Rate of Return Under Regulation:
New Directions and Perspectives
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Brief biographical sketches will be found on page 213.
Preface

The field of corporation finance has undergone significant changes in theory and technique since the mid-1950's. These developments have an important bearing on the analysis of the rate of return which, in turn, is a major factor in the regulatory process. However, commission and management practices and policies have lagged in recognizing and adapting these theories and techniques to actual situations. Perhaps this can be attributed to a lack of appreciation of the potential contributions inherent in such developments. It is hoped that the following collection of papers will serve to bridge this gap and encourage further research and the application of new concepts and methods.

The rate of return is a crucial variable in the task of regulation. It serves as an inducement to attract capital, as compensation to the suppliers of capital, and as a criterion for judging the feasibility of investment expenditures. In these roles, rates of return perform an important allocative function and ultimately become an element of cost to be borne by consumers as a part of the cost of service. For the regulatory agency to fulfill its responsibilities in promoting the public interest, it is important that the allowance for the rate of return be kept at levels that do not permit extortionist prices or the confiscation of capital. Nor should the rate of return remain at levels which are conducive to resource misallocation and the production of services that are inconsistent with consumer wants. The optimal rate of return reflects the opportunity cost of capital, and it is typically a residual after operating expenses, depreciation, and taxes have been met.

Considering the important functions of the rate of return, it is curious that the subject was a relative latecomer to the academic literature of public utility economics. Aside from a few insightful dis-
cussions by Erickson¹ and Glasser,² little was written on the subject before World War II. Far greater attention was focused on the valuation of the assets (or rate base) to which the rate of return was to be applied, as evidenced by the on-going debate between advocates of original cost, reproduction cost and “fair value.” Indeed, it is not too great an overstatement to argue that the Supreme Court, speaking through Justice Butler in the Bluefield case (1923)³ set forth the concept of the rate of return under regulation far more effectively than did most academicians of the period. The Court held that the return allowance should reflect a recognition of “returns being currently earned on investments in other business undertakings which are attended by corresponding risks and uncertainties . . . and . . . earnings . . . sufficient to assure confidence in financial soundness of the utility.” Of course, it would be inappropriate to argue that in the years prior to the early 1940’s scholarly attention was seldom directed to the level of earnings; rather, it would be more correct to state that residual earnings were accorded attention through adjustments in the valuation of assets rather than through the direct determination of a permissible percentage rate of return.

The Hope Natural Gas case (1944)⁴ seems to have been a turning point, and the postwar, or more correctly post-Hope years saw a surge of interest in the subject. The Court held in the Hope case that the returns should recognize “the service on the debt and dividends on the stock . . .” and that the return on equity capital should assure “. . . confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital.” Using maintenance of credit and capital attraction as criteria, a number of economists and students of finance moved to make rate of return determination more precise. In part their efforts reflected the license afforded by the Hope case, in part a recognition that the uniform systems of accounts had narrowed the latitude for rate base maneuvering and debate, and in part the pressure of postwar inflation. The pioneering work of Bon

¹See: Halford Erickson, “Relation Between the Valuation and Rate of Returns Theorons,” Proceedings, National Association of Railroad and Utilities Commissioners (1913), pp. 440-46.


bright, Clemens, Kosh, Morton, Rose and Thatcher deserves particular mention.⁵

The technique for estimating the rate of return was essentially premised on a composite return allowance which reflected: (1) the cost of debt capital (usually embedded or historical interest charges), (2) the cost of equity capital (measured by an earnings-price ratio or dividends-price ratio plus a recognition of the pay-out ratio), (3) a weighting by the capital structure (whether pro forma or ex post), and (4) supplemental consideration of various factors such as management efficiency, attrition, and the like.

The popularity of this approach was immense and the expert in corporation finance assumed a new prominence, usurping the prestigious position previously accorded the valuation engineer in the 1920’s and the accountant in the 1930’s and early 1940’s. The financial techniques employed were, for the most part, rooted in the traditional concepts of corporation finance. Hence, the route to a fair return, and to the satisfaction of the Bluefield-Hope criteria of maintenance of credit and capital attraction, was to be achieved through the application of such concepts to the estimation of the cost-of-capital.⁶

During the 1930’s, corporation finance experienced far-reaching changes that challenged both the conventional wisdom of finance and regulatory practice. Beginning with Durand, and continuing to new levels with the work of Modigliani and Miller, as well as Gordon in the late fifties, new concepts were introduced, the range of subject


⁶The “bare-bones” cost of capital was seldom equated directly with the rate of return, rather it was usually embellished with additional, and often ill-defined, supplemental allowances. Passing reference should also be made to the so-called comparable earnings technique as an estimate of the return requirement. This approach sought to draw parallels between regulated and “comparable” non-regulated companies in evaluating the return allowance, especially for equity capital. Whatever the theoretical merits of the argument, the major stumbling block to acceptance (like the case of reproduction cost) was one of implementation in a fashion that did not stretch the bounds of credibility. This barrier seemed too great for the vast majority of commissions and companies.
matter was broadened, and new, more rigorous techniques were applied. Of course, it might be argued that some of the new developments were no more than rediscoveries of selected writings by Irving Fisher, J. B. Williams, and others. But regardless of the source, it must be admitted that profound changes were underway.

The new thinking in finance broadened perspectives and sharpened the tools of analysis. Of the many topics which received increased attention, those involving the cost of capital should be singled out because of that concept's close association with the rate of return. The cost of capital, more than any other term, encompasses the range of topics which have been the target of much of the debate since the 1950s.

One of the topic areas within the cost of capital which has received increased attention is the concept and measurement of the cost of equity capital. In trying to define and measure the cost of equity capital, it has come to be recognized that the old earnings-price ratio, using only the current period for evaluation, is generally inadequate. Rather, the cost of equity capital has come to be viewed as expected and based upon a future flow of benefits. Accordingly, the argument in recent years has centered on how to conceive of these benefits and how to measure the cost of capital implied by them. Much of the building and testing of models dealing with the cost of equity has resulted in a debate over the relevance of dividends and dividend policy. One group holds that dividend policy does affect the cost of equity capital, while another group maintains that it does not. To utilities, which have needs for large amounts of capital and which have historically had high payout ratios, the resolution of the relevance of dividend policy as well as the identification of other variables affecting the cost of equity capital are of considerable importance.

A second topic area which has been the subject of extensive examination has been the concept of leverage and its effect on the cost of capital to the firm. Some theorists and practitioners argue that there is an optimal combination of debt and equity capital that should be used in financing a firm. That is, there is some least-cost combination of the two sources of capital from the standpoint of the firm. Although this position has been clarified and has been stated in rigorous terms, it is commonly called the traditional approach. Another group argues that the cost of capital to the firm is not affected by the use of debt financing, regardless of the proportions of the two sources. More recently, this position has been modified to include consideration of the fact that interest is deductible for tax purposes, recognizing the tax subsidy favoring debt. The relationship of leverage and the cost of capital has been and continues to be important for all firms and particularly public utilities. The latter have historically been heavy users of debt, hence the cost of this source of capital and the effect of its use on the overall cost of capital to the firm have important implications for managing and regulating these firms.

A third topic which has received much attention is that of risk. Attempts have been made to define the concept of risk within the context of an expected rate of return and expected deviations from that return. By the admission of most, these attempts have not been too successful when they are used in evaluating the cost of capital. Most attention has focused on the application of the expected mean-deviation approach to risk measurement to the problems of security portfolio management.

The more rigorous treatment of selected conventional problems has also been a feature of the new work in finance. For example, improved quantitative techniques have made it possible to better perceive the impact of depreciation practices on prices and returns. Similarly, a recognition of the contributions of the work done in industrial organization, economic theory, and quantitative methods, together with finance, has led to an improved understanding of the function and performance of the capital market, which is a principal mechanism for allocating resources.

Work in all of these areas has an obvious relevance to the regulation and management of public utilities. Such work should be of concern to the regulatory agency seeking to discharge its responsibility, not in the sense that the concepts and techniques must be controlling in an immediate fashion, but rather as an important consideration to be weighted together with questions of equity and societal values in
determining what course of action best promotes the public interest. Similarly, public utility management should be fully cognizant of such concepts and techniques—whether in exercising its conventional managerial responsibilities or in participating in an adversary proceeding dealing with the level of earnings. In short, neither regulators nor management can afford to be complacent or indifferent.

There is some evidence that the new concepts and techniques are gaining wider acceptance. For example, one may cite the recognition given growth and time in the estimates of the cost of equity capital for public utilities via the discounted cash flow approach. Likewise, capital structure testimony now appears to imply at least passing recognition of the existence of different viewpoints on the leverage issue. And, of course, the quantitative analysis of a greater range of variables pertaining to the return allowance seems to be growing in importance. But in spite of these changes, there are grounds for believing that we are only at the threshold of the great advances that can be made. A full recognition of and participation in these changes should be advantageous to everyone involved, whether academician, practitioner, regulator or manager, and hopefully, the following papers will make a contribution to this mutually advantageous process of exploration.

The papers included in this volume were originally presented at a conference devoted to new developments in the rate of return under regulation, sponsored by the Institute of Public Utilities, Graduate School of Business Administration, Michigan State University on April 17-18, 1968.

For purposes of organization, the papers have been arranged under five general headings: (1) Economic Criteria and the Allowable Rate of Return, (2) Supply of Funds and the Structure of the Money Markets, (3) Equity Capital, Leverage and Taxes, (4) Depreciation Policies, Inflation, and the Rate of Return, and (5) Information Requirements for Regulatory Decision Making.

Under the first heading, James R. Nelson re-examines developments in macroeconomics and capital theory and their relationship to public utility rate of return allowances. He considers not only new thinking in finance but also contributions to be derived from economic theory.

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A. H. Aymond and Peter B. Spivak comment on rate-of-return criteria from the respective viewpoints of management and regulation.

Under the second heading, A. James Meigs analyzes the performance of the money and capital markets in meeting the requirements for funds of the public utility industries. Imperfections, in terms of efficiency and responsiveness, in these markets could have adverse consequences for the capital-intensive utilities and, ultimately, for the consumer. Hence, this topic assumes a crucial—though seldom examined—importance in considerations of public utility finance. Roland I. Robinson serves as the discussant for Meigs' paper, and comments upon government reforms of these markets and capital market determination of the cost of capital.

The third heading includes papers dealing with the return on equity and debt capital as well as leverage. Myron J. Gordon examines the return in equity capital through a stock price model and an empirical stock valuation model. These models permit a rigorous analysis of the variables bearing upon the cost of equity funds. Robert S. Hamada examines the Modigliani and Miller leverage propositions (including the impact of the tax subsidy for debt on the cost of capital). He also considers the effect of leverage on shareholders' risk, the capacity expansion induced by lower product prices, and examines the attendant policy implications. The Gordon and Hamada papers are surveyed by four discussants: Myles S. Delano, David A. Kosh, Joseph M. Quigley, and J. Fred Weston. Their comments provide a variety of perspectives and a careful scrutiny of assumptions, models and implications.

The fourth heading includes papers which consider the effects of alternative depreciation practices on the cost of equity capital, and the impact of inflation on regulated returns. In the former, Eugene F. Brigham and James L. Pappas provide an excellent illustration of the use of quantitative analysis to explore a traditional topic and to provide fresh insight and findings. Clement T. Loshing and William H. Melody serve as discussants, providing two alternative viewpoints. Melody expands his comments to include certain broader implications of regulatory practice and depreciation policy. In the second paper under this heading, John J. Scanlon reviews the effects of inflation on the rate of return—a topic which has taken on renewed importance in the last several years. Thomas G. Gies serves as the discussant for
Finally, an expression of thanks should be extended to the Institute’s members, whose continued support has made these conferences possible.

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R. Hayden Howard
East Lansing
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The relationship between the rate of return and the problems of resource allocation, incentives, and efficiency has been considered by Harold H. Welin in "Fair Rate of Return and Incentives—Some General Considerations," *Performance Under Regulation*, ed. by Harry M. Trebing (East Lansing: Institute of Public Utilities, Division of Research, Graduate School of Business Administration, Michigan State University, 1968). Also, see: Harry M. Trebing, "Toward an Incentive System of Regulation," *Public Utilities Fortnightly*, LXXII (July 18, 1965).
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I  Economic Criteria
and the
Allowable Rate of Return
Reassessment of Economic Standards for the Rate of Return Under Regulation

JAMES R. NELSON
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When quiet backwaters are suddenly invaded by the main stream, all sorts of pools and eddies may develop. This seems to be particularly true of public utility capital theory and practice as it is invaded by the rising flood of general capital theory. The dynamic new currents have penetrated deeply into some phases of public utility capital analysis and left others practically untouched. Therefore, I propose to make some effort toward generalizing the flow. I am not trying to develop any particularly rigorous or abstract or systematic argument, but rather to confront certain newer preoccupations of economic theory with what seem to me to be the enduring realities of public utilities and of public utility regulation.

I will start, and finish, with the familiar twin criteria of the Hope Natural Gas case: regulation of the level of utility rates should be compatible with maintaining the integrity of the utility investment, and it should be compatible with the attraction of capital. Sandwiched in between two thin layers of Hope will be thick slabs of what may sound at times like despair. But the tone is incidental. The point to the middle sections, which make up the great bulk of the paper, is to engage in some preliminary exploration of two issues. The first of these is how to analyze the relationship and interactions between the essentially micro-economic context of traditional public utility economics and what, at least until recently, was bravely called the "New Economics"—written in capitals, especially in the English-
speaking ones. The second of these middle sections will be devoted to an attempt to add certain provisos to the capital theory which has developed so rapidly in recent years as an aspect of the theory of the firm.

I

Perhaps the greatest achievement of the Hope decision was to demolish a particularly extreme extension of the pathetic fallacy which had developed in the public utility field. Somehow, pre-Hope, the old nursery rhyme had got reversed. The Supreme Court had acquired the notion that one could break the bones of sticks and stones. The Hope decision corrected this by shifting the emphasis to the animate from the inanimate: to the capitalist from the capital, and to the investor from the investment. If this were an exercise in pure theory, I would spend a good deal of time on the proposition that the Court's conversion to the anthropomorphic was overdone. For “attraction of capital” is neither a wise nor perhaps even a meaningful standard for a utility facing both a decline in demand and an inevitable stagnation of technology. Only an antiquarian could seriously be interested in trying to bring back the streetcar. But telephones and electricity are highly dynamic on both the demand and supply sides, and both natural gas and water must contend with steadily-expanding markets. So, as a practical matter, ability to attract capital must be considered very seriously indeed.

The other Hope standard, “integrity of the investment,” appears to be inconsistent in logic with the “attraction of capital.” For what matters is not the integrity of the investment but the integrity of the investor. If no new capital will ever be needed, then the owner of specialized assets can expect to receive average regulatory treatment only if the market for his product can produce the necessary revenue without a disquieting volume of consumer protest, and if the regulatory commission has a highly-developed sense of equity. If new capital is needed, what will attract new investors is not the treatment of old investment, as such, but the treatment of old investors. This distinction may look like a mere play on words, since every dollar's worth of assets is offset on the balance sheet by an allocation to either a creditor or an owner. But at least the distinction provides a way to point out that what matters in setting the stage for attraction of new capital is not the dollar value of entries on a regulatory commission’s books but the dollar value of the yields and market quotations of the utility’s securities.

Once they are viewed in this light, the two Hope commandments appear to be eligible for telescoping into one only: “attraction of capital without sacrifice of the integrity of the investor's position.” The rest of this paper will be devoted to examining possible meanings, in various contexts, of the phrase “the integrity of the investor's position.”

II

The first general area may be described, variously, as involving the inter-relationships of the capital theory of the firm and of the firm's external environment, or alternatively as the kind of capital theory that emerges from the interaction of micro and macro.

As an introduction to this complicated topic, let us note a peculiarity of the usual discussion of “fair return on fair value.” The experts all agree that what counts is the number of dollars which finally accrue to investors. Since a change in this quantity may be produced by a change either in asset valuation or in rate of return calculated relative to this valuation, no unique properties can be assigned to either multiplicand or multiplier. But, in practice, neither regulatory policy nor analytical discussion has been consistent on this point. It has been argued that the multiplicand, or asset value, should be derived from original cost of capital assets, or from their reproduction cost, or from some mixture of these ingredients passing under the name of “fair value.” But no such arguments have been advanced for rate of return. Logically, the distinction between original cost and reproduction cost can be applied to rate of return just as well as to assets. Practically, the distinction may be established much more easily and securely for the fixed-interest obligations. The original cost rate of return is reflected simply in the weighted average rate of actual payments on fixed-interest obligations; and the reproduction cost rate of return is simply the going market rate of interest for obligations of comparable quality and maturity. Equivalent concepts with respect to equity capitalization are obviously much harder to come by, for two reasons: first, the investor who buys new stock or acquires in the ploughback of earnings is responding to general expectations,
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not to explicitly-quantified commitments; second, yields on the market value of common stocks are notoriously unstable over time both in absolute terms and relative to yields on the senior capitalization of the same enterprises. So "original cost" and "reproduction cost" yields on common stock cannot be pinned down as fixed coefficients. But the concepts are perfectly valid nonetheless. Moreover, the historical record of common stock yields is not totally divorced over spans of time from bond yields; however, the two may diverge for short periods.

In view of the possibility of talking meaningfully and even quantitatively about "original cost" yields and "reproduction cost" yields, it is surprising that there has been no such discussion. Instead, the implicit assumption seems to have been, and seems still to be, that there is a long-run "normal" cost of capital which may be combined with some long-run "normal" risk factor to obtain the long-run "normal" rate of return appropriate to public utilities. But this attempted explanation must remain pure surmise in the face of the silence of the authorities. The practical, or regulatory commission, approach to the rate of return is probably less given to rigid ideas of a long-run norm; but a comparison of what were considered to be appropriate rates of return in the low-interest 1940's and in the high-interest mid-1980's would reveal a similarity which could scarcely be explained by relative original costs of capital and certainly not explained by relative reproduction costs. Our next chore is to examine the state of the economy, and of theorizing about it, to see if there really are equilibrating influences at work which would make the idea of a stable or normal rate of return realistic in the long run.

Since I am not attempting a treatise on the theory of interest, I will organize my present comments under two arbitrary chronological headings: the classical and palae-Keynesian period, and the period since 1925 and especially since World War II.

Classical economic work on the theory of interest was dominated by two concerns which are almost wholly irrelevant to public utility economics. The first revolved around the development of a true central-banking function, as this is now understood. English writings on this subject, which dominate the literature in both quality and quantity, center around the related questions of whether, to what extent, and in what ways the Bank of England should function as a central bank. Although these discussions are of the highest importance for the economic historian, their conclusions are now obsolete. They have either been incorporated into present banking systems, or discarded as inappropriate for modern conditions. Apart from their institutional aspects, the analytical emphasis of this discussion was wholly on short-term interest rate policy, in two senses: interest rates charged on ninety-day paper or similar staples of the traditional England-speaking commercial banker, and the modulus operandi of changes for limited periods of time to achieve relatively limited and specific financial or economic objectives.

Although the second strand of classic discussion has again become as topical as this morning's nightmare, it is also as far as possible from the public-utility field. This is the connection between interest rates and balance-of-payments equilibrium. As being the chief executive of the world's most famous gold-holders since King Mullah, General de Gaulle still represents the bullionists of a hundred fifty years ago in a manner which indicates that he may confuse the Cross of Lorraine with the Cross of Gold. But the British contention of the last century that 5 percent bank rate would draw gold from the moon appears almost paradoxical in an era when far higher Bank of England rediscount rates scarcely interrupt the flow of gold to Paris and Zurich. Whatever the connection between central bank interest rates and gold flows, it has become a great deal more complicated than anything a classical or even modern economist can convincingly analyze.

There is, however, one aspect of the present balance-of-payments imbroglio which may shed some light on appropriate public utility rates of return. This is the novel appearance of long-term capital movements as a prime factor in the embarrassments of the United States. We have been told that the financial crises of the 1930's may have started with the failure of the Kreditanstalt, in Vienna; and we have been told that the Kreditanstalt's troubles arose from disregard of a model banker's repugnance toward borrowing short and lending long. But this episode occurred in Austria, a country which no one would have nominated in 1931 or at any other time between the wars as a model of economic or financial achievement. To levy similar charges against the United States in the 1960's, as many of the informed as well as the uninformed are doing, is quite another matter. If long-term capital movements are indeed a source of U.S. balance-of-payments difficulties, then even the analysis of the international
economic problems of the United States must examine the conditions for equilibrium in long-term capital markets—a topic of consuming interest for public utility economics.

Fortunately, once we have identified this path, we do not have to wander down it very far. It is at least arguable that the existence of the European Economic Community provides a better explanation of the outward movement of capital from the United States than any theoretical analysis of long-term capital markets.

But there is one aspect of the movement of American capital to Europe which provides a useful bridge between the classic analysis of the relationship between relative interest rates and short-term capital movements, on the one hand, and the modern growth of dis-equilibrating long-term capital movements on the other. This link between the old and the new fashions in analysis is provided by the fact that Western European countries tend to rely much more on monetary than on fiscal discipline. Supposedly “balanced” budgets may be assisted by such extrinsic supports as government ownership of the dominant national savings banks, whose net increments in deposits may be channeled at will to support government expenditures. Or expenditures which by American standards would be classed along with all others in the government accounts may be isolated in capital budgets. Regardless of the technique, the result is what Americans would call a budget deficit combined with what anyone would call relatively high interest rates. And the latter could be expected to have an effect on long-run rates of return on private investments within the high interest rate country as well as on the short-term interest rates which are traditionally expected to influence footloose international capital movements.

This observation leads, finally, to the main argument of this section. Before this argument is developed, it must be preceded by certain reflections on the state of economics in general:

1) Modern macro-economics is attracted to the twin poles of monetary policy and fiscal policy.

2) The fiscal policy aspect, derived from Keynes’s emphasis on the inadequacy of monetary policy, is worthy of its description as the New Economics in the sense that it emphasizes deliberate use of discrepancies between government receipts and government expenditures (put less elegantly: deficits, and—in principle—surpluses) to affect the level of national income and employment.

3) The New Economics has run headlong into the Old Politics, as exemplified by descendants of the legendary congressman who attributed his long tenure in Washington to his habit of never voting for a tax or against an expenditure. So, although the logic of the New Economics is that of a cross-roads in which one can go in either direction, the light is likely to remain red against tax increases unless a rising tide of inflation has completely swamped all other routes.

4) As a possible long-run offset to this ratchet effect of the Old Politics on the New Economics, it is plausible to argue that a lower federal government deficit, or larger surplus, is in the interests of both the private economy and of long-run national growth through stimulated private investment. For, if the federal claim on national savings is lessened through a higher total of government receipts relative to expenditures, private investment can be stimulated through lower interest rates.1

5) But even this argument assumes some resolution of the controversy between the schools of thought opting for higher government receipts and for lower government expenditures, respectively. An unbalanced budget can be pushed to balance toward the right, via lower expenditures, as well as toward the left, via higher taxes. The fiscal policy argument in its popular form, placing sole emphasis on the net balance of receipts and expenditures, is logical. But when economic pressures require cutting a net deficit or perhaps enhancing a net surplus, the logical immediately runs afoul of the ideological.

