Liberalized Depreciation
and the Cost of Capital

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Preface

This report is the culmination of a series of studies examining the effects of depreciation policy on the cost of capital to regulated utility companies. The work began as an outgrowth of a general study of the cost of equity capital in which utility data was used purely for convenience. It became apparent in this first study that a problem exists when one attempts to compare the earnings of companies that use different depreciation policies for computing reported profits. In attempting to solve this problem, we soon realized that it would be necessary to integrate the effects of depreciation policy on utility rates, cash flows, and debt policy, and that alternative depreciation policies would have radically different effects under different assumptions about asset growth rates. The interrelationships among the various factors increased the complexity of the problem, but a computer simulation model was developed to bring them all together to determine their net impact on utility rates and reported earnings.

Computer models are, of course, no better than the assumptions used in programming them, and two basic assumptions used in our model caused its results to be questioned. The model assumed, first, that economic conditions and regulatory bodies would allow utility companies to make instantaneous adjustments to their rate structures so as to maintain a given rate of return on their ratio bases; and, second, that investors believed with a probability of 1.0, that is they were “certain,” that this condition would hold. The first assumption is necessary in any deterministic model (and we have no basis for construction of a probabilistic model), but the second is not. It is possible to determine empirically whether or not investors are indifferent between earnings reported on a flow through, normalized, or straight line basis, and this determination was the second major segment of our study.

Certain parts of the monograph have been published previously. We considered omitting these sections and simply referencing the
Introduction

to the

Problem

A utility company that takes advantage of liberalized tax
depreciation allowances can (subject to the approval of its utility
commission) elect to use either of two basic accounting procedures,
flow through or normalization, to compute profits as reported to
stockholders. Under flow through, certain tax savings that occur
early are flowed through to reported profits. Under normalization,
the tax savings are not included in reported profits but are segre-
gated in a reserve for deferred taxes.

Some argue that the initial high after-tax income is illusory, that
although taxes are being deferred temporarily they must eventually
be paid in full. Consequently, they suggest crediting the increased
early years' income to a reserve for deferred taxes, then bringing

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\[1\] This procedure is required for an unqualified opinion by the Ameri-
can Institute of Certified Public Accountants for all nonregulated firms,
but it is only recommended for regulated utilities (see American Instit-
ute of Certified Public Accountants "Declining Balance Depreciation,"

Note also that tax savings may arise from the investment tax credit
and from using longer lives for stockholder reporting than for tax pur-
poses. The AICPA recommends normalization for tax savings arising
from each of these sources (ARB No. 44 rev.). Since the method of
analyzing the effects of these savings is identical to that for accelerated
depreciation methods, this work does not specifically treat these addi-
tional sources of savings.
it back into income in the later years. This procedure levels out or normalizes profits.8 Others disagree, maintaining that so long as firms continue growing and adding depreciable assets, the tax payment will continue to be deferred. They go on to say that most firms, and especially those in the utility industry, can expect continuous growth, hence a permanent deferral. This group therefore recommends flowing through deferred taxes to reported income.9 Controversy in the regulated sector of the economy over the use of normalization versus flow through accounting for treating the deferral arising from the use of accelerated depreciation for income tax purposes centers on the question of whether flow through companies have a higher cost of capital than normalized firms. The answer depends primarily on investor expectation about the future prospects of companies employing different accounting methods. If investors perceive flow through earnings as being artifically high and likely to decline relative to the earnings of comparable normalized firms, then the cost of capital may indeed be higher for flow through companies.  

SCOPE OF INTEREST

Determination of the effect of depreciation policy on the cost of capital in the electric utility industry is of interest to several rather varied groups. Those directly concerned with the cost functions of these firms, that is, management, public utility commissions, and investors are concerned with the problem, as are academicians interested in empirical tests of the several cost of capital hypotheses.

Regulators

Given the monopoly position of utilities there is an absence of, or at least a reduction in, the competitive forces that tend to eliminate accounting practices leading to a higher cost of capital funds. Regulatory bodies must therefore thoroughly understand the effects of the various arguments in the cost of capital function in order to

8 Several state public utility commissions and the Federal Power Commission are strong proponents of flow through accounting. This is discussed at length later.

9 Liberalized Depreciation

effect regulation that will fulfill their two main responsibilities of setting rates such that costs are covered and a fair rate of return is provided investors, while at the same time insuring that consumers are not paying for operating or financial inefficiencies.

Management

The concern of some utility managers over the possible effects of depreciation policy on the cost of capital is apparent from their efforts to avoid being forced to adopt flow through accounting practices. These managers argue that flow through reporting involves a serious understatement of current costs and that this understatement increases the riskiness of flow through firms, thereby raising cost of capital. This higher cost of capital places firms at a disadvantage relative to normalizing or straight line firms in obtaining funds in the capital markets, and since the utilities continually need to raise substantial sums for capital investment, this poses a significant problem.

Academicians

The effect of depreciation policy on the cost of capital to firms in the electric utility industry is of interest to academicians who have used electric utilities as a supposedly homogeneous sample for testing the several hypotheses about the cost of capital. Samples drawn from this industry have been used by Friend and Puckett,1 Miller and Modigliani,2 Weston,3 Brigham and Gordon,4 and others for empirical tests of the various leverage and dividend hypotheses. The results of these tests have been as varied as the theories they purport to verify or disprove.

Introduction

It is apparent from statements about attempts to adjust reported earnings to correct for depreciation accounting variations, and from conjecture about the results of such adjustments on the outcome of empirical tests, that there is a basic misunderstanding about the various depreciation policies among some academicians. Miller and Modigliani, for example, have repeatedly referred (erroneously) to the need to make adjustments in earnings to account for depreciation policy variations in discussing both their empirical results and the attempts of others to verify or extend those results. In an unpublished dissertation, McDonald adjusted all electric utility reported earnings to a flow through basis for his empirical tests of several valuation models.

The tests of the Miller and Modigliani dividend and leverage hypotheses performed by Brigham and Gordon point up another possible area of difficulty for academicians interested in the cost of capital. If investors view variations in depreciation policy as having a real effect on the future prospects of the firm rather than just an effect on reported profits, and if depreciation policy is not explicitly taken into account (and it has not been in any previous tests), then empirical examinations of the determinants of the cost of capital may be biased by the depreciation policies of the supposedly homogeneous firms included in the sample population. This bias is potentially large and important if, for instance, depreciation policy is highly correlated with either capital structure or dividend payout, the two variables that have generated most of the controversy in the cost of capital literature. Brigham and Gordon, while explicitly recognizing the difficulty associated with accelerated tax depreciation, included the reserve for deferred taxes in their estimate of total equity capital. This inclusion increased the correlation between leverage and depreciation policy and much of the significance of their leverage coefficients can be traced directly to this correlation.


Brigham and Gordon, "Leverage Dividend Policy," op. cit.

 APPROACH AND MAJOR CONCLUSIONS

Although a great deal of research has been devoted to questions related to the effect of depreciation policy on utility rates and profits, the problem is still unsolved. Depending on the rate and duration of asset growth, on debt policy, and on how the "tax savings" benefit of accelerated depreciation is distributed among ratepayers and investors, the various accounting methods produce widely differing patterns of reported profits and utility rates. The complicated interrelationships among these variables make algebraic analysis virtually impossible, but they do lend themselves to simulation, and this is the tool used in this study of the effect of depreciation policy on utility rates, reported profits and cash flows.

In the study, the four basic depreciation combinations are explained and eleven prototype firms to be simulated are introduced. The simulation model is then described and a report made on the time pattern of utility rates under various asset growth assumptions. The effect of depreciation on reported profits, cash flows, and risk is examined with the conclusion that while earnings of utilities are correct as reported and should not be adjusted to reflect another depreciation procedure, there may be a qualitative difference in earnings reported under various depreciation accounting methods.

Empirical analysis, necessary to determine whether investors perceive different levels of risk with varying depreciation practices, follows. Comparison between the price-earnings ratios of flow through and normalized firms is made, actual rates of return realized by investors on a sample of flow through and normalized companies are examined, and multiple regression analysis employing depreciation method as one of the explanatory variables in order
to determine the actual effect of depreciation practices on the cost of capital is used to explain price/earnings ratios and dividend yields. The conclusion drawn is that investors do perceive earnings reported on a flow through basis to be inherently more risky than those reported on a normalized basis and, because of this, that the cost of capital is somewhat higher for a flow through utility company than for a normalized one.

In further empirical analysis, the relationship between depreciation and leverage is examined and the results tied to earlier empirical studies. Contrary to the Brigham-Gordon results, we conclude that there is no consistent statistical relationship between the cost of equity capital and leverage for electric utility companies when depreciation policy is taken into account.

2

Depreciation Policy

Combinations

for Simulation

The impact of depreciation policy on reported profits, cash flows, and utility rates is determined by many interacting forces. Failure to give full consideration to any one of these forces could lead to serious error. Conclusions based on less than a fairly complete system would be tenuous, if not actually misleading, and the final simulation model must necessarily be rather complicated.

For pedagogic reasons, development of the simulation model from its earliest stages is traced, beginning with a hypothetical but easy to understand situation. Modifications in the initial model, necessitated by the public utilities' regulatory environment, are then discussed and finally, the various threads are drawn together in a description of both the utility and nonutility prototype firms whose simulated behavior is described.

SIMPLEST CASE

There are four basic depreciation methods to be compared:

1. Firm S which uses straight line depreciation for both stockholder reporting and tax purposes;
2. Firm N which normalizes, using sum-of-years digits for tax
purposes and straight line for stockholder reporting, and sets up a reserve for deferred taxes.

3. Firm F which flows the tax savings through to reported profits, using sum-of-years digits for tax computations and straight line for stockholder reporting and which has no deferred tax reserve; and

4. Firm A which uses accelerated depreciation (sum-of-years digits) for both book and tax purposes.

To put the example in context, assume that the firms are all newly organized electric utilities and that they commence operations by building plant and distribution facilities costing $200 in four newly created cities. Demand in each of the cities is constant (that is, growth is zero), and the plants wear out and must be replaced once each decade. Replacement costs, operating costs (defined to include maintenance but to exclude depreciation charges), and gross revenues are also constant. Cash flows from depreciation and deferred taxes are held as cash, so they provide no return to the companies. The firms are financed 50 percent by debt, 50 percent by equity, and they pay out all of their reported profits in dividends. Gross operating revenues (sales) equal $200 and operating expenses $100 each year for each of the firms.

These assumptions are made to create four firms differing only in the way they handle depreciation. The companies' reported profits and cash flows—along with Firm N's tax reserve—are graphed in Figure 1, while the method of calculating the points on the graph is shown in Table 1. Initially, Firm F's reported profits are 20 percent higher than those of the other three companies, but F's profits decline uniformly over the ten-year cycle and end below those of the others. Then in the eleventh year, F's earnings jump by 50 percent as it replaces its plant and starts the cycle again. Firm A's reported profits, which start low and end high, are exactly the reverse of F's.

The example illustrates the essential nature of the four depreciation policies. Other things held constant, profits are also constant under straight line. Normalization levels out reported profits in spite of fluctuations in cash flows and income taxes. Flow through produces a cyclical pattern—reported profits are relatively high in the years immediately following large capital outlays and low

| TABLE 1 | PARTIAL INCOME STATEMENTS FOR THE FOUR HYPOTHETICAL FIRMS |
|-------------------------------|------------------|------------------|------------------|------------------|
|                           | Income Statement to Tax Purposes | Income Statement to Stockholder |
|                           | Firm N and F | Firm S | Firm N | Firm F | Firm A |
| First Year | | | | | |
| Gross income | $200 | $200 | $200 | $200 | $200 |
| Operating expenses | 100 | 100 | 100 | 100 | 100 |
| Income before depreciation | 100 | 100 | 100 | 100 | 100 |
| and interest | | | | | |
| Depreciation | 36 | 20 | 20 | 20 | 36 |
| Interest | 6 | 6 | 6 | 6 | 6 |
| Income before taxes | 58 | 74 | 74 | 74 | 58 |
| Taxes | 29 | 37 | 29 | 29 | 29 |
| Deferred taxes | — | — | 8 | — | — |
| Net profits | $29 | $17 | $37 | $45 | $29 |
| Cash flow | $57 | $65 | $65 | $65 | $65 |
| Fifth Year | | | | | |
| Gross income | $200 | $200 | $200 | $200 | $200 |
| Operating expenses | 100 | 100 | 100 | 100 | 100 |
| Income before depreciation | 100 | 100 | 100 | 100 | 100 |
| and interest | | | | | |
| Depreciation | 32 | 20 | 20 | 20 | 22 |
| Interest | 6 | 6 | 6 | 6 | 6 |
| Income before taxes | 72 | 74 | 74 | 74 | 72 |
| Taxes | 36 | 37 | 36 | 36 | 36 |
| Deferred taxes | — | — | 1 | — | — |
| Net profits | $36 | $37 | $37 | $38 | $36 |
| Cash flow | $57 | $58 | $58 | $58 | $58 |
| Tenth Year | | | | | |
| Gross income | $200 | $200 | $200 | $200 | $200 |
| Operating expenses | 100 | 100 | 100 | 100 | 100 |
| Income before depreciation | 100 | 100 | 100 | 100 | 100 |
| and interest | | | | | |
| Depreciation | 4 | 20 | 20 | 20 | 4 |
| Interest | 6 | 6 | 6 | 6 | 6 |
| Income before taxes | 45 | 74 | 74 | 74 | 45 |
| Taxes | 45 | 37 | 45 | 45 | 45 |
| Deferred taxes | — | — | (8) | — | — |
| Net profits | $45 | $37 | $37 | $39 | $45 |
| Cash flow | $57 | $49 | $49 | $49 | $49 |
Depreciation Policy Combinations

where $TR = $ the present value of the tax reduction $T = $ the firm’s marginal tax rate $D_t = $ the tax depreciation in each year $t$ (the sum of the $D_{t+1}$ equals the cost of the asset less its salvage value) $r = $ the firm’s cost of capital.

It is clear from Equation 1 that the faster $D_t$ is recovered, the greater $TR$ will be, so long as $r > 0$. The recovery patterns of firms $N$, $F$, and $A$, all of which use sum-of-years digits depreciation, are faster than the straight line company’s, so they have a relative advantage.

Three additional factors may cause the disadvantage of straight line to be much greater than the foregone “interest” on the deferred tax reserve. First, if tax rates decline then the relative disadvantage of straight line is increased, and conversely, if taxes are increased the disadvantage of straight line is decreased. This can be seen from Equation 1. It is apparent that the undiscounted value of each annual depreciation charge is the charge itself times the tax rate $r(D_t)$. The higher the tax rate, the greater the value of the depreciation expense in terms of its ability to reduce taxes. Therefore, if the tax rate declines during the life of the asset, the value of the remaining tax depreciation also declines. Since companies using accelerated depreciation will have taken a larger percentage of total depreciation at any given time, the total of their depreciation-produced tax reduction will be greater than that of the straight line company. The reverse, of course, holds if tax rates are increased.

The second factor influencing the disadvantage of straight line is that inflation provides an advantage to firms using accelerated depreciation since deferred taxes will be paid, if at all, in cheaper dollars. Finally, accelerated depreciation reduces the risk of economic obsolescence somewhat, for if economic shifts render a company (or an industry) obsolete and consequently unprofitable, then a company using accelerated depreciation will end up having paid less taxes and recovering more cash than a company using straight line depreciation. While this is impossible in the case of electric, gas, and telephone utilities, one has but to recall the case of the railroads to recognize that radical changes in an industry’s economic environment may take place. In view of the very long lives...
of utility assets and the rapid rate of technological change, this could be an important consideration.

MODIFICATIONS FOR REGULATED INDUSTRIES

While the preceding example indicated the basic nature of the different accounting methods, a much more realistic model is needed for even approximately paying the true impact of depreciation policy on reported profits. Establishing a realistic set of assumptions requires that certain regulatory procedures be taken into account.

Rate Regulation

Regulatory bodies generally set the prices charged by public utilities, and this rate regulation is based on sound economic reasoning. Utilities are granted franchises to provide essential services, and therefore competition among firms is generally limited as compared with other industries. Further, since the service is essential, demand is relatively inelastic. With inelastic demand and limited competition, the firms would be in an ideal position to exploit their markets were it not for price regulations. For this reason most utilities are regulated, with the prescribed rates being just sufficient to provide companies a "fair" return on investment. 11

In theory, the regulatory procedure calls for estimating the demand and cost schedules under normal conditions and then using these two schedules to produce estimates of profits at various prices. 12 All of this is shown graphically in Figure 2. At a price P*, Q1 units are demanded. The cost per unit at Q1 units of output is C1. The profit per unit is equal to P* - C1, and this unit profit multiplied by Q1 units gives total profits. Under normal conditions, a higher price results in greater profits due to the price inelasticity of demand.

12 As used here, "profit" means the total after tax return on investment. It is the earnings available for common and preferred stock plus interest on debt, and is defined as gross operating revenues minus the sum of operating expenses, depreciation charges, and taxes.
rates are changed with a lag. If a particular company is especially efficient and thus able to keep its cost lower than those used when the rate schedule was set, then it will be able to earn a higher than prescribed rate of return, at least until a rate case arises and a rate reduction is ordered. Conversely, if costs rise and profits fall, there will be a lag before a rate increase can be obtained. This lag can also provide a powerful stimulus to efficiency.

