and industry influences is:

¹Benjamin F. King, "Market and Industry Factors in Stock Price Behavior," Journal of Business, XXXIX (January 1966), 139-190.

²Stephen L. Meyers, "A Re-examination of Market and Industry Factors in Stock Price Behavior," Journal of Finance, XXVIII (June 1973), 695-705.

³William Sharpe, "A Simplified Model for Portfolio Analysis," Management Science, X (January 1963), 277-293.

$$(1) \quad \tilde{R}_{it} = a_i + b_i \tilde{R}_{Mt} + c_i \tilde{R}_{It} + \tilde{u}_{it}$$

where \tilde{R}_{it} = rate of return on the i^{th} security over time period t ⁴

\tilde{R}_{Mt} = rate of return on the market index over time period t

\tilde{R}_{It} = rate of return on the industry index over time period t

a_i = intercept term

b_i = systematic risk of the i^{th} security

c_i = slope coefficient relating the rate of return of the security and the industry index

\tilde{u}_{it} = disturbance term, assumed to have a zero mean, to be independent of the market and industry indexes, and to be uncorrelated across i .

This two-index variant of the market model can be estimated by ordinary least squares regression for each firm:

$$(2) \quad R_{it} = \hat{a}_i + \hat{b}_i R_{Mt} + \hat{c}_i R_{It} + \hat{e}_{it}$$

where \hat{e}_{it} = residual term of the i^{th} security in period t .

⁴The rate of return is defined as:

$$R_{it} = \frac{P_{it} + d_{it}}{P_{i,t-1}^*}$$

where P_{it} = market price for a share of security i at the end of month t

d_{it} = the cash dividend paid on security i in month t

$P_{i,t}^*$ = the price of a share of security i at the end of month t , after an adjustment for capital changes in month $t+1$.

In order to avoid problems of multicollinearity, an orthogonalization procedure is used. That is, R_{It} is regressed on R_{Mt} ⁵ prior to running the individual security regression described by (2). The residual which is calculated:

$$(3) \quad \hat{W}_{it} = R_{It} - (\hat{f}_i + \hat{g}_i R_{Mt})$$

where \hat{f}_i = intercept term from the orthogonalization regression

\hat{g}_i = slope term from the orthogonalization regression

is used to represent the pure industry factor. \hat{W}_{it} is then substituted back into (2) to give:

$$(4) \quad R_{it} = \hat{a}_i + \hat{b}_i R_{Mt} + \hat{c}_i \hat{W}_{it} + \hat{e}_{it}$$

The residual term, \hat{e}_{it} , can be looked at as incorporating the abnormal return on a security due to some unique factor affecting that security. If the securities markets are efficient, the expected value of the residual after the event should equal 0. A problem arises from the fact that OLS constrains the average residual to be 0, so that the average adjustment to the accounting change will be impounded into the intercept term and not into the residual. In order to avoid this, it is necessary to use an iterative procedure. This involves examining the residuals from (4) for abnormalities, removing those months in which abnormal behavior occurs, and rerunning the regressions until the market adjustment appears to be entirely contained in the

⁵The time period used to calculate the orthogonalized industry index more than spans the time period over which the accounting change took place for all the companies in the sample.

⁶See Eugene F. Fama, Laurence Fisher, Michael C. Jensen and Richard Roll, "The Adjustment of Stock Prices to New Information," International Economic Review, X (February 1969), 1-21.

residuals from the excluded periods. The parameters of this regression are then used to form estimates of the residuals that are due to the effect of the accounting change:

$$(5) \quad \hat{e}_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{Mt} + \hat{c}_i \hat{W}_{it})$$

The model described above assumes that the systematic risk of the stocks remains the same after the accounting change. As has already been discussed, the risk of flow through utilities should increase after the accounting switch. Thus, it is necessary to run separate regressions before and after the switch.

In order to see if the regulatory mandated or induced accounting change has any effect on rates of return, and at the same time eliminate eccentricities to which individual securities are subject, the residuals are averaged across companies month by month to obtain an average residual. Defining month 0 as the month in which the accounting change takes place, the average residual is:

$$(6) \quad AR_T = \frac{1}{N} \sum_{i=1}^N \hat{e}_{it} \quad t = (-30, -29, \dots, 0, T)$$

where AR_T = cross-sectionally averaged residual in month T

N = number of firms for which a residual was computed in month T.

In order to examine the cumulative effects of unexpected returns in the months surrounding the accounting change, the cumulative average residual is calculated:

$$(7) \quad CAR_T = \sum_{T=-K}^T AR_T$$

Some measure of dispersion is needed to determine if the average residuals are significantly different from 0. Questions have been raised about the advisability of testing for the significance of the average residuals using parametric statistics. Previous research has indicated that stock returns can be described by non-normal stable distributions. On the other hand, work by Officer⁷ and Hsu, Miller, and Wichern⁸ has shown that stock returns have been approaching normality in the post World War II era. Officer has found that the standard deviation appears to be a well-behaved measure of dispersion.

Since the average residuals are formed from residuals that come from different regressions, a composite measure of dispersion is needed. Such a measure can be obtained by pooling the variances obtained from each regression equation. This is given by:

$$(8) \quad \text{Var}(\bar{\hat{e}}_i) = \frac{1}{N^2} \sum_{i=1}^N \text{Var}(\hat{e}_i)$$

where $\text{Var}(\hat{e}_i)$ = variance of the estimate from each regression

N = number of securities for which abnormal returns are being calculated. (The formula assumes that the residuals across securities are uncorrelated.)

⁷R. R. Officer, "The Distribution of Stock Returns," Journal of the American Statistical Association, LXVII (December 1972), 807-812.