6) Thus the notions of a normal level of interest rates that we have inherited from the days of the gold standard and the balanced budget may not tell us very much about the relevance of “normal” interest rates, or “normal” returns on capital, in an economy which has abandoned the balanced budget as a matter of principle and may have abandoned the gold standard as a matter of practice.

7) Even if we disregard macro analysis, we are confronted with the fact that many a micro makes a macro. Cost-push inflation may not be capable of leading a vigorous independent life. It may, in fact, be largely a shadow of demand-pull inflation. But it cannot be eliminated from any consideration of long-run price trends on all goods and services, and consequently on probable long-run levels or trends of the price of money. We may be able to dismiss the more

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extreme gold-standard arguments as proof that General de Gaulle has finally immured himself in the Maginot Line. But we cannot dismiss the concept behind a Phillips curve—the lower the rate of unemployment, the higher the rate of price increase—nor can we dismiss its corollary that there may even be a structural incompatibility between a zero rate of unemployment and a zero rate of inflation.

Although the foregoing observations move at different analytical levels and are likely to be unequally applicable to particular economic situations, they seem to me to be a fair summary of the developing economic context in which the question of public utility rates of return must be examined. The detailed accuracy of each observation is less important than the fact that they all point in the same direction. To say that they point toward high interest rates risks double-counting, because the influences listed have not been hidden from the men whose judgment is decisive in setting present interest rates in present markets. But the arguments do point toward high interest rates. And, in the long run, commission endorsement of rates of return for utilities which still cluster around 6.5 percent already seems obsolete relative to a market which has just witnessed the issuance of AAA electric utility bonds, not refundable for five years, to yield 6.67 percent.

Having come abruptly down to earth, it behooves us now to regain some altitude to survey certain relationships among fiscal policy, interest rates, public utility rates of return, and the allocation of resources between consumption and investment and between the public and private sectors of the economy.

First let us examine the argument for a low-interest-rate economy. Essentially this says that economic growth is important, that an increase in investment increases the rate of economic growth, that expanded private investment will require expansion in public expenditure to enhance the rate of economic growth, and that lower

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interest rates will encourage expanded private investment by permitting exploitation of lower segments of the investment demand curve. How does this relate to public utilities? Mainly indirectly. It can be argued that high interest rates maintained for long enough will tend to shift final demand from capital-intensive to less capital-intensive industries, or at least moderate any tendency to shift toward the capital-intensive. Even during shorter periods, given any capital market imperfections, high interest rates are likely to slow down the growth rate of the most rapidly-growing industries relative to industries which generate their own funds for investment. And this is likely to be especially true for industries whose internally-generated return is subject to external regulation. All of these three points are, of course, specially significant for utilities. So, if the higher interest rates were to be allowed to transmit themselves directly to utility returns via utility prices, the effect would be a substantial decline in the rate of utility investment.

But this straightforward argument requires two qualifications. The first is that it considers public utilities in isolation. The truth is that a considerable proportion of utility investment is economically complementary to other forms of investment. This complementarity is particularly marked with respect to residential construction. No urban or suburban housing would be complete, or saleable, without provision of most or all of the standard utility services.

Higher interest rates extending over a period of time are likely to diminish total new investment in housing by a greater percentage than total new investment in industrial facilities. To the extent that housing bears most of the burden, demand for utility investment will be particularly affected. Of course, there need not be any comparable shrinkage in the demand for current utility output, or even any very obvious shrinkage in the rate of growth in demand for utility output.

This first argument comes down to the proposition that an important influence of long-term interest rates on utility investment should be exerted via the external demand for utility investment. A higher interest rate, to use an old-fashioned term, would slow down the widening of utility capital by slowing down an important cause of

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Footnotes:


2In terms of returns nominally permitted, this figure of 6.2 percent is too generous. The most recent compilation of permitted rates of return to come to my attention is contained in *State Utility Commissions*, Senate Document No. 26, 90th Cong., 1st Sess., Washington, Supt. of Documents, 1967. This summarises the evidence for returns permitted electrical utilities, as of 1966: average (by state), 6.14 percent; median, 6.11 percent (page 28). But this report also points out that actual rates of return reported for privately-owned utilities in 1965 averaged 7.39 percent.

3It is in this context, incidentally, that the argument that low interest rates stimulate investment runs into trouble when it tries to connect this additional investment to additional growth. For housing investment is particularly interest-sensitive, and not especially related to growth.
this widening—the appearance of new consumers at new points of consumption.

The second qualification required of the argument is more interesting both in theory and in practice. To revert to the central theme of this entire discussion, utility rates of return supposedly permitted by commissions during the recent persistent upward shift of long-term interest rates have scarcely moved upward at all. Thus that portion of the external demand for utility investment which constitutes a response to utility prices (i.e., is determined by price elasticity of demand) has remained largely unaffected by the interest-rate surge of recent years. Deterrents to the widening of utility capital have tended to originate solely in deterrents to complementary investments, and not in deterrents to demand for utility services per unit of such complementary investments.

What is not so clear is what has happened, on balance, to the deepening of the utility capital stock, and to qualitative changes in this stock. And even if we accept the Averch-Johnson hypothesis of previous utility over-investment due to the allowance by commissions of super-competitive rates of return to utilities,\(^2\) we cannot say to what extent their argument based on deepening of utility investment was counterbalanced by constraints imposed by these supposed high rates of return on widening of this investment, nor, without investigating depreciation rates and replacement policies, can we do very much to relate their discussion to qualitative changes.

But, whatever our uncertainties, we can still be sure that a continued juxtaposition of 6.57 percent yields on triple-A electric utility bonds and overall utility rates of return of anything like 6.5 percent is bound to put growth utilities in a very confusing position. How will the decreased demand for widening their capital stock, which is the assumed consequence of the impact of higher interest rates on housing starts, react with the assumed tendency toward a more "shallow" capital stock—i.e., a lower capital-output ratio? And what would be the implications for general economic growth of attempts to move toward less capital stock per unit of output?

Once we reach such questions as these, we can realize how far we have come from our starting point in the general theory of fiscal policy versus monetary policy. First, we have at least implicitly questioned whether low interest rates really are an important stimulus to economic growth, on the ground that low interest rates are most likely to stimulate that form of investment which is closest to the final consumer and probably least related to economic growth—i.e., investment in housing. But, second, we have argued that low interest rates would stimulate the rate of utility investment, most particularly in the form of the widening of the utility capital stock to keep pace with the assumed faster growth of investment in housing. Finally, we have come down to the issue of the relationship between the rate of return permitted to utilities and prevailing long-term interest rates. Since utilities have public service responsibilities, they presumably must somehow find ways to finance the widening of their capital stock or eventually forfeit their franchises. But these public service responsibilities are not framed in terms of any requirement as to the depth of capital stock per unit of output. Even if the past relationship between permitted rates of return and prevailing conditions in capital markets might have induced them to deepen their capital assets excessively, this trend could swing to the opposite extreme in the absence of alterations in recognized rates of return to allow for major changes in capital market conditions. And it is likely that the growth aspects of utility service—both directly within the industries themselves, and indirectly through their relationships to suppliers and customers—assume more significance in a context of capital deepening than in an environment of capital widening only. So, even if we deprecate the importance of low general interest rates for economic growth, we may rather hesitantly suggest a possible exception related to the relationship of utility rates of return to market rates on long-term securities.

on how to relate the original cost of capital assets to some trended or modernized revision of this cost.

III

This section will discuss the relationship between public utilities and the capital theory which has been developed in recent years for business firms in general. It will be shorter than the preceding section, not because of the lesser importance of its subject matter, but because so many aspects of the topic have already been exhaustively analyzed by others. This section has one special claim to uniqueness. It will have nothing to say about the optimum ratio of utility debt to equity. Its only assumption will be the commonplace one that any utility being discussed shall have some of both debt and equity.

The first aspect of public utility finance is a peculiarity which stems from a difference between public utility management and business management in general.

The usual chore of the corporate finance committee is to achieve, and maintain, a maximum excess profit by extending investment until the marginal return is just equal to the opportunity cost of the final unit of capital employed. This task may be accomplished, of course, with or without the sale of new securities, or with or without the payment of dividends. If the corporation has substantial monopoly power in the sale of its products, this maximum excess profit may produce an average return substantially above anything which could be described as a normal profit.

Public utility finance differs from this generalized example in two respects: it is subject to additional constraint, due to regulation; and this regulation, in its turn, must proceed on the basis of standards of "comparable earnings"—however defined—which cannot be identical with the simple standard of maximum excess profits if regulation of maximum rate of return is to have any practical meaning.

Here again we run across the trail of Hope Natural Gas. For one thing, "comparable earnings" and "maintain the integrity of the investment" are concepts which differ in more ways than grammatical structure. The heart of the difference has already been stressed in the first section: the idea of maintaining the integrity of the investment must refer, in some way, to a ratio between the book value and the market value of the utility security in question; whereas comparable earnings must refer to some ratio between the relative book and market values of security and non-utility stocks. Even in the absence of inflation, the common stock of a company with an unregulated monopoly position should sell on the market for a good deal more than its book value. So here we have two different standards. Without inflation or changes in long-term interest rates, one would permit market values within reach of book values. The other at least opens the way for arguments favoring much higher returns and valuations.

This apparent contradiction probably cannot be completely resolved. But the worst inconsistencies may be reduced along the lines of the following reasoning: first, assume that the real "integrity" which is to be preserved is that of the investor; second, ask how this integrity may be threatened by economic events other than those which might lead to the specific demise of his industry; third, protect this integrity in exchange for his surrender of the possibility of excess profit.

What do these points mean in practice? The general threat to the investor's integrity stems, or course, from the possibility of adverse national price trends and adverse movements in interest rates. These two threats are not likely to be independent. As has already been argued, a tendency toward high interest rates should accompany a tendency toward steady price rises, and a tendency toward higher interest rates should accompany any acceleration in the rate of general price increase.

Whether or not there is a close relationship in fact between inflation and high or rising interest rates, the important thing to note is that the emphasis is on movement through time. But in a market which has recently fallen in love with so-called performance stocks, any attempt to relate relative stock movements through time to comparable earnings must fail. If the chief attraction of a non-utility stock is hope for capital gain, and if hope for capital gain increases every time the stock goes up, then definitions of comparable earnings which allow for changes in market values of assets may pit utility stocks against a perpetual-motion machine.

In a less euphoric market, or a market less given to circular reasoning, "comparable earnings" might still be reconciled with "integrity of the investment" by comparing the trends of stock prices. Or something might be done simply with relative trends of per-share earnings.
But any attempt to resist utility rate-of-return policy on a base of comparable earnings is likely to lead to insoluble problems, analytically as well as administratively. The trouble stems from several sources. First, if utility stocks are compared with those of non-utility corporations of comparable size, utilities which are protected from many forms of competition will be compared with the winners in other areas with no such legal or legislative protection from competition. Somehow, in strict logic, the shadow losses of long defunct automobile companies would have to be subtracted from the profits of General Motors, after these in turn had been adjusted downward for the hypothetical competition—and then, following this trip through the looking-glass, the result would be comparable earnings in a radically non-comparable competitive setting.

Second, if an attempt were made to bring market prices of stock into the reckoning, it would be found that those companies with the highest rates of return on book value would also often have the highest market price-earnings ratios. Analytically, this would prove only that monopoly power raises both present earnings and prospects for future earnings. A barrier to entry does not vanish overnight. But it would again intrude the monopoly issue which has already been discussed.

Third, even without any suspicion of survival of the fittest, on the one hand, or monopoly power, on the other, the whole distribution of expectations must be different for a utility stock. The idea of certainty equivalent—may be introduced to deal with two probability distributions of future dividends which have the same general shape but differ with respect to measures of dispersion such as the index of variance. But the idea cannot be used to harmonize different initial types of probability distribution. There is no certainty equivalent which will harmonize the hopes of the plunger with the expectations of the cautious investor.

Fourth, dividend policy may be an independent influence on the relative market values of different stocks, or of different types of stocks. If a so-called performance stock is really what it purports to be, the optimum dividend policy would seem to be no dividend payments at all, in order to maximize the holder's capital gains and enable him to minimize income tax payments on given earnings. But utility stocks also have an advantage in this respect which may not have been fully exploited. To the extent that risk of investment in utility stocks is below average, the degree of uncertainty surrounding the future yield of a dollar ploughed back in the present is also below average. One might suppose that this would lead utilities to minimize the ratio of present dividend payments to present earnings, especially since most of them are engaged in a ceaseless task of trying to attract new capital. The factual situation is just the opposite of this hypothetical behavior. Utility stocks tend to pay out as dividends an abnormally high percentage of earnings attributable to common stock. When this is combined with their unusual dependence on debt financing and its attendant compulsory payment of interest, the overall result is a very high ratio of throughput of returns on utility investment. In view of the traditional concern of utility financial experts for the attraction and retention of the widow-and-orphan type of investor, and of the understandably great reluctance of utility financiers to alienate any major group of investors, continuation of this pay-out policy is understandable even in the face of the much higher personal income taxes of the last generation. But it may represent a continuing triumph of history over current tax realities.

A further aspect of public utility finance is anything but a peculiarity. This is the profound reluctance of all finance committees, in all types of industry, to sell shares of stock at less than book value. The railroad industry, in the regulated sector but subject to far less emphasis than is found among utilities on the relationship between rate levels and rates of return, provides a case intermediate between utilities and industry in general. Railroad stocks typically sell for less than their book value. And, in spite of important opportunities for investment in more efficient new fixed capital installations, the railroads have sold almost no new common stock since 1929. The railroads have financed massive changes in motive power and rolling stock by equipment trusts and conditional sales contracts; but rolling stock does not exist among utilities. The two points which seem to emerge from the railroad experience are these. First, for fixed assets which are integral parts of a total installation, there is no feasible way to segregate financing on an item-by-item basis in order to capture exceptional gains which may be possible even in an industry of mediocre, average profitability. Second, even though investment of
funds derived from sale of new stock may yield returns sufficient to carry the new issue and leave something extra for the stock previously outstanding, particular attractive opportunities are likely to be small relative to the total volume of existing assets and the total flow of earnings attributable to them.

We must remain true to our promise not to discuss optimum capital structures. This leaves us, at the close of this section, with the following summary observations: In industries which are supposedly not permitted to maximize profits but are to some extent protected from the entry of competition, the idea of comparable earnings is exceptionally difficult to apply if the comparability is supposed to be with unregulated industries. But comparability may not mean what it seems to mean, since the relevant comparability would be of trends through time and not at a point in time. Once this is said, it must be added that there is nothing sacred about the trend of the Dow Jones Industrials. The integrity of the investor’s position may be maintained on the basis of criteria which may be at least as meaningful to an adequate sample of investors as the price movements of other securities, bought for other reasons and reflecting different economic influences. In particular, a standard of comparability which would lead to substantial fluctuations in the prices of utility stocks might at times run afoul of the repugnance of managements toward the sale of stocks below par. In an industry constantly in need of outside capital, the resultant stoppages in the flow of new stock issues might be costly as well as embarrassing.

IV

And so, by a meandering route, we return to Hope Natural Gas. What have we learned on our journey which might be useful in setting up criteria for “maintaining the integrity of investment” and “attracting capital”? At best, we have picked up a few hints. These may be summarized as follows:

First, the idea of directly adjusting the values of capital assets may not be a completely satisfactory answer to modern forms of inflation. These inflations can take the form of relatively steady upward price movements as well as the classic inflationary spasm which are typical wartime and postwar phenomena. Higher interest rates may both reflect the inflationary movement and hold it in check.

So any approach to public utility earnings standards which looks only at the inflation and neglects the interest rates may be missing much of the point. Moreover, to the extent that fiscal policy is independent of monetary policy as a means of hastening or slowing inflation, the relationship of inflation to interest rates may be erratic over time. Given a harsh fiscal policy and an easy money policy, prices and interest rates could both be lowered at the same time; given fiscal laxity and monetary stringency, the two might move upward together—and so on for the other possible combinations. The point is that use of reproduction versus original costs cannot be a surrogate for attention to interest rate trends and levels. The latter may lead a life of their own.

Second, as long as there is a market for fixed-interest securities of the traditional type, neither allowance for price changes nor allowance for interest rate changes is likely to affect interest costs very rapidly. For bonds indexed to reflect changes in the cost of living or other measures of inflation would tend to lower the average cost of capital when they are first issued. Only with the passage of time would the impact of inflation on the outstanding mass of such bonds tend to overcome the continuing lower interest rates payable on new issues. Adjustment of rates of return to reflect interest rate changes would not produce the preliminary dip in average return which should be associated with indexed bonds; but it would involve no increase in yield on the mass of outstanding bonds in response to rising interest rates. The logical counterpart of the cost-of-living bond—a flexible-interest bond which yielded whatever the going short-term interest rate might be at any future date—would commend utilities and their regulators as being influenced by all of the external events and policy shifts which combine to determine short-term interest rates.

Third, the most difficult problems of translating Hope standards into preserving integrity of the investment or attracting capital would arise in connection with common stocks. Of course, a rise in long-term rates of interest means a decline in market values for holders of outstanding bonds. But, unless they are the unlucky possessors of British Consols, they can presumably retrieve their remaining fortunes if they hold their bonds to maturity. Common stockholders have no such recourse. Moreover, the purchaser of a conventional bond enters into a rigid contract, once-for-all. Having made his bid, he must live in it. But the common stockholder does not, and cannot, insulate him-
self from future change. He hopes, instead, to obtain maximum benefit from it, and is presumably prepared to assume risks of loss in return. Thus no commission can differentiate between the treatment of purchasers of the latest utility stock issue and the simultaneous treatment of stock already outstanding.

Since common stock involves no hard and fast commitments, treatment of rate of return to influence yield on the book value of common stock can follow no hard and fast rules. Clearly no common stockholder is entitled to anything, come hell or high water. But, just as clearly, an attempt to deprive the utility common stockholder of the increased yield per share in other industries which would tend to proceed directly from inflation, or indirectly and probably over a longer period from higher interest rates, could be self-defeating because it might tend to raise the actual or ex post return to capital by frightening away potential new investors. It might even run afoot of the "not below book value" rule for sales of new stock.

But if rates of return are to be adjusted to changes in any economic magnitude to maintain the integrity of the common stockholder, this adjustment should probably reflect changes in the cost of living rather than changes in interest rates. Even if the holders of utility stocks are institutions and not individuals, these institutions will often be fiduciaries or middlemen who represent the individual investor indirectly. As has been pointed out earlier, however, adjustment of utility yields allocable to common stock to changes in the cost of living is likely, in a very rough and general way, to parallel adjustment in utility yields to reflect changes in interest rates. Therefore, yield adjustments reflecting interest rates may not be wholly irrelevant to yield adjustments reflecting price rises.

But after all this is said, the fact remains that no adjustment of common stock yields for changes in interest rates can possibly reflect the flesh-and-blood concerns of the flesh-and-blood investor. Therefore, to return to our starting place, the idea of a "normal" rate of return on utility assets is clearly inappropriate in a world of changing interest rates; but the more important issue is that this normal return may be unrelated to the trend, or the rate of acceleration or deceleration, of prices.

Comment

A. H. AYMOND
Consumers Power Company

In my discussion of Professor Nelson's paper, I do not believe that it would be fruitful for me to recount the various points he makes with which I agree or disagree in whole or in part. Rather, I think you will find it will be more helpful to analyze and then expound on some of the parts that I consider particularly significant.

Professor Nelson commented about the fact that there has been a great deal of concern in the writings and the precedents about rate base and very little about the rate of return. That is certainly true, and it is simple arithmetic, as he noted, that when you multiply one number by another you can make an appropriate allowance for inflation or any other given factor in either the multiplier or the multiplicand. Most certainly the recognition of inflation or change in the value of the dollar can arithmetically be made in either rate base or rate of return. I am not going to get involved here in the legal argument of whether the law requires post-Hope recognition of inflation in the rate base in any particular jurisdiction, although when I last checked a few years ago, the courts of last resort in at least fifteen states held that it did. And I don't believe there have been too many rate cases in the last few years that have been contested. But regardless of legal arguments, there are two very simple, practical reasons for making the adjustment in the rate base.

One is the matter of better acceptance by the public. A rate of return, properly adjusted to produce the correct end result may
sound high and therefore be unacceptable, whereas the same result obtained by a lower rate of return applied to fair value might be received with approbation. But more important is the fact that rarely is the adjustment ever made in the rate of return. Many commissions and courts have commented upon the fact that the end result can be achieved through the rate of return. But when they get around to calculating the rate of return, they don't do it. They merely pay lip service to principle and abandon their responsibilities in order to follow the simple precept, keep rates down. Here they demonstrate that they are politically oriented and that they can count. Most utilities have some ten times as many customers as stockholders. But it does not have to be that way, and perhaps it is the fault of the utilities in not getting their story across to the regulatory authorities.

Let us look into the matter of developing a rate of return for original cost. But first let us look at some background factors. One factor to consider is the economic environment that exists now and the outlook for the reasonable foreseeable future. As Professor Nelson pointed out, we are in a period of high interest rates and all the arguments point toward their continuance: a world wide shortage of capital, balance of payments problems, deficit financing (not only on the federal level but at state and local levels as well), inflation, and full employment policy. He very astutely noted that they do not necessarily point to higher interest rates, because present interest rates may already reflect the influence of these factors. But interest rates do not have to get any higher to fully justify his statement that in the long run, commission endorsement of rates of return for utilities which still cluster around 6½ percent already seems obsolete relative to a market which has just witnessed the issuance of triple-A electric utility bonds, not refundable for five years, to yield 6½ percent. Professor Nelson, in his paper, then proceeded to demolish the argument that if higher interest rates were to be allowed to transmit themselves directly to utility return via utility prices, the effect would be a substantial decline in the rate of utility investment. I agree that no such result would follow but for different reasons.

In the first place, in some circles there seems to be an utter lack of understanding as to the relatively small effect on rates that would result from allowing a fair return. Given the usual relationship between net investment, revenue, and net operating income in both the electric and gas businesses, it may surprise many of you to know that the difference between a 6½ and 7½ percent rate of return is only a difference of about 6 percent in rates. This is clearly too small to have any significant effect upon demand for utility services. It is likewise too small to account for all of the pain that seems to be created in the minds of commissioners in providing for an adequate rate of return. As a footnote, I would also like to take issue with the thought that higher interest rates diminish investment, at least under today's conditions. When, as now, we have serious inflation which is expected to continue, investments are being made regardless of high interest rates because future higher costs of construction will more than offset the higher interest being paid, and the borrowing will ultimately be paid off in cheap dollars anyhow. As a matter of fact, there is certainly no slackening but rather a widening of demand for utility services, which aggravates the burden of high construction costs and high interest rates that is being placed on the utilities. This is the situation in which my own company finds itself, where our capital construction budget for this year is some 30 percent above last year's record level.