Depreciation and Rates

In terms of the cost schedule in Figure 2, both depreciation charges and income taxes constitute allowable costs. But if a firm uses accelerated depreciation for tax purposes and straight line for stockholder reporting, what depreciation and tax costs should be included in allowable service costs? A survey of the literature indicates that with the exception of Wisconsin practically all commissions allow only straight line depreciation as a cost of service.15 For income taxes, however, the following two methods are employed.

Normalization

The theory supporting normalization states that accelerated deprecation merely provides a deferral of taxes, not a true saving, and that proper income accounting requires the establishment of a reserve for deferred taxes. Under this theory, the annual credit to the reserve is considered to be a cost of doing business, and consistency with the theory requires that a utility commission permitting (or requiring) normalization include the credit to the tax reserve as an allowable service cost. Utility commissioners advocating normalization do, in fact, follow this practice.16

The question immediately arises, however, of whether or not the company should be permitted to earn a return on the cumulative reserve for deferred taxes. In fact, of course, companies earn returns on assets, not liabilities; however, regulatory bodies determine the rate base and set the rate of return to be earned on this base. If regulatory bodies so decide, they can deduct the dollar amount of the tax reserve from allowable assets when establishing rate bases. In this sense, a return is earned or not earned on the deferred tax reserve.

In Appendix A, it is shown that in 1965 about 61 percent of all utility companies were permitted no return on the tax reserve, another 30 percent were permitted to earn a partial return (for example, 1.5 percent versus 6.5 percent of the “normal” rate base), and 9 percent earned a full return on the reserve. We will not attempt to answer the question of whether stockholders or ratepayers should benefit from accelerated depreciation.17 However, since the actual treatment is critically important in determining how deprecation policies affect reported profits, the simulation model is programmed to treat either of the extreme cases, that is, profits can be calculated under the assumption that the reserve is completely excluded from the rate base or that the firm earns a full return on the reserve. Only the results calculated under the assumption that rates are reduced by an amount that completely allocates the benefits of accelerated depreciation to ratepayers are reported, since this is the most common practice.

Flow Through

In diametrical opposition to the philosophy of normalization are the advocates of flow through, who expect continued growth to permit permanent deferral of the tax savings from accelerated depreciation. Or these grounds, they argue that the tax actually paid is the proper cost of service.

Using actual taxes as the allowable cost of service has the effect of passing all direct benefits of accelerated depreciation on to current customers. The equity of this procedure has been questioned (some feel that stockholders should bear, e.g., the benefits of accelerated depreciation), and its resolution has followed the same pattern as for normalized companies. Utility commissioners ordinarily give the full benefits to ratepayers, but in some instances}


16 Peterson, "An Application of Depreciation Accounting," passim, discusses the question at length.
the firms are given a part of the benefits (see Appendix A). It should also be pointed out that stockholders can benefit indirectly from a rate reduction. Even though it has a monopoly in providing a particular service in its franchise area, a utility is subject to competition from other energy sources. This is clearly true when electric and gas utilities are not combined and thus compete with one another, and it is also true for industrial power when the customer has the option of generating his own energy. As a result of this competition, the lower rates that arise with flow through (and, to a lesser extent, with normalization) can be of considerable aid in promoting load increases. This in turn can create new and profitable investment opportunities and thus benefit stockholders as well as customers.

In the simulation model, the extreme cases are again treated with profits first calculated under the assumption that rates are reduced by an amount that completely appropriates the benefits of accelerated depreciation to ratepayers, then under the assumption that all benefits accrue to the stockholders. Again however, only the results of the more common practice of giving the entire benefits to ratepayers are reported.

Comparison

One point about the differential effects of normalization and flow through should be emphasized. If stockholders receive all benefits of the tax savings, then going on accelerated depreciation obviously has no effect on utility rates. However, if these savings are passed on to customers, the timing of the benefits varies greatly depending on whether the company flows through or normalizes. To illustrate this, assume that a company has a $1 million tax saving from accelerated depreciation in one and only one year, that it makes a 6 percent return on its rate base, and that utility rates are adjusted annually to keep returns at 6 percent.

Under these assumptions, flow through produces a one-time rate reduction of $2 million, that is, rates fall one year then return to the old level and remain constant thereafter (assuming a 50 percent tax rate, a $2 million utility rate reduction is necessary to keep after-tax earnings constant after a $1 million income tax reduction). Normalizing creates a $1 million credit to the reserve for deferred taxes, and this reserve is (typically) deducted from the rat basis when allowable profits are calculated. Since a 6 percent return is allowed on the rate base, utility rates must be reduced by $120,000 (again, the 50 percent tax rate causes the reduction to be $120,000 not $60,000 if the return on the rate base is to be held at 6 percent!). It should be noted, however, that if the reserve is not paid, the rate reduction is permanent. This example is highly artificial, but it does illustrate that under flow through current customers receive the bulk of the tax saving, while with normalization the savings accrue largely in the future. This statement is amplified when the simulation results are discussed.

Accelerated Companies

The controversy between normalization and flow through does not arise if a firm uses the same depreciation method for book and tax purposes. If a utility company and its regulatory commission decided that “true economic depreciation” actually followed an accelerated rather than a straight line path, how would this decision affect its reported profits and utility rates? Profits would be reduced vis-à-vis the other firms (straight line, normalized, and flow through) because of the heavy depreciation charges, but the high accelerated depreciation charges used as an allowable cost of service would produce higher rates to offset the profit decline. Over time, the high depreciation charges would reduce the rate base much like the build up of the deferred tax reserve reduces normalized firms’ bases. Normalized and accelerated companies do not have identical results, however, as the simulation makes clear.

Debt Regulation

In addition to rate regulation, utility commissions are also very much concerned with the capital structures of firms under their jurisdictions. During the 1920s, the utility industry (largely by use of the holding company vehicle) became leveraged almost beyond belief. When the depression struck, the burden of debt was overwhelming and caused many utility systems to fail. This obviously had a disruptive effect and could have caused turmoil and hardships even for very efficient and well-run operating companies (there is little evidence that excess holding company debt actually did adversely affect operating companies, as several holding company
Depreciation Policy Combinations

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<td>CAPITAL STRUCTURES FOR TWO FIRMS</td>
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<th>Short-term liabilities</th>
<th>Normalized Firm</th>
<th>Flow Through Firm</th>
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<td>Reserve for deferred taxes</td>
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<th>Capital structure</th>
<th>Debt</th>
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<th>$47.50</th>
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<td>Preferred stock</td>
<td>12.70</td>
<td>14.20</td>
<td></td>
</tr>
<tr>
<td>Common equity</td>
<td>29.80</td>
<td>23.30</td>
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| Total capital | 85.00 | 95.00 |
| Total liabilities and net worth | $100.00 | $100.00 |

higher ratio of debt to assets than the normalized firm—47.5 versus 42.5 percent. In general, if firms have similar capital ratios, then the ratio of debt to total assets must decline as the ratio of reserves to assets increases. The debt/assets ratio is equal to:

\[ D/A = \frac{D/C}{S/A} \times \frac{S/C}{R/A} \]

where

- \( D = \) long-term debt
- \( A = \) total assets
- \( C = \) total capital (long-term debt + equity)
- \( S = \) short-term liabilities
- \( R = \) deferred tax reserve.

If the flow through companies have zero deferred taxes, then the normalized companies must have \( D/A \) ratios that are lower by \( (D/C) \times (R/A) \), providing they have similar \( D/C \) and \( S/A \) ratios. The larger the tax reserves as a percent of assets, the lower the debt of normalized firms vis-à-vis flow through companies.

Since normalized companies generally have larger tax reserves, hence higher ratios of reserves to assets, it follows that they should also have lower debt to assets ratios. This proposition was tested using a sample of 60 electric utility companies contained on the Standard and Poor’s Compustat data tapes (Appendix B contains a list of the normalized and flow through companies used in this as well as all other statistical tests reported). Table 3 gives the annual average debt to asset ratios for flow through and normalizing firms during the period 1962 to 1966. These ratios confirm

systems collapsed causing huge losses to investors while the operating companies were largely unaffected. As a result, many regulatory agencies were granted some degree of authority over utility companies’ capital structures (the SEC has control over the capital structures of public utility holding companies). The regulations are usually flexible, and in most jurisdictions the regulatory agency simply prescribes broad guidelines within which the companies must operate. Enforcement is not complicated; the companies merely obtain commission approval before each security offering. Disagreements are resolved through formal or informal hearings in the same manner as are those arising over rates.

Depreciation and Use of Debt

Firms in most industries, and certainly electric, gas, and telephone companies, earn higher returns on assets than the after-tax interest rate on their debt. Consequently, a greater degree of financial leverage generates higher returns on stockholder equity. The question arises of whether or not depreciation policy can influence debt capacity and the use of leverage, thus affecting the rate of return on net worth. This influence does, in fact, seem to be present. Consider the following example.

Assume that two otherwise identical electric utility companies, one normalizing and the other flowing through, are being compared. Both use conventional financing policies, maintaining capital structures with 50 percent debt, 15 percent preferred stock, and 35 percent common equity. Short-term liabilities equal 5 percent of assets for both firms, but these liabilities are excluded from the capital structures—this is the procedure electric and gas utility companies follow as a rule. On the additional assumptions that the normalized company has a reserve for deferred taxes equal to 10 percent of assets and that total assets for each firm are $100, the right sides of the balance sheets are shown in Table 2.

It is clear that the hypothetical flow through company has a

This is not to say that firms should make the maximum possible use of debt. The risk inherent in leverage could cause the wealth-maximizing debt ratio to lie well below the rate of return maximizing ratio. See F. Modigliani and M. Miller, “The Cost of Capital, Corporation Finance, and the Theory of Investment,” American Economic Review, June 1958, pp. 261-97.
the proposition that flow through companies are, on balance, somewhat more highly leveraged than normalized firms.

Although flow through companies as a group tend to use more debt than normalized firms, individual companies differ widely in their debt practices. To allow for this, three possibilities are considered in the simulation model. First, some normalized companies expect to continue investing at a level sufficient to postpone payment of the deferred tax liability indefinitely. On this basis they treat the reserve as equity for purposes of computing capital ratios. Second, some normalized companies definitely expect to discharge the tax liability at a future date, and this causes them to class the reserve as long-term debt when determining capital proportions. Finally, as in the preceding example, the majority of utility companies simply ignore the reserve when computing capital ratios. These three cases are handled in the simulation program.

Simulated Firms

These considerations of utility rate and debt regulations dictate an expansion of the four firms in the simple example that opened this chapter to the eleven prototype companies diagrammed in Figure 3. Although the simulation program makes no provision for companies whose stockholders and ratepayers share the benefits of accelerated depreciation, any sort of sharing arrangement would simply produce intermediate patterns between the companies that are described.

While the questionnaire data reported in Appendix A suggests that utility companies' stockholders generally do not receive the direct benefits of accelerated depreciation, the stockholders of un-
Depreciation
and Utility
Rate Structures

The simulation model shows how utility rates, cash flows and reported profits vary among the eleven firms introduced in the preceding chapter. Although a full description of the model is too lengthy to be included here, an idea of its primary features is essential to an understanding of the simulation results. The ways alternative depreciation policies affect utility rate schedules and cash flows under various assumptions about rates and durations of growth, asset lives, and so on also need to be examined.

Although eleven "pure" cases have been identified and simulated, most of the analysis is restricted to those cases that actually exist in practice. The relevant utility companies are firms S, N6, and F3. To avoid unnecessary confusion, most of the discussion is restricted to these cases, but A2 is occasionally examined for comparative purposes.

SIMULATION MODEL

At the start of the simulation run the eleven firms are identically equal. They have identical balance sheets and income statements; they are earning the same rate of return on assets (the rate base
is defined to be equal to assets); and their common stocks all have the
same earnings, dividends, and prices. Initially, the eleven com-
panies all use straight line depreciation. The firms also use the same
asset lives when computing depreciation for stockholder reporting,
rate determination, and income tax calculations.

During the first simulated year the companies all have exactly
the same operating results. At the beginning of the second year,
however, the firms receive permission to depreciate newly acquired
assets by one of the accelerated methods for tax purposes. In effect,
the situation is analogous to the one prevailing in 1954 when ac-
celerated depreciation was first allowed for tax purposes.

At the beginning of the second year, ten firms switch to sum-of-
years digits for tax purposes while one remains on straight line. Of
the ten accelerated companies, two flow through, two use acceler-
ated depreciation for book and tax purposes, and the other six
normalize. Within the flow through, accelerated and normalized
groups, firms differ according to the description in Figure 3.

The main variables generated by the model are listed in Table 4,
and the model’s primary assumptions are given in Table 5. For
convenience, assets are initially set at $100, debt at $80, net worth
at $40, and the reserve for deferred taxes at zero, while one share
of stock is assumed to be outstanding.

Given the initial balance sheet items, the program generates first-
year values for the variables listed under (H) and (III) of Table 4.
Depreciation and interest charges are directly calculated first.
These values, plus the tax rate and the allowed rate of return, are
then used in a system of simultaneous equations to find gross in-
come, taxes, the credit to the deferred tax reserve, and net profits.
Net profits are divided by shares outstanding to determine the
earnings per share, and the payout ratio is applied to find dividends
per share. The dividend payout ratio is determined within the
model as a function of the firms’ growth rates. If assets are growing
at 10 percent or more then the payout is 40 percent. If growth is
zero or negative then the payout is 100 percent. Between these two
limits, payout is a linear function of the growth rate.

Given the required investment outlay (the investment outlay is
equal to book depreciation plus the net investment required to pro-
duce the specified rate of growth, which is a variable starting at the
prescribed initial growth rate and declining to the specified terminal

---

**TABLE 4**

<table>
<thead>
<tr>
<th>VARIABLES GENERATED IN THE SIMULATION MODEL</th>
<th>Initial Value Used</th>
<th>Reported Results</th>
</tr>
</thead>
</table>

**TABLE 5**

<table>
<thead>
<tr>
<th>PARAMETERS USED IN SIMULATION MODEL</th>
<th>Initial Use of</th>
<th>Range of Use</th>
</tr>
</thead>
</table>

---

**LIBERALIZED DEPRECIATION**
Utility Rate Structures

Figure 4 gives the various firms’ utility rates under four different assumptions about the rate of growth in assets. In panel A assets grow at a constant 10 percent rate throughout the entire simulation; in panel B the growth rate is 5.15; in panel C it is zero; and in panel D assets decline by 2 percent per year. In all cases the average life of assets is assumed to be thirty years. These cases illustrate some fundamental relationships between growth and utility rates under the various methods of accounting for taxes and depreciation.

Firms S’s utility rate is constant in each of the panels. N0’s rate declines for about thirty years, then levels out. A2 has an increasing utility rate initially, but eventually it falls and levels off. Finally, F2’s rate follows a reverse pattern from that of A2; it first declines rapidly, then rises and stabilizes in the same year that N6 and A2 experience stable rates. These are fundamental relationships, and they show exactly how depreciation policies affect the timing of utility customers’ benefits from accelerated depreciation.

The stabilized positions of the different companies’ rates are also of interest. N6 always stabilizes below S, and F2 stabilizes below S at any rate of asset growth greater than zero. At a zero growth rate, F2 stabilizes at the same rate as S, while at negative rates F2’s stabilized rate exceeds that of S. Panel B provides a graphic illustration of a very important point. If the rate of growth equals a certain critical level, then the stabilized utility rates of N6, F2, and A2 are equal. The critical rate of growth is found by using the equation:
Utility Rate Structures

\[ G^* = R - (T)(D)(i) = 6.5 - (0.5)(0.6)(0.045) = 5.15\% \]

where
- \( G^* \) = the critical terminal growth rate
- \( R \) = the allowed rate of return on the rate base
- \( T \) = the corporate tax rate
- \( D \) = the ratio of debt to capital
- \( i \) = the rate of interest on debt.

Stabilization occurs \( N \) years after the firms adopt accelerated depreciation, \( N \) being the average depreciable life of the firms' assets. If growth exceeds the specified critical level—5.15 percent under the assumptions used here—then \( F2 \)'s utility rate is always less than that of the normalized firm and the accelerated company always has a higher rate than either of these two. On the other hand, if the growth rate is less than 5.15 percent, then \( F2 \)'s stabilized utility rate exceeds that of \( N6 \), which in turn exceeds that of \( A2 \). This point can be seen by comparing panel A, where the growth rate is above the critical level, to panel C where it is below.

Variable Growth Rates

The question arises whether generalizations about utility rates which are possible under the assumption of constant growth will hold if growth rates are expected to vary, especially if the investment rate declines from its current level. When the simulation model was used to examine utility rate patterns under a number of different assumptions about asset growth rates, the conclusions reached were similar to those found under constant growth.