⁸Der-Ann Hsu, Robert B. Miller and Dean Wichern, "On the Stable Paretian Behavior of Stock Market Prices," Journal of the American Statistical Association, LXIX (March 1974), 108-113.

The standard error is given by:

$$(9) \quad SE(\bar{\hat{e}}_i) = \left[\frac{1}{N^2} \sum_{i=1}^N \text{Var}(\hat{e}_i) \right]^{1/2}$$

$\text{Var}(\bar{\hat{e}}_i)$ is obtained for each group both before and after the accounting change. This is done in order to make allowance for differing variances before and after the accounting switch. Standard errors are calculated and z-scores are formed by dividing each monthly average residual by the appropriate standard error. In this way, the monthly average residuals for each group before the event are matched with the respective pre-event standard errors, while the post-event monthly average residuals are matched with their respective post-event standard errors. The z-scores are used to determine those months in which the average residual is significantly greater than 0.

Sample and Data Used

In order to test the hypotheses, a questionnaire was sent to all electric utilities which met the following criteria:

- 1) operations are basically confined to one state
- 2) utility operates in a state with statewide regulation of utilities.

The former criterion is necessary to avoid the problem of having a utility operate in one state with flow through and another state with normalization. Classification of such a utility would then be impossible. This criterion eliminates holding companies. The second criterion is necessary as the object of this study is to examine the effect of a regulatory mandated or induced accounting change. Without statewide regulation, the utility would be free to adopt whatever

accounting system it wants with respect to the tax savings from accelerated depreciation. This criterion eliminates companies in Texas and Minnesota.

The questionnaire asked the company to supply information as to the month and year in which the accounting change was first publicly announced. This would be the date the regulatory commission made a ruling affecting the tax savings policy of the utility, or in the absence of this, the date the utility first informed the investment community of the accounting switch. The utility was also asked to specify the origin of the accounting change--regulatory required (including court rulings), regulatory induced (via policy statement of the regulatory body), or company initiated.

Questionnaires were sent to 79 companies. Fifty-two replied, but only 40 had usable information. Of these 40, 23 represent flow through utilities, and 17 represent normalization utilities.⁹ (A list of the utilities included in the sample and their respective accounting policy can be found in the Appendix.) The companies in both sample groups are heterogeneous with respect to size. Based on 1974 figures,¹⁰ the assets of the flow through group ranged from \$420 million to \$7,250 million, while for the normalization group, the range was from \$412 million to \$6,150 million.

Rates of return for the individual securities and the market (the Fisher Dividend Adjusted Index was used) were obtained from the

⁹Observation of the companies in the sample will indicate four which appear in both groups. However, their accounting switches were far enough away from each other so as not to bias the regressions.

¹⁰See Moody's Utility Manual, 1975.

CRSP tapes. Forty-eight observations were used to estimate the regression parameters. The orthogonalized industry index includes on an unweighted basis all companies with CRSP industry numbers 491 and 493 (electric and electric-gas utilities, respectively). The monthly returns of the index were calculated according to:

$$(12) \quad R_{It} = \frac{1}{N} \sum_{i=1}^N R_{it}$$

where N = number of securities qualifying for inclusion in the index in month t .

The unorthogonalized industry index covers the period July 1949 - June 1972.

Empirical Results

Selection of Time Periods:

In order to determine what periods should be excluded from the regression, a test concerning a proportion was performed on the residuals after each run. The first runs--one for the pre-event period and one for the post-event period--excluded no observations in either period. The residuals across the entire sample were examined month by month relative to the accounting event. The null hypothesis was that the proportion of positive (and thus negative) residuals should equal 0.5 in any month relative to the month in which the accounting change took place.

For the pre-event period, the following z-scores were obtained after the first regression run:

<u>Period</u>	<u>Observed z-scores</u>
-1	-1.26491109
-2	- .31622784
-3	- .31622784
-4	- .94868334
-5	.94868325
-6	- .31622784
-7	2.21359432
-8	- .31622784
-9	-3.16277670

Using a cutoff criterion of $z = \pm 1.96$ (that is, a 5% significance level), it is seen that month -9 has an observed z-score much greater than the cutoff level. (Notice that month -7 has an observed z-score greater than the cutoff level. However, to stop at that point would still leave in a month which is affected by the accounting event.)

The regressions were rerun excluding observations from 9 months before the event. Examination of the observed z-scores of residuals from these regressions revealed no month in which the cutoff level was exceeded. Thus, for the pre-event period, it was appropriate to exclude observations from 9 months before the accounting switch. The same procedure was followed for the post-event period. This resulted in the exclusion of observations up to and including 13 months after the event.

Residuals:

Presented in Tables 3 and 4 are the average monthly residuals and cumulative average residuals for the flow through and normalization

groups from 30 months before through 13 months after the accounting switch.¹¹ There is no discernible pattern in the average residuals for either group over the entire period (see Figures I and II). The cumulative average residuals present a somewhat different picture. For the flow through group (see Figure III), the CAR declines until month -20, at which time the CAR picks up, rising until month -2. The CAR drops off in month -1 and 0 (the month of the switch), but builds up again over months +6 to +9. Another dropoff occurs in months +10 to +13. By month +13, the CAR of the flow through group equals .011752 versus .019426 at month -1.

For the normalization group, (see Figure IV), the cumulative average residual climbs until month -12 and then follows a see-saw pattern, so that at month -1 the CAR equals .007692. It should be noted that there is only a small difference between the CAR of the flow through group and that of the normalization group at month -1 (the difference equals .011734). In the post-event period, the CAR builds up in months +5 to +9, and then drops off, equalling .009456 at month +13. Thus, 13 months after the accounting switch there is a negligible difference between the cumulative average residuals of the two groups.