As a second footnote, I would like to take a swift whack at the Averch-Johnson proposition (which I am happy to note that Professor Nelson did not endorse, although he mentioned it), which demonstrates that there is just no place in the world in which we live for some of the things that come out of a think-tank. Utility management generally are somewhat different from other businesses, as Professor Nelson noted. I believe that they have a greater degree of sensitivity to the interests of their customers as well as their stockholders than do other businesses, and have an almost obsessive desire to keep rates at the lowest possible level and to try to avoid the necessity of asking for an increase in authorized rates. Perhaps this attitude stems in part from a regulatory background, with all the anguish that is involved in processing a rate increase application to its ultimate conclusion. Competition with subsidized government power agencies doubles is a factor for electric utilities. But for whatever the reason, I completely reject the basic assumption of the Averch-Johnson proposition that the utility firms wish to maximize profits. Further, the proposition rests upon a lack of understanding of the utility business. Those of you who are not actively engaged in the business cannot fully appreciate the horror with which we envision the possibility of an inadequate gas supply on a cold winter day, or a blackout of electric service on any day. With minor qualifications, we cannot set up a
reserve to be called upon in times of emergency. Rather, we must plan, design, and build the necessary facilities with a lead time of at least several years. This requires a forecast of future loads a number of years in advance and, of course, forecasting the future is always an uncertain task. If we overestimate future demands, we have facilities installed before they are needed and we have to bear the fixed costs on those facilities of some 15 percent per annum, which is approximately two times what any commission would authorize as a fair return. If, on the other hand, we were to underestimate those demands, we would be confronted with the horrors I mentioned earlier. The fact is that I think we do tend to err on the side of overbuilding rather than underbuilding, and the effect is not to improve earnings but to cut them back in the interest of reliability of service.

In developing a rate of return applicable to a fair value rate base, reference should be made to current costs of capital including for the equity component earnings net proceeds ratios. But in developing a rate of return for an original cost or net investment base, we have the principles enunciated by the Supreme Court not only in the Hope case referred to by Professor Nelson, but also in the Bluefield case, which describes the standard as a little narrower than that of Professor Nelson. I won't go into the quotations on that, but the important thing is that the return is related to comparable business undertakings with corresponding risks of uncertainty and you leave out any highly profitable enterprises or speculative ventures from the standard.

I would like to say in passing, if you do use historical cost of debt capital, I think it is very important to give consideration to projected issuance of new capital at today's higher interest rates, because the embedded costs will not allow you to last very long without coming back for another rate increase if you look solely at the past. But as Professor Nelson points out, the big problem is in the common equity. I think that a commission when it considers a standard of comparable earnings, should first look at the return on investments of other utilities. This is a point that Professor Nelson has not mentioned. I guess he is concerned about circular reasoning, but I think that the most comparable companies are other utilities similarly situated, and there is no problem on circular reasoning because you can always then turn to what the industrials or any other group are earning just as a check.


point. And when you do that, I think that you will find that the utility return is on the low side anyway. If you follow such a procedure, I think you will be interested to know what kind of an answer you might be getting under today's conditions. A recent article in the *Public Utilities Fortnightly* by C. J. McCarthy of Reli and Chandler calculated the embedded cost of capital for electric utilities from 1950 through 1966. For the 50-57 period, it was close to 6 percent and ranged from 5.7 to 6.2, presumably forming the basis for prevailing attitudes concerning the appropriate level for a fair rate of return. But it has risen ever since, and in 1958 it was 7.35 percent. The old preconceived levels no longer are justified.

I would like to say one more word about the Hope case before we conclude. I certainly agree with Professor Nelson's interpretation of it, but I would like to point out this one thing, and that is that the Hope case was decided in 1944, before all of the inflation that has taken place since World War II. I think this may well give us a whole new ball game. Now there may be some who scoff at anything an industry witness might have to say, so I would like to close with a quotation from a talk by the late Judge John E. Benton, who was General Solicitor of the National Association of Railroad and Utilities Commissioners a number of years ago. He made this remark shortly after the Hope case was decided by the Supreme Court:

If severe inflation shall occur, so that dollars shall shrink in purchasing power to a small fraction of the pre-war level, no one but an enemy to capitalism would advocate that companies should receive no more dollars for return than they were paid when they received their return in dollars of pre-war value. A fair return is just compensation for service rendered measured in money of the time when paid.
Comment

PETER B. SPIVAK
Judge, Common Pleas Court of Detroit

I think it is particularly appropriate that I am here to discuss rates of return, after just having heard a case in which a telephone company in Michigan is advocating, through an experienced law firm, an experienced consulting firm, and an experienced accounting firm, that I, who am hearing the case, should allow them to do something at a certain rate that will allow their company a 2.3 percent rate of return and a 1.1 percent rate of return on equity capital. When I asked them questions about it, these learned gentlemen argued that they can certainly get along on that and, based on the economy (this is the testimony I took yesterday) they, as self-qualified experts, see it as perfectly reasonable. I wonder how many of the Michigan companies that are represented here today know how often the Commission gets testimony like that, as well as the conversation that I seem to hear this morning about rates of return that have sevens in front of them.

I notice that in Professor Nelson's paper there is considerable discussion about a 6% percent rate of return being "normal." Well, the truth is, and I suspect that Professor Nelson and I would have no disagreement about this, I don't know of any 6% percent rates of return. Neither do the Michigan utilities, because they haven't been earning returns that low since I have been on the Commission. Consequently, I think it is fiction to talk about them in that context. There are really very few states in this country that have had 6% percent rates of return either during periods of higher or lower interest rates in the past few years. Very few jurisdictions and very few companies have been held to anything that approximates the last rate of return found by whatever state regulatory body they have had to deal with, so the 6% percent rate of return is a figure and nothing more.

The question facing public utilities today on the rate of return is not whether they have to go back to the good old days, because there is no one, be he regulator or utility person, who thinks that they do.

There are very few regulators in this country who have ever sat through a major rate case, because times have changed. And who are the regulators? I have heard them discussed as politicians and I suspect that we can all—or most of us—plead guilty, having received political appointments, because we have a greater or lesser degree of comprehension or alleged comprehension, empathy, and understanding of the body politic of the jurisdiction in which we serve. And, gentlemen, we are supposed to represent those people.

Now, sometimes I find in dealing with regulated utilities that there is a tendency to over react to any anticipated crisis. Every time there is a projected increase in cost, such as an increase in wages, or, as recently, the increase in income tax, there is the cry that if the commission does not do something remarkable, sundry calamities will fall upon the safest and soundest of utility earnings—much more than 2.3 or 1.1 percent. I must say that I do not believe this, and I must say frankly that most other regulators do not believe it either. We do know that the utility industry's economics are highly sophisticated and complicated, so much so that the utility industry does not even seem to agree with itself, almost as much as utility regulators do not seem to agree with each other.

Now, there is one group that seems to agree with itself and that is the investment community, which constantly tells the utilities they ought to earn a higher rate of return. My experience is that it tells them that in good times as well as in bad times. And, gentlemen, if I were in the investment industry, I would tell you exactly the same thing. How much should you react, and how high a premium should you place on that advice? Should you attach more importance to it than to the self-interest of the political bodies and the body politic which the utilities and the commissioners serve?

In the case that I mentioned earlier, I asked the consultant if he believed that in evaluating a situation in which low cost and low return are so manifest, with many consequences to the people in the
service area, should a utility commission give as much weight to the social responsibilities as it does to the economic responsibilities or, if not, what weight should it give to the social responsibilities of the utility? The answer of this consultant of a very experienced firm in Michigan was that his firm never considered the social responsibility of utilities in making recommendations to them. Well, if that is the kind of advice the utilities are going to take unto their bosoms, or attempt to present to utility commissions in 1968, they are at least foolish. I could use much stronger words than that.

Frankly, gentlemen, if we are going to think about the utility industry's rate of return only in terms of how jolly it is going to look on a sheet to be handed to someone to get their trust to invest in it, we are all doing ourselves a great disservice, and the utility industry is placing itself in a position where the challenge is merely to sell the most, rather than the challenge to serve the most. The wise mixture of both will not hurt.

I do not believe that there is any responsible regulator in this country who does not understand that the cost of money is going up, and has not allowed for it under the doctrine of continuing surveillance. I would point out to you that if there is going to be a sudden rash of utility rate filings, it will be the utilities who will abandon and turn their backs on continuing surveillance, a doctrine which they espoused with passion and arduous no less than one year ago. And it will be the utilities who will be declaring to the investors that their own self-constructed rate structures are not adequate—not adequate even under a continuing surveillance basis to generate the revenues that they need. The planning onus will not be on the regulatory commission; it will be, at least partly, on the drafters of those rate schedules.

Rates of return are essential to the utility and essential to the consumer in terms of their being equitable to both. If there is apprehension on the part of the utility industry or on the part of the academic community that regulators do not understand the importance of rates of return, if the apprehension is based upon the fact that regulators are short-tenured and too many of them part-time and understaffed, that would be understandable. But drop the other shoe, gentlemen, if you really believe that regulators do not understand (and certainly you do not want to believe that regulation is in the pocket of the utilities, and it is not) then who is responsible for that belief? All the "bad politicians"? Or is it all of you and the industries that you

represent and the investment industry who really have no interest in regulation, or only enough interest in regulation to hope it agrees with you? If that is the case, then for both utilities and regulation any rash of rate cases is going to lead to some rather perplexing and vexing times.
II

Supply of Funds
and
Capital Markets
Capital Flows to Public Utilities and the Structure of the Money and Capital Markets

A. JAMES MEIGS
First National City Bank

The money and capital markets play a larger role in allocating capital resources in the United States than they do in any other country. Because these markets are so important to the growth and health of the economy, they have drawn a tremendous amount of attention from scholars and regulators, much of which has been aimed at discovering and remediying apparent imperfections in market structure.

We are all familiar with the long-run projections for growth in demand for public utility services and we know that meeting this demand will require massive amounts of new capital. We, therefore, have good reason for taking a look at how well the money and capital markets channel capital to the utilities industry. My thesis is that there is no reason to fear that imperfections in capital market structure will deprive public utilities of access to capital. But this industry is just one of many to which the markets allocate capital. It will have to meet market tests.

In this examination, I hope to illustrate two aspects of the performance of capital markets. The first is the allocation of capital funds, the adjustment of flows of funds as demands for real capital assets change. The second is the efficiency with which capital market services are produced. The capital-moving industry, if viewed as the

Note: This paper benefited very much from the help of my colleagues at First National City Bank—especially Miss Amy Bright and Miss Linda Rezac. The charts were made by the Chart Section of the Economics Department, First National City Bank, under the direction of George Suman.
whole collection of conventionally defined financial institutions, produces more than 10 percent of national income. Actually, this understates the value of capital market services because the financial work done by nominally nonfinancial businesses is not included. In any case, this industry is big enough that any gains in its productivity would be significant to the whole economy.

First, we will look at recent developments in the capital markets, using electric utilities to illustrate changes in utilities financing. Then I will suggest some explorations for what we have seen, touching incidentally on a few topics of special interest, such as private placements, competitive bidding, and call protection.

In one sense, the term market structure means a classification of participants in the market according to some selected characteristics. The Federal Reserve flow of funds accounts, for example, group households, units of government, corporations, banks, and other financial institutions into market sectors. Major changes in the relative volume of transactions or in assets and liabilities can be regarded as changes in structure. This version of market structure, which perhaps should be called institutional structure, is helpful for seeing what is new for whom, but it is inadequate for analysis of some aspects of financial market behavior.

Another sense of the term, and the one I prefer to use, is a structure of demand and supply schedules that can be used to predict behavior of financial stocks and flows. This is in keeping with the growing practice of applying traditional tools of price theory and capital theory and the newer tools of econometrics to the analysis of financial markets. The institutional structure just discussed may influence the elasticities of the demand and supply schedules. But one has to be careful about announcing discovery of a new trend or a change of institutional structure in the money and capital markets. What one observes, for example, may simply be a predictable response of supply to a change in demand somewhere in the economy that will be reversed later on when demand conditions change. The problem is to see through the institutional market structure, which is continually changing, to the underlying structure of demand and supply schedules, which may be more stable. Some of the evidence needed for doing this can be found in market interest rates.

On these charts we see a few of the important interest rates that marshal funds through the markets. Although the 4 3/4 percent ceiling on Government bonds prevents the Treasury from issuing new long-term debt, the market yields on outstanding long-term Governments are a good indicator of movements in long rates. Municipal governments are major bidders for new funds, so are mortgage borrowers. The bank prime rate, in Chart 2, is technically a short-term rate, but it serves reasonably well to indicate movements in rates on term loans. The rate on new Aaa corporate issues, which is heavily weighted by issues of utilities, moves rather closely with bank lending rates. As I will show later, bank loans and bonds are alternative sources of funds for many companies. Finally, we have a dividend yield on equities. I will not try to settle here the question of what yield the investor looks at, but it is evident that the dividend yield standing alone does not compare well with the others on this chart. If we had a yield composed of expected dividends plus expected appreciation in price, however, it would be higher than any other line on the chart for the years covered here.
One of the main characteristics of these rates is that all of them, except dividend yields, rise and fall with the business cycle with roughly coincident timing. Another is that all except dividend yields have trended generally upward over the years covered. These rates are convenient for purposes of illustration, but they are not necessarily the most important rates in the market. Short-term rates could have been included as well, especially now that short-term assets and liabilities are so prominent in the financial operations of corporations. The omission of yields on real assets is much more serious, for one of the key places where financial and physical capital considerations meet is within firms and households, where it is decided how much capital to use and what to put it into. How well the markets reflect differences in these yields on real assets, which include everything from industrial plant to houses and autos, in order to direct capital flows to the highest yielding investments is crucial to the allocation process. This obviously leads into the subject of rate of return.

Changes in the market price of a firm's securities, furthermore, supply a continuing evaluation of the financial condition and future prospects of the firm, and, in effect, compare it with all other possible uses of capital. Interpreting the information from the markets and using it for investment decisions within the firm, however, involve interesting but extremely difficult theoretical and empirical problems. Although investment decisions within firms obviously must affect financial markets outside, I leave the questions of cost of capital, valuation of the firm, optimal financial structure, and capital budgeting to other participants in the program.

Of greatest significance from the standpoint of capital allocation are the changes in spreads in the yields available to investors. For example, in 1950, the yield on new Aaa corporates was fully two per-
Percentage points lower than the contract interest rate on new home mortgages. This year, there is virtually no spread. The influence of this narrowing of spreads on the behavior of mutual savings banks is shown on a later chart. Over the same period, the spread between the Aaa bond yield and dividend yields widened (Chart 2), which should make stock issues a relatively more attractive means of financing.

Borrowing firms should, in principle, draw funds from all available sources until the next dollar costs the same from every source. It is, in fact, possible to make good predictions of capital market behavior by assuming that all borrowers are trying to reach that position. But it is difficult to see this in the rates that are easily observed, such as those on these charts. Not one of them is a pure cost of capital, for each probably includes compensation for various amounts of other services such as risk-bearing. Call protection, which is illustrated on the next chart, is a good example.

The line called "Spread Between Callable and Noncallable New Corporate Issues," in Chart 4, is an estimate by Salomon Bros. & Hutzler of the price of call protection. As you can see, it is generally high when bond yields are high. This might be interpreted to mean that when rates are high, lenders are able to drive hard bargains and so ask for call protection as additional compensation. A borrower who does not provide it has to pay a higher yield. The other line, "Spread Between 3-5 Year and Long-Term U.S. Governments," puts call protection in a different perspective. This line is a rough indicator of what people in the market think interest rates are going to do in the future. When it is highest, yields on 3-5 year Governments are higher than yields on long-term Governments, indicating that rates are expected to fall. This is when the price of call protection is highest also, indicating that when rates are expected to fall, investors are willing to accept a lower yield in return for assurance that the issues will not be redeemed early. The borrowing company that provides call protection, therefore, is not really getting funds at lower cost. It is merely taking on the risk of an interest rate change that would otherwise be borne by the lenders. Frank Jen and James Wert found in a recent article that the privilege of calling is a valuable one, for utility firms have been able to refund high-coupon bonds when rates fall.

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Many other examples of differences between pure interest cost and nominal market yields could be found. In general, these suggest that the differences in costs of the various sources of funds available to public utilities are probably considerably smaller than they appear to be.

The next several charts illustrate some interesting changes in the financing methods used by all nonfinancial corporations and electric utilities since the early 1950's. One of the most striking similarities between the utilities and all corporations can be seen in the swings in capital expenditures, which appear to be the major influence in the timing and amount of borrowing.

Despite the fears expressed as late as the early 1960's that internal financing was freeing corporations from the discipline of the capital market, the last few years have seen the heaviest corporate borrowing ever.

**Chart 5**

*Financing Corporate Growth: Non-Financial Corporations, Seasonally Adjusted Annual Rates*  
3-Quarter Centered Moving Average

As you can see in Chart 5, cash flow has met most of the capital requirements of nonfinancial corporations. Liberalization of depreciation allowances, the investment tax credit, and rising profits made cash flow grow especially fast from 1961 on. Beginning in 1964, however, expenditures outran cash flow. The widening gap was filled by a rise in external financing.

**Chart 6**

*Financing Utility Growth: Privately Owned Class A & B Electric Utilities in the U.S.*

For Chart 6 we have constructed sources and uses accounts for privately-owned Class A and B electric utilities, from FPC reports through 1966 and our own estimates for 1967. In order to make some long-period comparisons, we have organized the figures in the format used by Melville J. Ulmer in his study, *Capital in Transportation, Commission of Governors of the Federal Reserve System, Flow of Funds Accounts, Seasonally Adjusted* (Washington, D.C., 1967 and 1968).


Distribution of Sources and Uses of Funds: 
Class A and B Electric Light and Power Companies 
1938-1966

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<td>Other</td>
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Sources

Retained Profits 8.0 8.0 5.4 4.9 12.8
Depreciation Charges 17.5 18.8 14.1 12.9 17.5
Current Liabilities 42.4 45.0 39.8 42.8 6.4
Non-government 20.4 17.0 16.8 15.0 5.1
Tax liability 15.1 19.5 17.1 22.5 4.1
Other current and accrued liax. 6.9 7.6 5.9 5.4 0.2
Net New Issues 20.2 22.6 26.8 24.3 44.2
Stocks 5.4 6.0 13.3 27.0 18.0
Bonds 30.3 27.2 30.3 35.6 54.5
(less) Inv. In assoc. cos. -0.5 -11.3 -12.0 -18.3 1.4
Other $ 6.0 5.5 5.0 5.1 -1.0
Total Sources 100.0 100.0 100.0 100.0 100.0

1 Includes notes and accounts payable plus customer deposits.
2 Includes dividends declared, matured interest on long-term debt, and other current and accrued liabilities.
3 Includes deferred credits and reserves.

Chart 7

Financing Corporate Growth

Non-Financial Corporations, Seasonally Adjusted Annual Rates
3-Quarter Centered Moving Averages

Source: Board of Governors of the Federal Reserve System.

Utility financing in the period covered by Chart 8 has had two major bond issue peaks, 1957 and 1967. Current liabilities have risen considerably in importance both in absolute terms and as a share of total sources of funds. Stock issues reached their peak in 1953 and have generally declined since, despite a slight upturn in 1967. Judging by developments in the markets for corporate securities, which we turn to next, it would not be surprising if there is an increase in volume of stock issues in the years ahead.

The responsiveness of the capital markets to changes in demand for funds is illustrated in the charts on the buyers of securities. In the most recent upsurge of bond issuing, state and local government pension funds turned out to be the biggest purchasers, accelerating their general rise as bond buyers. Insurance companies also stepped up buying. Households and mutual savings banks, both of whom had been net sellers, were pulled into the market by higher yields.

Chart 8

Financing Utility Growth

Privately Owned Class A & B Electric Utilities in the U.S.


Pension funds, a consistent buyer for years, reduced their purchases. As we will see in a moment, the share of private placements declines when the volume of issues is large. One factor that would be expected to reinforce this tendency in the last expansion is the concentration of buying by the state and local governments, households, and mutual savings banks, all of whom would largely require marketable issues.

Some years ago it was feared that financial intermediaries had too strong a preference for debt issues. From Chart 12 it is evident that some of the biggest ones have swung toward equities, with pension funds leading the way. Households have supplied most of the stock bought by the institutions. Price inflation has something to do with the swing to equities in institutional investing, but it is by no means the whole story. The utilities, however, as traditional borrowers in the bond market, may well wonder who will buy next year's bonds.
The state pension funds have not bought equities to any great extent in the past, but they are under the same pressures that affect private pension plans, so are bound to buy stocks too.

The share of private placements in total corporate issues, as can be seen from Chart 14, rose from 17 percent in 1933 to a peak of 67 percent in 1964. The share of private placements generally falls in periods of heavy borrowing. Utilities rely much less on private placements than do manufacturers, and have actually been using them less and less. Nevertheless, whether or not utilities use direct placements, the terms on which they can borrow are affected by direct placements.*

There are large swings in sources of short-term financing as well.

The most recent surge in commercial paper growth does suggest that a shift in attitudes toward the paper market may have occurred. The rise in commercial paper growth was associated with a much smaller spread of interest rates in the last cycle than in the other three episodes. And there was an increase, although a very small one, in the number of utility companies using this channel. But, as we saw earlier, there was a much greater rise in total external financing by corporations on this occasion. Furthermore, banks were under so much pressure from the Federal Reserve to hold down their business loans in 1966 that they actually encouraged some of their customers to go into the commercial paper market. This might not happen again.

In the period covered by these charts, we have seen that the markets have accommodated great variations in flows from year to year. Over longer periods it can be seen that major types of institutions can rise and fall in importance as the demand for their special services changes.

One of the best examples of this can be found in comparing growth rates of thrift institutions and commercial banks. The rapid growth of assets and liabilities of the thrift institutions—savings and loan associations and mutual savings banks—was one of the outstanding features of financial history from World War II to 1966. The share of commercial banks in total financial assets and liabilities, on the other hand, declined so much in this period that some observers worried about how the Federal Reserve could be effective in conducting monetary policy through what was apparently becoming a less and less important part of the financial system.