One point of difference should be noted. When growth is constant, Firm \( S \)'s utility rate is also constant (though it varies depending on the level of the constant growth rate). When growth varies, however, \( S \)'s utility rate also varies—rising when growth declines and falling when the rate of growth increases. This phenomenon is caused by the fact that depreciation, taken as a percent of total assets, is smaller the faster the rate of growth. Since the utility rate includes a factor for depreciation expenses, and since this factor is smaller when the depreciation/assets ratio is lower, the utility rate must be lower the faster the rate of growth. Therefore, as the rate of growth slows, the utility rate must creep
upward. This phenomenon, however, is not very important and has no bearing on our comparative analysis.

The various panels in Figure 5 show rate patterns under the assumption that the firms all grow at a 10 percent rate initially, but that the rate declines over a twenty-year period to terminal growth rates of 5.15 percent, zero, and minus 2.0 percent. Initially, A2 charges the highest rates, F2 has the lowest rates, and N6 and S lie between these two extremes. As before, the normalized, flow through, and accelerated companies all have the same stable utility rates when the terminal growth rate equals the critical level of 5.15 percent. With faster terminal growth, F2’s rates are below and A2’s rates are above those of N6, while with slower terminal growth these patterns are reversed. Again, terminal growth must be negative for F2’s rates to exceed those of the straight line firm.

Varying Asset Lives

Different depreciation methods produce different effects depending on the average life of assets. All the material presented thus far has been based on a thirty-year average asset life, which is a good assumption for the average utility company. However, firms vary depending on the type of services they provide (gas, electricity, water, telephone), on whether they are engaged primarily in production or distribution, on whether their production facilities (for electric companies) are steam, hydro or nuclear, and so on. Consequently, it is of interest to see just how the average depreciable life affects the utility pattern.

The average depreciable life obviously affects rates because the longer the life, the lower the annual depreciation charge that is included in “capital costs.” Not quite so obvious is the fact that using a shorter depreciable life for tax than for book purposes produces a situation exactly analogous to the one we have described for accelerated depreciation. As with accelerated depreciation versus straight line, a tax saving (or deferment) that can be flowed through to profits or normalized arises if a firm uses shorter lives for tax than for book purposes. Also, the firm can use the same long life for book and tax purposes, making it similar to the straight line company; or it can use the same short life for book and tax, making it similar to the accelerated company.

Figure 6 shows how utility rates vary depending upon average
asset life. In the figure growth is held constant at 5.15 percent, while average asset lives vary from five to thirty years. First, it is apparent that changing the average life radically alters the level of utility rates, but the fundamental relationships among the different types of firms are not altered. Second, it is clear that stabilization occurs much later when the depreciable life is longer; in fact, stabilization occurs after the firm goes on accelerated depreciation, N being the average depreciable life of assets. Third, and less obvious, the peak-to-trough variations for P2 and A2's utility rates are greater the shorter the average depreciable life. P2, for example, experiences a 20 percent decline from peak-to-trough when asset lives are as short as five years, but the decline is only 15 percent for thirty year assets. And fourth, since the trough occurs at approximately one-half the depreciation cycle, rates fall for a relatively long period if assets have long service lives. If, for example, assets are depreciated over thirty years, then flow through rates decline for fifteen years, ceteris paribus, before the company finds it necessary to request a rate increase.

When one stops to consider that utility companies probably do have some price elasticity in their demand schedules—especially their industrial demand schedules—then it becomes apparent that a fairly substantial rate decline over a relatively long period might well stimulate load demand for the flow through company and help it to maintain a higher growth rate. This point is examined in more detail later when the question of investor expectations is considered.
Depreciation

and Reported Profits,

Cash Flows, and Risk

Because of the rather complex relationships involved, the effect of depreciation policy on reported profits is difficult to ascertain. The simulation, however, shows quite clearly how depreciation interacts with growth, dividend policy, debt structure, and relevant variables to produce observable patterns of reported profits.

NONUTILITY COMPANIES

Until this point the discussion has focused on regulated utilities, the only firms to which the utility rate concept is applicable. Unregulated firms presumably earn as high a return on investment as market conditions permit. However, certain of these firms—notably defense contractors—are similar in many ways to regulated utilities. Depreciation policy can affect their "utility rates" (or, alternatively, their rates of return on net worth), so it is convenient to reintroduce certain others of the prototype companies.

Unregulated firms are assumed to earn a return on the true economic value of their assets without regard to the way the assets are financed. Specifically, these companies should not suffer a decline in gross revenues because they build up a deferred tax reserve (as did the normalized utility) because they over-depreciate for book purposes and thereby understate assets (as did the accelerated
utility) or because they flow the tax saving through to reported profits (as did the flow through utility). Accordingly, N5 is the appropriate accelerated firm.

Remember that we are not concerned with whether the accelerated utility is over-depreciating or the others are under-depreciating. For our purposes, it does not matter if "true depreciation" is best approximated by the straight line or by an accelerated method. The relative rates, profits, and so on among firms would exactly be the same if we assumed that sum-of-years digits was correct and that straight line under-depreciated assets. The appropriate depreciation method is vital to companies in their rate setting, stockholder reporting, and so on, but it is of little importance in a comparative analysis such as this one.

Also, as explained in the introduction, the AICPA does not permit the F1 case, but it is included in some parts of our analysis for comparative purposes. Actually, the AICPA cannot forbid the use of flow through by nonutility firms, but if a nonutility used flow through its auditors would qualify their opinion, stating that the firm is not using "generally accepted accounting procedures." This would create some serious problems with the investment community, and the SEC would doubtless exert pressure on the firm to follow the accepted practice. In view of this, it seems reasonable to say that the AICPA does prevent nonutilities from using flow through accounting.

Zero Growth

Earnings per share for nonutility firms F1, N5, A1, and S are graphed in Figure 7 under the assumption that assets experience no growth. Since the firms are assumed to maintain a constant ratio of debt to equity, a zero growth rate implies that all reported profits are paid out in dividends. Accordingly, the model is programmed to have the payout ratio vary with the growth rate, and for the zero growth case the payout is set at 100 percent. Each firm’s earnings start at $3.80. Firm S remains at this level, but the others all diverge. F1’s reported profits climb quite rapidly in the early years while tax depreciation greatly exceeds that used for stockholder reporting, but they turn down in the fifteenth year and level off at the straight line level during the thirty-first year. N5 has an increasing profit pattern. Starting from the initial $3.80, it over-

![Figure 7: Non-Utility Earnings Per Share Assuming Zero Growth in Assets (Thirty Year Depreciable Life)](image-url)
obvious which of the other situations is best. If the market looks only at reported profits—i.e., uses the same price/earnings ratio for all the firms—a sophisticated stockholder would vote to have his company adopt flow through initially. He would then sell his shares in the tenth year, when the earnings differential is greatest and buy A1's greatly depressed shares.

If the market sensibly recognizes that different depreciation methods result in different rates of earnings growth, then a more complex evaluation procedure is required. Perhaps the most logical theory assumes that stock prices are based on the current level of earnings and dividends, and on expected future growth. Using this theory, the simulation program finds each company's price by the following equation:

\[ PV_i = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k)^t} + \frac{P_{st}}{(1 + k)^{f_5}} \]  

(2)

where

- \( PV_i \) = the present value of the ith company's stock
- \( D_t \) = the dividend per share in each year
- \( k \) = the stockholders' discount rate
- \( P_{st} \) = the price of the stock in the fiftieth year.

In turn, \( P_{st} \) is found as:

\[ P_{st} = \frac{D_{f_5}}{k - g} \]  

(3)

where

- \( g \) = the rate of growth in dividends between the fiftieth and fifty-first years.

Under the asset growth assumptions used here, earnings and dividend growth stabilized by the fiftieth year. It is important to note that \( k > g \) is a necessary condition for obtaining a finite solution to Equation 2.

Using a 7 percent value of \( k \) and solving Equation 2 for the various companies gives the following present values:

---

**Reported Profits, Cash Flows & Risk**

<table>
<thead>
<tr>
<th>Company</th>
<th>Present Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>$61</td>
</tr>
<tr>
<td>N5</td>
<td>$58</td>
</tr>
<tr>
<td>A1</td>
<td>$56</td>
</tr>
<tr>
<td>S</td>
<td>$54</td>
</tr>
</tbody>
</table>

At this discount rate (and also at all other rates examined), the flow through company's present value is highest, followed by the normalized, accelerated, and the straight line companies in that order. At some unrealistically low discount rate A1 would take over first place and N5 second, but for all reasonable rates (that is, \( 6\% < k < 12\% \)) the order shown in the table holds.

It is worth mentioning that changing \( k \) alters the patterns of earnings and dividends somewhat. The larger alternations occur at higher growth rates because the price of the shares in each year depends in part upon \( k \), and the share price affects the number of shares that must be sold to finance growth. This factor is not very important, however, and the earnings graphs do not change significantly.

**Non-Zero Growth**

The situation is more complicated if assets grow or decline, but the same procedures can be used to analyze depreciation's effect on stockholders. Figure 8 shows earnings patterns under different asset growth assumptions. It is not appropriate to compare the different panels to one another. Recall that the dividend payout ratio varies depending on the rate of growth in assets, with lower payout being associated with faster growth rates. This means that the companies having the fastest growth rates in assets also retain the most earnings, and this fact causes their earnings to grow faster than the high payout firms.

In panels A and B of Figure 8, where assets grow by at least 5.15 percent per annum, F1’s earnings are highest and N5’s are second, while A1 and S trade positions between the twenty-fifth and thirtieth years. In panel C, where growth declines to zero, stabilized earnings show the same pattern as when growth was zero throughout. When the terminal asset growth rate is negative, as in panel D, a highly confused pattern emerges, but the same general conditions hold here as under other growth rates—the flow
Reported Profits, Cash Flows & Risk

through company has high reported profits in the early years, the accelerated company looks relatively good in later years, and the normalized and straight line firms lie between these extremes.

Present value calculations once again rank F1 first, N6 second, A1 third, and S last. This is especially true at higher discount rates, but the ranking still holds even when the rate of discount is set as low as 6 percent. Note, however, that these conclusions are predicated on the assumption that firms pay dividends on the basis of reported profits. With payout based on cash flows the flow through, normalized, and accelerated companies have identical present values if investors are able to forecast correctly. Investors should see that depreciation tax policy has no effect whatever on unregulated firms' future cash flows when accelerated depreciation is used for tax purposes. Consequently, they would value F1, N6, and A1 identically and S somewhat lower. If, however, investors cannot unscramble the tangle caused by different accounting procedures, then differences in value will occur.

Regulated Utilities

Although the AICPA effectively ruled out unregulated companies' use of flow through, it is permitted and frequently used by public utilities. The accelerated case, on the other hand, is used by 40 percent of the nonutilities but by none of the utilities (see Appendix A). The most common utility cases are therefore S, S2, and N6. F2's utility rate is adjusted to keep its return on capital equal to what it would be on straight line—this is the definition of "giving customers the benefits of accelerated depreciation." F2 also has exactly the same capital structure as the straight line company. Consequently, S's and F2's total reported profits and earnings per share are exactly equal and no adjustment of any kind is needed to make them comparable.

Deferred Tax Reserve

N6 is slightly different because its gross revenues are higher than F2's or S's in the early years, and because it uses excess revenues to build up the deferred tax reserve. Assuming they receive all the benefits of accelerated depreciation, this reserve effec-
tively belongs to the ratepayers. The annual credit to the reserve amounts to an investment by the customers; the total reserve represents their total accumulated "investment;" and their "dividends" are the reduced future utility rates.

A utility's earnings growth depends on finding profitable investment outlets for retained earnings and new outside capital. To some extent the reserve "uses up investment opportunities" and decreases N0's ability to invest stockholders' capital. The larger the reserve (as a percent of assets), the greater the diminution of private investment opportunities.

The reserve build-up depends upon the depreciable life of assets, the rate of growth in assets, and the length of time the company has been using accelerated depreciation. Table 6 shows how the reserve builds up under different growth assumptions. In general, the build-up is faster with a higher rate of growth, but the stabilized proportion of assets financed by the reserve is lower with a faster stabilized growth rate. Where growth is zero, for example, the reserve stabilizes at 16.1 percent of assets versus 11.0 percent for the 10 percent growth case.

Naturally, the reserve stabilizes faster with a shorter average asset life, and the stabilized reserve/asset ratio rises slightly as asset lives decline. For the 5.15 percent growth case, the stabilized

<table>
<thead>
<tr>
<th>Years on Accumulated Depreciation</th>
<th>Reserve as a Percent of Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1.0</td>
</tr>
<tr>
<td>20</td>
<td>1.6</td>
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<td>25</td>
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<td>40</td>
<td>3.6</td>
</tr>
<tr>
<td>45</td>
<td>4.1</td>
</tr>
<tr>
<td>50</td>
<td>4.6</td>
</tr>
</tbody>
</table>


Reported Profits, Cash Flows & Risk

The A2 case builds up an excess reserve for depreciation that corresponds to the reserve for deferred taxes, but this excess depreciation reserve is exactly twice as large as the N0's reserve for deferred taxes when the tax rate is 50 percent. Accordingly, the reserve percentages in Table 6 could be doubled, then applied to an A2 company. For example, if growth is 5.15 percent, 13.2 percent of N0's assets are financed by the tax reserve once the reserve is centered on stabilizing rates. However, for this same growth rate, 26.4 percent of A2's "true" assets are financed by the funds built up through excess depreciation. Since large companies' revenues are used to build up the depreciation reserve, and since the company earns no return on the reserve for depreciation, the investment analogy carries over to the A2 case. In this case, however, the depreciation reserve absorbs twice as many investment opportunities.

Using a sample of twenty-four electric utility companies that have been normalizing continuously since 1954, the actual buildup of this reserve for deferred taxes was examined (Table 7). While it is not possible to directly compare Table 7 with Table 6 due to differing depreciable lives for assets, the results do indicate that the reserve grows to a significant size relative to total assets. Even more important, however, is the percentage of assets financed by deferred taxes or, stated another way, the percentage of growth opportunities absorbed by the reserve. On the average, over 10 percent of the increase in assets has been accounted for by the growth in the tax reserve. This percentage has varied widely however from firm to firm, ranging from a low 5.2 percent for Idaho Power Company to over 10 percent for Public Service Company of Indiana. It is important to remember that while the reserve has increased rapidly during the thirteen years between 1954 and 1966, this increase will not continue indefinitely. As shown in Table 6, the increase in the reserve will asymptotically approach a maximum percentage of assets, and as it does the percentage of new assets financed by deferred taxes will level out and become constant.

Earnings Per Share

Because the tax reserve builds up and absorbs some of N0's investment opportunities, this firm's reported profits grow less rapidly
TABLE 7
TAX RESERVE RATIOS AS OF 1966

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Assets</td>
<td>Total Assets</td>
</tr>
<tr>
<td>Boston Edison</td>
<td>.055</td>
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</tr>
<tr>
<td>Central Illinois Public Service</td>
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<tr>
<td>Commonwealth Edison Company</td>
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<tr>
<td>Consumers Power Company</td>
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<td>Detroit Edison Company</td>
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<td>El Paso Electric Company</td>
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<td>Florida Power Corporation</td>
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<td>Gulf States Utilities Company</td>
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<tr>
<td>Idaho Power Company</td>
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<tr>
<td>Illinois Power Company</td>
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</tr>
<tr>
<td>Iowa-Illinois Gas and Electric Company</td>
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<td>Kansas City Power and Light Company</td>
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<tr>
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<td>Tampa Electric Company</td>
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<tr>
<td>Tucson Gas and Electric Company</td>
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<td>.079</td>
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<tr>
<td>Average</td>
<td>.059</td>
<td>.109</td>
</tr>
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</table>

than those of F2 and S. Figure 9 shows the different companies' earnings per share patterns under various assumptions about asset growth. For the cases shown, F2's and S's earnings are greater than those of N6, which in turn exceed those of A2. Reserves for taxes and depreciation absorb part of N6's and A2's investment opportunities, producing these interfirm differences.

Present value calculations are unnecessary in the utility cases presented. For each rate of growth in assets, each company’s dividends are the same percentage of reported profits, and since the earnings per share lines never cross, the company with the highest earnings per share line must have the largest present value.

One particularly important fact is that, unlike the nonutility cases, no adjustment whatever is necessary to compare the re-
Reported profits of utility firms S, F2, N6, and A2. S's and F2's reported profits are identical, and N6's and A2's reported profits are correctly stated with respect to those of S and F2. If N6's and A2's profits were recomputed on the same basis as S's and F2's, they would remain unchanged except for the small difference caused by the fact that some of N6's and A2's investment opportunities are being absorbed by the reserve (this investment absorption continues so long as the reserve builds). therefore, no adjustment should be made for its presence). This being the case, no adjustment to the reported figures is necessary.

Examining cash flows available to utility stockholders under the alternative depreciation policies also shows that earnings adjustments are unnecessary. S's and F2's total cash flows are identical, while those of N6 and A2 are high during the early years and relatively low later on. However, this difference is accounted for entirely by reserves for deferred taxes and depreciation, and N6's and A2's differential cash flows do not belong to their stockholders. Except for the minor differences caused by absorption of investment opportunities, the cash flows that are available to stockholders for dividends and building up equity are the same for each of the four classes of firms. Once more, this leads to the conclusion that no adjustments should be made to utility companies' reported profits.