An important question is whether or not for any month either before or after the switch any of the average residuals were significant. The standard errors of the flow through and normalization groups in the pre-event period were .0068947 and .0068344, respectively. The average monthly residuals were converted to z-scores, and a two-tailed test at

TABLE 3

Residuals - Flow Through

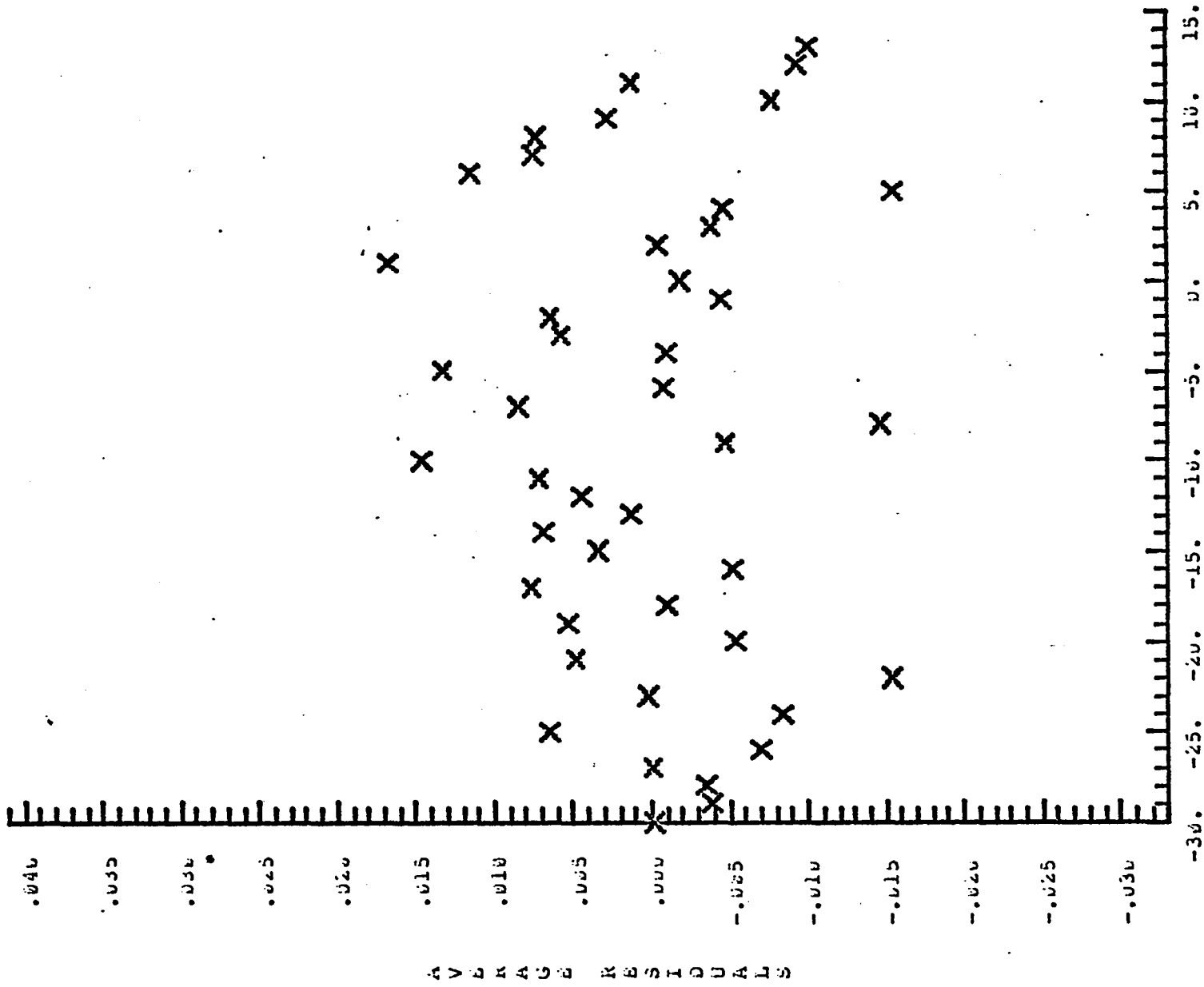
<u>Month</u>	<u>Average</u>	<u>Cumulative</u>	<u>Month</u>	<u>Average</u>	<u>Cumulative</u>
-30	-.000135	-.000135	-7	.008424	.000588
-29	-.003891	-.004027	-6	-.000821	-.000233
-28	-.003447	-.007473	-5	.013231	.012999
-27	-.000066	-.007539	-4	-.001089	.011910
-26	-.007022	-.014561	-3	.005711	.017620
-25	.006448	-.008113	-2	.006386	.024006
-24	-.008368	-.001648	-1	-.004580	.019426
-23	.000204	-.016277	0	-.001860	.017566
-22	-.015452	-.026909	1	.016697	.034263
-21	.004820	-.032388	2	-.000578	.033685
-20	-.005479	-.032388	3	-.003933	.029752
-19	.005308	-.027080	4	-.004720	.025032
-18	-.001005	-.028085	5	-.015607	.009425
-17	.007644	-.020441	6	.011434	.020859
-16	-.005260	-.025701	7	.007298	.028157
-15	.003353	-.022348	8	.007152	.035309
-14	.006793	-.015556	9	.002651	.037960
-13	.001203	-.014353	10	-.007807	.030153
-12	.004378	-.009975	11	.001141	.031294
-11	.007106	-.002869	12	-.009408	.021886
-10	.014492	.011623	13	-.010134	.011752
- 9	-.004797	.006826			
- 8	-.014662	-.007836			