In the 1960's, the situation has been very different; the growth rate of banks has accelerated and that of the thrift institutions has slowed down relatively. This has aroused much concern about the
supply of mortgage funds. One of the popular explanations for changes in the relative growth rates of the banks and the thrift institutions has been the raising of Regulation Q ceilings on the rates that banks can pay for time deposits. Homer Jones of the Federal Reserve Bank of St. Louis, however, has offered another explanation. According to Jones, the post-war housing boom increased demand for the services of institutions specializing in mortgage lending, so they bid for funds to meet the demand. Indeed, they bid so effectively that "seemingly insatiable demands of the mortgage market" were cited by the First National City Bank Monthly Economic Letter as a factor limiting the supply of funds for corporate financing in 1959. In the 1960s, the business capital spending boom increased demand for the kinds of loan services commercial banks are especially adept in supplying and are permitted to supply. At the same time, demand for new residential construction leveled off or declined, so banks were able, in effect, to bid funds away from the thrift institutions. In 1966, the federal government outlawed both types of institutions for household savings. This episode, incidentally, enriched our noble tongue, the language of Shakespeare and Milton, with a new word, "dissintermediation."

The flood and ebb of institutional growth in response to changes in the underlying demand for real assets follows a very old pattern. Proponents Curley and Shaw have pointed out that savings and loan associations grew rapidly to take up the mortgages generated during the residential construction boom of the 1880's, again just before World War I, in the 1920's, and after World War II. It between spurts of homebuilding, the associations languished.

It may seem like kicking a straw man to say it, but the general picture of a highly responsive, stable financial market structure has not always been generally accepted. Early diagnosticians assigned much of the blame for the 1929 crash and the depression to alleged weak-


9 "Where Is the Money Coming From?" First National City Bank, Monthly Economic Letter, July, 1956, pp. 77-82.


of CDs, PCs, RPs, Treasury issues, tax exempts, and acceptances, not to mention some more exotic instruments to be found on the Continent and in the bazaars of Beirut.

As Homer Jones suggested, necessity is the mother of invention in the capital markets as elsewhere. These inventions and innovations, furthermore, tend to reduce the real costs of financial operations and to increase productivity of the market machinery.

Although we may not be able to measure overall productivity of financial markets, efficiency gains can be seen on a product-by-product basis in reductions of the spreads between rates paid by borrowers and those received by the ultimate lenders. In principle, this is like measuring the voltage drop in a transmission line. In practice, measurement is complicated by the tremendous variety of forms in which interest payments and payments for other financial services are made. The prohibition on payment of explicit interest for demand deposits, for instance, has led banks to pay implicit interest in the form of services, such as wire transfer facilities, foreign exchange facilities, credit lines, lock-box check collection, payroll accounting, and arranging direct placements.

The decline in costs of flotation of long-term corporate debt is one fairly clear-cut example of improvement in capital market efficiency, and one of great significance to utilities. According to Professor Avery Cohan, the cost of selling new utilities debt to the public fell by about 50 percent between 1955 and the early 1960's and then rose somewhat thereafter. He attributed the behavior of spreads to five major factors:

1) Passage of the Securities Act of 1933 and the Securities and Exchange Act of 1934, which greatly increased the risk and cost of public offerings. Much of the subsequent history of the bond markets can be viewed as efforts to overcome this increase in costs and to regain competitive position.

2) The Public Utility Holding Company Act of 1935, which brought in competitive bidding and simplified the financial structures of utilities so that their securities became more standardized and hence more easily marketed.

3) The rise of private placements as financial intermediaries grew.

4) The decline of interest rates over most of the period, which tended to reduce underwriting risk. When rates began to rise again, underwriters' spreads increased.

5) The development of more efficient methods of distribution by investment bankers.

The main point is that the options available to issuers increased so that competition brought spreads down. The rise in size of the financial intermediaries was especially important, for obvious reasons; it costs less to sell an issue in a few large blocks than to peddle it in many smaller ones. This economy of scale brought down the cost of public as well as private placements.

The significance of competitive bidding is less obvious, for it came along with other developments that would have been expected to reduce spreads in any case. I suspect that faith in its merits is based on a common tendency to overestimate the effectiveness of collusion, if any exists, in supporting prices of a product or service in markets where close substitutes are available. Inter-industry competition actually is a more effective protection against intra-industry monopoly power than is often realized.

As a matter of fact, Cohan's data suggest that when spreads began to rise again in the early 1960's, the cost of competitive-bid underwriting rose more than that on negotiated issues. A possible explanation for this can be found in the notion of "cost of search" in the economics of information developed by Professor George Stigler and others. For example, it is possible to save several hundred dollars on the price of a new car by shopping at several dealers, but you might consider the cost of search to be too high in time and aggravation to be worthwhile. And so it is with finding money; investment bankers sell the service of searching, and must be paid for it one way or another. Before a sealed bid underwriting, as Cohan found, the underwriters make a preliminary search of potential investors, so the level of bids eventually reflects the search costs not of just one underwriter but of the group. They all, in effect, allow for the probability of missing an occasional bid. To put the matter another way, the spread on a competitive bid underwriting may be less than on a negotiated one because the underwriters do less, as M. H. Waterman has argued.

Rate of Return Under Regulation

Being required to use only competitive bidding, it could therefore be argued, might confine a group of borrowers to a less efficient arrangement than they could work out for themselves by shopping around or by staying with one underwriter. Competitive bidding is, of course, an efficient procedure in many instances. Its availability as an option, furthermore, contributed to reducing underwriting spreads on negotiated issues when it was initially required, as Cohan pointed out.

To sum up, much of the early post-World War II discussion of financial market structure overemphasized the significance of market compartmentalization and underestimated the responsiveness of the money and capital markets to changes in demand for real capital throughout the economy. We are not at the mercy of mysterious evolutionary forces that pile up funds in institutions that will employ them inefficiently. The pervasive force of competition is everywhere at work to reduce costs of moving capital and to direct funds into the highest yielding uses.

Utilities will get fair treatment in the markets as they try to raise the capital to meet growth in demand for their services. But, in this search for capital, they will be competing with everyone from the family borrowing to buy a new car to the United States Government. This, of course, underscores the importance of a rate of return on utilities investment adequate to meet the going market price for capital.

Comment

ROLAND I. ROBINSON
Michigan State University

The paper presented by Jim Meigs is thoroughly in keeping with modern theory of capital investment and solidly based on good empirical evidence. It is one more example of the excellent work being done by the new generation of economists. I am stirred to admiration of it, and if the truth were told, probably bitten by envy. The world is getting smarter if not better.

For this reason I have a different problem: my esteem of the paper is large, and my reservations are trivial and marginal. Thus, I must choose between tedious praise and dubious criticism. My resolution of this quandary will be brevity; except for one point that I feel is important. First let me deal briefly with a few small matters.

THE NATURE OF NEW DEAL FINANCIAL REFORM

Meigs interpreted New Deal financial reforms as tending to force financial institutions into narrow patterns of specialization. The prime example he cited was the prohibition put upon commercial bank participation in most of the functions of investment banking. This is not the only example that might be cited, but I think this is not a correct reading of the full record. To my mind the major thrust of New Deal financial reform was to force those who deal with the public in financial affairs to tell the truth, the whole truth, and so forth. The Securities Act, the Securities-Exchange Act, the Trust Indenture Act, the Investment Advisers Act, the Investment Company Act and more
recently the Bank Disclosure Regulations are a part of this long sequence. What more, I believe the financial community has benefited vastly from this requirement. Widespread participation in capital markets would not have been feasible without full trust and confidence.

**FINANCIAL FLEXIBILITY**

Meigs' thesis that the financial system is quickly and sensitively adaptable to changing needs is generally right, and I join him in emphasizing the merits of this flexibility. However, to attribute this quality to a special virtue of the financial system may be giving it inappropriate credit. In a free economic system, the real demands of the market are likely to be met, but it is not clear that this has always been done within the financial community without considerable resistance. Two examples may be cited: for at least a generation, life insurance companies concentrated on selling the kind of actuarial instruments they felt the public needed. However, the public wanted something a bit different and so privately trusted pension funds and many varieties of investment companies which gave customers more what they wanted were developed outside the insurance industry. Industry attitudes have changed but they lagged, not led, this change. Another example is in Meigs' own field of commercial banking. Within the past seven years commercial banks have finally come alive to the role of time and savings deposits. However, less than ten years ago I worked rather actively on the idea of doing away with the rate limitations of Regulation Q so that commercial banks could compete more effectively for savings funds. Who were the principal opponents of the removal of Regulation Q? The commercial bankers who wanted to live within the shelter of a regulation that limited competition.

**EFFICIENCY AND THE FINANCIAL SYSTEM**

I applaud Meigs' notice of possible measures of operational efficiency within the financial system. His analogy to a voltage drop in an electrical distribution system may have been a happy one for the technological orientation of this gathering, but I think it would have been closer to have viewed the margin between rates paid and received as operating costs of a transmission system. However, we can be rightly proud of how low this cost is in the United States. I recently encountered some excellent evidence on this point in the *General Report of the Organization for Economic Cooperation and Development in their Capital Market Study.* (With the peculiar gift international bureaucrats have for unusual titles, it was prepared by the "Committee for Invisible Transactions." ) This report showed that not a single Western European nation came within reach of the narrow margins that prevail in our markets. Costs in every Western European country are about twice as much as in the United States and sometimes more.

**COMPETITIVE BIDDING: A BURDEN OR A SAFEGUARD**

Meigs' reservations about competitive bidding are interesting. It is true that the evidence about cost of distribution is a bit mixed and it is hard to make a strong case for mandatory competitive bidding. Still, I would not be sure that with freedom to do otherwise, a utility company would be well advised to drop competitive bidding. The cost of search for money is no more of a social waste than the cost of competitive research by chemical companies, and I feel safer with the competitive search for money taking place.

**CAPITAL MARKET DETERMINATION OF THE COST OF CAPITAL**

I am disappointed that Meigs did not choose to give some attention to the cost of public utility capital. This area has become so cluttered with academic dispute that I can appreciate his preference for avoiding involvement in these endless debates. However, cost of capital is determined by market forces and capital markets should not be considered without some attention to their role in this cost determination. Whenever the stock market takes a sharp drop, I ask my students: "Has the cost of capital risen sharply?" If they answer affirmatively, I then ask them if such a volatile market is a valid source of guidance for the important capital budgeting decisions.

Since cost of capital is market determined, it is necessary to pay respectful attention to the changes in market preferences and structures which may have an effect on this cost. It is my sincere belief that changes in both of these dimensions have been taking place and that they are of major proportions.

The cost of equity capital is the return expected by investors. The return expected by investors has two parts: the present return or the dividend yield now, and the future return which may be in the shape.
Rate of Return Under Regulation

of altered (hopefully increased) dividends or a higher share price based on such expectations.

Almost every past empirical study shows that investors clearly preferred returns in the present, rather than in the future; they gave a greater value to the bird in hand than to the uncaught bird. But it appears that investor preference may be changing, giving fuller and possibly greater weight to the future—and there is good reason why such a change should take place. If a company can make capital investments that yield returns equal to the investor-required cost of equity capital, retention of earnings saves transaction costs in the market; if the return they earn is even higher, then so much the better. What is more important, taxes are strongly weighted on the side of earnings retention; not only are capital gains rates lower, but the postponement of tax payments can be an added advantage.

It should be noted, however, that a growing preference for future returns is valid only if investors are reasonably confident that such returns will be forthcoming. Uncertainty usually leads to larger discounts of such future returns; the cost of capital can be reduced by diminishing such uncertainty.

Application to Public Utility Financing

If such a change of investor preference is taking place in our capital markets, as I believe it is, then this change has two important applications to public utility financing. In the past, a number of utility firms have become frozen into rather high pay-out ratios so that any temporary halt in earnings growth or a slight reversal in earnings can reduce earnings retention rather sharply. Since growth in per share earnings is closely related to the degree of earnings retention, this change can have a large adverse influence on investor expectations.

The second application is to the posture of public regulation of the utility industry. The economic logic of rate regulation is that it should allow such service rates as will recover all costs (wages, capital equipment, materials, and the like) including the cost of capital. However, the tradition of populism is deep in our political life and both the statutes of public utility regulation and the regulatory authorities often are tainted with deep feelings as to what the cost of capital ought to be, and resist the notion that the real market cost of capital may exceed their idea of what ought to prevail. The net effect of this is that investors quite reasonably fear that the regulatory system will be laggard in adjusting service rates to cover the cost of capital, which leads to the paradoxical situation that by stingy allowance for cost of capital, the regulatory system can create ultimately a higher cost of capital than would otherwise prevail. This may not show up immediately, the economics of fixed costs being what they are, but sooner or later the public will have to pay the cost of capital in some form, and we can hope that it will not be in the form of deteriorating quality of service.

I cannot help but feel that the present backward market for public utility equity shares is partly a reflection of such a fear by investors. The expectation of inflation has become widespread. When expectation of inflation prevails, both rates of interest on debt obligations and investor expectations of return on equity are affected and the cost of capital increases. But investors have a strong and possibly correct fear that public regulation, tainted with populist moralism about what the cost of capital should be, will not be willing to make adequate rate adjustments. The service costs of the higher costs of capital are being deferred into the future rather than being recognized now.

I hail the spirit in which Meigs closes his paper. The capital markets are fair and equitable reflectors of real and basic underlying economic forces. There is no valid grounds for complaining about high interest rates when real economic forces bring them about. I would only add that this admonition is aimed more at the regulators than at the operators of public utilities.
III

Equity Capital,
Leverage, and Taxes
Rate of Return on Equity Capital
Under Regulation

MYRON J. GORDON
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I propose to raise and discuss two questions. One is the rate of return a regulated utility should be allowed to earn. The other is the rate of return that stockholders require on investment in utility shares. In the course of what follows, it will become evident that in reaching an answer to the first question one must answer the second.

The theoretical and practical justification of our market economy is that it serves the consumer, the public at large, better than any other arrangement of our economic affairs. In the case of companies designated as public utilities, regulatory agencies are authorized to establish the prices these companies charge consumers for their products or services, and we may presume that the objective remains the same—to serve the consumer. In short then, our decision problem is the level of prices a utility charges, and our decision criterion is to serve the consumer.

Anyone not informed on the elementary laws of economics and finance might conclude that the lower the prices charged to consumers, the better the consumers are served. However, it is evident that with a zero or negative rate of return on its capital, a utility would not be able to raise the capital necessary to provide consumers with the output of the product they require. Therefore, in serving the consumer, the regulatory agency must be constrained by the requirement that the rate of return it allows is large enough to secure the investment in
productive facilities necessary to provide the output that the consumers require.

The immediate decision maker with respect to the investment by a utility in productive capacity is the utility management. That management has many concerns in making its investment decision. The welfare of consumers, workers, stockholders, creditors—and possibly of the management itself—may concern the management. Keeping the regulatory agency happy may also influence the management's thinking. However, under our system of private property, we lock on the management of a utility as the agent of the stockholders or owners of the company. Hence, subject to certain broad constraints with respect to the interests of other parties, it is legitimate to lock on the objective of the management as being to serve the stockholders of the utility.

A plausible hypothesis is that the higher the price of a utility stock, the happier are its stockholders. Accordingly, we may lock on a utility management as deciding whether or not to undertake an investment by asking the following question: will that investment raise or lower the price of the company's stock? In the latter event, the management should and would not undertake the investment, while in the former case it would. If the investment is expected to leave the price of the stock unchanged, we might imagine that in the public interest the management would undertake the investment.

Turning back to the regulatory body, we now have a basis for arriving at a rate of return it should allow a utility to earn. First, the regulatory agency must arrive at some estimate of the investment or rate of growth in productive capacity that the public's interest requires. Then, the agency must arrive at the lowest rate of return for the utility which will secure that investment or rate of growth in productive services. Specifically, assume that the public interest requires a 5 percent rate of growth in capacity, and with a 7 percent rate of return the price of the utility's stock is maximized at the 5 percent investment rate. If the utility is then allowed a lower rate of return than 7 percent, a lower investment rate would be in the interest of the stockholders. Conversely, a higher rate of return would result in higher consumer prices and a higher investment rate than the public interest requires.1

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1For a more detailed justification of this approach to the problem see Myron J. Gordon, "The Rate of Return AT&T Should Be Allowed to Earn," F.C.C. Docket No. 10258, Staff Exhibit 17, Federal Communications Commission, 1987, pp. 5-27.

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**Model of the System**

The ideas just raised can be represented more precisely by recognizing that we have an interacting system with three decision-making entities: (1) investors, (2) a utility, and (3) a regulatory agency.

Investors take as given the rate of return the regulatory agency allows the utility to earn and the investment and financing policies of the utility. From this information he arrives at an expectation as to the future dividends a share of stock will pay. On the basis of the rate of return the investor requires on the stock and its market price, the investor decides on whether or not to buy or to hold the stock.

This process for all investors determines the price of the stock and the rate of return at which the stock is selling.

A utility management takes as given, (1) the rate of return on assets the regulatory agency allows the utility to earn, and (2) the determination by investors of the rate of return at which the stock sells on the market. With this information the utility management arrives at the investment and financing policies which can be expected to maximize the price of the stock.

Finally, the regulatory agency takes as given, (1) the way investors arrive at the rate of return at which the stock sells on the market, and (2) that management's policy is to make the investment and financing decisions which can be expected to maximize the stock's price. The regulatory agency can then determine the lowest rate of return on assets that will generate the investment and financing required by the public interest.

**A Stock Price Model**

For a regulatory agency and a utility management to act as described above, they must predict the variation in a share's price with the rate of return a utility earns on assets and with a utility's investment and financing policies. A stock price model will now be presented that establishes the relations among the above variables.

To simplify the task and to respect the division of labor proposed for this session, I will assume that debt financing is not employed by the utility. The model is easily modified to allow debt financing, and the significant conclusions reached are not affected by doing so.

The symbols to be employed are defined below.

\[ P_t = \text{current price per share of stock} \]

\[ D_t = \text{dividend per share expected in period } t \]
\[ W_o = \text{current book value or common equity per share} \]
\[ r = \text{rate of return on assets and investment the utility is expected to earn} \]
\[ b = \text{fraction of earnings utility is expected to retain} \]
\[ g = \text{expected rate of growth in dividend} \]
\[ q = \text{funds utility is expected to raise periodically through stock financing expressed as a fraction of common equity at the start of each period} \]
\[ s = \text{fraction of funds raised through stock financing that accrues to the benefit of existing shareholders} \]
\[ k = \text{rate of return at which stock is selling on the market, i.e., rate of return investors require on the stock} \]

The purchase of a share of stock like any other investment represents a current outlay, \( P_0 \) in this case, in return for the expectation of one or more future receipts. If the investor has a one-period horizon, the future receipts are the dividend during the coming year and the end of year price. It can be shown, however, that the expected price for any future date depends on the expected subsequent dividends. Hence, the price of a share, \( P_0 \), depends on the expected dividends for the indefinite future and the rate of return investors require on the share. That is

\[ P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}. \]  

(1)

A plausible assumption for electric utility companies is that investors arrive at values for \( b, r, w, \) and \( s \) that are not expected to change for the indefinite future. In that event, it can be shown that the expected dividend in period \( t \) is

\[ D_t = (1-b)W_r(1+g)^t \]

with

\[ g = br + q. \]

(2)

(3)

Making the indicated substitutions in Equation (1) and carrying out the required mathematical operations results in

\[ P_0 = \frac{(1-b)W_o}{k-br-q} \]

(4)

\[ W_o \] is the current earnings per share and \( 1 - b \) \( W_o \) is the current dividend. Since \( br + q \) is the expected rate of growth in the dividend, the price is equal to the current dividend divided by the excess of rate of return investors require on the share over the expected rate of growth in the dividend.

This equation makes clear the dependence of share price on \( r \), the rate of return the utility is allowed to earn and on the utility’s investment and financing policies. The retention rate, \( b \), and the stock financing rate, \( q \), determine the investment rate and its financing. The benefit to existing shareholders of stock financing, \( s \), depends on the difference between \( r \) and \( k \).

**INTERRELATIONS AMONG THE VARIABLES**

To establish the interrelations among the variables, let us look carefully at Equation (4). The book value per share at \( t = 0 \), \( W_o \), is historically given, \( r \) is determined by the regulatory agency, \( b \) and \( q \) are determined by the utility management, and \( s \) depends on \( r \) and \( k \). The variable that remains is \( k \), and consideration of it involves us in a very lively theoretical controversy. One hypothesis is that the rate of return investors require on a share is independent of the corporation’s investment and financing policies. That is, if \( k \) has some value with \( b \) and \( q \) equal to zero, \( k \) will not change \( b \) and/or \( q \) rise.

If the above hypothesis is true, the rate of return a utility should be allowed to earn is easily determined. We simply set \( r = k \). Making this substitution, Equation (4) becomes

\[ P_o = \frac{(1-b)W_o}{1-bk} = \frac{(1-b)W_o}{(1-b)k} = W_o. \]

(5)

The term \( kq \) in Equation (4) drops out since \( s = 0 \) when \( r = k \).

The interpretation of Equation (5) is quite simple. If \( k \) is independent of \( b \) and \( q \), when we set \( r = k \), \( P_o \) is independent of a utility’s investment and financing policies. Price per share is equal to book value per share regardless of the utility’s investment and financing.

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2This model is developed more fully in Myron J. Gordon, The Investment, Financing and Valuation of the Corporation (Homewood, Illinois: Richard D. Irwin, Inc., 1962).

rate. To actually find the numerical value of $k$, we simply solve Equation (4) for $k$. The result is

$$k = \frac{D_0}{P_0} + br + ws.$$  \hspace{1cm} (6)

The dividend yield $D_0/P_0$ is easily observed. The values of $b$, $r$, $q$ and $s$ can be estimated with reasonable accuracy. Given $k$, the regulatory agency changes $r$ to $k$, if it is different. The utility management then sets $b$ and $q$ so that the investment rate is equal to that required by the public interest. Doing so will not benefit or hurt the stockholders since $P_0$ remains unchanged as $b$ and $q$ vary with $r = k$.

Both theory and evidence persuade me that $k$ is not independent of $b$ and $q$. On the contrary, the return investors require on a share (1) increases with the expected rate of growth in the dividend and (2) increases with the rate at which the market is asked to absorb additional shares of a company. If $k$ increases with $br$ and with $q$, the solution to our problem becomes quite difficult. However, the difficulty cannot be ignored, since the solution is radically different than the one previously discussed.

A detailed discussion of the theoretical and particularly of the empirical evidence which persuade me that the above theories are true is not possible in the time allowed.\textsuperscript{4} However, some indication of the reasonings is desirable.

A rise in a corporation’s retention rate reduces the current dividend and raises the rate of growth in the dividend (and the price). It is reasonable to believe that growth is more uncertain than the dividend. Since the return at which a share sells is an increasing function of its risk, $k$ increases with the retention rate. Turning to stock financing, it is unreasonable to believe that a corporation can market additional shares at the prevailing price regardless of the amount. The use of

To arrive at the rate of return a utility should be allowed to earn, we use Equation (7) as follows: First, the numerical values of the $\beta$ are estimated by statistical analysis of sample data. Second, recall that

$$D_b = (1 - b) \ W_0r$$

and

$$g = br + qs.$$  

Third, assign a value to $r$ and evaluate $P_b$ for successive values of a corporation’s investment rate. For each investment rate an optimum combination of $b$ and $q$ that provides the investment rate is used. The relation between $P_b$ and the investment for alternative values of $r$ is illustrated in Figure 1.