This conclusion is not in accord with previously published works. In their study of utility companies' cost of capital, Miller and Modigliani indicate that they believe such adjustments are necessary and tried several different adjustment procedures, including "adding back to profits any allocations to a reserve for deferred taxes." Such a procedure might be appropriate for a flow through industrial company (if one existed), but it is clearly inappropriate for a utility where the reserve benefits only customers. Adding the credit to stockholders' profits simply overstates the normalized firms' profits.

Some security analysts are also unaware that utilities' tax reserves are radically different from those of unregulated firms. Writing in the Financial Analysts Journal, W. D. Williams makes the

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Reported Profits, Cash Flows & Risk following statement:25

A current illustration of investors' failure to give full weight to important accounting variations is provided by the electric power industry. Historically, utility stocks with similar growth trends have tended to sell at similar price-earnings ratios. In recent years, however, many companies in the field have been permitted or required by state regulatory agencies to adopt "flow through" accounting, whereby the tax benefits from accelerated depreciation and the investment tax credit are fully reflected in reported earnings. Subsequently, shares of the "flow through" utilities have sold at slightly lower price-earnings ratios than those of comparable utilities following the more conservative practice of "upfronting" (offering depreciation tax benefits and stripping out the investment credit). But, if earnings are put on the same basis, the "upfronting" companies actually have been priced at a discount from the "flow through" utilities.

Williams' adjustment is similar to the one suggested by Miller and Modigliani, and it is equally inappropriate in a utility industry where public utility commissions' rate actions offset the effects of accounting differences among firms.

Qualitative Differences

While adjustments to utilities' reported earnings are not generally appropriate, there may be differences in the quality of earnings reported under alternative accounting methods. First, the slight tendency for flow through companies to leverage their earnings somewhat more than normalized companies could cause some cyclical instability in flow through earnings. This is of questionable significance. Second, and more important, the simulation demonstrates clearly that flow through companies' utility rates must at some future time rise above their low point. That is, flow through companies must eventually seek rate increases. Normalized companies, on the other hand, will never have to ask for rate increases arising from their depreciation accounting policy. Now if public utility commissions raise rates with a lag, flow through companies could be disadvantaged while their rate structures are being adjusted. Third, and related to the second point, is the fact that if

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either economic conditions or regulatory climate make it difficult for a normalized utility to obtain rate increases to offset rising operating costs, the normalizing company could simply switch over to flow through and boost reported profits. This possibility is not open to flow through companies—they have already used up this source of higher reported earnings. Finally, it is at least possible that technology and economic conditions could change so radically that demand would simply not permit a sufficiently high rate structure to produce a fair return on investment. Such a situation would clearly be accompanied by relatively little investment and a low or even negative growth rate, and this would mean that the flow through companies would need very high rates to pay off the deferred taxes (Figure 4). But if the economic situation does not permit this high rate structure, stockholders simply suffer reduced returns on their investment.

On the other hand, the flow through companies have relatively low rate structures for long periods under any conditions, and these low rates may well stimulate load demand and bring about profitable investment opportunities. Also, it has been argued that utility commissions are more likely to operate with a lag in ordering rate reductions than in granting rate increases, especially when a company’s rates are low relative to those of other firms in the industry. This being the case, the flow through company might be able not only to earn more than the normal rate of return while its rates are declining but also to obtain this rate without trouble when it finally does have to request an increase. Recall that the flow through company’s rates are still substantially lower than those of any other company when it begins to need increases (Figure 4). Finally, if the economic climate is satisfactory and if utility commissions operate efficiently and fairly, then the flow through company has a definite advantage in that none of its investment opportunities are being absorbed by the tax reserve. As we saw, the reserve builds up to 15 percent of assets for a normalized company growing at a 5 percent rate; therefore, this factor can be significant.

How do these qualitative factors balance out against one another? The answer depends upon how one views the future of the particular utility industry. If the analyst is optimistic about the industry and its prospects, and if he thinks that demand for service will be sufficient to enable firms to earn a fair return on investment, then flow through companies’ earnings should be regarded just as highly as those of normalized firms. On the other hand, if the analyst is concerned about the future of the industry, he should regard normalized earnings as being “better” in some qualitative sense. In this latter case, the analyst may want to make a downward adjustment to flow through earnings; but if he does, then he should recognize the adjustment for what it is—a qualitative adjustment for a risk differential and not an accounting adjustment to equalize profits reported under the two accounting procedures.

A reviewer suggested that Williams’ and the Miller-Modigliani procedure could be used for a qualitative adjustment. While certainly it could be used, it would be inappropriate only under the rather restrictive assumptions (1) that future growth is negative (requiring payment of deferred taxes) and (2) that service demand schedules are such that higher utility rates cannot produce sufficient revenues to pay for the deferred taxes. If these conditions hold, then ratepayers are charged too little for service in the early years and stockholders suffer a capital loss later on to compensate for the earlier under-pricing. While this could happen, it seems unduly pessimistic to assign a probability of 1.0 to the event. Using the Williams/Miller-Modigliani adjustment would be doing this implicitly.

**Depreciation and Risk**

If investors perceive a qualitative difference in reported profits, this means that the two firms are not considered to be in the same risk class—they differ because of difference in the accounting practices followed. This risk differential can be explained partly but not entirely on the basis of the timing of cash flows. That is, although we would associate lower risk with a faster cash flow as is the case with the ponzius for straight line versus accelerated nonregulated firms, the total effect in the regulated sector is much more complex. The capitalization rate applied to expected earnings for utility companies using different depreciation accounting procedures will also vary in a manner that reflects investor beliefs about the relative importance of the subjective factors discussed in the previous section.

Holders of equity may not be the only suppliers of funds that
base their required return in part on depreciation accounting procedures. It was shown earlier that near term cash flows of normalizing utilities are greater than those for similar flow through firms. This means that interest coverage will be lower for flow through companies, and this, in turn, should increase the riskiness of their debt and interest costs of this debt. Also, if debt holders look upon the reserve for deferred taxes as being a part of the equity capital, the leverage position of normalizing firms will appear very low and this additional risk reduction should again tend to lower the cost of debt. If the firm had problems to the extent of being unable to service its debt, it would probably be suffering losses. In such an event it would not have to pay the deferred taxes. Thus, there is some justification to creditors considering deferred tax reserves as a part of the equity cushion protecting debt.

5

Depreciation Policy

and

Investor Expectations

The set of electric utility companies contained on the Standard and Poor Compustat tapes was used to compare price/earnings ratios of flow through, normalized and straight line firms, and to examine actual rates of return realized by investors on a sample of flow through and normalizing companies. Finally, multiple regression techniques were employed to analyze stock prices and price/earnings ratios, using the depreciation method as one of the explanatory variables.

PRICE/EARNINGS RATIO TRENDS

The historical trend of price/earnings (P/E) ratios for electric utilities using various depreciation methods provides an admittedly crude, but nonetheless revealing measure of investor attitudes towards alternative depreciation policies.

When accelerated tax depreciation was first permitted in 1954, some companies elected to use it, others did not. Some of the companies that stayed on straight line in 1954 later decided to go to accelerated for tax purposes. The accelerated companies, at the time they stopped using straight line for tax purposes, could either normalize or flow through. If a company initially elected to normalize, it could later switch to flow through, or conversely. The
possibility for such changes makes it imperative to keep track of what a company was doing at each point in time. As Figure 10 shows, the average price/earnings ratio for those firms that went on flow through in 1954 dropped relative to those firms that continued using straight line or that switched to accelerated depreciation for tax purposes but normalized.\textsuperscript{23} The P/E ratios of the flow through companies were highest on the average in 1955 and 1954, but after the switch they dropped to become the lowest of the three types of firms. Assuming that no other factors were operating to cause this decline, the change in relative positions could be taken as clear evidence that investors attach some (negative) significance to the fact that a company reports profits on a flow through basis. It is interesting to note, however, that this difference diminishes somewhat during 1965 and 1966, the last two years studied. Figure 11 adds support to the hypothesis that the divergence in P/E ratios is due, at least in part, to variations in depreciation methods. There the time trends of the average price/earnings ratio for a group of electric utilities that used normalization continuously between 1954 and 1966, and the average P/E ratio for a group that switched from normalization to flow through during this period, are graphed. All of the firms in this latter group normalized through 1957 and they had all switched by 1963. The divergence of the trends as the firms shifted from normalization to flow through indicates that investors applied a higher capitalization rate (lower P/E ratio) to earnings reported on a flow through basis. Note, however, that in both Figures 10 and 11 the two curves diverge after the initial change in depreciation accounting policies (as in 1954 for Figure 10 and 1957 for Figure 11) then tend to converge somewhat prior to 1962 (at which time an additional liberalization of the Federal Income Tax depreciation law went into effect amplifying differences between normalized and flow through companies) diverge after 1962 and again converge somewhat in the last two years. This pattern may indicate an investor learning curve in which an overreaction to the initial change in depreciation policy at first is later overcome as investors become better acquainted with the changes.

The actual rates of return realized by investors in straight line, normalized, and flow through utility companies need to be examined. To put these differential returns in perspective, however, aggregate rates of return of the entire sample of fifty-nine electric utility companies (Appendix E) for which there was Compustat data going back to 1950, as well as information about their depreciation methods, are first studied. These returns are then separated into three components—one attributable to dividends, one to growth in earnings, and one to changes in the P/E ratio.

Table 8 gives the average before-tax rate of return for the 59 electric utility companies for each possible holding period from 1955 through 1966. To use the table, one first decides on the holding period he wishes to examine—for example, the period 1950 through 1956. The left column identifies the year in which the purchase was made, while the top row identifies the year the security was sold. Looking across the appropriate row and down the appropriate column locates the average rate of return for the period—the before-tax return from 1950 to 1956, for example, is seen to be 13.9 percent. The figures along the diagonal, which represent one-year holding periods, fluctuate significantly from year to year, but returns are relatively stable as longer holding periods are examined. Further, yields are seen to be relatively high—from a low of 8.7 percent (1960-1966) to over 17.2 percent (1955-1961) for all holding periods greater than five years—as compared with bond yields, allowed rates of return on assets, and other standards. The figure in the upper right hand corner, 12.6 percent, is the rate of return that would have been earned had a portfolio of utility stocks been held over the entire period 1950-1966.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>5.6%</td>
<td>6.0%</td>
<td>6.3%</td>
<td>6.9%</td>
<td>7.5%</td>
<td>8.4%</td>
<td>9.6%</td>
<td>11.0%</td>
<td>12.1%</td>
<td>13.6%</td>
<td>14.9%</td>
<td>16.3%</td>
<td>18.0%</td>
<td>20.7%</td>
<td>24.0%</td>
<td>29.2%</td>
</tr>
</tbody>
</table>

Investor Expectations
RETURNS FROM DIVIDENDS AND CAPITAL GAINS

Stockholders' returns are derived from dividends and from capital gains; capital gains result from growth in earnings and from changes in P/E ratios. Table 9, which gives the distribution of returns among these sources for the electric utility firms during three selected periods, reveals several interesting findings. First, approximately 40 percent of the total return during the entire period came from dividends, however, and dividends accounted for 27.2 and 76.6 percent of the returns in 1950-1960 and 1961-1966, respectively. Second, the bulk of the capital gains for the entire period came from higher earnings, not from increases in P/E ratios. Again, however, the contribution of earnings growth varies considerably over the subperiods examined, ranging from 27.6 percent for the period 1960-1961 to 57.5 percent for 1961-1966. In general, high rates of return are associated with rising P/E ratios, and those rising P/E ratios account for a large percentage of the total rate of return during such periods.

DEPRECIATION POLICY AND RATES OF RETURN

From the P/E ratio trend analysis, we observed that investors apply lower earnings multipliers to flow through earnings than to those of normalized firms. This suggests that the required rate of return for flow through firms may be higher than for those that normalize. However, the rate of return matrices shown in Tables 9 and 10 and 11 do not support this hypothesis. In only five of the ninety-one possible holding periods of four years or longer are the average returns for the flow through group higher than the comparable returns for the normalized companies. It might be expected that capital losses caused by the decline in P/E ratios in a company initiates flow through practices would cause relatively low realized rates of return for flow through companies, but this does not account for the lower returns in forty-four of the forty-five periods beginning after the change in dividends. In a further effort to determine the effects of depreciation methods on realized rates of return, we examined the component parts of the total returns for two groups of electric utility companies—one that has normalized continuously since 1954 and a second group in which the firms switched from normalizing to flow through after 1957. For holding periods commencing prior to 1958—in other words, while all the firms were normalizing—but ending after that date, the contribution of change in the P/E ratio to the total return was consistently lower for the group that switched to flow through. This difference was often substantial. The complete set of data is not presented, but an example is shown in Table 12. Here we see that the change in the P/E ratio accounted for 42.2 percent of the 1957-1962 return for firms that continued to normalize, but for only 31.5 percent of the return for those firms that changed to flow through. This suggests that the lower rates of return for flow through companies is largely due to the fact that they have not enjoyed rising P/E ratios to the same extent as have the normalized utilities.

The indeterminacy indicated by the rate of return data—that is, the lower rates of return for flow through firms coupled with the lower contribution of P/E ratio changes—suggests the need for multiple regression analysis to separate the effect of the depreciation method used from that of the other causal variables.
TABLE 12
COMPARISON OF COMPONENT PARTS OF RATES OF RETURN FOR FIRMS CHANGING TO FLOW THROUGH AFTER 1958 WITH FIRMS THAT CONTINUED TO NORMALIZE

<table>
<thead>
<tr>
<th>Holding Period: 1957-1962</th>
<th>Average</th>
<th>Percent Attributable To</th>
<th>Total</th>
<th>Change in P/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalizing to Flow Through</td>
<td>0.79</td>
<td>24.4</td>
<td>42.3</td>
<td>77.7</td>
</tr>
<tr>
<td>Normalizing</td>
<td>0.39</td>
<td>24.6</td>
<td>61.7</td>
<td>78.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Holding Period: 1957-1966</th>
<th>Average</th>
<th>Percent Attributable To</th>
<th>Total</th>
<th>Change in P/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalizing to Flow Through</td>
<td>0.12</td>
<td>25.2</td>
<td>57.9</td>
<td>64.8</td>
</tr>
<tr>
<td>Normalizing</td>
<td>0.13</td>
<td>32.4</td>
<td>56.4</td>
<td>67.6</td>
</tr>
</tbody>
</table>

P/E Ratio Analysis

Our first test, directly related to the earlier graphical exposition of price/earnings ratios, is a linear regression of the P/E ratio on a set of variables that include a dummy variable for flow through depreciation policy. The regression equation took the form:

\[
P/E = a_0 + a_1d + a_2e + a_3s + a_4s + a_5u + a_6h + a_7D/E\]  

(4)

where
- \(d\) = a dummy variable equal to zero for companies that used straight line or normalizing procedures and equal to one for companies that flowed through the depreciation tax savings in the year of the test
- \(e\) = the fraction of a firm's revenues attributable to electric sales, a measure of possible non-homogeneity of the sample
- \(s\) = an index of size
- \(u\) = the standard error of the estimate of reported earning per share around its trend line during the five years prior to and including the year of the regression run, a measure of earnings stability
- \(h\) = the book value of debt divided by the book value of equity, a measure of the leverage employed by the firm
- \(D/E\) = the dividend payout ratio.

To reduce errors in measurement of the growth variable, the Brigham-Gordon procedure of including two separate growth variables in the regression was followed:

\[
g_a = \text{the geometric average growth rate of total assets over the previous five years}
\]

and

\[
br = \left(1 - \frac{D_a}{Y_a}\right) \left(\frac{Y_a}{E_{Q_a}}\right)
\]

where
- \(Y_a\) = the predicted value of earnings per share obtained by running a regression of earnings against time for five years up to and including the year of the test
- \(D_a\) = the dividends per share in the test year
- \(E_{Q_a}\) = the book value of common equity per share in the test year.

As Brigham and Gordon reported, this function is superior to several others tested for measuring the growth that investors expect. Equation 4 was run for each year since the introduction of accelerated depreciation methods in 1954 with a sample consisting of the fifty-nine electric utility companies used in computing our rate of return matrices. The results of these regressions, reported in Table 13, clearly indicate that the price/earnings is dependent on depreciation policy. For the years 1960 to 1966—a period after almost all of the electric utilities in our sample currently using flow through had switched—the use of flow through depreciation lowered the average electric utility's P/E ratio considerably. For example, the value of \(a_1\), the coefficient of the depreciation dummy, was -3.74 in 1964, indicating that a flow through company would have a P/E ratio 3.74 points below that of a normalized firm, other things held constant. This is a 14 percent reduction from the P/E ratio of 29.4 for the average normalizing or straight line firm that year.