TABLE 4

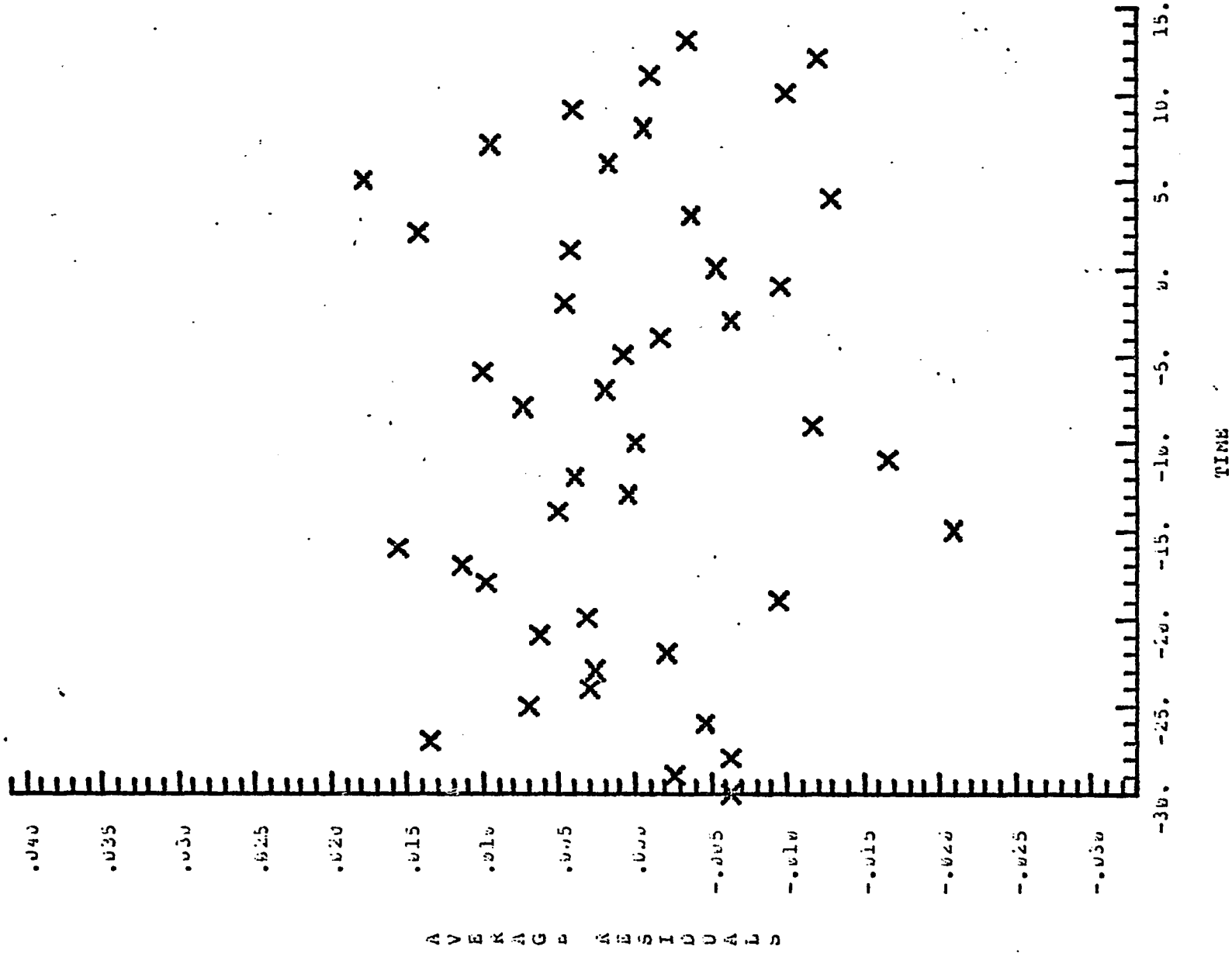
Residuals - Normalization

<u>Month</u>	<u>Average</u>	<u>Cumulative</u>	<u>Month</u>	<u>Average</u>	<u>Cumulative</u>
-30	-.006358	-.006358	-8	.007333	.008182
-29	-.002642	-.008918	-7	.001974	.010156
-28	-.006345	-.015327	-6	.010048	.020204
-27	.013501	-.001825	-5	.00063	.020868
-26	-.004655	-.006481	-4	-.001804	.019064
-25	.007065	.005843	-3	-.006380	.012683
-24	.002999	.003583	-2	.004619	.017303
-23	.002606	.006190	-1	-.009611	.007692
-22	-.002143	.004047	0	-.005376	.002016
-21	.006251	.010298	1	.004205	.006221
-20	.003131	.013429	2	.014261	.020428
-19	-.009405	.004024	3	-.003765	.016717
-18	.009767	.013791	4	-.012998	.003719
-17	.011393	.025184	5	.017786	.021505
-16	.015593	.040777	6	.001671	.023176
-15	-.020944	.019834	7	.009439	.032615
-14	.005124	.024957	8	-.000615	.032000
-13	.000437	.025395	9	.004068	.036068
-12	.003950	.029345	10	-.009974	.026094
-11	-.016635	.012710	11	-.001066	.025028
-10	-.000067	.012643	12	-.012068	.012960
- 9	-.011794	.000849	13	-.003504	.009456