For a utility that is correctly represented by Figure 1, the data should be used by the regulatory agency as follows. If the desired investment rate is a 4 percent rate of growth in assets per year, the utility should be allowed a 7 percent rate of return, since $P_b$ is maximized at a 4 percent investment rate when $r = .07$. If a higher investment rate is desired, say 5 percent, $r = .0775$ is necessary, since $P_b$ is maximized at a 5 percent investment rate when $r = .0775$. Setting $r$ in this way persuades a management to carry out the desired investment rate at the lowest possible rate of return on assets for the utility.\(^2\)

The Effects of Leverage and Corporate Taxes on the Shareholders of Regulated Utilities

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I. INTRODUCTION

The general purpose of this paper is to analyze the Modigliani and Miller leverage propositions\(^3\) within the context of a capital market equilibrium framework. This framework allows one to establish an equilibrium relationship between the expected rate of return from holding any asset and the risk of this asset, the risk being related to the general market of capital assets available to all investors. More specifically, some of the complications for the MM financing theorems introduced by regulation will be analyzed in detail in this paper.

For reference in helping to understand subsequent sections, a brief summary of the MM results is presented. For a world of uncertainty (expressed such that all firms can be grouped in equivalent risk classes), perfect capital markets, riskless debt, homogenous expectations, and no corporate taxes, they concluded that the debt-to-equity ratio, given the real assets of the firm, should not affect the share-

\(^2\)For a detailed description of how this model was used to arrive at the rate of return AT&T should be allowed to earn see: Myron J. Gordon, “The Rate of Return AT&T Should Be Allowed to Earn,” op. cit.

\(^3\)These propositions were initially presented in F. Modigliani and M. Miller, “The Cost of Capital, Corporation Finance, and the Theory of Investment,” American Economic Review, June, 1958, pp. 261-97, and were corrected for the corporate income tax case in F. Modigliani and M. Miller, “Corporate Income Taxes and the Cost of Capital: A Correction,” American Economic Review, June, 1959, pp. 433-43. Hereafter these authors will be referred to as MM.
holders' market equity. If management substitutes debt for equity, ceteris paribus, within reasonable limits, they claim that the stock price will remain unchanged. An arbitrage proof is used whereby shareholders can purchase bonds or resort to home-made leverage to neutralize, in a perfect capital market, any leverage ratio the corporation provides. Thus, a change in the firm's leverage proportion should not affect the shareholders, since they can always get back to their original risk and expected return position on their own.

An implication of this result is that the firm's cost of capital is unaffected by the debt-to-equity ratio of the corporation, and is equal to the capitalization rate for the asset earnings. This means that the effective cost of debt is equal to the effective cost of equity capital, both constant with respect to leverage. The cost of debt to the shareholders is not merely the rate of interest. In addition, since their expected return is the residual after interest is paid, the shareholders are put in a more risky position and therefore require a constantly increasing risk premium as debt is substituted for equity. The sum of the interest rate and this risk premium is a constant.

A further implication of this leverage-irrelevance proposition is that the shareholders' required yield (which is not the cost of equity capital) must rise with an increased debt-equity ratio. This is to compensate for the increased risk they must assume as their return is now subject to more fluctuations.

When the corporate income tax is considered in this context, it is shown by MM that the cost of debt is cheaper than the cost of equity. This implies that the stock price, or value of the firm, increases when a dollar of debt is used by the firm to purchase a dollar of its equity. Given the results of the no corporate tax case, it is clear that the deductibility feature in the tax laws for interest payments, but not for stockholder returns, is the only reason for preferring debt. Henceforth, we shall refer to this as the "tax subsidy" for debt financing.

These propositions, at the time of their publication, contradicted the established "traditional" theory of corporation finance. In a no-tax world, debt capital is considered cheaper than equity capital, according to this traditional theory, so that the stock price will rise as the former is substituted for the latter—at least up to a range where default is not a serious consideration. Presumably, the cost of debt is viewed as merely the rate of interest, ignoring the added fluctuation to the shareholders' return caused by the contractual payments. The more sophisticated versions of this theory argue that debt is cheaper due to capital market imperfections that will not allow the shareholder to neutralize completely the firm's leverage policy with his own home-made leverage. Regardless, the traditional theory assumes that the market will give a premium to the stock of a firm that increases its percentage use of debt. This premium is increased even further when the tax deductibility of interest is considered.

Thus, when MM reported the results of their empirical study of the electric utility industry, it was thought that the above leverage issue was settled. MM found that the "tax subsidy" for debt financing was statistically significant for this industry, but only the tax subsidy, no more, no less. Specifically, by showing that the market did not give a premium for debt over and above the tax subsidy, the traditional theory appeared to be in error. Of course all of their subsequent results, such as their estimated cost of capital for the electric utility industry, are conditional on their leverage finding being correct.

Following the publication of these results, a number of comments and criticisms were made of this study. Of all these comments, only one stands out as being specific to a regulated industry and appears to be able to refute the MM model with MM's own results.

This is the comment made by M. J. Gordon concerning the treatment of corporate income taxes by the regulatory agencies as an expense in determining the rate of return a utility is allowed to earn. Since this rate of return is after-tax earnings plus interest, divided by book assets, the tax subsidy given to debt financing by the federal government to nonregulated firms is presumably withdrawn for the sample of firms investigated by MM. Thus, as pointed out by Gordon, MM's reported results actually refute their no-tax leverage irrelevance theorem, but support the traditional theory—what MM thought was the tax-subsidy for debt was instead a premium for debt since utilities...
are denied this subsidy by the regulatory authorities. Therefore, Gordon presumes from MM's study that leverage within reasonable bounds results in a premium for regulated firms, and over and above the debt tax subsidy for nonregulated firms.

To add to the controversy, Brigham and Gordon subsequently reported their own empirical study of the electric utility industry.4 In this study, care was taken not to consider the debt tax subsidy.

MM replied to Gordon's comment in three ways. They first responded by noting that regulation may not, in fact, be effective. It is still an unanswered question, according to some recent economic studies, whether the regulatory agencies accomplish what they set out to do, and also, whether or not they are performing a redundant service. It is possible that product prices the authorities require are essentially the same as the firm would have set on its own.

If regulation is effective, and Gordon's comment is correct, then MM reasoned that a strong and consistent negative correlation between earnings before interest and taxes (divided by book assets) and debt (divided by book assets) should be observed. When debt is added, and if regulation will lower product prices, earnings before interest and taxes will fall, and the negative relationship follows. In a cross-section of sixty-three electric utility firms for 1954, 1956, and 1957, this consistent negative correlation was not observed. It was appreciably negative in only one of the three years (and even positive in one year). It is possible that this evidence is not altogether conclusive in showing that regulatory agencies are not acting to neutralize the debt tax subsidy. A cross-section analysis covering firms in different states, each state with its own agency, does not have to reveal a negative correlation even if regulation is effective in each separate state.

MM's second response to Gordon's interpretation of their results was concerned with the lack of finding a premium for preferred stock. If debt is favored by shareholders, regardless of the tax considerations, then they reasoned that preferred stock should also be given a premium. That they did not find such a premium implies that either debt is not favored or the underlying market mechanism for pricing the effects of debt is not the same as for preferred stock.

The final MM response dealt with the strange risk implications for earnings that would result from an immediate elimination of the debt tax subsidy by regulation. They noted that under these conditions, as leverage increases, the variance of earnings before interest and taxes must also increase. This appeared, to them, a puzzling result of regulation.

With this rather lengthy setting of the leverage controversy completed, the following sections will be devoted to an attempt at its resolution, starting from a framework of market equilibrium. In Section II, the assumptions are enumerated and the Sharpe-Lintner-Mossin equilibrium capital asset pricing model is presented. In addition, the MM results in a world that taxes corporate profits, are shown to be valid for nonregulated firms. Section III is devoted to the effect of a change in the leverage ratio, assuming immediate regulation, on the shareholders' risk. To isolate the effect on risk, a zero demand elasticity is assumed in this section. This last assumption is relaxed in Section IV so that the total effect of leverage with regulation on capacity expansion and risk can be examined. Finally, a short conclusion is provided.

II. THE EQUILIBRIUM RISK-RETURN RELATIONSHIP, LEVERAGE, AND NONREGULATED FIRMS

A. ASSUMPTIONS

The assumptions are divided into two sets. The following are required for the capital asset pricing model:

1) There are perfect capital markets. This implies that information is available to all at no cost, there are no taxes (except the corporation income tax) and no transaction costs, and all assets are infinitely divisible. Also, all investors can borrow or lend at the same rate of interest and have the same portfolio opportunities. If there are any capital market imperfections, it is assumed that they do not systematically bias the results in one direction.

2) Investors are risk-aversers and maximize their expected utility of wealth at the end of their planning horizon. For the purposes of this paper, the expected utility of the one period rate of return over this horizon will be maximized instead of the end-of-period wealth. This transformation has been derived and used in many of the previous writings on the portfolio model. In addition, it is assumed
that portfolio can be assessed solely by their expected rate of return and the standard deviation of this rate of return. Of two portfolios with the same standard deviation, the criterion of choice would lead to the selection of that portfolio with the greater mean; and of two portfolios with the same expected rate of return, the investor would select the one with the smaller risk as measured by the standard deviation. This implies that either the investor's utility function is quadratic or that portfolio rates of return are multivariate normal.9

3) The planning horizon is the same for all investors and their portfolio decisions made at the same time.

4) All investors have identical estimates of expected rates of return and the standard deviations of these rates.10

In addition to the above assumptions, the following will be required to analyze the leverage question for corporations:

5) Expected bankruptcy or default risk associated with debt financing, as well as the risk of interest rate and purchasing power fluctuation, are assumed to be negligible relative to variability risk on equity. Thus if a firm cannot meet its interest obligations in any year, it is assumed that new stock (or new debt) will be issued to cover this payment. If a firm does go into bankruptcy, it is assumed it would have done so regardless of the amount of debt in its capital structure. Therefore, the corporation is assumed to be able to borrow or lend at the same risk-free rate as the individual investor.

8The rate of return is defined as the change in wealth divided by the investor's initial wealth, where the change in wealth includes dividends and capital gains.

9See J. Tobin, " Liquidity Preference as Behavior Towards Risk," Review of Economic Studies, February, 1958, pp. 62-83, for a justification. The need for the restrictive normal probability distribution assumption is not strictly required, as L. Fama, in "Risk, Return and General Equilibrium in a Stable Paretoian Market" (unpublished manuscript, University of Chicago, Graduate School of Business, June, 1967), has generalized our results for the case of the capital asset pricing model for other members of the stable class of distributions where the standard deviation does not exist. It can be further noted that A. Roy in "Safety First and the Holding of Assets," Econometrica, July, 1966, pp. 451-46, has shown that investors who minimize the probability of disaster will have roughly the same investment criteria for risky assets.

10The extension of the capital asset pricing model to the case of differing judgments by investors can be found in Fierberg and Groe, "On Capital Asset Prices: Comment," Journal of Finance, March, 1965, pp. 89-93, and in J. Lintner, "Security Prices, Risk, and Maximal Gains from Diversification," Journal of Finance, December, 1965, pp. 601-607. We shall not use the heterogeneous expectations framework here since it will not add to the primary purpose of this paper and may only serve to take the focus away from our major concern.

6) Dividend policy is assumed to have no effect on the market value of a firm's equity. Having assumed perfect capital markets, this need not be an additional assumption as long as there is rational investor behavior and the financing and investment policies of the corporation can be considered independent.11 If assumption (5) is valid, this second requirement should be met.

7) Future investment opportunities available to the firm at rates of return greater than the cost of capital undoubtedly are reflected in the current market price. They can be considered a capitalized quantity independent of the leverage issue and, thus, will be ignored here.

B. CAPITAL ASSET PRICING MODEL

It is explicitly recognized that assumption (2) will result in all investors using the principles of efficient diversification in their selection of portfolios.12 Represent the rate of return of a portfolio or risky asset by the random variable R. Then from the first four assumptions and the existence of a riskless asset, the following market equilibrium relationship between expected rate of return and the risk of any outstanding security or asset can be derived:13

\[
E(R_i) = R_p + \lambda \text{cov}(R_i, R_m)
\]

for all assets i (1) where

\[
E(R_i) = \text{expected rate of return for asset } i
\]

\[
R_p = \text{riskless rate of return}
\]

\[
\text{cov}(R_i, R_m) = \text{covariance between the rate of return of asset } i \text{ and the market rate of return}
\]

11The irrelevance of dividend policy under these assumptions was demonstrated by Miller and Modigliani, "Dividend Policy, Growth, and the Valuation of Shares," Journal of Business, October, 1961, pp. 411-33.

there exists a nonregulated corporation with no debt. Denote this all-equity firm, A. Assumptions (6) and (7) allow us to write the following relationship for the expected dollar return to the shareholders of A:

\[ E[(1 - \pi) X_A] = E(\text{div}) + E(S_{A\pi}) - S_A \]  

(2)

where \( X_A \) is earnings net of depreciation but prior to the deduction of interest and tax payments.

\( \pi \) is the corporation income tax rate.

\( \text{div} \) is dividends.

\( S_A \) is the present equilibrium equity market value of this debt-free firm.

\( S_{A\pi} \) is the market value for this same firm at the end of the horizon period.

Employing the definition of the expected stockholder rate of return, we have:

\[ E(R_A) = \frac{E(\text{div}) + E(S_{A\pi}) - S_A}{S_A} = \frac{E[(1 - \pi) X_A]}{S_A} \]  

(3)

where all rates of return, \( R_A \), are defined after the deduction of corporate taxes.

Now envision firm A issuing some debt (at the rate \( R_D \)) and simultaneously purchasing as much of its equity as it can with the proceeds. The real assets and operation of the firm are not affected, only the financial structure. Denote the market value of the equity of this same real firm, after the issuance of debt, as \( B \). This framework is used merely to isolate the leverage effect. The results, of course, will not be affected if the firm's capital structure is changed gradually by the financing of new investments with an altered mix of debt and equity.

When market equilibrium is restored, the rate of return required by the remaining shareholders can be derived analogously to (3), such that:

\[ E(R_D) = \frac{E[(X_A - R_D) (1 - \pi)]}{S_A} \]  

(4)

where \( D \) is the market value of debt and \( R_D D \) is the dollar interest.
From equation (1), the equilibrium expected rate of return-risk relationship is substituted into (3) and (4) to yield:

$$E(R_a) = \rho + \lambda \text{cov}(R_a, R_m) = \frac{E[X_a(1-\pi)]}{S_a} \quad (3a)$$

$$E(R_b) = \rho + \lambda \text{cov}(R_b, R_m) = \frac{E[(X_a - R_b)(1-\pi)]}{S_b} \quad (4a)$$

As debt is exchanged for equity, it can be noted by comparing (4a) to (3a) that expected shareholder rate of return is increased. This is due to the rate of interest being less than the capitalization rate for the all-equity firm, E(R_a). But at the same time, the risk to the shareholder, as measured by the covariance terms, also is increased. To obtain the net effect to the stockholder of this increased expected rate of return and increased risk, rearrange (3a) and (4a) to isolate E[X_a(1-\pi)] and equate the two relations:

$$S_a[R_a + \lambda \text{cov}(R_a, R_m)] = S_a \left\{ \lambda \text{cov}(R_a, R_m) + \rho [1 + \frac{D}{S_b}(1-\pi)] \right\} \quad (5)$$

The next step is to investigate the two covariance terms by noting their definition:

$$\text{cov}(R_a, R_m) = E\left\{ \frac{X_a(1-\pi)}{S_a} - E\left[ \frac{X_a(1-\pi)}{S_a} \right] \right\} \left\{ R_m - E(R_m) \right\}$$

$$= \frac{(1-\pi)}{S_a} \text{cov}(X_a, R_m) \quad (6)$$

Similarly,

$$\text{cov}(R_b, R_m) = \frac{(1-\pi)}{S_b} \text{cov}(X_a, R_m) \quad (7)$$

Substitution of (6) and (7) into (5) gives us:

$$S_a = S_a + (1-\pi)D \quad (8)$$

Since the total market value of a firm, V, can be expressed as:

$$V = S_a + D \quad (9)$$

we have from (8):

$$V = S_a + \pi D \quad (10)$$

Without debt, the total value of the firm is simply S_a. As the corporation substitutes debt for equity, the aggregate equity value for the remaining shareholders increases by \(\pi D\), the government subsidy given to debt financing through tax-deductible interest payments. This debt tax subsidy is the only difference between the tax and no-tax case.

Since (3a) gives a relation for S_a, we can express (9) as:

$$V = \frac{(1-\pi)E(X_a)}{E(R_a)} + \pi D \quad (10a)$$

Given our assumptions, MM’s financing result is reproduced for a nonregulated firm in a market equilibrium setting.

III. EFFECTS OF LEVERAGE ON SHAREHOLDER RISK FOR NONREGULATED FIRMS

In dealing with regulated utilities, we shall follow Gordon in this section, as well as in the next, in assuming that an immediate response by the authorities will result when a firm changes its leverage ratio. This assumption disregards MM’s reply (their first point) to Gordon’s comment and will bias the subsequent results against their position. But we shall not ignore risk. Expected return is not all that matters in an uncertain world.

A comparative statics framework will again be employed. Assume initially that all regulated utilities have no debt in their capital structure and that their equities are in market equilibrium. We shall denote these all-equity firms by the subscript A. Then the actual amount of contractual interest now existing is issued by these firms at the going
rate of interest. This debt is used to purchase as much of their outstanding common equity as possible. It is assumed the regulatory agencies act promptly to maintain each firm's ratio of expected after-tax profits plus interest to the book value of assets.\footnote{Since the ratio of asset earnings, \(X_A\), among utilities will not be the same after regulation (if the debt-equity ratio differs among these utilities, firms will be changing risk-classes (by the MM definition) by changing their capital structure.} The authorities simply lower the product price so that the current output, costs, and book assets result in the regulated rate of return. We shall denote these same real firms (as \(A\)), after market equilibrium is restored, by the subscript \(B\).

Since debt and immediate regulation will affect both shareholder risk and the quantity demanded, and we are interested in this section only in the risk effects, a zero demand elasticity will be assumed, i.e., this lower price will not induce a greater demand for the product. In the next section, this restrictive assumption will be lifted.

For the all-equity firm, we have from equation (3b):

\[
E[(p_AQ_A - C_A)(1 - \pi)] = S_A[R_F + \lambda \text{cov}(R_F, R_M)] \tag{3b}
\]

where earnings before interest and taxes, \(X_A\), is decomposed into the product price, \(p_A\), the quantity of product sold, \(Q_A\), and the cost associated with this quantity (includes depreciation, but excludes interest and equity cost), \(C_A\).

After firm \(A\) substitutes debt for equity, the regulatory authorities will lower the product price from \(p_A\) to \(p_d\) so that:

\[
E[(p_dQ_A - C_A - R_dD)(1 - \pi)] + R_dD = E[(p_dQ_A - C_A)(1 - \pi)]. \tag{11}
\]

From the market equilibrium risk-expected return relationship, we have:

\[
E(R_F) = \frac{E[(p_dQ_A - C_A - R_dD)(1 - \pi)]}{S_A} = R_F + \lambda \text{cov}(R_F, R_M); \tag{12}
\]

substituting (11) in (12) and rearranging:

\[
E[(p_dQ_A - C_A)(1 - \pi)] = S_A \lambda \text{cov}(R_F, R_M) + R_F(1 + \frac{D}{S_A}) \tag{13}
\]

and equating the RHS of (3b) to (13):

\[
S_A[R_F + \lambda \text{cov}(R_F, R_M)] = S_A \lambda \text{cov}(R_F, R_M) + R_F(1 + \frac{D}{S_A}). \tag{14}
\]

Investigating the two covariance terms next, and asserting that product prices are not random variables,\footnote{It is clear that the price the authorities set, \(p_d\), is exogenously determined for the firm and is not a random variable. That \(p_d\) is not considered a random variable implies that the utilities are assumed to be monopolies. Undoubtedly, there are substitute products, such as coal and gas for electricity, but these are reflected in the elasticity of the demand curve with the assumption that the prices of the substitute products are not affected in this comparative statics analysis.} we have:

\[
\text{cov}(R_F, R_M) = E \left\{ \left[ \frac{(p_dQ_A - C_A)(1 - \pi)}{S_A} \right] \left[ (R_M - E[R_M]) \right] \right\} \tag{15}
\]

\[
= \frac{(1 - \pi)}{S_A} E \left\{ [(p_dQ_A - C_A - E(p_dQ_A - C_A)] [R_M - E[R_M]] \right\}
\]

\[
\text{cov}(R_F, R_M) = \frac{(1 - \pi)p_d}{S_A} \text{cov}(Q_A, R_M) - \frac{(1 - \pi)}{S_A} \text{cov}(C_A, R_M). \tag{16}
\]

In a like manner, we can show:

\[
\text{cov}(R_F, R_M) = \frac{(1 - \pi)p_d}{S_A} \text{cov}(Q_A, R_M) - \frac{(1 - \pi)}{S_A} \text{cov}(C_A, R_M). \tag{16}
\]

Substituting (15) and (16) into (14), and noting that \(V = S_A + D\) by definition, we obtain:

\[
V = S_A + \frac{\lambda (1 - \pi) \text{cov}(Q_A, R_M)}{R_F} [p_d - p_0] = S_A + \delta \tag{17}
\]

where we are defining the debt-immediate regulation effect on shareholder risk as:

\[
\delta = \frac{\lambda (1 - \pi) \text{cov}(Q_A, R_M)}{R_F} [p_d - p_0]. \tag{18}
\]
Since the shareholders of utilities presumably require a rate of return greater than the risk-free bond rate, it can be inferred that they consider $\text{cov}(Q_a, R_w)$ to be positive; and since $p_a$ is greater than $p_w$, $\delta$ is negative, contrary to Gordon’s assertion.

To interpret why $\delta$ is not zero and the stock price will increase, we can examine the shareholders’ expected rate of return and risk before and after the leverage change. It is indeed true that the tax subsidy for debt is neutralized by the authorities, according to (11), when only expected return to the stockholder is considered. But when the risk of the stock is compared, before and after the leverage change, it is noticed that the covariance does not increase as much as it would have for a nonregulated firm—compare (6) and (7) to (15) and (16). The covariance would be expected to increase with a larger debt-to-equity ratio since the shareholders’ rate of return is a residual after interest is deducted. And from (15) and (16), it is observed that the covariance does increase, but not enough to make debt irrelevant.