Linear Valuation Model Analysis

A second and somewhat more valuable test was provided by extending the valuation model described and tested by Brigham
TABLE 13
REGRESSION COEFFICIENTS FOR P/E RATIO MODEL

\[ P/E = \alpha_i + \alpha_d + \alpha_{gd} + \alpha_2 + \alpha_a + \alpha_b + \alpha_u + \alpha_h + \alpha_D/E \]

<table>
<thead>
<tr>
<th>Year</th>
<th>Regression Coefficient</th>
<th>Standard Error of Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>0.6860</td>
<td>(0.0695)</td>
</tr>
<tr>
<td>1955</td>
<td>-0.2559</td>
<td>(0.2745)</td>
</tr>
<tr>
<td>1956</td>
<td>0.1517</td>
<td>(0.2416)</td>
</tr>
<tr>
<td>1957</td>
<td>0.0960</td>
<td>(0.1960)</td>
</tr>
<tr>
<td>1958</td>
<td>0.3006</td>
<td>(0.1733)</td>
</tr>
<tr>
<td>1959</td>
<td>0.1306</td>
<td>(0.1684)</td>
</tr>
<tr>
<td>1960</td>
<td>0.5243</td>
<td>(0.1235)</td>
</tr>
<tr>
<td>1961</td>
<td>0.1176</td>
<td>(0.1593)</td>
</tr>
<tr>
<td>1962</td>
<td>-0.2545*</td>
<td>(0.3083)</td>
</tr>
<tr>
<td>1963</td>
<td>-0.2545*</td>
<td>(0.3083)</td>
</tr>
<tr>
<td>1964</td>
<td>-0.2840*</td>
<td>(0.4912)</td>
</tr>
<tr>
<td>1965</td>
<td>-0.2058*</td>
<td>(0.2977)</td>
</tr>
<tr>
<td>1966</td>
<td>-0.1420*</td>
<td>(0.7333)</td>
</tr>
</tbody>
</table>

* Significant at 5 percent confidence level.

and Gordon\textsuperscript{13} to include a variable for depreciation policy. This relationship was derived directly from the basic Gordon model:\textsuperscript{14}

\[ P = 
\frac{\sum D_n}{r} - \frac{a_d}{r} \frac{a_t}{r} \]

or in its more common integrated form:

\[ P = \frac{D}{k - br} = \frac{D}{k - g} \]

\textsuperscript{13} Brigham and Gordon, "Leverage, Dividend Policy, and the Cost of Capital."


Investor Expectations

where \( P = \) the market price of a share
\( D_t = \) dividend per share in period \( t \)
\( h = \) the rate of return investors require on the share
\( b = \) the retention rate for the firm
\( r = \) the rate of return earned on equity investment
\( g = kr, \) the growth rate of earnings and dividends.

Both a linear and nonlinear derivation of Equation 6 of the form:

\[ \frac{D}{P} = \frac{k}{h - g} \tag{7} \]

are tested to determine the impact of depreciation method on stock prices and dividend yield. Expressed in regression form, the linear dividend yield relationship tested was:

\[ \frac{D}{P} = \alpha_i + \alpha_{gd} + \alpha_b + \alpha_h + \alpha_d + \alpha_u + \alpha_d + \alpha_D \]

\textsuperscript{8} Here \( a_d \), the coefficient of the depreciation variable, can be interpreted as the incremental cost of capital to an electric utility for using flow through depreciation. It represents an additional risk premium investors require as compensation for the qualitative risks perceived to be inherent in flow through accounting procedures.

Equation \textsuperscript{8} was run for each of the thirteen years since the introduction of accelerated depreciation methods (1954 through 1966). Table 14 presents the regression coefficients and standard errors for the depreciation variable.

It is clear that investors do differentiate on the basis of depreciation policies since \( a_d \) is positive in every year, indicating a higher required yield for firms using flow through depreciation methods. The regression coefficient is not statistically significant (at the 10 percent level) in all years, but it is in four of the last five years examined. The coefficient ranges from 0.00082 to 0.00401 during these years, indicating that use of flow through methods can involve a significant cost for an electric utility company. The 0.00401 in 1964, for example, means that investors required a yield of over 0.4 percent more for a flow through than for a normalized or straight line company. Averaging the coefficients over the thirteen
TABLE 14
REGRESSION COEFFICIENTS FOR THE LINEAR DIVIDEND YIELD EQUATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Regression Coefficient</th>
<th>Standard Error of Coefficient</th>
<th>Standard Error of Regression Coefficient</th>
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<tbody>
<tr>
<td>1994</td>
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<td>1985</td>
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</tr>
<tr>
<td>1986</td>
<td>.0013</td>
<td>.0000</td>
<td>.0000</td>
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</tbody>
</table>

** Significant at 5 percent confidence level.
*** Significant at 1 percent confidence level.

years indicates that investors required approximately 0.208 percent additional return on flow through shares to cover the perceived additional risk. Note, however, that this risk premium had dropped to 0.11 percent by 1966.

Nonlinear Valuation Model Analysis

A similar nonlinear valuation model (Brigham and Gordon illustrated that the nonlinear formulation was a superior estimating tool)\(^2\) was used in a second test of depreciation's effect on stock prices. The equation was of the form:

\[
D = a_0(1+d)^n + (1+g_a)(1+g_e)^n(1+a)^n(1+b)^n(1+u)^n(1+h)^n
\]  

\(^2\) Brigham and Gordon, “Leverage, Dividend Policy, and the Cost of Capital.”

The log transformation of Equation 9, expressed as:

\[
\log \frac{D}{P} = \alpha_0 + \alpha_1 \log (1+d) + \alpha_2 \log (1+g_a) + \alpha_3 \log (1+g_e) + \alpha_4 (1+a) + \alpha_5 (1+b) + \alpha_6 (1+u) + \alpha_7 (1+h)
\]

was used to estimate the regression coefficients. If \(a_1\) is positive, the term \((1+d)^n > 1\) when \(d = 1\) as it is for a flow through company, but \((1+g_e)^n = 1\) when \(d = 0\) as in the other cases. Therefore, assuming \(a_3 > 0\), flow through will increase the estimate of \(h\), the cost of capital, but the estimate will not be affected by the other accounting treatments.

The actual impact of the flow through dummy can be determined by solving for \(X\) in the equation:

\[
X = (1+1)^n = (2)^n
\]

\[
\log X = a_3 \log (2)
\]

For example, if \(a_3 = 0.07445\), \(X = 1.053\). This means the required dividend yield would be 5.3 percent higher for a flow through than for a normalized or straight line firm, other things held constant.

The coefficients and standard errors for the nonlinear model are presented in Table 15. The results again indicate that investors apply a risk premium to flow through companies. Over the thirteen years examined, \(a_3\) averaged 0.07445, implying a risk premium of 5.3 percent. This risk premium varied considerably from year to year, however. For example, in 1984 it was approximately 13.6 percent, but by 1986 the premium had declined to 4.4 percent.

The effect of flow through depreciation practices on the cost of equity capital may become somewhat clearer if we actually calculate \(h\), the estimate of the unlevered cost of equity, for flow through and for normalizing and straight line companies. In order to do so, however, it is necessary to combine our growth variables, \(g_a\) and \(g_e\), to arrive at a single estimate of the expected future growth rate of dividends. Using an iterative approach, we found that the combination \(g = 0.8g_a + 0.2g_e\) produced the best fit for the nonlinear valuation model (the actual procedure consisted of regressing Equation 11 with various weights for \(g_a\) and \(g_e\), then choosing those weights which produced consistently higher \(R^2\)’s.)
TABLE 15
REGRESSION COEFFICIENTS FOR THE NONLINEAR DIVIDEND YIELD MODEL
\[ \frac{D}{P} = a_0 (1+d)^\gamma (1+g)^\gamma (1+e)^\gamma (1+br)^\gamma (1+u)^\gamma (1+h)^\gamma \]

<table>
<thead>
<tr>
<th>Year</th>
<th>Depression Coefficient</th>
<th>Standard Error of Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>0.0564</td>
<td>0.0254</td>
</tr>
<tr>
<td>1955</td>
<td>0.0495</td>
<td>0.0216</td>
</tr>
<tr>
<td>1956</td>
<td>0.0587</td>
<td>0.0232</td>
</tr>
<tr>
<td>1957</td>
<td>0.0550</td>
<td>0.0244</td>
</tr>
<tr>
<td>1958</td>
<td>0.0576</td>
<td>0.0265</td>
</tr>
<tr>
<td>1959</td>
<td>0.0586</td>
<td>0.0280</td>
</tr>
<tr>
<td>1960</td>
<td>0.0562</td>
<td>0.0297</td>
</tr>
<tr>
<td>1961</td>
<td>0.0548</td>
<td>0.0314</td>
</tr>
<tr>
<td>1962</td>
<td>0.0515</td>
<td>0.0333</td>
</tr>
<tr>
<td>1963</td>
<td>0.0560</td>
<td>0.0327</td>
</tr>
<tr>
<td>1964</td>
<td>0.0576</td>
<td>0.0326</td>
</tr>
<tr>
<td>1965</td>
<td>0.0583</td>
<td>0.0346</td>
</tr>
<tr>
<td>1966</td>
<td>0.0579</td>
<td>0.0349</td>
</tr>
</tbody>
</table>

for the thirteen years examined). Substituting this weighted average growth rate for go and br in Equation 10 we obtain:

\[
D = \log a_0 + a_1 \log(1 + d) + a_2 \log(1 + g) + a_3 \log(1 + e) + a_4 \log(s) + a_5 \log(1 + u) + a_6 \log(1 + h)
\]

and solving this for \( k \) results in:

\[
k = a_0 (1 + d)^\gamma (1 + g)^\gamma (1 + s)^\gamma (1 + u)^\gamma (1 + h)^\gamma - g
\]

The coefficients of Equation 11, along with their respective estimates of \( k \) for both flow through and non-flow through electric utilities are given in Table 16. Again these estimates indicate that the use of flow through depreciation procedures results in a significant increase in \( k \), the unlevered cost of equity capital. In 1961, for example, a year in which the depreciation coefficient was just slightly below the average for the thirteen years, \( k = 7.31 \) percent for a normalizing or straight line firm, but 7.46 percent for a flow through company, a significant increase of 0.15 percentage points. The diverge is much greater in 1964, the year of the largest

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addition to the cost of equity capital funds due to a firm's use of flow through practices. In that year, \( k = 6.78 \) percent for normalized and straight line electric utilities versus 7.13 percent, an additional 0.32 percentage points, for flow through companies.

The time path of the regression coefficient shows some interesting features. First, between 1955 and 1961 the coefficients are relatively consistent in sign but small in size. The economic significance of depreciation policy, therefore, was small in this period. The absolute size of the depreciation coefficient was substantially higher from 1962 through 1965, but dropped significantly after the 1964 peak, and was only 0.06207 in 1966. The size of this coefficient corresponds quite closely to the gap between normalized and flow through price/earnings ratios shown in Figure 10.

This trend of rising then declining importance of the depreciation factor is probably related to investor education. When conversions to flow through were occurring in the early years, investors gradually became aware that different firms were using different accounting methods for calculating reported profits. With this awareness, investors seemed to place a higher and higher risk premium on flow through companies. After 1964, it appears that investors began to recognize that the quality difference between flow through and normalized earnings was not as great as it was previously thought to be, and with this recognition the differential between the multiplier for flow through and normalized firms began to decline. In the future, some risk premium will continue to be associated with flow through earnings, but the premium will probably vary depending on the optimism or pessimism of investors, and it is unlikely to return to the 1964 peak level.

Using a Dummy Variable

In the empirical estimations, several other measures for the flow through depreciation variable were used in an attempt to find a continuous rather than a binary effect of flow through procedures. Among the continuous variables tested were the percent of the deferred income tax flowed through in a given year and the ratio of the flowed through tax savings to the total size of the depreciation charge, neither of which resulted in consistent estimates from year to year. It is interesting to note that in all the tests the use of a dummy variable, that is, a variable which was assigned a value
### TABLE 16

**REGRESSION STATISTICS FOR EQUATION 11**

\[
\log \frac{D}{P} = \log a_0 + a_1 \log (1 + d) + a_2 \log (1 + g) + a_3 \log (1 + e) + a_4 \log (s) + a_5 \log (1 +u) + a_6 \log (1 +h)
\]

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a_0) log (1 + d)</td>
<td>-0.0237</td>
<td>(0.0054)</td>
<td>-1.3045</td>
<td>-1.2834</td>
<td>-1.3045</td>
<td>-1.3045</td>
<td>-1.3045</td>
<td>-1.3045</td>
</tr>
<tr>
<td>(a_1) log (1 + g)</td>
<td>-0.6853</td>
<td>(0.1820)</td>
<td>-0.6853</td>
<td>-0.6853</td>
<td>-0.6853</td>
<td>-0.6853</td>
<td>-0.6853</td>
<td>-0.6853</td>
</tr>
<tr>
<td>(a_2) log (1 + e)</td>
<td>-0.4777</td>
<td>(0.0191)</td>
<td>-0.4777</td>
<td>-0.4777</td>
<td>-0.4777</td>
<td>-0.4777</td>
<td>-0.4777</td>
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</tr>
<tr>
<td>(a_3) log (s)</td>
<td>-0.1921</td>
<td>(0.0196)</td>
<td>-0.1921</td>
<td>-0.1921</td>
<td>-0.1921</td>
<td>-0.1921</td>
<td>-0.1921</td>
<td>-0.1921</td>
</tr>
<tr>
<td>(a_4) log (1 + u)</td>
<td>-0.5421</td>
<td>(0.0460)</td>
<td>-0.5421</td>
<td>-0.5421</td>
<td>-0.5421</td>
<td>-0.5421</td>
<td>-0.5421</td>
<td>-0.5421</td>
</tr>
<tr>
<td>(a_5) log (1 +h)</td>
<td>-0.7897</td>
<td>(0.1065)</td>
<td>-0.7897</td>
<td>-0.7897</td>
<td>-0.7897</td>
<td>-0.7897</td>
<td>-0.7897</td>
<td>-0.7897</td>
</tr>
<tr>
<td>Coefficient of Mult. Det. (βR)</td>
<td>.3068</td>
<td>.3574</td>
<td>.5996</td>
<td>.5940</td>
<td>.7445</td>
<td>.6944</td>
<td>.6924</td>
<td>.6918</td>
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</table>

**TABLE 16 (continued)**

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a_0) log (1 + d)</td>
<td>-1.0061</td>
<td>(-.0724)</td>
<td>-1.3200</td>
<td>-1.2763</td>
<td>-1.2834</td>
<td>-1.3045</td>
<td>-1.3045</td>
<td>-1.3045</td>
<td></td>
</tr>
<tr>
<td>(a_1) log (1 + g)</td>
<td>-0.6887</td>
<td>(-.0606)</td>
<td>-0.6887</td>
<td>-0.6887</td>
<td>-0.6887</td>
<td>-0.6887</td>
<td>-0.6887</td>
<td>-0.6887</td>
<td></td>
</tr>
<tr>
<td>(a_2) log (1 + e)</td>
<td>-0.7612</td>
<td>(-.1831)</td>
<td>-0.7612</td>
<td>-0.7612</td>
<td>-0.7612</td>
<td>-0.7612</td>
<td>-0.7612</td>
<td>-0.7612</td>
<td></td>
</tr>
<tr>
<td>(a_3) log (s)</td>
<td>-0.3543</td>
<td>(-.0573)</td>
<td>-0.3543</td>
<td>-0.3543</td>
<td>-0.3543</td>
<td>-0.3543</td>
<td>-0.3543</td>
<td>-0.3543</td>
<td></td>
</tr>
<tr>
<td>(a_4) log (1 + u)</td>
<td>-0.5443</td>
<td>(-.0391)</td>
<td>-0.5443</td>
<td>-0.5443</td>
<td>-0.5443</td>
<td>-0.5443</td>
<td>-0.5443</td>
<td>-0.5443</td>
<td></td>
</tr>
<tr>
<td>(a_5) log (1 +h)</td>
<td>-0.7208</td>
<td>(-.1207)</td>
<td>-0.7208</td>
<td>-0.7208</td>
<td>-0.7208</td>
<td>-0.7208</td>
<td>-0.7208</td>
<td>-0.7208</td>
<td></td>
</tr>
<tr>
<td>Coefficient of Mult. Det. (βR)</td>
<td>.3068</td>
<td>.3574</td>
<td>.5996</td>
<td>.5940</td>
<td>.7445</td>
<td>.6944</td>
<td>.6924</td>
<td>.6918</td>
<td></td>
</tr>
</tbody>
</table>

**Inflow Expectations**
of one if the company reported it used flow through procedures and zero otherwise, resulted in parameter estimates that were both more consistent and more significant over the thirteen years studied than did any of the several other depreciation variables examined.

This significant dummy variable parameter estimate implies that investors view the effect of depreciation policy in essentially a binary manner. A firm is considered to be either flow through or non-flow through for purposes of risk distinction. In other words, investors appear to separate flow through and non-flow through companies into two separate risk classes, rather than viewing the risk inherent in the flow through process as a function of the relative size of the flow through tax savings or other related variables.

This binary method of distinguishing firms may be due to the complexities of properly accounting for the effect of flow through. It is relatively easy to determine that a company reports profits on a flow through basis. It is much more difficult to estimate precisely the extent of the possible future liability associated with the use of flow through, since this is a function of variations in growth, utility regulatory edicts, and economic climate.