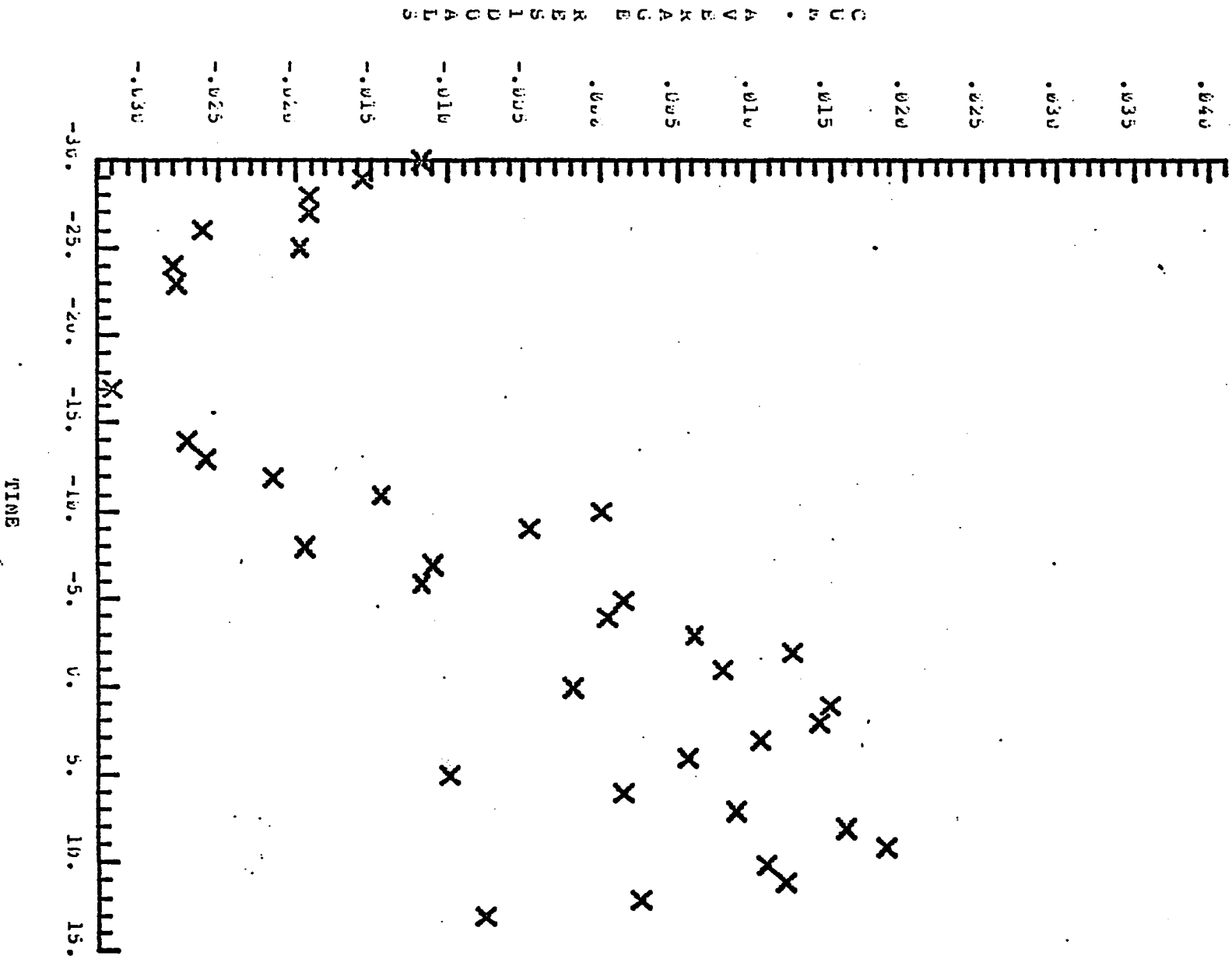
FLOW THROUGH



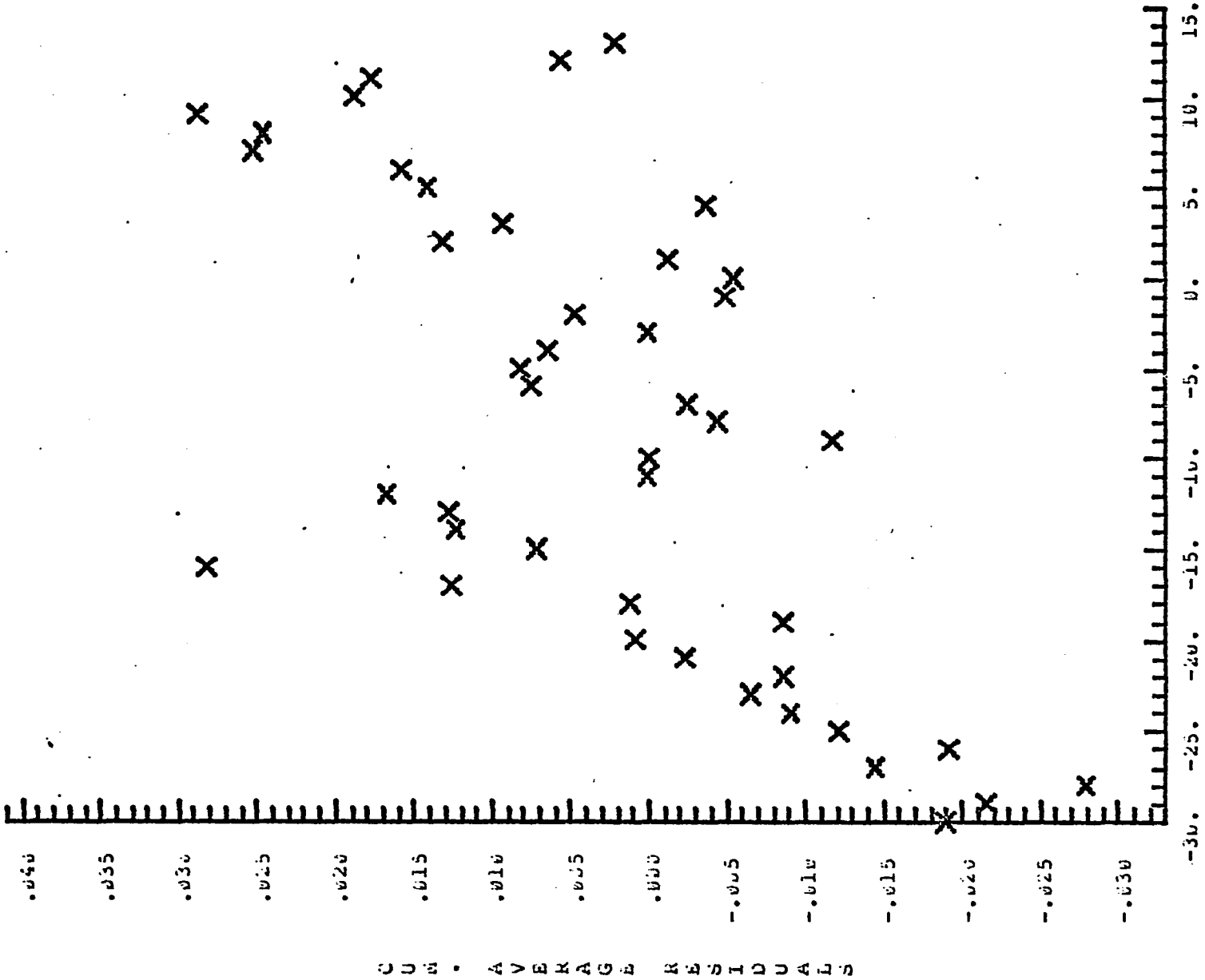
NORMALIZATION



FLOW THROUGH



NORMALIZATION



TIME

the 5% level of significance was conducted to see if any of the average monthly residuals were significantly different from 0. For the flow through group, the average residuals in months -23, -10, and -8 were significant (two had negative signs, one had a positive sign). For the normalization group, the average residuals in months -15 and -11 were significant (one had a positive sign while the other had a negative sign). In the post-event period, the standard errors for the flow through and normalization groups were .0074128 and .0083201, respectively. For the flow through group, the residuals in months +1 and +5 were significant (one was positive and one was negative). For the normalization group, the average residual in month +5 was significant (it was positive). Before these results can be analyzed, it would be useful to test for the interaction between valuation and growth under the alternative accounting methods.

Tests on Interaction Between Valuation and Growth Under Flow Through and Normalization

As indicated previously, the level of expected growth rates are a significant determinant of changes in valuation of flow through and normalization utilities. One way of testing for this relationship is to regress the cumulative average residuals formed in the period before the accounting switch on expected growth rates. Since expected growth rates are unavailable, past growth rates were used as a proxy. That is, growth rates in electric revenues were calculated over a 5-year period prior to the year of the accounting switch by using

log-linear regression analysis.¹²

The following regression equation was used to test for the existence of the change in valuation-growth relationship:

$$(13) \text{ CAR}_i = b_0 + b_1 g_i + b_2 d_i g_i + e_i$$

where CAR_i = cumulative average residual of the i^{th} utility, formed over 9 months before the accounting switches.

g_i = growth rate of the i^{th} utility.

d_i = dummy, which takes on a value of 0 if the utility uses flow through and 1 if it uses normalization.

If there is a connection between growth and changes in valuation on the basis of accounting technique, it should show up in the interaction dummy. The results of the regression was:

$$(14) \text{ CAR}_i = .022421 - .002845 g_i - .000308 d_i g_i$$

(.63699) (.12921)

N = 40 R² = .0193

None of the variables are significant (t-values appear in parenthesis).

Interpretation of Results:

The patterns of the cumulative average residuals in the pre-event period of both groups do not conform to a priori expectations. Based on the positive cash flow implications of normalization accounting,

¹²In choosing a variable to use to measure growth, one must be careful to avoid variables which are subject to biases. For example, dividends are subject to management discretion, and earnings are subject to accounting distortions. Moreover, some utilities also sell gas and steam. Since the sample deals with electric utilities, electric revenues seemed to be the most relevant variable.