The critical component of risk in (15) and (16) is $\text{cov}(Q_a, R_w)$. If $p_a = p_w$, the MM no-tax proposition would result; i.e., $\delta = 0$, since the gross revenue and its covariance with $R_w$ will remain the same. Due to the zero demand elasticity assumed for this section, the quantity of output remains at $Q_a$, and the major difference for regulated firms is the changed product price forced by the authorities. Since the product price is lowered after debt is issued, the covariance is less than for nonregulated firms.

It should also be noted that the risk of gross revenue is coming entirely from output due to the price being exogenous for regulated firms. The lower product price dampens $\text{cov}(Q_a, R_w)$ and thus reduces the risk. We can interpret this as a benefit to shareholders attributable directly to debt. This would increase the stock price and a debt premium of $\delta$ should be observed. Having demonstrated that Gordon’s claim ($\delta$ equals zero) is not correct, it can be further shown that MM’s claim ($\delta$ equals $\pi D$) is also not correct, at least insofar as only the risk effect is concerned. This can be seen by visualizing a firm with earnings before interest and taxes, $X_a$, decomposed into two firms—one merely collecting the gross revenues, $pQ$, and the other performing the actual operations and incurring the costs, $C$. Then by defining the rate of return and market value of the revenue collecting firm (prior to paying for the costs) by the superscript $G$ and the market value of the cost-incurring firm expression (18a) is obtained.  

\[\pi D = \frac{\pi D R}{(1 - \pi)} E(Q_a) \]  \hspace{1cm} (11a)

\[\pi D = \frac{\pi D Q}{(1 - \pi)} E(Q_a) \]  \hspace{1cm} (11b)

In addition, (3b) and (15) give us the risk-expected return relationship (after rearranging):

\[\lambda \text{cov}(Q_a, R_w) = \frac{1}{\pi D} E(C_a) \left[ \frac{S_a R_w}{E(Q_a)} + E(C_a) - \lambda \text{cov}(C_a, R_w) \right] \]

Substituting (11a) and the last relationship into (18) yields:

\[\delta = \pi D - \frac{\pi D R}{(1 - \pi) E(Q_a)} \left[ \frac{S_a R_w}{E(Q_a)} + E(C_a) - \lambda \text{cov}(C_a, R_w) \right] \]

Defining $Z = E(C_a) - \lambda \text{cov}(C_a, R_w)$ and $S_z$ as the market value of an all-equity firm which charges a fee for carrying out operations costing $(1 - \pi)C_a$, we can multiply and divide both sides of the definition of $Z$ by $(1 - \pi)$ and $S_z$ respectively:

\[\frac{(1 - \pi) E(C_a)}{S_z} = \frac{(1 - \pi)Z}{S_z} + \frac{\lambda(1 - \pi) \text{cov}(C_a, R_w)}{S_z} \]

Comparing this with the market equilibrium relationship, (1), we can deduce:

\[\frac{(1 - \pi)Z}{S_z} = R_w \]

or

\[\frac{Z}{(1 - \pi)} = R_z \]

Substituting this into (18), we have:

\[\delta = \pi D - \frac{\pi D R}{(1 - \pi)} \frac{S_a + S_z}{E(Q_a)} \]

Since the market value of gross revenues of an unlevered concern is:

\[S' = S_a + S_z = (1 - \pi) \frac{pQ E(Q_a)}{R_z + \lambda \text{cov}(R_z, R_w)} \]

expression (18a) is obtained.
\[ \delta = \pi D - \pi D \left( \frac{R_P}{R_P + \lambda \text{cov}(R_P, R_M)} \right) \]  

From (18a), it is clear that \( \delta \) is less than \( \pi D \), the debt tax subsidy, since the term after the minus sign consists of only positive quantities. Depending upon the magnitude of the risk premium for gross revenue, \( \lambda \text{cov}(R_P, R_M) \), it is possible to determine whether \( \delta \) is better approximated by \( \pi D \) or zero. Clearly, neither Gordon nor MM, so far, can claim to be correct without qualification.

IV. LEVERAGE, RISK, AND CAPACITY EXPANSION

A. STATEMENT OF THE PROBLEM

Maintaining the same hypothetical construct of Section III, we shall now lift the restrictive assumption that demand for the product will not increase with a reduction in price. This analysis will emphasize the induced capacity expansion that leverage and a forced price reduction can generate. Thus, full capacity is being assumed and the following analysis is primarily for long-run policy and its implications.

The use of idle capacity to handle the increased demand caused by the forced reduction of product price (due to increased leverage) is a very restrictive case and will result merely in a short-run benefit to the shareholders. Since capacity, or assets, in this case has not been increased, the base or denominator of the regulated rate of return remains the same while the numerator has increased. The second round of regulation, after the first round caused by adding debt, will find the product price even lower to maintain the regulated rate of return. In addition, the short-run framework is inapplicable for judging the empirical studies of MM and Brigham-Gordon. Since the outstanding debt at the time of their cross-sectional analyses was issued by the firm over a period of many years, undoubtedly a major portion of it has already been reflected in lower product prices by the regulatory process—that is, on the assumption that regulation is effective. Only the small portion of the debt floated very recently may have

escaped regulation at any given time. Therefore, we shall assume that the short-run effects using idle capacity have been eliminated by the regulatory authorities.\(^2\)

For analyzing the capacity expansion case, we have to be careful to attribute to debt only that portion of increased demand, costs, capacity, and shareholder wealth that would not have resulted otherwise. To do this, the following comparative statics framework has been worked out to isolate the debt effect.

Consider a regulated firm with no debt in its capital structure. This firm, on its own, sets its product price at the optimum value, \( p_a \), such that any lower price will not add to its shareholders' equity. Abstracting from risk considerations for the moment and assuming this firm operates as a monopoly, this price is determined on the average revenue curve at the point of intersection of the marginal revenue and long-run marginal cost curves (where all capital costs are included in the long-run cost curves). Management does not have to wait for the regulators to force it to decrease the price to this point when debt is added, or for any other reason, since it would have been to its advantage to do so itself. Either this optimum price, from the firm's point of view, or a lower price set by the regulatory authorities on the criterion of after-tax profits to book assets, is the equilibrium price hereafter referred to as \( p_a \).

From this point of reference, the company substitutes debt, \( D \), for some of its outstanding equity without affecting its real assets. This \( D \) represents all of the firm's currently-outstanding interest commitments so that no more debt will be added. The regulators lower the product price to \( p_a \) which may make an added investment in capacity now profitable to the stockholders—this increased capacity not being profitable before. If this results, the benefit must be attributed to the increased leverage.

Finally, this induced investment and profitability may require the authorities to decrease further the product price, which may lead to more investment, and so on. We shall assume that this chain reaction,

\(^2\)A mathematical expression for the leverage effect on stock prices due to risk and the use of idle capacity to service the induced increase in demand can be obtained with the same technical apparatus used in Section III. Inspection of the expression clearly illustrates that the premium for debt financing is larger than the premium, \( \delta \), found when only risk was considered.
if it has occurred, has converged to an equilibrium prior to the years studied by MM and Brigham-Gordon.

B. EFFECT ON MARKET VALUE

From Section IIIC, equation (10a), it was shown that for an all equity firm:

\[ V = S_A = \frac{(1 - \pi)[p_A E(Q_A) - E(C_A)]}{R_p} \]

\[ - \lambda \text{cov} \{(1 - \pi)[p_A Q_A - C_A], R_A \} \cdot R_p \]. (10b)

It was stated previously that management has no incentive to decrease the price, \( p_A \), any further on its own since stockholder wealth will not increase as a result. Because we wish to compare, before and after debt is added, the same size firm (in terms of assets) with the leverage ratio being the only difference, a before-debt criterion must be established. For this purpose, a broad product price margin will be assumed. Any price set by the firm below \( p_A \), down to \( p_L \), will result in a profitless all-equity expansion of capacity. The firm could undertake this expansion, but since it will not change the stock price, it decides against doing so. It is this all-equity financed, marginal investment case which will be used as the criterion to compare with the debt case. Representing the market value of this all-equity firm with a prime, we have:

\[ V' = S_A = \frac{(1 - \pi)[p_A E(Q_A) - E(C_A)]}{R_p} \]

\[ - \lambda \text{cov} \{(1 - \pi)[p_A Q_A - C_A], R_A \} \cdot R_p \] (19)

and the profitless expansion generated by the product price reduction can be represented as:

\[ S_A - S_A = dI \] (20)

Where \( dI \) is the cost of the expansion investment financed with equity.

The implication of the broad product price margin assumption leading to (20) can be observed by substituting the RHS of (10b) and (19) into (20) to yield:

\[ (1 - \pi)[p_A E(Q_A) - p_A E(Q_A)] = (1 - \pi)[E(C_A) - E(C_A)] + R_p dI \]

\[ + \lambda(1 - \pi) \text{cov} \{(p_A Q_A - C_A), R_A \} - \text{cov} \{(p_A Q_A - C_A), R_A \}. \] (21)

It is difficult to estimate the change in risk the lowering of price and increasing of capacity would produce. As far as the output, \( Q_A \), sold previously at \( p_A \) and the associated costs, \( C_A \), are concerned, a lower price should tend to make them less susceptible to fluctuation. The incremental output and costs, \( Q_B - Q_A \) and \( C_B - C_A \), should be more risky than the previous average \( Q_A \) and \( C_A \). The net effect of these two factors on the change in covariance is not immediately predictable. Nevertheless, for illustrative purposes only, we shall assume that \( dI \) is similar to a nondiversifying, scale-changing investment so that:

\[ \frac{\text{cov} \{(p_A Q_A - C_A), R_A \} - \text{cov} \{(p_A Q_A - C_A), R_A \}}{dI} \]

\[ \frac{\text{cov} \{(p_A Q_A - C_A), R_A \} \cdot S_A}{S_A}. \] (22)

Equation (22) merely states that the change in covariance to the shareholder due to the incremental investment is equal to the previous average covariance per dollar invested. Then if (22) is accurate, the implication of the assumption, (20), is that the marginal revenue curve is equal to the long-run marginal cost curve over the range bounded by \( p_A \) and \( p_B \). This result is observed by noting that the LHS of (21) is the marginal revenue curve and the RHS of (21) is the long-run marginal cost curve with average capital costs included (the last two terms). This assumption then has the further implication that the firm has decreasing long-run marginal and average cost curves since the marginal revenue curve is declining over this range.

The other plausible case is that the LHS of (22) is less than the previous average covariance per dollar invested. In this case, the declining marginal revenue curve can be less than the long-run marginal cost curve (with average capital costs included) for (20)
to hold. Then the decreasing long-run cost curves are not a necessary requirement for the profliteless expansion assumption.

Having discussed our before-debt criterion, we shall visualize next management substituting debt for equity—the market not having anticipated this change. The regulatory authorities immediately force the product price to $p_a$ to keep after-tax profits plus interest a constant according to (11). From Section III, it was demonstrated that this lower product price will not decrease stockholder wealth, but instead increase it by $\delta$.

One of the disadvantages for the firm to lower the product price on its own is that the previous output sold at $p_a$ must now be sold at $p_a$. This can be observed from the marginal revenue curve, or the LHS of (21), since:

\[
(1 - \pi) [p_aE(Q_a) - p_aE(Q_a)] = (1 - \pi) [p_aE(Q_a) + p_aE(Q_a) - p_aE(Q_a)]
\]  

But regulation has lowered the price to $p_a$ on $E(Q_a)$ such that the shareholders' wealth has not decreased. This is, in effect, cancelling the first and the third terms on the RHS of (23) and leaving merely the second term. Since this second term is larger than the previous marginal revenue, and the previous marginal revenue resulted in a profliteless expansion, the criterion for capacity expansion has been relaxed. Therefore, any capacity expansion at this lower price will increase shareholder wealth rather than keeping it the same, the important point being: this benefit should be attributed to leverage.

We should also recall that this capacity investment, $dL$, is to be financed with equity only. All of the firms' outstanding debt has already been issued.

Using the subscript $C$ to represent the firm after it substitutes debt for equity, the authorities lower the product price to $p_a$, and expansion by $dL$ has been completed, we have from the market equilibrium risk-expected return relationship:

\[
E(R_C) = E(p_aE(Q_a) - E(C_a) - R_aD) = R_a + \lambda \text{cov}(R_a, R_a)
\]  

and since:

\[
\text{cov}(R_a, R_a) = \frac{1}{S_o} \text{cov}[(1 - \pi)(p_aE(Q_a) - C_a), R_a]
\]  

(24) can be rearranged to yield:

\[
S_o = \frac{(1 - \pi)[p_aE(Q_a) - E(C_a) - R_aD]}{R_a} - \lambda \text{cov}[(1 - \pi)(p_aE(Q_a) - C_a), R_a] + \lambda \text{cov}[(1 - \pi)(p_aE(Q_a) - C_a), R_a] - D
\]  

We can now relate (25) to our before-debt reference, (19), since the product price and scale are comparable, only the leverage ratio differs. Therefore subtracting $D$ from $S_o$, we have as the debt effect:

\[
S_o - (S_a - D) = \frac{(1 - \pi)[p_aE(Q_a) - E(C_a) - R_aD]}{R_a} - \lambda \text{cov}[(1 - \pi)(p_aE(Q_a) - C_a), R_a] + \lambda \text{cov}[(1 - \pi)(p_aE(Q_a) - C_a), R_a] - D
\]  

Of the two important valuation parameters, covariance and expected return, it is observed that the covariances cancel each other. We not only have standardized for product price and scale, but also for risk. This leaves only expected return as being important. Investigating (26) further, we have:

\[
S_o - (S_a - D) = \frac{(1 - \pi)[p_aE(Q_a) - E(C_a) - R_aD]}{R_a} - \frac{(1 - \pi)[p_aE(Q_a) - E(C_a)]}{R_a} + D
\]  

\[
S_o - (S_a - D) = \frac{(1 - \pi)R_aD + D}{R_a}
\]  

\[
S_o - (S_a - D) = \pi D
\]  

(26a)
and the tax subsidy for debt financing has reappeared. Managers of regulated companies, it seems, should act no differently with respect to leverage policy from their counterparts in nonregulated companies.

C. Further Regulation Required?

The final task is to analyze whether the increased capacity and stockholder wealth will lead to a further product price adjustment by the regulatory agencies. If not, the MM debt proposition, as shown by (26a), is a permanent, equilibrium result. But if there is need for another price reduction, then the premium for debt financing would fall between δ and πD.

We can observe that the regulated rate of return (τ) was earned on book assets (A) before debt was added, and also immediately after debt was substituted and the product price reduced to p₀ (but before expansion). This implies:

\[
\frac{[p_0E(Q_a) - E(C_a)](1 - \pi)}{A} = \frac{[p_0E(Q_a) - E(C_a) - \rho D]}{A}(1 - \pi) + \rho D = \tau. \tag{27}
\]

After expansion, no further regulatory action is required if the ratio of added after-tax profits to the cost of the investment is exactly equal to the regulated rate of return. That is, if:

\[
(1 - \pi) \left[ \frac{p_0E(Q_a) - E(C_a)}{dt} \right] = \rho. \tag{28}
\]

In order to determine what conditions would lead to (28), we can make use of the information that the expected marginal rate of return on the investment dt, due to a voluntary produce price reduction by the all-equity firm, was not greater than the cost of capital (ρ). Otherwise, the firm would have lowered the price to p₀ on its own. Maintaining the assumption of a profitless expansion at the margin leads to:

\[
(1 - \pi) \left[ \frac{p_0E(Q_a) - E(C_a)}{dt} \right] = \rho. \tag{29}
\]

The LHS of (28) is seen to be greater than the LHS of (29) since p₀ is larger than p₀. This increase in the marginal rate of return obtained from debt and a forced price reduction (relative to a voluntary price reduction) is the debt tax subsidy which appeared in (29e). Thus, for the regulated price p₀ to be stable, τ must be larger than the cost of capital. The exact relationship required for a regulatory equilibrium, and therefore the full tax subsidy for debt, is:

\[
\tau = \rho = \frac{\pi D}{dt}. \tag{30}
\]

product price on its own to induce a greater demand even if this action would have resulted in a capacity investment with a rate of return less than the firm’s cost of capital. As long as τ is larger than ρ, as the empirical evidence appears to indicate, a well-established argument points out that any investment so matter how unprofitable (even with a negative rate of return at present prices) will eventually yield τ since the regulators will adjust prices to guarantee it. And because τ is larger than ρ, any unprofitable project will eventually increase stockholder wealth.

We are not resorting to this line of reasoning in this study, assuming that short-run decreases in stock prices, caused by investments with rates of return less than ρ, before the authorities act to guarantee τ, will be enough to dissuade management. In any event, if we assume that regulators will assure τ on all projects that yield less than τ at present prices, the entire concept of equilibrium becomes meaningless. Since the firm can raise capital at ρ, it rationally should not stop investing until the entire economy is owned by regulated firms, or at least until opportunities with risk-adjusted ρ equal to τ are exhausted.

To derive (30), first add and subtract \( \frac{(1 - \pi)p_0E(Q_a)}{dt} \) to the LHS of (29). Then we have:

\[
(1 - \pi) \left[ \frac{p_0E(Q_a) - E(C_a)}{dt} \right] + \frac{(1 - \pi)p_0E(Q_a)}{dt} = \rho. \tag{30a}
\]

For (29) to hold, we can substitute τ for the first term in (29a):

\[
\frac{(1 - \pi)p_0E(Q_a)dt}{(p_0 - p_0)} = \rho \tag{30b}
\]

and substituting (11a) in (29b), (30) is obtained.
Considering the $p$ reported by MM in their empirical study of the electric utility industry\textsuperscript{24} and the general magnitude of $r$, the condition expressed in (30) may not be violated. Just how large the difference between $r$ and $p$ must be for a regulatory equilibrium, however, depends upon a number of implicit factors. The larger the debt, $D$, the larger must be the product price reduction according to (11) or (11a). And the larger the decrease in product price, the larger the increase in the quantity of output, measurable by the elasticity of the demand curve. Finally, the larger this output increase, the larger will be the new investment required, measurable by the production function. That the RHS of (30), after this process is completed, turns out to be exactly equal to $r$ minus $p$ is unlikely. In addition, the larger the output increase, the more implausible the profitless product price margin assumption becomes. Nevertheless, as long as this difference ($r - p$) is positive, some portion of the tax subsidy for debt financing will be permanent. And it should be remembered that in Section III we demonstrated that a minimum premium of $\delta$ will be obtained from risk reduction alone regardless of this more elusive elasticity effect. Empirical results for specific firms on their demand elasticities and production functions are required before the exact premium for debt can be estimated.

V. Conclusion

When we take into consideration the effect of leverage (and required regulation) on both the shareholders' risk and the capacity expansion induced by the lower product price, it appears that the utility stockholder obtains roughly the same benefit he would have received without any attempt by the authorities to neutralize the debt tax subsidy. Therefore, the MM results should not be criticized for grossly misspecifying the effects of leverage.

It is also recognized that the assumptions underlying the valuation model presented here may be disputed. But regardless of how risk is measured, it cannot be ignored. With a different model, the leverage effect on risk and capacity expansion may not correspond precisely with our results. Nevertheless, that debt, within reasonable bounds, benefits the shareholders of regulated utilities in a corporate tax world appears to be difficult to dispute.

As a final note, a few obvious comments on the policy implications of the results will be made. As far as managers of private utilities are concerned, a sizable bonus to the shareholders is available through debt financing as long as the regulatory authorities do not consider the risk and elasticity effects. Conversely, as far as regulators are concerned, if this debt tax subsidy is truly meant to be passed on to the consumer, the effects of lower product prices on risk, elasticity, and investment must be taken into consideration. Prices must be adjusted so that the allowed rate of return is earned after taking into account the economic effects generated by the initial price change.

A much less technical alternative is available to the agencies if it can be assumed that the consumers of the products of private utilities are representative of the taxpayers. A tax (not deductible for any other tax), equal to the federal corporate tax rate ($\pi$) times the net interest payments ($R_jD$), levied by the taxable authority most closely representing the utility's consumers, would effectively neutralize the federal government debt tax subsidy. The regulators should attempt to keep, then, the ratio of after-tax profits plus interest minus the above special tax to book assets a constant. This ratio will not change if the firm merely substitutes debt for equity, or vice versa, as long as the proposed tax is calculated according to the formula given above. The purpose is to pass on the debt tax subsidy without affecting product prices. Of course, this special tax cannot be redistributed to the consumers at the end of the year; it would then have the same effect as a price reduction.

Comment

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The role of the discussant is on the whole a pleasant one. He can ask questions he doesn't have to answer, and make those comments, so distressing to the principals, that are "intuitive in nature." The papers presented by Professors Gordon and Hamada provide interesting contrasts in the approach to the problem of utility regulation. More than the approach differs, however, for the two authors have quite different opinions regarding the very fundamental concept of valuation. I found both papers interesting and will discuss each in turn. I will not cover all of the issues raised for they deal with, among other things, two of the most troublesome and controversial issues in the field of finance—debt and dividend policy.

Professor Gordon's statement of the problem of utility regulation is lucid and to the point. Investors in utilities require returns that are, for the risks assumed, in line with those available in other investments. If utilities are to obtain funds from private sources, it seems logical that the returns they pay should be determined from the security markets that investors use. The problem is, how can the appropriate returns be determined?

The familiarity of the stock valuation model Professor Gordon uses is clear evidence of how much he has contributed to valuation theory. The logic of the approach used is widely accepted and the explanatory variables he selects are familiar ones. The success of a specific model such as Gordon presents, depends both upon the identi-

fication of the proper explanatory variables and the specification of the inter-relationships that exist between them. Success is measured by the predictive ability of the model.

My comments will deal with both the explanatory variables used in the model and the inter-relationships specified for them. I think tax advantages of capital gains may make growth more valuable for public utilities than Gordon acknowledges. Even if one accepts the statement that a dollar of dividends is worth more than a dollar of growth because of the uncertainty attached to growth, the fact remains that at any positive tax rate, the after-tax returns to the stockholder of a dollar of growth would always be larger than a dollar of dividends once the dividend exclusion limit has been passed if the growth results in a realizable long-term capital gain. If the higher after-tax returns on capital gains more than compensate the investor for the added uncertainty of growth, then a high payout ratio might raise rather than lower the return required on equity capital. My knowledge about regulated utilities is limited, but I would expect that some companies are so situated that investors would be highly confident of earnings growth if they felt regulatory authorities would allow such growth.

Professor Gordon acknowledges this possibility, but properly replies that his evidence does not support this conclusion. The trouble is that his evidence is not conclusive. While multiple regression analysis may serve as the social scientist's substitute for the controlled experiment, it is, at best, an inferior substitute. I do not think it necessary to cite the recent literature relevant to this area; suffice to say that some individuals have reached other conclusions and the matter is still in dispute.

In his short book, *The Art of Scientific Investigation*, the English scientist W. J. B. Beveridge states, "No one believes a hypothesis except the originator and everyone believes an experiment except the experimenter." Unfortunately, in finance, it may be that no one believes an experiment (done with multiple regressions) including the experimenter. Certainly the academic journals contain many studies using multiple regression that present confused and conflicting results. You have only to read the first few pages of Professor Hamada's paper to verify this fact.