**Impact of Flow Through on the Cost of Debt**

It has been suggested that flow through has a more significant impact on the cost of debt than it does on the cost of equity. Cash flows to a flow through company are lower than those of a normalized company, and this reduced coverage has an impact on risk, which in turn has an impact on the cost of new debt issues.

In an attempt to examine the effect of depreciation accounting methods on the cost of capital, the following regression equation was run for the years 1962 - 1966:

\[
Dev = a_0 + a_1d + a_2h + a_3s + a_4dt + a_5e + a_6s + a_7u
\]

where
- \(Dev\) = the deviation between the company's cost of a new debt issue and Moody's average cost of all utility bonds issued that month
- \(d\) = the depreciation dummy variable, defined as above
- \(h\) = the book value of total debt divided by the book value of common equity plus preferred stock, a measure of leverage relevant to debt investors
- \(s\) = the measure of relative firm size as described above
- \(e_2\) = the size of the current debt issue
- \(e\) = the ratio of electric revenues to total revenues
- \(u\) = the measure of earnings stability as described above

The results of these regressions are at best inconclusive. As shown in Table 17, the coefficient of the depreciation variable changes sign three times during succeeding years and was significantly different from zero only in 1965. Leverage and earnings appear to be the major determinants of deviations in debt cost with size of the issue producing variation in some of the years.

Although the regression statistics indicate a complete lack of any consistent relationship between a firm's depreciation policy and its cost of debt capital, we are hesitant to accept this conclusion without further qualification. Most accepted theory of corporate finance suggests that the higher the coverage of fixed charges, the lower the risk to debt holders; and that the lower the risk, the lower the marginal interest rate on new debt. However, the theory also suggests that this relationship is nonlinear, that is, that interest rates are relatively independent of fixed charges until some critical level is reached, after which they rise at an increasing rate with further reductions in fixed charge coverage.\(^8\) This suggests that risk increases at an increasing rate with reductions in the coverage ratio. The debt coverage ratio for a utility is a function of both the capital structure and of the cost of debt, the method followed. Since flow through companies have higher debt to assets ratios and lower cash flows than normalized or straight line firms, their coverage ratios must be smaller. These ideas are illustrated in Figure 12.

Panel A shows a probability distribution of expected cash flows for a utility company as they might be viewed by investors. In the solid curve for normalized firms the mean expectation is \(X\), and

\(^8\) See Weston and Brigham, *Managerial Finance*, chaps. 9, 10, 11, and 12 for a full development of these relationships.
### Table 17
Regression Statistics for Equation 13

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>$a_1$</td>
<td>-0.4267</td>
<td>-0.4678</td>
<td>-0.8236</td>
<td>-0.63493</td>
<td>-0.43022</td>
</tr>
<tr>
<td>$a_2$</td>
<td>-0.1295</td>
<td>-0.1320</td>
<td>-0.0230</td>
<td>-0.1078</td>
<td>-0.24558</td>
</tr>
<tr>
<td>$a_3$</td>
<td>0.9396</td>
<td>0.9318</td>
<td>0.9320</td>
<td>0.9364</td>
<td>0.9636</td>
</tr>
<tr>
<td>$a_4$</td>
<td>0.4044</td>
<td>0.4186</td>
<td>0.3546</td>
<td>0.51564</td>
<td>0.4885</td>
</tr>
<tr>
<td>$a_5$</td>
<td>0.0269</td>
<td>0.0464</td>
<td>0.0393</td>
<td>0.04103</td>
<td>0.03379</td>
</tr>
<tr>
<td>$a_6$</td>
<td>0.0269</td>
<td>-0.0087</td>
<td>-0.0019</td>
<td>-0.0033</td>
<td>-0.0033</td>
</tr>
<tr>
<td>$a_7$</td>
<td>-0.0217</td>
<td>0.00376</td>
<td>0.0210</td>
<td>0.0295</td>
<td>0.0019</td>
</tr>
<tr>
<td>$a_8$</td>
<td>0.9052</td>
<td>0.1075</td>
<td>-0.1552</td>
<td>-0.15078</td>
<td>-0.22841</td>
</tr>
<tr>
<td>$a_9$</td>
<td>0.25025</td>
<td>0.250318</td>
<td>0.51097</td>
<td>0.68793</td>
<td>0.21766</td>
</tr>
</tbody>
</table>

Coefficient of Det. (t-sq)

| 1962 | 0.6157 | 1963 | 0.7255 | 1964 | 0.7031 | 1965 | 0.5616 |

---

**Figure 17**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel A**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel B**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel C**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel D**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel E**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel F**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel G**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel H**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel I**
Illustration of the relationship between the expected cash flows and the interest rate.

**Panel J**
Illustration of the relationship between the expected cash flows and the interest rate.
there is virtual certainty that cash flows will be at least as large as C. Given this probability distribution, investors will regard any cash flows to the left of C, for example, A and B, as being virtually certain.

Now suppose the point A designates some level of fixed charges. The coverage ratio will, on the average, be equal to $\bar{X}/A$, and since it is considered virtually impossible for actual cash flows to fall below A, it must be virtually impossible for fixed charges not to be covered. This means that the debt securities of the firm in question are perceived to be riskless, so they will sell to yield the riskless rate $i$.

Now suppose the firm issues more debt, and that fixed charges rise to B. Cash flows of B are also considered to be certain, so even though the coverage ratio has declined from $\bar{X}/A$ to $\bar{X}/B$, the debt is still riskless and will still sell the yield $i$, the riskless rate. Debt can increase, driving down coverage ratios, until point C is reached. After point C, for example, at point D, the fixed charges have risen to a point where it is no longer certain that they will be covered. Therefore, beyond point C the interest rate on marginal debt rises.

Coverage ratios are also affected by the depreciation policy used, but here the effect is a shift of $\bar{X}$ and the probability distribution rather than a shift in the level of fixed charges. For example, if a firm was normalizing and had expected cash flows equal to $\bar{X}$, a change in flow might reduce expected cash flows to $\bar{X}'$ and shift the probability distribution to the left as indicated by the dashed curve. Such a shift would cause the maximum certain cash flow to shift from C to B and the debt ratio at which interest rates begin to rise from $(D/A)$ to $(D/A_'{)}$.

With these concepts in mind, we are now in a position to qualify the statistical results presented in Table 17—the results that indicated investor indifference to whether a utility normalizes or flows through for purposes of assessing the risk of debt securities. It is possible that at the time firms began going to flow through, debt ratios were in the vicinity of $(D/A)$; and that since our tests were run, debt ratios have shifted to the vicinity of $(D/A_'{)}$. If this is the case, any further increases in debt ratios should cause a rise in interest rates, and therefore, a switch to flow through today (when debt ratios are much higher than they were when most present flow

**Investor Expectations**

through firms switched) should give rise to immediate interest rate hikes on new debt.

While this development is speculative, there is some statistical data to indicate it is correct. First, based on a sample of fifty-six new debt issues by electric utility companies during 1968, a significant relationship was found between the effective yield of the security and the pro forma coverage ratio of the issuing firm. The relationship estimated was:

$$Y = 7.294 - 118.6 - 0.0035R^2 = 0.248$$

(0.031 0.001)

where $Y$ = the effective yield on the issued security

$C$ = the pro forma coverage ratio for the issuing firm

$S$ = the size of the issue in millions of dollars.

Although the coefficient of determination ($R^2$) for the equation is not large, the size of the coefficient of the coverage variable and its high level of significance (the coefficient of the coverage variable is significant at the .001 level) indicate the important role played by fixed charge coverage in determining required yields on debt securities. The $R^2$ for the equation could not doubt be improved by adding other variables to the equation, for example, a variable for call provisions. However, unless these additional variables were highly correlated with the coverage variable the conclusions would remain valid and unchanged.

Given the results of the empirical estimation of the relationship between coverage and required yields on debt, the findings of John L. O'Donnell further support our hypothesis. He found that during the period 1961-1966, the average fixed charge coverage for a group of flow through electric utilities declined by over 5 percent, while average coverage ratios for straight and normalized firms in that industry actually improved somewhat.\(^{10}\) Taken together then, these studies indicate the strong possibility that flow through depreciation procedures may affect the cost of debt as well as equity.

\(^{10}\) O'Donnell, "Further Observations," p. 551.
Depreciation Policy

and Previous

Cost of Capital Studies

The repeated use of electric utility firms for testing various cost of capital hypotheses has led to several problems. Some of these problems have been overlooked in previous research, while others have been recognized but incorrectly accounted for. This research effort pointed to two problems of some significance—one dealing with measured profits and the other with measured leverage—and provided means of correctly accounting for them.

Adjusting Reported Earnings

As demonstrated in Chapter 4, there can be no justification for adjusting a firm's reported profits to reflect another depreciation procedure when those profits are regulated on the basis of the rate of return on investment. That is, while it is both necessary and correct to adjust reported earnings of nonregulated enterprises to account for differing depreciation practices,\(^{10}\) the profit regulation feature of public utility industries acts to offset the effects of accounting differences among firms. This leads to the

of risk class among utilities using different accounting procedures. Another example of the failure to correctly account for regulatory procedures is McDonald's definition of "the cash flow relevant to common shareholders as the sum of reported earnings available to common stock plus depreciation plus (if any) the adjustment for deferred taxes," with his statement that this adjusted all firms "to a 'flow through' basis of reporting earnings." McDonald correctly recognized that this adjustment necessitated the implicit assumption "that regulatory commissions will penalize utilities to continue to earn this increment over what earnings would be under normalizing procedures," but as reported in Appendix A, this assumption is invalid. Public utility regulation is based on earnings as reported by the company. Firms are not allowed to continue earning the "incremental" earnings when reporting on a flow through basis. The adjustment of public utility reported profits suggested by Miller and Modigliani and actually used by McDonald cannot be defended. It is an incorrect attempt to account for the effect of varying depreciation accounting practices used by public utility companies. Public utility earnings are correct and comparable as reported. Any perceived differences in earnings reflect qualitative variations and can be correctly accounted for by dropping the assumption of a single homogeneous risk class for all electric utility companies.

MEASURING LEVERAGE
An attempt to reconcile the results of the empirical analysis with those of Brigham and Gordon turned up a second difficulty in correctly accounting for variations in depreciation policies among electric utility companies which is to be directly related to the accounting variations of flow through and normalizing companies.


The Brigham-Gordon Results

In an attempt to empirically test the Miller and Modigliani leverage hypothesis, Brigham and Gordon developed a dividend yield model:

\[
\frac{D}{P} = a_0 + a_1 g + a_2 h + a_3 u
\]  

(14)

where \( \frac{D}{P} \) = dividend yield
\( g \) = the expected growth in dividends
\( h \) = the book value of debt divided by the book value of equity, a measure of leverage
\( u \) = an index of earnings stability.

With this model, they obtained parameter estimates for the years 1958 to 1962 using a sample of electric utility companies. The coefficients of the leverage variable and their standard errors as reported by Brigham and Gordon are reproduced in the top row of Table 18.

Brigham and Gordon concluded that while the data provide "no support for the Miller and Modigliani theorem that investors are indifferent between leverage on personal and corporate account," they "indicate quite clearly that \( h \) (the cost of equity) is an increasing function of a utility's leverage ratio." That is, the coefficient of the leverage variable was reported to be both positive and consistently significant, although not large enough to support the Miller and Modigliani hypothesis.

Comparison of Results

As shown in Table 18, these results were not supported by the empirical findings in this study, based on the regressions of Equation 8. Whereas Brigham and Gordon estimated the leverage parameters at 0.0026 and above for each of the five years, in this study the leverage coefficient was large and significant only in 1958. Further, for the years 1960 to 1962 the results of the current investigation showed that the estimate approached zero and was substantially smaller than its standard error, although it was

\[\text{Ibid., p. 100.}\]
It was initially suggested that the difference between the 
British and Gordon findings and the conclusion of this study 
that there was not a consistent, positive relationship between 
the cost of capital and the level of leverage in terms of stock 
prices and dividends. The problem might be thought of as 
the forecasted profit and profit margin relationship, and 
account for the difference in the forecasted profit and 
profit margin relationship between the two studies.

Recall the British and Gordon results. The divergence 
of these findings from the two studies is consistent.

**Table 19**

<table>
<thead>
<tr>
<th>Simple Depreciation and Leverage Policy 1958 - 1962</th>
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<tr>
<td>Year</td>
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<td>1958</td>
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<tr>
<td>1959</td>
</tr>
<tr>
<td>1960</td>
</tr>
<tr>
<td>1961</td>
</tr>
<tr>
<td>1962</td>
</tr>
</tbody>
</table>

Previous Cost of Capital Studies

The variance in the results of the study with the different 
variables and the correlation between the variables and the 
mean profit of the firm. It is expected that the correlation 
will be positive, with the highest correlation occurring 
when the tax reserve is included. The results are found in 
Table 15. The correlation coefficients are found in the 
Appendix. The correlation between the use of equity and 
the tax benefit is also expected to be high.

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tax benefit is also expected to be high. The correlation 
between the use of equity and the tax benefit is also 
expected to be high. The correlation between the use of 
equity and the tax benefit is also expected to be high.
results provide additional indications that the Miller-Modigliani leverage hypothesis is false and should be rejected. Second, they suggest that the Brigham-Gordon study overstated the significance of the effects of leverage on the cost of equity capital. Some of their leverage results actually are due to the nonhomogeneity of risk class of electric utilities with varying depreciation policies. Finally, and perhaps most significantly, present results again indicate the importance of properly accounting for institutional factors when making empirical studies. It is always a big step from a theoretical model to an empirically testable formulation of that model, but only when institutional effects are properly accounted for can the results of the empirical work be reconciled with the theory.

Summary

Conclusions

This study of the effects of alternative depreciation policies on the cost of capital has examined the effects of depreciation practices on utility rate structures, reported profits, cash flows, and risk. Although a great deal of previous research has been devoted to these topics, particularly to utility rates, prior studies have left issues clouded. Depending on the rate and duration of asset growth, on debt policy, and on how the benefits of the tax savings are distributed among ratepayers and stockholders, the different accounting treatments produce widely varied patterns of reported profits and utility rates. The complicated interrelations among these variables make it virtually impossible to study the problem algebraically, so a simulation model was used as the principal tool in the study of depreciation policy’s effect on utility rates, reported profits, and cash flows.

Background studies preceding the actual computer programming led to the conclusion that eleven prototype companies should be simulated. Of these, one used straight line depreciation for book and tax purposes, six normalized, two flowed through, and two used accelerated depreciation for book and tax purposes. Differences among the normalized, flow through, and accelerated firms reflect differences in their regulatory positions and debt policies. The computer model simulated these eleven firms’ rate, earnings,
and cash flow patterns.

The results of the simulation study led to the development of several empirical tests for determining investor expectations as related to depreciation accounting variation. These tests completed the answer to the question of the effect of depreciation accounting policy on the cost of capital to electric utility companies.

SUMMARY OF THE SIMULATION

The simulation model was constructed on the basis of a specified set of conditions, and quite obviously the conclusions based on this model are valid only to the extent that the assumptions of the model are met in the real world. While every effort was made to obtain the degree of realism needed to generate reasonably valid results, it is clearly impossible for a set of mathematical equations to reproduce real world behavior exactly.

UTILITY RATES

The most important conclusions with regard to utility rate structures were:

1. Companies using straight line for tax purposes have the highest utility rates under almost any reasonable set of conditions.

2. Under realistic assumptions, flow through rates decline rapidly after the firm adopts accelerated depreciation; normalized rates decline more slowly but over a longer period; accelerated rates first rise, then decline rapidly; and straight line rates remain constant throughout.

3. Assuming that asset growth stabilizes, utility rates also stabilize. Rate stability occurs exactly N years after growth stability, where N = the average depreciable life assets.

4. Depending on the stabilized growth rate, steady-state utility rates vary among companies as follows:
   a. Flow through rates are always lower than straight line

   provided growth is not negative. Normalized rates are always lower than straight line rates. Stabilized accelerated rates are always lower than straight line rates so long as growth is less than (approximately) 10 percent.

b. Flow through rates, once the steady-state has been reached, will be less than, equal to, or greater than normalized rates depending on whether the stabilized growth rate exceeds, is equal to, or is less than a critical level equal to about 5 percent. Even though the stable growth rate is less than the critical level, causing the flow through firm’s final utility rate to exceed that of the normalized firm, it is important to note that flow through rates are substantially lower for a relatively long period—about 20 years under normal circumstances.

5. Changing the average life of assets does not alter the basic rate patterns, but it does alter the timing of crossover points among the various firms. Also, percentage variations (for example, the percentage difference from peak-to-trough for flow through companies) during the transition period are greater the shorter the depreciable life of assets.

Reported Profits—Nonutilities

The “utility rate” concept is not very meaningful for most unregulated companies, so the simulation model assumed that non-utility prices are unaffected by depreciation policy. However, depreciation affects these companies’ reported profits just as much as, if not more than, those of the utility companies. Flow through has been ruled out by the AICPA for nonutilities, so only accelerated, normalized, and straight line companies need be compared. Generally, accelerated earnings decline relative to straight line and normalized for a time, then rise relative to the other firms. These patterns vary, however, depending on asset growth rates.