one would expect the cumulative average residual of these utilities to increase up to the month of the accounting switch, and to exceed that of the flow through utilities in month 0. As shown above, this does not occur. Due to the small sample size of both groups, one must be cautious about drawing inferences from these results. Nevertheless, if differences in growth between the two groups have an impact on cash flows under the different accounting methods, the results of the interaction regression should have been significant. One possible explanation for the lack of significance could be the fact that the theoretical model is based on expected growth rates, while the regression model uses past growth rates. To the extent that the latter is not a good proxy for the former, the results will be adversely affected.

As indicated, there were two post-event months for the flow through group and one post-event month for the normalization group in which the average residuals were significantly greater than 0. This does not indicate market inefficiency. Assuming a round trip commission of 2%, it would not be possible to make an above normal profit by buying or selling a portfolio of the appropriate securities. However, one could have bought a portfolio of normalization utilities in the month of the switch and sold them in month +9 for a net return of 1.41% (again assuming a 2% round trip commission). While this positive abnormal return is small, it is an indication of slight market inefficiency. There is no trading rule by which one could have earned abnormal returns by investing in a portfolio of flow through utilities after the event.

One complicating factor that was not taken into account in discussing the cash flow implications of the two accounting methods is the matter of tax-free dividends. Such dividends arise when dividends that are paid are not fully earned on the books the company keeps for tax purposes. A dividend may be partially or fully tax-free, with the non-taxable portion considered a return to capital. (The non-taxable portion must be used to reduce the tax cost of the stock). Linhart¹³ has shown that tax-free dividends from normalization utilities are likely to be smaller and arise later on than for flow through utilities. Since stockholders' required rate of return is on a pre-tax basis, any portion of the dividend that is non-taxable would raise the actual pre-tax rate of return. This can be seen by looking at the constant growth case where the required rate of return is:

$$(14) \quad k_e = \frac{D}{P} + g$$

where k_e = required rate of return on common stock on a pre-tax basis

D = cash dividend on the common stock

P = price of the stock

g = growth rate

If a portion of the dividend is tax-free, the actual rate of return on a taxable equivalent basis becomes:

$$(15) \quad r_e = \frac{D[tf + nf(1-T)]}{\frac{1-T}{P}} + g$$

where r_e = actual rate of return on a pre-tax basis

tf = percent of the dividend that is tax free

nf = percent of the dividend that is taxable

T = marginal tax bracket of the investor

¹³Peter B. Linhart, "Some Analytical Results on Tax Depreciation," Bell Journal of Economics and Management Science, I (Spring 1970), 106-108.