My second point concerns risk. In the all-equity case presented by Gordon, the risks for a regulated utility would seem to be of two
kinds. First, regulated utilities are subject to the risk that the demand for their product will decline and the volume of sales will fall. Secondly, utilities are subject to the risks inherent in regulation. Regulatory authorities may establish rates that provide earnings that are lower or higher than those required for equity capital. Higher rates than required would lead to windfall gains for investors, and lower rates to losses, as the market prices adjusted to provide the appropriate risk-return combinations for the assets. Consider the case where a regulatory commission suddenly altered its regulatory policy and decided to periodically lower rates so that future earnings would fall below the minimum required by the investors. The result of this action would be to cause subsequent declines in capital values in order to restore the necessary return to investors. At some point investors would anticipate the rate reduction and the required return (cost of funds) would rise as a consequence.

If the regulatory action became predictable, future rate reductions would be discounted in the price of the stock and no further losses would occur. If regulatory boards subject investors to greater risk, investors will demand a higher expected return on their investment, and to the extent that regulatory actions increase the variability of the returns, the cost of funds becomes a function of regulation.

The second point can now be related to the first. The crucial question is how much of the variability of growth is due to basic economic risks and how much to regulatory risks? I cannot, of course, answer the question, but since I am addressing an audience that includes both the regulated and the regulators, I can suggest that if the principal risks is one of regulatory action, then regulatory bodies have the power to reduce this risk and to make growth more certain. The policy implications are clear. In situations where regulatory risk is paramount, then public utility boards should try to reduce the uncertainty of growth. To the extent that they are able to do this, they may be able to reduce the required rate of return. As a corollary action it might be desirable to increase earnings retention and to allow capital gains to replace dividends for stockholders.

The recent experience of AT&T illustrates the problem. As the price of the stock has declined, the dividend yield has risen and (it seems) the possibility of capital gains has lessened. At the present price of AT&T stock does the combination of a higher dividend yield and lower capital gains potential imply that investors require a higher or lower return than they would if the reverse situation occurred? My suggestion is that if the real risk is regulatory risk (the economic risk is negligible), then regulatory bodies should be able to reduce the uncertainty of growth, and by definition, the cost of funds. If this was done for AT&T, for example, then capital gains would be a better coin with which to pay investors than dividends, and a low dividend payout-higher capital gains combination would lower the cost of capital.

So you will not recoil in horror at the thought of the effect of a reduction in dividends for AT&T on the price of the stock, I hasten to add that as a practical matter a stated policy would have to be established that would provide for no increase in dividends as earnings increased (retention would rise), and investors would have to believe that the regulatory commission would allow future earnings growth to reflect earnings retention.

To this point I have ignored transactions costs and those widows and orphans whose very lives are dependent upon the income from their small holdings of stock. My comments upon this problem are two-fold. First, I have some doubts about the importance of this group of stockholders, and second, as their participation in stock investments becomes more and more institutionalized through growth of investment companies, pension funds, and similar institutions, the importance of transactions costs diminishes. Such institutions are able to pass both capital gains and dividends on to small investors efficiently and periodically. While the tax advantage of capital gains over dividends may not exist for some institutions, other institutions are primarily interested in capital gains.

Finally, the problem of obtaining proper coefficients for a model is a difficult one. Relationships estimated from sample data do not always apply to a particular company or even to groups of companies. Possibilities exist that relationships will change over time. Such problems do not mean models are not useful, but rather that we should retain some reservations about the results we obtain from their use. In Gordon’s model, I am disturbed because he found the inclusion of risk did not improve the explanatory power of his model. If risk is excluded, why is a dollar’s worth of growth more uncertain than a dollar’s worth of dividends? The risk that makes the growth uncertain must also be relevant to valuation. While I will not discuss the means by which Gordon arrived at the coefficients used in his valuation
equation, I will say that after examining his procedures, I would be extremely reluctant to use his model for a specific company. Gordon found that his measure of business risk was statistically insignificant for AT&T, but this does not establish that stockholders regard AT&T as not having any business risk. The results may simply reflect the inadequacy of the model. In fact, the comments made regarding his treatment of business risk can be extended to the values he found for his other variables.

Professor Hamada’s paper attempts the ambitious task of putting the MM propositions in the framework of a static two-parameter model and using the model to analyse the effect of leverage and corporate taxes on shareholders of regulated utilities. Since the two-parameter model Hamada uses was developed from the seminal work in portfolio analysis done by Markowitz, I suppose we should refer to the results of the combination as the Triple M. I leave my fellow discussant and authority on mergers, Professor Weston, the task of determining whether or not the effect is synergistic. The direction of the paper is the right one. I think the problem of risk that is so pervasive in finance must be dealt with directly. I applaud Professor Hamada’s efforts to do so and greatly admire the way he has developed his model.

The paper I worked with was a rough first draft and included a warning that it might contain errors. It did, and I mention this only because my corrections have not been approved by the author. I do not feel that the corrections substantially affect the author’s argument and I see no point in enumerating them. Other than some confusion regarding definitions, I have no quarrel with the mathematical development of his argument.

I have considerable reservations about the results the author obtained. The presentation of an argument about an essentially dynamic process is severely restricted when it is presented in a static framework. The argument is also difficult to follow for the assumptions of the model imply but do not clearly establish the relationships between the probability distributions of the portfolio analysis and the analysis involving price and quantity changes in output due to regulation.

Sir Sydney Smith, the noted nineteenth century English wit and one of the best (or worst) creators of puns, was walking down the street with a friend when he saw a woman leaning out of the window on one side of the street arguing violently with a woman leaning out of the window on the other side of the street. Smith quickly remarked to his friend, “Those two women will never agree, they are arguing from different premises.” With the possibility in mind that Professor Hamada and I are on opposite sides of the street, I would like to examine some of the implications of the assumptions made in his basic model. Assumption 4 specifies that assets of the corporation produce an uncertain earnings perpetuity, the random variable $X$, defined as earnings before interest and taxes but net of depreciation. Assumption 5 specifies that the corporation can borrow (or lend) at a riskless rate of interest. No limit is placed on borrowing.

The interesting question is how a corporation whose income is a random variable $X$, an uncertain earnings perpetuity, can borrow without limit at $R$, the risk-free rate of interest. Three possibilities occur to me. One possibility is that the range of the random variable $X$ is limited and can never be less than the interest the corporation must pay. Such an assumption would not be very useful, however, for if the corporation issued debt equal to 99.99 percent of its assets, this would mean that a certain return equal to the pure rate of interest would be assured and, at the limit, the total assets would always return a minimum rate equal to pure rate of interest. Since firms would have the same assets with an all equity capital structure, we would not be dealing with uncertainty at all, but with certainty.

A second possibility is that the firm always maintains a cash balance equal to the interest it must pay on its bonds. This assumption cannot be used, for it would contradict another assumption of the MM formulation, that the financing and investment policies of the corporation are independent. As a matter of record, however, if modified, it seems a reasonable assumption. Firms with large amounts of debt requiring periodic cash outflows may in fact carry larger cash balances. The MM assumption itself may be suspect.

A third possibility, and it is the one that Hamada adopts, is that the corporation can issue additional debt or equity if the value of the random variable $X$ in any period fails to provide sufficient funds to meet interest payments. From a practical viewpoint, the possibility of a corporation facing financial difficulty issuing additional debt at the risk-free rate seems somewhat remote. It would be equally difficult to sell new equity in such a situation. It seems to me that with this assumption we have an implied limitation on the range of the
random variable that is equivalent to our first possibility. If we had a corporation financed (almost) completely with debt, there would have to be, in order to borrow at the riskless rate, a certain return in assets in some long-run sense equal to the risk-free rate. I am not sure what the statement "If a firm does go into bankruptcy, it is assumed it would have done so regardless of its capital structure" means. A firm without debt cannot, in the formal meaning of the word, go into bankruptcy. Furthermore, there can be no possibility of bankruptcy if a firm borrows at a risk-free rate. The effect of Hamada's assumptions on the range of the random variable should be specified for the model and its implications made clear. If he wishes to consider leverage only over some relevant range, then his model should indicate this range. The risk in Hamada's model is the risk of the variability of the earnings on the equity. No risk exists for bondholders since by definition they lend to the corporation at $R_0$, the risk-free rate.

The proof of the MM propositions with the model Hamada uses restates a familiar argument. The central point in the dispute regarding the effect of debt on the value of the firm is whether individual leverage is a perfect substitute for corporate leverage. Hamada makes them perfect substitutes by assumption since his model assumes that both investors and corporations can borrow at the risk-free rate. Once the equilibrium relationship $E(R_t) = R_t + \lambda \sigma^2(R_t, R_m)$ has been derived, investors can alter their risk-return combination by borrowing or lending at the risk-free rate, given the market price of risk $\lambda$, where

$$\lambda = \frac{E(R_m) - R_t}{\sigma^2(R_m)}.$$  

If corporations can also borrow and lend at the risk-free rate, they can alter risk-return combination in the same manner since $\lambda$ is assumed to be constant for all securities. Hamada has not really dispensed with MM's arbitrage; he has merely insured that it will work perfectly.

Hamada's analysis is quite ingenious. The use of comparative statics as a framework weakens the analysis, but it may be a necessary simplification. The only way to determine whether Hamada's model has useful implications or is merely an interesting exercise is to test it. In this particular case the testing has preceded the model. MM's study showed a premium for debt due to a tax effect that Gordon pointed out did not exist because it was removed by regula-

tion. MM countered that it did exist because regulation was ineffective. Now Hamada states that he is willing to concede that regulation may be effective in some conventional sense, but a premium for debt still exists because regulation is not effective when shareholders' risk and capacity expansion induced by lower product prices are considered. Hamada concludes that MM's results should not be criticized for grossly misspecifying the effect of leverage.

The particular results Hamada obtains are a function of the assumptions he makes. He candidly points out, however, that a different model might obtain different results. Hamada admits that the premium for debt which he establishes is, if I may use the expression, somewhat elastic. We have now added to the difficult problems of testing faced in prior studies of the effect of debt on the value of public utility companies, the additional complication that we are not sure what value we should look for in our testing. The same premium for debt cannot support both the traditional and the MM argument. One is reminded of the difficulty John Hunter encountered when he deliberately infected himself with gonorrhea to find out if it was a distinct disease from syphilis. The material he used to inoculate himself also contained the syphilis organism. He contracted both and established that both were manifestations of the same disease. Although the problem of experimental error is as distressing in finance as in medicine, we should find some solace in the fact that our discomfort will not be physical as well as mental.
increases the price of the stock. This is not necessarily or universally true. It is probably true today, and probably has been for some time, as the semantic lure of “growth” coupled with the benefits of a favorable capital gains tax acted to favor growth as against current dividends. Consequently the capitalization rate is an increasing function of growth in dividends per share—the “bird in hand” story.

(2) The capitalization rate increases with the investment rate, i.e., the rate at which additional equity capital is sought from the market. The appetite for new issues and the alleged shortage of the supply of common stock in the face of an increasing demand by funds, institutions, and investors in general, raises some doubt as to the validity of this, the second key assumption.

But even assuming the validity (at least currently) of these basic assumptions, I suspect that the estimation of the $\alpha$ coefficients and exponents in Equation (7) will be difficult, and the confidence limits none too good. I suspect that estimating $\alpha_3$, the exponent of the growth parameter is crucial, and that relatively minor variations in $\alpha_3$ will cause major variations in the end result.

I also suspect that all of the $\alpha$ values vary over time. The combination of the suspected sensitivity of the $\alpha$ values, and the suspected fluctuation over time, might well make the model difficult to apply.

Then I have still another difficulty. As the actually realized rate of earnings rises above the market capitalization rate—i.e., as the ratio $r/k$ increases—so does the market price of the stock; and consequently $s$—the fraction of funds raised through stock financing that accrues to the benefit of existing shareholders—also increases. Thus as the realized rate of earnings goes up, more of the requisite financing should be done via the sale of stock, and less via retained earnings, since the rate of growth of total capital is an externally fixed amount.

However it should be noted that retained earnings are “tax-free,” whereas the subscription of additional stock calls for “tax-paid” dollars. There may therefore be a preference for a higher earnings retention.

Does the model account for this effect? That is, does the “optimum combination,” i.e., the maximized $P_0$, take this tax factor into account? At the moment I fail to see how it does. But despite my question as to the practical workings of the model I wish it well.

The idea that the cost of capital is part and parcel of the theory that seeks to explain the price of securities, while rather obvious to the economist, seems to have a tough time being accepted by the prac-
tactical man in finance. Studies of the kind presented here by Professors Hamada and Gordon will speed the day of recognition.

Professor Hamada intimates that the only point at which his paper may be criticized, if at all, is not in the mathematics, but in the assumptions. And essentially that is a rather fair self-appraisal.

It is of interest to note that while Professor Hamada recognizes that there can be several measures of "risk," he nevertheless accepts the standard deviation of the rate of return as the sole measure. This crucial assumption is open to question. For example, a stock with cyclical earnings, i.e., where increases are each followed by decreases, presents a hazard different than one for which a whole series of declines may occur. The problem would, of course, be ameliorated if we assume a long-term horizon, with an investor presumed to hold stock for a "long" time. But the ability to get out of an investment at favorable (or not too unfavorable) terms is a very important consideration.

The trend in earnings, i.e., whether we have a rising, flat, or falling trend is of importance, and the effect of trend is not fully comprehended in the estimated level of earnings—Hamada's second factor entering into the assessment of a portfolio. An investor may arrive at the same estimate for rate of return, with the same standard deviation, for a "flat" trend as well as for a rising trend. Yet these would not constitute similar risks.

Basic theory, I have with the assumption that the mean and standard deviation of the rate of return fully determine the relative values of investment, may not be so much with the theory, as with its verification; or better, quantification, especially in the regulated utility sector. All other things being the same, a given level and pattern of earnings is of higher "quality" and hence value, if it is derived from lower rather than higher utility rates. For example, if company A earns \( r \) percent with a standard deviation of \( \sigma \), and company \( B \) earns the same, but the electric rates charged by \( B \), whether due to efficiency (supply) or market (demand) factors, are higher, the market value of \( A \)'s securities will be higher.

Another example; both the level and standard deviation will of necessity be based on the extrapolation of past experience, perhaps

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1 I wonder, does Professor Hamada use "risk" in a deliberate effort to maintain Frank Knight's distinction between "risk" and "uncertainty"? And if he does, should he not be talking of "uncertainty"?

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not a cold numerical extrapolation, but an extrapolation none the less. One can envision the same average rate of return and standard deviation, for each of two companies, but one derived from a rising trend whereas the second is based on a flat or falling trend. It would be difficult to conclude that these are equivalent investments.

Now having raised some objections as to one assumption, allow me to support another. Professor Hamada assumes that the risk of purchasing power fluctuation "will be assumed to be very small relative to the variability risk on equity investment." I had occasion some years ago to make a study of the effect of the rate base on the cost of equity, i.e., would the use of current value, rather than an original cost type of rate base, affect the cost of capital. Two groups of electric utilities were selected. They matched each other closely as to capital structure, dividend payout policy, size and type of market, means of power production, and the like. The major difference was the type of rate base used by their regulatory commissions. The period studied was 1948 to 1957 when existing and continuing inflation could be assumed to exert a major force. The difference in the cost of equity as between these groups was minor, in fact negligible.

I now turn to a third assumption, and again one that affects the verification of the theory rather than its development; the assumption that regulation is continuous and effective. This assumption bears importantly on the validity of the MM hypothesis, and whether or not the effect of income taxes would invalidate their thesis that the capital structure was neutral with respect to the cost of capital. Gordon found, on the basis of the MM study of the cost of capital to electric utilities, that leverage had an effect on capital structure, and that for utilities regulation supposedly took the tax-subsidy from the company and promptly passed it on to consumers in the form of lower rates. But, as MM pointed out, regulation is neither immediate nor continuous, and that is true. But what is even more disturbing, from the point of view of statistical verification, is that the efficiency of regulation (i.e., the extent to which the tax subsidy is passed on) varies from commission to commission; the regulatory lag is different, and the strictness of regulation varies.

For example, many commissions regulate on an original cost basis, i.e., they allow that they allow a return equal to the cost of capital times the net original, nominal dollar investment. If they did so, then the market prices of the common stock should approach their book
values. Yet we find not only substantial divergences from book values, but also substantially different divergences as among companies. This situation, it seems, raises serious questions as to the homogeneity of data used in cross-section analyses of the kind used by MM and others.

In sum, while I have no great problem about accepting Hamada’s mathematical models, I do have some serious reservations about the validity of the assumptions.

Comment

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A manager of business has an objective to perpetuate that business. The business must be profitable to survive in our type of economy. A utility business, operating in at least a quasi-monopolistic climate, has added responsibilities. These include an obligation to serve all who request service if it can be reasonably supplied, to serve its customers without unreasonable discrimination, to have rates which have been judged reasonable by regulatory authorities and have customer acceptance, and to have adequate and safe facilities. This means that a utility has broader responsibilities than most businesses that carry over to the consumer and general public. These obligations are in addition to the responsibilities a utility has to its employees and stockholders. Utility managers recognize and accept these added duties.

Comment on Gordon’s Paper

Dr. Gordon seems to infer that a utility management would operate to maximize the return to its stockholders at every opportunity were it not for a regulatory agency. It is true that regulation is required where there is some absence of competition. I believe that most of our present day utility companies, carrying on their business with broad ranges of that business subject to effective competition from other services, would not operate much differently without regulation. In other words, good regulation will result in operations that bring
the best balance between the interests of the investors, the customers and the public generally, as well as provide good management in the long run.

Professor Gordon states that utility management decides to make added investment on the basis of the projected effect it might have on the price of the company's stock. The companies I know decide whether or not to make an investment on the basis of the return that can be expected. Even here there are limitations since certain investments must be made. At the same time, I recognize that the sum total of all of our decisions will ultimately be reflected in the market place. We do not constantly watch the price of our stock in an attempt to determine the effect of each of our decisions as Professor Gordon suggests is the case. Rather, we attempt to do the best job we can in running the business by using every tool we can to make sound decisions. It is hoped that the result of these decisions will produce reasonable earnings per share for our stockholders. If this job is done satisfactorily, adequate rewards should be reflected in the market place.

In our 1967 annual report to stockholders, our president, Marvin Chandler, talked about the frustrations we are having: in spite of continuing good earnings, our stock is selling at a very low price compared to what it had been several years ago. In the chief executive report, Mr. Chandler states "It makes me wonder why six years of good progress, including a gain of over $1.00 a share in earnings and an increase of more than 60 percent in dividends, are not more favorably regarded by investors." Of course, most utilities have this same situation.

Professor Gordon states that "a utility management takes as given the rate of return on assets the regulatory agency allows the utility to earn." I would like to point out that this is true only if the utility management believes that the return is within a range of reasonableness. If not, management has an obligation to pursue the matter further with the commission, or if no satisfaction is obtained, to seek relief from the courts.

In his paper, Gordon says that "the return investors require on a share increases with the expected rate of growth in the dividend." This appears to be the same as the definition of the term which he used in his testimony in the AT&T rate case. There he defines rate investors require on a share to be the sum of the current dividend expressed as a percentage of the stock price, plus the

vestor's expected percent of growth in the price of the stock. This expectation is translated into an earnings-price ratio. Of course, this percentage is not the rate of return for the utility but only a figure expressed in terms of the market price. The better the outlook for a company the lower this percent is likely to be.

Professor Gordon goes on to state that the expected rate of growth in the price of the stock is equal to the expected rate of growth in its dividends. He further maintains that since the investor is buying future dividends, the discount that equates the dividend expectation with the stock price is the rate of return that investors require. It does not take you very long to come to the realization that the lower the price of the stock, the higher the discount rate will have to be to equate the dividend expectation to the price. Of course, this says nothing about the difficulty of predicting the dividend to infinity. It would seem to me that the higher the price an investor is willing to pay, the greater the return expected in either dividend or capital appreciation, or both.

Professor Gordon stated that the rate of return at which a share sells is an increasing function of risk. Therefore, the earnings price ratio will increase, that is, the stock price will go down, with an increase in the company's retention of earnings. Again, it may be that we are working within a limited range, since the market place requires a certain amount of payout. Payout depends on the company's need for funds also. If the company is able to reinvest earnings at a reasonable rate, the investor may be more than satisfied and other potential investors might bid up the price of the stock.

There is nothing precise about the effect on the price of the company's stock as a result of earnings growth, payout ratio, capitalization structure, and the like. However, some examinations of these changes are made as if they had precision without qualification. We should recognize the limitations these studies have. We should also recognize that there are certain limits as to what is and what is not acceptable to the investor. Just because it can be proved that there is correlation between certain items, this does not mean that changes can be made without qualification.

In conclusion, let me say that the management of a utility company attempts to maximize earnings on the investment. In doing so, a utility manager realizes that if he is too successful, rates will be reduced. Many of us think that this is a good thing to do. Low rates
allow a company to be more competitive and give a better opportunity to perpetuate the business. If the earnings are good, a reasonable dividend can be maintained and the stock might increase in price also. The stock price increase, we hope, will be at least equal to our additional earnings made on the amount of earnings retained in the business. On the other hand, there are many things that can affect the price of a stock. For example, at the present time, utilities are somewhat out of favor with the investor. This has been reflected in the overall averages of the utility prices. Several years ago, the very opposite was true. The utility stocks were selling at very high prices. If the regulatory agency allows the utility an opportunity to earn a fair return on the value of its property committed to public use, it will have done its job.

There is no simple mathematical formula to determine the return required or the portion of the capitalization that is in common equity. In any case, we should never confuse the term “rate of return” as the percent earned by the company on its rate base as being synonymous with the rate of return a new investor will accept in the second-hand market of shares traded on a particular day.

**Comment on Hamada’s Paper**

Utility companies have large amounts of debt in their capital structure. It has to be obvious that this is acceptable to the investor, otherwise the debt could not be sold at reasonable rates. It has to be equally evident that no company or utility commission can control the demands of investors. With this thought in mind, I will make several comments about the effect of leverage and taxes as I see it.

First, and most important, a company, utility or otherwise, can set the minimum amount it will trade on its equity but it cannot set its own limits as to the maximum. For example, if a utility company were to decide that by having a 95 percent debt and 5 percent equity capitalization, it would increase its earnings, this would never be accomplished. The market would either not buy the securities at any price, or would make the price so prohibitive that the company would not undertake the sale. My point is that there are limits on the reasonableness of capitalization for any type of business. Moreover, the range is limited if you want to maintain a certain rating for your debt issues. Also, the percent of the total capitalization that can be in debt securities is not the same for a manufacturing company as it is for a utility company.