Reported Profits—Utilities

Contrary to published statements, flow through and normalized utilities’ reported profits were found to be comparable without adjustment. The literature suggests that adding the deferred tax
Credit to normalized firms' earnings is necessary to make their earnings comparable to those of flow through companies. However, this adjustment totally neglects the fact that the credit really belongs to ratepayers, not to stockholders, so it results in a serious overstatement of profits. In other words, the rate-setting process automatically adjusts utility companies' reported profits and any additional accounting adjustment is an overstatement.

There are, however, qualitative differences among the various utility companies' reported profits. The primary disadvantage of flow through lies in the fact that these companies must, at some time in the future, request rate increases. If utility commissions operate with a lag when increasing rates, or if the future economic environment makes it impossible to increase revenues by increasing rates, then flow through companies could be seriously disadvantaged compared with normalized or straight line firms.

Several qualitative advantages offset, to some extent, this disadvantage. First, it has been argued that utility commissions order rate reductions with a lag, so during the long period when flow through rates should be declining the companies may be earning super-normal rates of return. Second, flow through rates are substantially lower than normalized rates over a long period, so, depending on the price elasticity of demand, a flow through utility's lower rates may stimulate load demand, increase investment opportunities, and benefit stockholders. Finally, as the deferred tax reserve builds up, it absorbs some of the normalized firm's investment opportunities and places it at a disadvantage in comparison to the flow through company. Thus, it was not all clear that the reported earnings of flow through utilities were qualitatively inferior to those of normalized firms, and an empirical analysis was necessary to determine whether investors perceive different levels of risk with varying depreciation practices.

**Summary of the Empirical Analysis**

In the analysis of the effect of depreciation policy on investor expectations we first compared price/earnings ratios of flow through, normalized, and straight line companies. Next, we examined actual rates of return realized by investors on a sample of flow through and normalizing companies. Finally, we employed multiple regression analysis to explain both stock prices and price/earnings ratios using depreciation method as one of the explanatory variables.

**Price/Earnings Ratio Trends**

Graphing the time trends of price/earnings ratios of electric utilities using various depreciation methods suggests the presence of investor distinction based on accounting practices. For firms that whose depreciation policies were unchanged from 1954 to 1969, the P/E ratios of the flow through group were consistently below those of the straight line and normalizing groups. Further evidence that this distinction was based on depreciation practices was provided by observing the divergence of the average P/E ratio for a group of firms that switched from normalization to flow through from the average P/E ratio of the group that continued to normalize. This divergence began only after firms started changing depreciation policy in 1968.

**Returns on Electric Utility Stocks**

The examination of actual rates of return realized by investors in electric utility stocks results in an indeterminacy as to the effect of flow through procedures on the cost of capital. First, actual returns realized on investment in flow through companies were consistently lower than comparable returns for normalized companies. This was in direct conflict with our expectations based on price/earnings ratio analysis. A further examination of the component parts of the total returns, however, revealed that the lower returns for flow through companies were largely due to the fact that they have not enjoyed rising P/E ratios to the same extent as have the normalized utilities.

The indeterminacy indicated by the rate of return data (that is, the lower rates of return for flow through firms coupled with the lower contribution of P/E ratio changes) suggested the need for multiple regression analysis to separate the effect of the depreciation policy from that of other causal variables.

**Multiple Regression Analysis-Equity**

Our first test was the linear regression of the P/E ratio on a set
of variables that included a dummy variable for flow through depreciation policy. The results of these regressions clearly indicated that the price/earnings ratio is dependent on depreciation policy. For the years 1962 to 1966—a period after almost all of the electric utilities in our sample currently using flow through had switched—the use of flow through depreciation lowered the average electric utility's P/E ratio considerably.

A second test of the effect of depreciation policy on investor expectations was provided by the regression of a linear dividend yield relationship. This test reconfirmed that investors do in fact differentiate on the basis of depreciation policies. The regression coefficient for the depreciation variable was positive in every year from 1955 to 1966, indicating that the use of flow through methods increases the cost of capital to an electric utility firm.

A similar nonlinear valuation model was also used to estimate the effect of depreciation practices on the cost of equity. The results of this test indicated that during the years examined, the cost of equity capital to flow through electric utilities ranged up to 0.35 percentage points higher than the cost for similar straight line or normalizing firms.

The path of the regression coefficients for the depreciation variable also showed some interesting features. It was quite small during most of the 1950s, rose to a peak in 1964, declined sharply in 1965 and especially in 1966. While admitting that it is speculative, this trend of first rising, then declining importance of the depreciation factor probably is related to investor education. In the early years, when conversions to flow through were occurring, investors were gradually becoming aware that different firms were using different accounting methods for calculating reported profits. As they became aware of these differences, investors seemed to place a higher and higher risk premium on the flow through companies. After 1964, however, we judge that investors gradually began to recognize that the "quality" difference between flow through and normalized earnings was not as great as previously thought. With this recognition, the differential between the cost of capital for flow through and normalized firms began to decline. We expect that, in the future, some risk premium will continue to be attached to flow through earnings, but that the premium will vary depending on the optimism or pessimism of investors and that it

Summary & Conclusions

will not return to the peak level reached in 1964.

Multiple Regression Analysis—Debt

The results of an examination of the effect of depreciation policies on the cost of debt were inconclusive. A consistent relationship between depreciation method and new debt issue costs from 1962 to 1966 could not be established. This suggests that investors feel that whatever risk is inherent in flow through is absorbed by the common equity, leaving creditors of flow through and normalized firms on approximately equal footing. There is, however, some chance that future studies will show these conclusions to have been the result of a non-linear relationship between interest rates and cash flows, in which case interest rates may well turn out to be dependent upon depreciation accounting practices.

DEPRECIATION POLICY AND PREVIOUS COST OF CAPITAL STUDIES

The results of our analysis have significant implications for some earlier cost of capital studies. We have shown that there is no justification for adjusting a public utility's reported profits to reflect a different accounting method since the rate-setting process automatically accounts for variations in depreciation practices. This finding reduces the relevance of results arrived at on the basis of such "adjusted" earnings, and of conjecture about the improvement of such an adjustment on the ability of a model to estimate the cost of capital.

The finding that investors do, in fact, perceive a qualitative difference in earnings of flow through and normalizing electric utility companies makes the practice of considering all electric utility companies to be in a single homogeneous risk class suspect. Earlier tests of cost of capital hypothesis may have been seriously affected by the invalidity of this assumption.

The failure to explicitly account for the effect of depreciation policy variations on investor expectations has also affected the results of earlier tests of cost of capital hypotheses. This is demonstrated by the finding—related directly to the Brigham-Gordon tests of the Miller-Modigliani leverage hypothesis—that the statistical relationship between the cost of equity capital and the debt/equity ratio depends upon how the debt ratio is defined. If
equity is included in net worth, the relationship found by Brigham and Gordon holds. However, if it is excluded there appears to be no relationship between leverage and the cost of equity over the ranges of leverage observed in the utility industry, and it would appear that Brigham and Gordon overstated their results.

CONCLUSIONS

The results of an analysis of the simulation model raise a question as to whether a utility commission is justified in permitting companies under its jurisdiction to continue using straight line depreciation for tax purposes. The model demonstrates that using taxes computed on the basis of straight line depreciation as an allowable cost of service results in a higher cost to ratepayers than would be necessary if the important benefits of accelerated depreciation were utilized in ratemaking. The company could increase its cash flows and thus obtain interest-free capital in the form of deferred taxes. By refusing to use accelerated depreciation, the company is refusing to accept this capital contribution. Thus, the model lends support to the thesis that neither the customer nor the stockholders benefit from straight line depreciation. Until evidence to the contrary has been evaluated, there is reason to question whether it is advisable for a utility commission to permit a company under its jurisdiction to disregard the tax savings afforded by liberalized depreciation.

On the basis of the empirical analysis, it is apparent that investors do make a risk class distinction based on variations in depreciation accounting practices. From this it follows that certain regulatory adjustments should be made to take account of this perceived variation in risk. That is, it was shown that the use of flow through depreciation procedures increases the risk perceived by investors. This increased risk in turn leads to a higher required return on investment, that is, a higher cost of capital for the utility. Given this measurable increase in the cost of capital to firms using flow through methods, it follows that flow through companies should be allowed an additional return on investment to cover this cost.

As desirable as it would be to conclude with a recommendation for either flow through or normalization for utilities, the results do not warrant it. The use of flow through methods has been shown to increase the cost of capital to electric utility companies, however, the effects of depreciation policy do not end there. Depending upon the price elasticity of demand, the lower initial flow through rates may increase growth opportunities of flow through companies relative to normalizing companies. Further, this relative difference in growth will be accentuated by the absorption of investment opportunities of the reserve for deferred taxes of normalizing companies. To the extent that the faster growth offsets the higher cost of capital, flow through may be preferred to normalizing by both stockholders and utility commissions. There is also the question of the effect of the lower flow through rates on utility customers. A cost-benefit analysis would be needed to determine whether the added cost of capital to a flow through firm was possibly offset by the increased benefits of lower rate schedules to current consumers.
APPENDIX A

Actual Depreciation Practices and Policies

The analysis in Chapters 3 and 4 showed how alternative depreciation policies affect reported profits and utility rate schedules. This appendix indicates what policies do firms actually follow in practice, and how these are chosen.

SOURCE OF THE DATA

Since no systematically collected body of data dealing with depreciation policy was available, a survey of practices in the utility and nonutility industries was conducted. A detailed, six-page questionnaire was mailed in September, 1965, to each publicly-owned electric or gas utility listed in Standard and Poor's Monthly Stock Guide, and a follow-up letter was sent out to non-respondents in early November. The response was extraordinarily good, with 92 percent of the 102 electric companies and 89 percent of the 44 gas companies returning complete questionnaires. This heavy response resulted from Ford Foundation sponsorship of this phase of the project, high company interest in the topic, and the encouragement of active cooperation at a utility trade association conference shortly after the questionnaire was mailed. It should be noted that six respondent companies (four gas and two electric) were eliminated from the sample because their data could not be made comparable with that of the other companies since they operate in several states.

As the original questionnaires were analyzed, a number of problems requiring correspondence with individual companies arose. In addition, preliminary analysis revealed the necessity of obtaining additional information from all companies concerning their use of guideline depreciable lives, and information from all flow-through companies on whether utility rates are lowered to offset
depreciation-generated "profits." All but two companies returned these supplemental questionnaires, and information on these two was obtained from other sources.

In July, 1965, a similar questionnaire was sent to a smaller sample of utility companies to determine if major changes had taken place since 1965. The results did not warrant the expense of replicating the 1965 survey. Accordingly, unless otherwise specified, the text of this appendix reports 1965 findings.

The nonutility sample was selected by taking each twentieth firm, beginning with a company randomly chosen from the first twenty on an alphabetical listing of nonutility New York Stock Exchange firms. Questionnaires were mailed to seventy companies selected in early November, 1965, and followed up in December. A total of fifty-one firms (72.9 percent) completed and returned the questionnaire. No supplemental questionnaires were required in the nonutility case since flaws in the questionnaire format had been discovered and worked out in the utility case.

The sizes, locations, and other characteristics of the responding and nonresponding firms were compared to determine whether or not these two groups were materially different, but no difference was noted. This, combined with the extremely good response, indicates that the statistics are representative of the larger industrial firms and of the investor-owned segments of the electric and gas utility industries.

SOURCES OF TAX SAVINGS

Although most of the discussion in the study has centered on the tax saving resulting from accelerated depreciation methods (for example, double declining balance), similar savings may also arise from the investment tax credit and from the use of shorter depreciation asset lives for tax than for book purposes. This section first considers the use of accelerated methods, then turns to depreciable lives and tax credit.

Depreciation Methods Used

Practically all responding utility companies, electric and gas alike, used straight line depreciation for reporting income to stockholders: 121 used straight line in 1965, two used double declining balance, and four used an annuity method (which is accelerated as compared with straight line). The percentages were similar in 1968. Nonutility companies were less concentrated: 61 percent used straight line for stockholder reports, and 39 percent reported on the basis of either double declining balance or sum-of-years digits. Although it was not checked, reports by the financial press suggest that a larger percentage of industrials were using straight line for reporting in 1965 than in 1966.

Considerably more variation was found in the methods used for tax purposes (Table A-1). About 20 percent of the utilities and 6 percent of the industrials did not take advantage of accelerated depreciation. Among those utilities using an accelerated method, double declining balance was by far the most popular choice, outpacing sum-of-years digits more than three to one. The 1966 results were quite similar to those reported in 1965. It is not shown in the table, but of the 103 utility companies employing accelerated depreciation, eighty-six began using this procedure when it first became permissible in 1954. The other seventeen firms switched from straight line at rather evenly spaced intervals between 1955 and 1965.

Particularly interesting is the fact that five of the twenty-four utility companies using straight line for tax purposes used accelerated depreciation for a time, then reverted back to straight line. Their comments indicate that in each instance the reversal occurred when it became apparent that regulatory agencies would allow stockholders no direct benefits from accelerated depreciation. That
is, rate cuts would fully offset the tax reductions and stockholders would not gain. Further, comments by the straight line companies that have never used an accelerated method indicate that their depreciation policies are a result of the same line of reasoning.

Depreciable Lives

In addition to the method used, the period over which an asset is depreciated has a bearing on actual depreciation charges. In July, 1962, the Internal Revenue Service issued a new set of guideline service lives for broad classes of depreciable assets which are in general, appreciably shorter than the Bulletin F lives previously used for tax purposes. If a firm elects to use the guideline lives for tax purposes, but longer lives for stockholder reporting, the depreciation charges are higher for tax than for book purposes. This is exactly analogous to using an accelerated method for tax calculations while using straight line for stockholder reporting.

By 1965, over 50 percent of the utility companies were using guideline lives to the maximum possible extent. Another 20 percent, while not using the maximum guideline lives, still used shorter lives for tax than for book purposes. The remaining 20 percent used the same lives for book and tax purposes. Table A-2 gives an idea of the extent to which these differences existed among the utility companies in 1965, and no significant changes were reported in 1968. The nonutility companies were simply asked if they used the same, a longer, or a shorter life for book than for tax purposes. Seventy-one percent reported the use of the same lives, and 29 percent used shorter lives for tax than for book purposes. However, for the nonutilities as well as for the utility companies the questionnaires indicate that the depreciable lives used, though different, were generally not very different for book and tax purposes.

Investment Tax Credit

The Revenue Act of 1962 provided an investment tax credit which is generally equal to 3 percent of the cost of new depreciable assets for utility companies and 7 percent of cost for nonutilities. These rates apply if the asset is expected to have a service life of eight years or more. Assets depreciable in less than four years receive no tax credit; those with a life of four or five years get one-third of the normal credit; those with a life of six or seven years get two-thirds of the normal credit; and those lasting eight or more years get the full credit. The impact of this credit may be flowed through to reported profits during the year in which the investment is made, or it may be amortized over a specified period, generally the service life of the asset. This latter treatment is a form of normalization. All of the utility and nonutility companies in the sample elected to take the credit.

NORMALIZATION VERSUS FLOW THROUGH

The tax savings that arise from liberalized depreciation, shorter tax lives, and the investment tax credit may be flowed through to current income or normalized.

Accelerated Depreciation

Table A-3 shows that of the 103 utilities electing to use accelerated depreciation, 57 percent normalized and 43 percent flowed through (the normalized utilities include two Wisconsin companies whose tax reserve is transferred to the depreciation reserve). The tendency to normalize was considerably stronger among gas companies; 65 percent of these firms normalized versus only 54 percent of the electric companies. The nonutilities, of course, did not have the choice of flowing through; they either had to use the same depreciation method for book and tax purposes or to normalize. Of the nonutility firms using accelerated depreciation, 60 percent normalized and 40 percent used the same method for tax and book.

<table>
<thead>
<tr>
<th>TABLE A-2</th>
<th>DEPRECIABLE LIVES USED</th>
<th>BY ELECTRIC AND GAS UTILITY COMPANIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Guideline Lives</td>
<td>Shorter Lives For Tax Purposes</td>
</tr>
<tr>
<td>Electric</td>
<td>43 64.2 12 17.9 12 17.9 67 100.0</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>14 53.4 7 26.3 5 19.3 25 100.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>57 61.3 19 30.4 17 18.3 93 100.0</td>
<td></td>
</tr>
</tbody>
</table>
The percentages were not materially different in 1968. Geographic breakdowns of these practices among utilities are interesting. Although these breakdowns apply only to companies using accelerated depreciation for tax purposes, it is interesting to note that straight line firms were heavily concentrated in the Southeast and in the Missouri-Kansas region. In the Middle Atlantic States (United States Census Bureau designation for New York, New Jersey, and Pennsylvania), all seventeen companies bowed through, as did the eight companies in the Pacific States (California, Oregon, and Washington). Companies in the West South Central Region (Oklahoma, Arkansas, Louisiana, and Texas) by contrast, all normalized, as did most of the firms located in the Midwest. This geographic pattern is significant because companies using flow through were largely forced to adopt this policy by their regulatory agencies.