For any dividend that is partially or totally tax-free, and any marginal tax bracket, $r_e > k_e$. Looked at in another way, the after-tax cash flows to investors who own stock in firms qualifying for tax-free dividends will be greater than for firms not qualifying. The market adjusts for this fact by either bidding up the price of the tax-free stocks or bidding down the price of the stocks with taxable dividends until $r_e = k_e$.¹⁴

¹⁴A possible scenario to explain the results would take tax-free dividends into account. The increasing cumulative average residual of the normalization group up to month -12 is likely due to the expected positive impact of normalization accounting on the utilities' cash flows. The decline of the CAR until month 0 could be due to investors bidding down the price of these stocks and switching into flow through stocks. As pointed out, tax-free dividends arise in smaller amounts and later on for normalization utilities as opposed to flow through utilities. The build-up in the CAR of the flow through utilities starting in month -20 is due to investors bidding up the prices of these stocks in anticipation of receiving dividends that will most likely be tax-free after the switch. The bidding down of the prices of normalization stocks along with the bidding up of the prices of flow through stocks would then explain the small difference between the CAR of both groups in month -1, as well as the fact that the cumulative average residual of both groups is close to 0 in month -1. In other words, the expected negative cash flow implications of flow through are counteracted by the positive impact of tax-free dividends. For the normalization group, the expected positive cash flow implications are reduced by the paucity of tax-free dividends.

It should be noted that the adoption of flow through accounting is no guarantee that the utility's dividends will be partially or totally tax-free. However, the likelihood of tax-free dividends is much greater for a flow through utility than a normalization utility. The full impact of tax-free dividends would not necessarily occur prior to the switch, since in any given year the portion of the dividend that is tax-free is not known until year's end. If the tax-free portion varies from year to year, it is likely that the impact would not be entirely discounted prior to the accounting switch. One might argue that in spite of tax-free dividends, investors would be better off with normalization utilities, because given the expected favorable cash flow implications of this accounting method, their dividends may be increased. Due to the negative cash flow implications of flow through accounting, the dividends of these utilities may eventually be reduced. However, the unfavorable implications of flow through are a long way off. As discussed in Chapter III, the need for rate increases will not arise until the weighted average half life of the plant installed after the switch is reached. Over the investment horizon of

Implications for Public Policy:

The average residuals from before and after the accounting switch indicate that there is no marginal difference in the market rate of return between flow through and normalization utilities. This has important public policy implications for if investors penalized flow through utilities, the customers of these utilities would lose the tax savings from accelerated depreciation. That is, any higher cost of capital resulting from flow through accounting would be passed on to the customers. The results of this study would indicate that customers of flow through utilities will be able to retain the tax savings.

It should be noted that the results of this study only apply to the time period examined, namely from 30 months before to 13 months after the switch. Interestingly, under recent tax law reform, tax-free dividends have been phased out.¹⁵ Thus, an important component

¹⁴an investor facing the decision of whether to invest in flow through or normalization utilities prior to the event, the present value of all flow through dividends on a pre-tax basis (that is, those paid up to the weighted average half-life and thereafter) could still exceed the present value of all normalization dividends also on a pre-tax basis. Thus, investors before the switch would not necessarily be better off with what would become normalization utilities. Finally, it should be noted that the scenario just described assumes that at the appropriate time the impact of tax-free dividends exceeds the impact of the accounting methods on the cash flow of the firms. There is no way of accurately measuring the degree to which each of these factors affects the average residuals.

¹⁵Sec. 442 of the Tax Reform Act of 1969 provides that for any fiscal year beginning after June 30, 1972, profits out of which dividends are declared will be considered those reported to stockholders. While a firm is entitled to use accelerated depreciation in computing taxable income, profits for dividend purposes will be computed as if the firm is using straight line depreciation. This provision will limit a firm's ability to claim that dividends exceed profits and thus qualify as a return of capital.

of the observed excess return of flow through will be eliminated. Without tax-free dividends, the required rate of return for flow through utilities may well be greater than for normalization utilities. After tax-free dividends are entirely eliminated, customers of flow through utilities should experience rate increases greater than those of normalization utilities.

Tests on Risk Factor:

A major thesis of this study is that flow through utilities are more risky than normalization utilities. The appropriate measure of risk for the investor is systematic risk, since it represents the risk that cannot be diversified away. Systematic risk measures (β_M) were obtained for each security before and after the event from running regression equation (4). These were then grouped by accounting technique and by time (relative to the accounting switch). Mean β_M were calculated and a t-test on the difference between means was conducted with a null hypothesis of equal means. (The assumption of homogeneity of variance was satisfied.) Presented below are the results of the test.

TABLE 5

T-Test on $\bar{\beta}_M$

	Mean $\bar{\beta}_M$	t-actual
FT (pre)	.4480	-.6533
N (pre)	.4630	
FT (post)	.4993	2.0486
N (post)	.4522	

The tests¹⁶ show that there is no significant difference between the mean β_M 's before the event, while after the event, the risk of the flow through group is significantly greater than that of the normalization group (2.5% level of significance, one-tailed). There was no reason to expect that the risk of the two groups would differ before the accounting switch, but the test does confirm that flow through is indeed more risky than normalization.