**Shorter Tax Lives**

While over 57 percent of all utility companies normalized the tax savings resulting from accelerated depreciation, Table A-4 shows that only 20 percent normalized savings produced by shorter depreciable asset lives. Again, the tendency to normalize was much more pronounced among gas companies, and 1968 results were similar to those found in 1965.

Companies are grouped in Table A-4 according to their depreciation methods—straight line (S), flow through (F2), and normalized (N6). It is particularly interesting to note that all the S-type companies using shorter tax than book depreciable lives flowed these savings through to profits, as did all the F2 companies. Firms that normalized for accelerated depreciation, on the other hand, also tended to normalize for shorter tax lives. This indicates a consistency on the part of regulatory agencies. Nonutilities, once more, did not have the choice of flowing through the tax saving from short tax lives.

**Investment Tax Credit**

The tendency to normalize for the investment tax credit was pronounced among utilities. In 1965 and also in 1968, about 65 percent of these companies normalized, versus 18 percent of the nonutilities (Table A-5). As might be expected, the F2 utility companies were also most likely to flow through the tax credit.

Judging from questionnaire comments, a utility normalizes for the tax credit, even though it flows through savings from accelerated depreciation, because investment is uneven from year to year and thus the tax credit also varies. To illustrate, a company that builds a new generating plant every five years also has an abnormally high tax credit each fifth year. If the tax credit is flowed through, profits jump every fifth year, then fall back. Since such an uneven pattern is generally considered to be undesirable, normalization is used to smooth out the stream of reported profits. An uneven investment pattern also produces irregular earnings if the
TABLE A.5
TREATMENT OF INCREASED INCOME FROM THE INVESTMENT TAX CREDIT

<table>
<thead>
<tr>
<th></th>
<th>Depreciation</th>
<th>Flow Through</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yearly</td>
<td>Per cent</td>
<td>Per cent</td>
</tr>
<tr>
<td>ELECTRIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight line</td>
<td>11</td>
<td>68.5</td>
<td>5</td>
</tr>
<tr>
<td>Normalized</td>
<td>35</td>
<td>83.3</td>
<td>7</td>
</tr>
<tr>
<td>Flow through</td>
<td>13</td>
<td>37.1</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>63.4</td>
<td>34</td>
</tr>
<tr>
<td>GAS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight line</td>
<td>5</td>
<td>62.5</td>
<td>3</td>
</tr>
<tr>
<td>Normalized</td>
<td>12</td>
<td>70.6</td>
<td>5</td>
</tr>
<tr>
<td>Flow through</td>
<td>13</td>
<td>66.7</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>67.6</td>
<td>11</td>
</tr>
<tr>
<td>TOTAL Utilities</td>
<td>82</td>
<td>64.6</td>
<td>45</td>
</tr>
<tr>
<td>Nonutilities</td>
<td>9</td>
<td>17.6</td>
<td>42</td>
</tr>
</tbody>
</table>

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*See note 3, Table A.2*

The very high percentage of industrial companies using flow through for the tax credit is significant. Since such a high percentage of these firms, when given a choice, have elected to use flow through for one element of tax savings, there is reason to believe that many would also like to flow the other types of tax savings through to reported profits. Comments on several of the questionnaires submitted by nonregulated companies bore out this contention. To quote from one:

I myself feel that a large proportion of deferred income tax that has been provided by many companies in recent years will never actually be paid out in taxes, and that we have, in effect, charged current earnings with a contingency that will never occur... I feel that the AICPA has taken an arbitrary and, in the long run, indefensible stand in this connection in its Accounting Research Bulletin No. 44 revised July, 1958, and in its Accounting Principles Board Opinion issued in November, 1962.

While it is not completely clear that a relaxation of the AICPA's position requiring normalization for industrial firms would result in a massive shift to flow through, there is at least some reason to believe that such a shift would, in fact, occur.

THE TREND TOWARD FLOW THROUGH IN THE UTILITY INDUSTRY

There was a pronounced trend toward the use of flow through in the utility industry, especially in the period 1958-1962 (Figure A-1). At the end of 1954, seventy-one companies were normalized while only sixteen flowed through. By 1965, the number of normalized firms had fallen to fifty-nine, while the flow through group had increased to forty-four. Both groups were bolstered by the addition of firms converting from straight line, but the principal factor leading to the increased importance of flow through was the fact that a number of regulatory bodies shifted positions and required firms under their jurisdictions operating in New York in 1959, in California and Ohio over the two-year period 1961-62, instituted such requirements, explaining the large increase in the number of flow through companies during those years. Complete figures were not available for 1965, but the sample results showed
virtually the same percentage breakdown between normalized and flow through as was found in 1965.

**TREATMENT OF RESERVE WHEN SWITCHING TO FLOW THROUGH**

In total, the 1965 questionnaire showed that seventeen utility companies normalized for a time, then switched to flow through. In seven cases the full amount of the reserve for deferred taxes was eliminated by crediting it directly to earned surplus. In the other ten cases, the reserve was amortized over a period generally corre-
vested tax credit and short tax lives. Generally, those benefits are distributed in the same manner as those from accelerated depreciation.

The allocation of the cash flow advantage is by no means completely unambiguous. Comments on the questionnaire, especially those of firms indicating some form of sharing arrangement, suggested that many companies were not actually earning their theoretically permitted rates of return at the time they began using accelerated depreciation. This was especially true of the flow through companies. In those cases, since the companies were already earning less than the allowed rate of return, the tax saving simply boosted earnings up where they should have been. Some companies interpreted this as a "sharing" arrangement. Others seemed to interpret apparently identical situations not as sharing arrangements but as a means by which utility commissions avoided otherwise necessary rate increases. Attempts to clarify the questionnaire answers were not very satisfactory, so Table A-8 should be viewed with some caution.

Since the rulings of the New York Public Service Commission tend to set the precedent for a number of other jurisdictions, the situation in that state is particularly worthy of comment. In 1959, New York forced public utilities to adopt flow through accounting by refusing to recognize the credit to the tax reserve as an allowable cost in utility rate determinations. But in doing so, the Commission decided to permit some sharing of the tax savings.13

13 New York Public Service Commission Order dated May 26, 1959, Re: Central Hudson Rate Case.

### Actual Depreciation Practices

It follows that for equitable treatment there should be some sharing of the Section 107 tax benefits between the customers of the company and the company itself, to the customers because it is the duty of the utility to keep its operating costs as low as is consistent with the maintenance of adequate service and to the utility of its stockholders to furnish an incentive for the use of the most advantageous tax depreciation method. The proportions of sharing should not be predominantly to the company but rather in major part to the customer, although no precise formula can be set down that will apply to each and every utility.

It is interesting to note that in spite of this ruling, two out of the eight New York State utilities responding to the questionnaire indicated that the full benefits of accelerated depreciation were being passed on to their customers. These two companies apparently felt that their own share of the benefits was insignificant.

### Authority for Setting Depreciation Policy

Table A-7 provides some insights into the question of whether the firms themselves or their regulatory agencies set utility depreciation policies. Approximately 56 percent of the companies indicated that they had effective control over their depreciation policies, while 48 percent stated that control was exercised by their regulatory authorities. A number of companies indicated that their regulatory agencies require a specific depreciation policy but added that the approved method is the company's first choice and the one that would be practiced if full freedom were to be granted. Further, some of the comments suggested that the companies were instrumental in getting the regulatory agencies to adopt the specific policy. Consequently, whenever the company indicates that the method used constitutes its first choice, the firm is considered to determine its own depreciation policy.

The 1968 figures indicate a small change toward more agencies setting the depreciation policy. When the firms were classified by depreciation policy, however, some sharp divergencies showed up, particularly when the flow through and normalized cases were examined. About 74 percent of the normalized electric companies reported that they set their own depreciation policies, while only 26 percent of the flow through firms used this method by choice. The same situation occurred in the gas industry where 71 percent
TABLE A-7
EFFECTIVE AUTHORITY FOR SETTING DEPRECIATION POLICY

<table>
<thead>
<tr>
<th>Company</th>
<th>Number</th>
<th>Regulatory</th>
<th>Number</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Num-</td>
<td>Num-</td>
<td>Num-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ber</td>
<td>per</td>
<td>per</td>
<td></td>
</tr>
<tr>
<td>ELECTRIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight line</td>
<td>13</td>
<td>81.3</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Normalized</td>
<td>31</td>
<td>73.8</td>
<td>11</td>
<td>26.2</td>
</tr>
<tr>
<td>Flow through</td>
<td>9</td>
<td>25.7</td>
<td>26</td>
<td>74.3</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>57.0</td>
<td>40</td>
<td>43.0</td>
</tr>
</tbody>
</table>

GAS

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight line</td>
<td>2</td>
<td>25.0</td>
<td>6</td>
</tr>
<tr>
<td>Normalized</td>
<td>32</td>
<td>70.6</td>
<td>5</td>
</tr>
<tr>
<td>Flow through</td>
<td>1</td>
<td>11.1</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>44.1</td>
<td>19</td>
</tr>
</tbody>
</table>

GRAND TOTAL

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>68</td>
<td>53.5</td>
<td>59</td>
</tr>
</tbody>
</table>

of the normalized companies expressly chose this method, while only 11 percent of those using flow through selected this procedure.

The straight line companies presented something of a dilemma. Three electric and six gas companies using straight line indicated that their depreciation policies were essentially forced on them by their regulatory commissions. This did not, however, mean that regulatory authorities directed these companies to use straight line depreciation for tax purposes. Rather, in their comments two of the three electric and four of the six gas companies stated that if they used accelerated depreciation, they would be required to go on flow through. Their first choice was to take accelerated depreciation and normalize, but since this was not permitted they elected to continue using straight line. The following quotation was typical of the feelings of this group:

Prior to 1954, our company was on a straight line basis for Federal income tax purposes. For the years January 1, 1954 to 1962, inclusive, we used the double declining balance method. As you will probably learn in the process of your study, in 1963 the Federal Power Commission in the Alabama-Tennessee Pipe Line Company case that any dollar benefit from accelerated depreciation should be flowed through to the rates currently existing. After January 1, 1963, we reverted to straight line depreciation. Even though the FPC only has regulation on approximately 20% of our business, we felt it advisable to go back to straight line.

As you also will probably learn in the pursuit of your study, the FPC is now attempting to force a company to take accelerated depreciation by flowing through current tax savings to the customers even though the company is not using accelerated depreciation. This is the Midwestern Gas Transmission Case.

The comments of a number of flow through companies indicated that their state utility commissions had been able to do what the FPC was attempting to do, that is, force the firms to use accelerated depreciation and flow through the benefits to current ratepayers.

Not all the companies using flow through did so under duress. Although only ten of the forty-four companies indicated that they use it by choice, some of the ten felt quite strongly that flow through was the most appropriate method. The following quotation is representative of this group:

Our studies indicated that for us the "flow through" method for rapid depreciation is the only appropriate method for reporting rapid depreciation tax reductions. Through projections based on budget figures in the near term and conservative estimates for the long term, we have been able to demonstrate that tax reductions from rapid depreciation are permanent; that they will continue for many, many years; and that the annual tax depreciation deductions under rapid depreciation will not fall below straight-line depreciation charges so long as we continue in business.

We are convinced that a "normalization" charge for taxes which will never be payable or which would be payable only under the most extreme or unlikely circumstances should not be included as a current charge to operating expenses.

Others favoring flow through correctly pointed out that a public utility, even though it has a monopoly in providing a particular service to households and firms in its franchise area, is subject to competition from other energy sources. This is equally true for electric and gas companies which are not combined, thus, in competition with one another. It is also true for industrial business when the customer has the option of generating his own energy. As a result of this competition, the lower rates that arise with flow through can be of considerable aid in promoting load increases. This can, in turn, create new and profitable investment opportunities, and thus benefit stockholders as well as customers.
SUMMARY OF ACTUAL DEPRECIATION PRACTICES

This appendix has reported on procedures used by utility companies to account for the taxes saved (or deferred) by using liberalized depreciation and compared these procedures with those employed by firms outside the utility industry. All of the utilities (and nonutilities) took advantage of the investment tax credit. Over 80 percent of the utilities use an accelerated method for computing tax depreciation and straight-line for stockholder reporting, and a like percentage used shorter asset lives for tax than for book purposes. No significant differences were noted in 1968. Consequently, the tax saving that may be deferred or flowed through to reported profits is substantial for most utility companies.

Fifty-five percent of the utilities using accelerated depreciation normalized, 43 percent in some flow through, and 2 percent used accelerated depreciation for book and tax purposes. The taxes saved by the investment tax credit were also normalized in the majority of the cases (65 percent versus 35 percent using flow through) but only 29 percent of the utilities normalized for shorter asset tax lives. Industrial firms, by comparison, must normalize if they use shorter tax lives or different depreciation methods for book and tax purposes, but they generally flow through the savings arising from the tax credit (90 percent of the nonutilities normalized and 40 percent use accelerated depreciation for book and tax purposes). This is interesting, for the AICPA insists on normalization for shorter tax lives and accelerated depreciation, but only recommends normalization for the tax credit. These findings suggest that many industrial firms consider normalization to be unrealistically conservative and would switch to flow through if they could.

The utility companies generally favored normalization, and most of those using flow through did so because of utility commission requirements. This difference was based on the distribution of benefits from liberalized depreciation and an uncertainty over the permanence of the tax credit and liberalized depreciation.

With regard to the first point, while one might argue that most firms pass the corporate income tax forward to the customers and, 95 AICPA, Interpretive Opinion No. 7, “New Depreciation Guidelines and Rules,” 1962, and Opinion No. 4, “Accounting for the Investment Credit,” 1964.

Consequently, that tightening the tax burden is reflected in lower consumer prices, it is clear that for industrial firms the immediate impact of reduced corporate taxes is higher cash flows and profits. Consequently, stockholders get the initial, if not the ultimate, benefit from liberalized depreciation whether these benefits are normalized or flowed through. Utilities are quite different. First, the questionnaire showed that the direct benefits of liberalized depreciation are generally passed on to the customers as lower utility rates. In 61 percent of the responses customers received all the benefits, there was some sharing in 31 percent, and 9 percent reported that stockholders retained all the benefits in 1965. Analysis further shows that when benefits are passed on to ratepayers, it is current customers who benefit most from flow through and future customers who benefit most from normalization. Quite obviously, if either the electric or the gas industry should suffer the same type of technological obsolescence that befall the railroad industry with the advent of automotive transportation, the final result of flow through would be that current ratepayers benefit while future stockholders (or creditors) suffer.

The second reason why utilities prefer normalization is related to uncertainties over the permanence of liberalized depreciation. If liberalized depreciation should be repealed (in 1966 Congress temporarily suspended the investment tax credit, a related investment incentive) then many flow through utilities would be forced to seek immediate rate increases. To the extent that utility commissions delay granting such increases, profits would suffer. Normalized companies, on the other hand, would not find it necessary to increase rates because of such changes. They would, however, have a reduced cash flow which would necessitate additional outside financing.
APPENDIX B

Electric Utility Companies Used
In the Empirical Studies

Normalizing Companies
Boston Edison Company
Central Illinois Public Service
Commonwealth Edison Company
Consumers Power Company
Detroit Edison Company
El Paso Electric Company
Florida Power Corporation
Gulf States Utilities Company
Idaho Power Company
Illinois Power Company
Indianapolis Power and Light Company
Iowa Power and Light Company
Iowa Public Service Company
Iowa-Illinois Gas and Electric Company
Kansas City Power and Light Company
Kentucky Utilities Company
Montana Power Company
Montana-Dakota Utilities Company
Northern Indiana Public Service Company
Northern States Power Company
Public Service Company of Indiana, Incorporated
South Carolina Electric and Gas Company
Tampa Electric Company
Tucson Gas and Electric Company

Flow Through Companies
Arizona Public Service Company
Central Maine Power Company
Consolidated Edison Company of New York, Incorporated
New York State Electric and Gas Corporation
Niagara Mohawk Power Corporation
Orange and Rockland Utilities, Incorporated
Pacific Power and Light Company
Public Service Company of New Hampshire
Puget Sound Power and Light Company

Straight Line Companies
Baltimore Gas and Electric Company
Dayton Light and Power Company
Duke Power Company
Florida Power and Light Company
Houston Lighting and Power Company
Interstate Power Company
Kansas Gas and Electric Company
Louisville Gas and Electric Company
Minnesota Power and Light Company
Wisconsin Electric Power Company

Companies That Changed from Normalizing to Flow Through
Atlantic City Electric Company
Central Hudson Gas and Electric Corporation
Cincinnati Gas and Electric Company
Cleveland Electric Illuminating Company

Columbus and Southern Ohio Electric Company
Delaware Power and Light Company
Ohio Edison Company
Pacific Gas and Electric Company
Philadelphia Electric Company
Public Service Electric and Gas Company
Public Service Company of Colorado
Rochester Gas and Electric Corporation
Sierra Pacific Power Company
Southern California Edison Company
Toledo Edison Company
United Illuminating Company
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