Further proof of the greater riskiness of flow through utilities is found by looking at their interest coverage ratios versus those of normalization utilities. Presented below are the average pre-tax interest coverage ratios¹⁷ (by Standard & Poor's grouping, 4911--flow through, and 4912--normalization).

	1973	1972	1971	1970	1969	1968	1967
FT	2.52	2.75	2.65	2.93	3.60	3.94	4.40
# of Firms	38	38	38	40	40	39	39
<hr/>							
N	3.19	3.40	3.36	3.85	4.63	5.31	5.74
# of Firms	41	41	41	41	38	38	38

While the coverage ratios of both groups dropped -- 42.8% for flow through and 44.4% for normalization -- the coverage of the latter is both substantially above the former, and in a range to merit higher bond ratings. These results confirm theoretical expectations and could provide another explanation for the increased systematic risk of flow through utilities relative to normalization utilities.

¹⁶It should be noted that the t-values could be upward biased due to lack of independence between the systematic risk measures of both groups.

¹⁷Moody's Utility Manual, 1974.

Chapter V

Conclusion

Flow through and normalization accounting has been a controversial issue in the public utility industry. This study has attempted to examine both theoretically and empirically the impact of the two accounting techniques (as it applies to the tax savings arising from accelerated depreciation) on cash flow, risk and stock prices of electric utilities. A summary of the theoretical discussion will be presented first.

The cash flow implications of flow through and normalization were examined under conditions of a single plant, no growth, and multiple vintage plant, steady state growth. In the case of the former, there is no clear cut basis for favoring either flow through or normalization using the present value of cash flows as a criterion. This is due to the fact that the differential cash flow between flow through and normalization is a positive function of the life of the plant. Unless the investor's time rate of discount is known, it is not possible to reach any conclusions as to which accounting technique results in a greater present value of cash flows. Under steady state growth, conditions were found for which the present value of flow through cash flows would decrease relative to the present value of normalization cash flows. If investors expect the growth rate of normalization utilities to increase relative to the growth rate of flow through utilities, then the value of the normalization utility should increase relative to the value of the flow through utility after the accounting switch.

One would also expect that the risk of flow through utilities would be greater than the risk of normalization utilities. This arises from two sources--increased regulatory risk and reduced interest coverage accruing to the former. Finally, the prices of utility stocks that switch to either flow through or normalization should quickly adjust to this new information. Given efficient markets, it should not be possible to make extraordinary profits, adjusted for risk after the announcement of the switch.

Each of the theoretical implications was tested empirically. The tests relied on a two index variant of the market model--one index for the returns on the market portfolio and the other index for the returns on an orthogonalized industry portfolio. Those months before and after the accounting event which could bias the estimates of the parameters were excluded by testing the month by month residuals of the entire sample for irregular behavior. Separate estimates of the regression parameters were calculated for the period before and after the announcement of the accounting switch. The findings can be summarized as follows:

1a) Normalization utilities do not show abnormal returns in excess of flow through utilities.

b) There does not appear to be any interaction between growth, valuation and accounting technique.

2) The overall impact of the switch to flow through or normalization appears to be largely discounted by the market before the switch. There is some slight indication of market inefficiency in the post event period.

3) Flow through utilities have significantly greater systematic risk than normalization utilities after the accounting switch. The

pre-tax interest coverage ratios of both flow through and normalization utilities have dropped by almost the same amount in percentage terms, but those of the former have dropped to the point where bond rating reductions are likely.

Findings 1a) and 1b) are at variance with the theoretical impact of flow through and normalization on firm valuation. Before one can draw inferences from these results, one should be aware that a small sample was used to test the theoretical implications. Moreover, the effect of tax-free dividends had a significant influence on the results. A possible scenario taking this factor into account was advanced. Findings 2) and 3) are generally in agreement with a priori expectations.

The study has interesting public policy implications. The results are inconsistent with those who believe that flow through accounting should lead to an immediate increase in the cost of capital to these utilities. Such an increase, if it occurred, would reflect itself in increased rates to the utilities' customers. On the other hand, the increased systematic risk and drastically reduced interest coverage accruing to flow through utilities, as well as the elimination of tax-free dividends means that the cost of capital to these utilities must eventually increase.

The controversy over the effect of flow through versus normalization on public utilities is not resolved by this study. A number of areas of future research might be explored. For example, what has happened to the cost of capital to flow through utilities since 1972, the year in which tax-free dividends were severely limited? What is the effect of other regulatory accounting methods -- such as accounting for the rate base (original cost versus fair value) and accounting for funds used

during construction -- on utility rates of return and risk? Is there any interaction between these accounting methods and flow through or normalization? Has a differential in the customer rates charged by flow through and normalization utilities developed since 1972?

Appendix

Flow Through Companies:

Atlantic City Electric
Central Hudson Gas & Electric
Cincinnati Gas & Electric
Cleveland Electric Illumination
Columbus & Southern Ohio
Consolidated Edison
Dayton Power & Light
Long Island Lighting
New York State Electric & Gas
Niagara-Mohawk
Ohio Edison
Pacific Gas & Electric
Philadelphia Electric
Potomac Electric Power
Public Service of Colorado
Public Service Electric & Gas
Rochester Gas & Electric
San Diego Gas & Electric
Southern California Edison
Toledo Edison
Utah Power & Light
Virginia Electric Power
Washington Water Power

Normalization Companies:

Central Illinois Public Service

Cleveland Electric Illumination

Columbus & Southern Ohio

Commonwealth Edison

Consumers Power

Detroit Edison

Florida Power Corporation

Florida Power & Light

Idaho Power

Illinois Power

Indianapolis Power & Light

Montana Power

Philadephia Electric

Public Service of Indiana

Southern Indiana Gas & Electric

Toledo Edison

Wisconsin Public Service

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