Second, the final determination for the percent of debt that a particular company has outstanding belongs to management. In determining the amount of risk to be assumed, the manager must consider protection for the stockholder through bad times as well as during good times.

Third, the one principal advantage of having debt in the capitalization is that it reduces federal income taxes. The company gets this advantage, not the bondholder.

Fourth, if we assume that (1) a utility can raise the percentage of debt in the capitalization by selling added debt at the same cost as the presently imbedded cost, and (2) the revenue received on the added investment is proportionally equal to the present revenue; then (a) the total revenues can be reduced by the amount of the federal income tax reduction, (b) the rate of return on the common equity will be increased, and (c) the overall rate of return can remain the same.

Fifth, all debt adds risk to the enterprise. If the common stockholder assumes more risk by having debt in the capitalization, he should be compensated for it. In pure theory, for each dollar of added debt, the common stockholder should have a higher return. If there were to be no compensation, the common stockholder would not be very happy.

Sixth, it would be unreasonable, in my opinion, to say that a utility today should be completely without debt. Just what the maximum or minimum amount any particular company should have cannot be determined by formula. If it can, the formula should be developed that would tell us how to have the maximum debt outstanding during good times with the right price, and the minimum, if any, outstanding during the periods of low business activity.

The fact that there is a benefit in having debt in the capitalization does not solve the manager's problem as to the proper capitalization for his company. Also, there is no dispute that commissions recognize that rates to customers can be less if part of the capital is provided by debt. The ability to maximize this advantage for the future, not the past, is where judgment comes into play. The reason why judgment is required is because of the vagaries of the future. Since it is the manager's job to reasonably protect the investment of the common
shareholder, it is a requirement that only a reasonable amount of debt can be outstanding. This does not mean that the manager best fulfills his obligation to protect the common shareholders' investment by not taking any risks, only that undue risks are not assumed. My principal comment about Professor Hamada's paper is that it does not give proper recognition to the risk question. The amount of debt outstanding may change with the times. It is clear that companies are alert to these changes, since debt ratios do change. I wholly agree with Professor Hamada's statement that "the fact that the debt in a corporate tax world within reasonable bounds benefits the shareholders of regulated utilities appears very difficult to dispute." In addition, it should be stated that the utility customers are benefited, also.

When all the cloaks are taken away, it remains that the utility manager must make the final decision as to the amount of risk the company will take with debt in the capitalization. The Commission may influence the decision by penalizing the company, or if reasonable judgment is not made, the owners may make a change in the management of the company.

Comment

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The papers by Professors Gordon and Hamada represent important contributions toward an understanding of the development of an appropriate rate of return in regulated industries. Professor Gordon's contributions have been important in moving us along the path of progress in analytical approaches to utility rate making. Professor Hamada's contributions represent another original analytical framework that also gives great promise for improving our understanding. Both are consistent with the fundamental aim of regulation, which is to achieve the rate of return and prices that would prevail under competitive conditions.

I would like to begin my discussion of Professor Gordon's paper by adding a supplement to it. He did not explain why his share price curves in Figure 1 have a maximum necessary to induce utility management to operate at the growth rate judged to be appropriate. The basis for the maximum is found in Equation (7) of Professor Gordon's paper. The exponent or the parameters indicating the power or influence of each of the factors on price have, according to Gordon, the following values: The exponent for dividends is equal to approximately 1, so that if dividends were the only influence, price would be some multiplier times dividends.
Gordon indicates the exponent for the growth factor to be positive. The higher the growth, the higher the price. The exponent for the outside equity financing factor Gordon argues on theory and evidence to be negative (less than zero). Given a retention rate for very low rates of growth, retained internal financing will meet all the financing needs of the utility firm. There will be little or no need for outside equity financing (in Gordon's more general model both external debt and outside equity financing are considered). At some higher rate of investment growth, resort to external financing will be necessary. The higher the rate of investment growth, the greater the necessity for external equity financing. Thus at some higher rate of investment growth, the influence of the q factor in Gordon's model, the factor with the negative exponent, becomes stronger and stronger. At some point it becomes strong enough to cause the share price curve to turn down. Thus a maximum must exist.

My second point follows from this explanation. A method that provides a basis for determining a rate of return for a regulated company that depends upon the share price curve reaching a maximum is a relatively sensitive type of model. The parameters of the price equation, or what is referred to as the objective function, become, therefore, of critical importance.

Yet there are well-known statistical problems in estimating the parameters. One problem is reflected by Gordon's discussion of the interrelationship between the company's internal profitability rate, its dividend retention rate, its growth rate, and its need for external debt or equity financing. In view of these interrelationships, the statistical measurement of the parameters may reflect the mixed influence of the variables. There appears to be a problem of multicollinearity.

Third, in Professor Gordon's Equation (7), q, the outside equity financing rate, depends upon the price at which the shares will be sold. But the price at which the shares can be sold is the dependent variable in the equation. If there is a relationship between the presumed independent variable q and the dependent variable P, clearly the equation system does not yield a unique solution.

Here we encounter the situation of simultaneous relationships which presents the problem of attempting to identify a system of equations and the relations between the variables. Gordon's single equation model does not reveal the complete structure.1

Another technical problem is that the spirit of Gordon's Equation (7), as well as most of the other models following the early pioneering work of Gordon, is that of an infinite time horizon. It is an equation for returns received over an infinitely long time horizon for investors. This would not be a great problem if share price formation was based on investor expectations of ten or fifteen years—an intermediate term of years. The power of compound interest and discounting is such that beyond ten or fifteen years the influence of returns in later years is relatively small. But it appears that investor expectations upon the basis of which market prices are determined, are relatively short term—in the range of three years. Given this kind of expectation pattern upon which prices are determined, there are downward biases in determining the cost of capital or the appropriate rate of return for the firm to use a model with an infinite time horizon.

This in turn leads to my fourth point. In recognition of the kinds of biases in the data and difficulties in the estimating procedures, Gordon, in applying his model in Phase I of the AT&T hearings before the Federal Communications Commission, employed his total model with a leverage relationship in addition to the other factors contained in the paper presented to this conference. Because of the difficulties of the data and the biases in the statistical procedures, Professor Gordon felt it was necessary to adjust the parameters or exponents whose values determine whether a maximum in share price will result and lead to the determination of the r or the rate of return permitted by the regulatory commission. Therefore, Professor Gordon adjusted the parameters on a subjective basis. Such a procedure risks the danger of at worst biasing the results, or at best making the results dependent upon an expert's subjective judgment.

It is one thing for the regulatory commission to exercise judgment after all evidence has been presented. It is another thing for the out-

1Basically, what is needed are exogenous or shift variables such that the relationships in the system can be identified. For example, in a two-equation system, where one dependent variable is a function of two variables, and the dependent variable in the second equation is a function of one of these two variables, the second equation can be identified. Fundamentally we need to determine the structural equations which identify the relevant relations. If such a problem of simultaneity and consequently of identifying the structural relations exists, a single equation model does not present the true relationships between the independent variables and the dependent variable.
side expert pursuing scientific procedures to utilize judgment, particularly in a model whose results are so sensitive to changes in the parameters. It will be hoped that as our body of knowledge expands and our understanding improves, methods will be developed for making the appropriate adjustments in the parameters on an objective statistical basis rather than on a basis of personal subjective decisions.

My fifth and final point in connection with Professor Gordon's paper relates to the role of economic analysis in the model. One of the great strengths of the Gordon model is that it introduces a greater richness of economic theory, and reflects the operation of economic processes to a greater degree than many of the earlier models. But much of a mechanical and partial equilibrium nature remains in the model.

Let me illustrate this general point. Professor Gordon observes that dividends are less risky than capital gains, and then finds that the empirical data appear to support his theory. But theory also suggests that the investor's attitude toward dividends is greatly influenced by the investor's income and tax position. The high income tax bracket investor prefers capital gains. The "widow and orphan" type, dependent upon income for current living expenses, prefers dividends. So the situation of the investor is important. In addition, the situation of the business firm itself is of great significance. And here I would emphasize the prospective internal profitability of the retained earnings compared with the profitability of earnings paid out and put to other uses, aside from personal income tax influence. Thus the situation of both the investor and the firm are of great significance in determining the relative value placed on dividends versus capital gains.

It is not persuasive that Gordon's empirical data for the electric utility industry appear to indicate a preference for dividends over capital gains. Such a result could follow from two influences. One, a number of commission decisions that I have read indicate that external equity financing stands on a higher level in determination of rate of return than equity built up from internal financing. Such an attitude places a premium on dividends and external equity financing rather than the reverse. Second, since future earnings prospects of utilities are subject to commission decisions, there is a greater element of regulatory risk involved in expectations of future dividends from utilities, or, particularly, growth in future dividends from utilities than for non-regulated business firms. The risks and unpredictability of commission decisions for regulated industries would have a great influence on the empirical measurement of the relative weight placed by investors on dividends versus possible future growth in dividends from retained earnings.

Another way in which economic processes should be reflected to a greater degree in the Gordon model is in the analysis of the desired investment rate. Here the Lerner-Carleton models, which attempt to start with prospective growth rates for the economy as a whole, working through to individual firms, are suggestive in view of the pivotal role played by the investment rate.

I now turn to the paper by Professor Hamada. May I first comment that from a professional standpoint it is a tour de force, representing an exemplary expression of the highest professional skills. In addition, the longer-run implications of Professor Hamada's model have great promise. Particularly in its emphasis on general equilibrium interactions, Professor Hamada's paper overcomes some of the mechanical aspects of other approaches to the determination of the appropriate rate of return for regulated industries and influences on their cost of capital. Two comments may be helpful in connection with future development of the model.

The first is that Professor Hamada, in analyzing the price impact of the requirement that any tax benefit from the use of debt, utilizes the framework of partial equilibrium analysis in which the utility was initially equating marginal costs and marginal revenue. But the whole point of regulation is to seek achievement of what would have obtained under competitive conditions. Thus, probably more appropriate even in a partial equilibrium framework would be one which started with equating marginal cost to price. This might have little influence on his results if the important point is that a price adjustment takes place.

Another aspect needs to be taken into account. There is much evidence that utilities operate under declining cost conditions. Therefore if average cost is in the declining range, marginal cost lies below average cost. In equating marginal cost to price, the resulting price is below average cost. Thus the utilities would not be earning an adequate rate of return. This leads to the general observation that because commissions generally set prices below an adequate return for utilities on the basis of current volume, there is tremendous pressure exerted on utilities to expand their volume of services in order to move along their average cost curve to the point where price will cover...
average cost including an appropriate return on investment. This recognition, I believe, would have some implications for Professor Hamada’s analysis.

My second point is that in his analysis, Professor Hamada compares two prices for an individual utility company. But economic analysis argues that the relevant comparison is not individual prices but rather relative prices. Therefore, particularly in view of the general equilibrium type of analysis of Professor Hamada, I believe that the appropriate specification in his model is not the prices of the individual firm but relative prices.

A corollary to this is an analysis of what happens to the tax benefit of debt for companies in non-regulated industries. Competitive processes remove tax benefits until only normal returns on investment are received. Therefore the process which Professor Hamada analyzes, if expressed in terms of relative prices, does not imply a reduction in risk for the utility. It simply puts the utility in the same position as it would be if it were operating under competitive conditions, the aim of regulatory determinations by the commissions.

This suggests a further analysis of the implications of the tax benefits of debt as compared with other forms of financing for non-regulated industries. The central question is whether the tax benefit is retained by the company, or whether it is passed on to consumers or to laborers. In other words, the question is not only the incidence of the tax benefit, rather, the question is the influence of this tax benefit of debt compared with other forms of financing on the determination of the optimum financing mix. The incidence of the benefit is certainly relevant for this determination. But the incidence should be considered not only in connection with utility companies, but also in relationship to what happens under competitive processes in non-regulated industries.

The final observation I should like to make in connection with Professor Hamada’s paper is not a problem of his paper but rather of the original MM theory. In attempting to explain the MM theory with a general expected return and variance approach, Hamada’s model runs into the same fundamental problem of the MM theory. This problem exists either in a no-tax situation, the MM uncorrected tax situation, or the MM corrected tax theory. In the original MM presentation, since leverage does not matter, guidance is provided neither for managers of business firms nor for regulatory commissions as to choice of capital structure.

Under the correct tax version of the MM theory, with a tax subsidy for debt, business firms should employ debt without limit. In the new hybrid case advanced by Professor Hamada, there is a tax benefit, but it is mostly required to be passed on to consumers. This again puts us back into the “leverage does not matter” situation. We then again have the problem of explaining the determination of a firm’s capital structure.

Professor Hamada, like Modigliani and Miller, provides as an answer some target debt ratio. But this begs the question. How was the target debt ratio determined? In MM, the explanation finally comes to the recognition that sources of capital will strictly ration sources of funds at some point beyond the target debt ratio. But this implies that the cost of equity and/or cost of debt rise very sharply beyond that range. In terms of economic analysis, this simply means that those supply functions become very inelastic beyond the target debt ratio. The determination of the target debt ratio is what business finance is trying to explain. The MM explanation then simply comes back to the spirit of the traditional business finance approach as a rational basis for determination of appropriate leverage by business firms or by regulatory commissions.

The language of the traditional approach appeared to be somewhat careless in assuming that the cost of equity and cost of debt functions were flat over a wide range. The MM approach is deficient in assuming that the cost of capital without tax considerations is flat throughout. It is deficient in yielding the result that with no taxes, leverage does not matter, and with taxes, leverage should continue without limit. An approach which recognizes that the cost of equity and the cost of debt functions may rise beyond some critical leverage rate (related to the characteristics of the firm, and management policies toward risk in terms of asset structure and operating policies) has increasingly received acceptance.

In these studies of the cost of capital, the emphasis is on quantitative and econometric studies. I am somewhat uneasy that in this necessary and desirable emphasis in advancing our understanding, the

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analysis does not include the qualitative considerations that need to be taken into account. In particular, the role of quality of management and incentives needs to be recognized. In many of these studies and the related discussion, management is treated almost as an automation with neither motivation nor judgment. But in the ongoing activity of the operation of utility companies, the quality of management performs an important role. This quality of management is expressed both in motivation of organizations, organization relationships, and business processes.

The continued efforts at lowering of costs, improving services, innovating to lower cost, to improve services, and to expand the volume of operations, deserves some recognition. In short, the cost of capital should reflect not only risk, but should also reflect efficiency. This is consistent with the aim of regulation which seeks to replicate what would have been achieved under competitive conditions. Under competitive conditions, the achieved rate of return by a firm reflects not only the risks of its environment, but management efficiency as well. Both the nature and the accomplishments of management efficiency deserve consideration as well as reflection in the results of empirical studies.

The papers by Professors Gordon and Hamada provide a basis for continued progress in the determination of appropriate costs of capital and capital structure for business firms. They improve our analytical framework and thereby provide promise for further significant progress.

And yet, the state of our knowledge on these promising new developments has not reached the point where we can discard traditional methods. Some have denigrated the comparable earnings test based on historical book values, suggesting that they are not really measures of cost of capital. However, there is at least some theoretical underpinning for the traditional comparable earnings test. In the long run, historical returns should be equated to growth yields or incremental returns. Furthermore, although the analytics of the newer methods involve attempting to measure expected earnings, expected yields, expected variances, the data employed to formulate and test these models are historical data. In view of the sensitivity of the newer methods, the use of the historical data to measure expectations and to rationalize historical prices that were based on expectations and not the actual historical data on earnings and related measures, may involve even more serious errors than the traditional comparable earnings test.

My recommendation, therefore, is not to discard the old. In an area as complex as this, where an attempt is made to substitute administrative determinations for the operation of market forces, the problem is difficult and it is certain that the results will be imperfect. Therefore, it is important to use a number of tests to provide some boundaries within which commission judgment can be expressed.

On the one hand, our aim is to arrive at results that are as objectively determined as possible. On the other hand, it must be recognized that this is an impossibility. There are two great virtues in the recent quantitative developments in finance and other areas of business management. One is an attempt to develop an analytic framework for understanding relations and interrelations between variables. A second is to take the decision process as far as possible on the basis of objective data and objective relationships. To the extent that this is achieved, progress is accomplished. The result will not be to substitute quantitative methods or mathematics for business or commission judgment. Rather, the aim is to narrow the jump that has to be made between objective data and a final subjective determination. The aim is to reduce the ratio of subjective to objective determination.

Therefore, in connection with the historical method, it is important not to discard accumulated wisdom. There may be some excess baggage in the accumulation of our understanding, but a careful distinction has to be made between accumulated wisdom and ideas that may no longer be valid.
IV
Depreciation Policies, Inflation, and the Rate of Return
through earnings to be artificially 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.

Our approach to the question is to separate the problem into two components. First, we examine the fundamental nature of flow through and normalization, using a simulation model to examine returns to investors under a set of idealized, but reasonable, assumptions. On the basis of this analysis, we hypothesize about how investors can be expected to evaluate normalized versus flow through earnings. This is done in the first section of the paper. The second section tests the hypotheses generated in the first section, using multiple regression analysis to separate the effects of depreciation treatment from the myriad of other forces affecting stock prices and investor returns.

I. THE EFFECT OF DEPRECIATION ON REPORTED PROFITS

Depreciating a newly acquired asset by an accelerated method results in relatively low taxes early in the asset's life and higher taxes later on as the depreciation tax allowance declines. If operating profits and all expenses other than depreciation are constant, and if the profits reported to stockholders are computed by using straight line depreciation, then after-tax earnings follow a reverse pattern.

Some argue that the initial high after-tax income is illusory, saying that although taxes are being deferred temporarily, they must eventually be paid in full. Consequently, this group suggests crediting the increased early years' income to a reserve for deferred taxes, then bringing it back into income in the later years. This procedure levels out or "normalizes" profits. 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 con-

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1 This procedure is required for an unqualified opinion by the American Institute of Certified Public Accountants for all nonregulated firms, but it is only recommended for regulated utilities (cf., Accounting Research Bulletin No. 44 (revised), "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 purposes. The AICPA recommends normalization for tax savings arising from each of these sources (ARB 44, revised). Since the method of analyzing the effects of these savings is identical to that for accelerated depreciation methods, this paper does not specifically treat these additional sources of savings.

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

**Figure 1**

**Reported Profits, Cash Flows, and the Reserve for Deferred Taxes for Four Hypothetical Firms: F, N, A, and S**

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Income</th>
<th>Operating Expenses</th>
<th>Income Before Dep'r &amp; Int.</th>
<th>Depreciation</th>
<th>Interest</th>
<th>Income Before Taxes</th>
<th>Taxes</th>
<th>Deferred Taxes</th>
<th>Net Profit</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1</td>
<td>$200</td>
<td>$100</td>
<td>$100</td>
<td>50</td>
<td>6</td>
<td>$74</td>
<td>29</td>
<td></td>
<td>$29</td>
<td>$29</td>
</tr>
<tr>
<td>YEAR 2</td>
<td>$200</td>
<td>$100</td>
<td>$100</td>
<td>22</td>
<td>6</td>
<td>$74</td>
<td>36</td>
<td></td>
<td>$36</td>
<td>$36</td>
</tr>
<tr>
<td>YEAR 10</td>
<td>$200</td>
<td>$100</td>
<td>$100</td>
<td>4</td>
<td>6</td>
<td>$74</td>
<td>45</td>
<td></td>
<td>$45</td>
<td>$45</td>
</tr>
</tbody>
</table>

Source: Table 1.
each year for each of the firms. Finally, "true economic depreciation"—
the figure the companies' managements believe to be the appropriate
annual cost of the plants—can best be approximated by the straight
line method.

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 Firms S and N and 50 percent above those of
Firm A, 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 earn-
ings 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 is not at all realistic, but it does illustrate the essen-
tial nature of the four possible depreciation policies. Other things held
constant, under straight line depreciation, profits are also constant.
Normalization levels out reported profits in spite of fluctuations in
cash flows and income taxes. Flow through produces a cyclical pat-
tern—reported profits are relatively high in the year immediately
following large capital outlays and low later on. Using accelerated
depreciation for book and tax purposes also produces cycles, but
they follow a reverse pattern from flow through.

When the assumption that reserves are held as cash is relaxed, it
is immediately apparent that the straight line company has a relative
disadvantage. At any given time, the firms using accelerated tax de-
preciation have cumulative net cash inflows from operations which exceed
those of S by the amount of the accumulated deferred taxes. This
additional cash can be used to replace debt. Since debt has a cost
but the reserve does not, the straight line company is depriving itself
of free capital by not using accelerated depreciation.

Using a simulation model, the above example has been expanded to
allow for more realistic assumptions about growth rates, asset lives,
et cetera. This simulation shows that for nonregulated firms, ac-
celerated earnings generally decline relative to straight line and nor-
malized, then rise relative to earnings calculated under these methods.4
However, cash flows are identical under accelerated and normalization
(and also under flow through if it was allowed). That is, depreciation
policy has no effect whatever on unregulated firms' future cash flows
when accelerated depreciation is used for tax purposes. Consequently,
if investors can determine that cash flows of A and N (and also F)
are identical, they should value A and N (and F) identically and S
somewhat lower. If, however, they cannot unscramble the tangle in
reported profits caused by different accounting procedures, then dif-
ferences in value can occur.

Modifications for Regulated Utilities

The preceding section indicates the basic nature of the different
accounting methods as they apply to unregulated firms, but certain
fundamental modifications are necessary for regulated utilities. These
modifications, which appear not to be recognized by all analysts, are
described in this section.

In theory, the regulatory procedure calls for (1) estimating the
demand schedule in a "normal" year, (2) estimating the cost schedule
under normal conditions, and (3) using these two schedules to produce
estimates of profits at various prices.5 All of this is shown graphically
in Figure 2. At a price \( P^* \), \( Q^* \) units are demanded. The cost per
unit at \( Q^* \) units of output is \( C^* \). The profit per unit is equal to
\( P^* - C^* \), and this unit profit multiplied by \( Q^* \) units gives total profit.
At prices other than \( P^* \), different values of \( C^* \) and \( C^* \) result, produc-
ing different amounts of total profit.

In the figure, total profit for \( P^* \), \( Q^* \), and \( C^* \) is given as the cross-
marked area, and it is a function of price. The utility commission
knows approximately how large total profit should be—it should be a
specified percentage of investment, which is known. Consequently,
the commission can set the particular price that produces the desired
level of profits. For example, if investment (the rate base) is $100

4In this paper, we restate some of the results of the simulation study without
repeating the data. See E. F. Brigham, "The Effects of Alternative Depreciation
on Reported Profits," The Accounting Review, January, 1965, pp. 40-41, for a
complete description of the actual simulation.

5As the term is used here, "profit" means the total after-tax return on invest-
ment. It is the earnings available for common and preferred stock plus interest
on debt, and it is defined as gross operating revenues minus the sum of operating
costs, depreciation charges, and taxes.
each year for each of the firms. Finally, "true economic depreciation"—the figure the companies’ managements believe to be the appropriate annual costs of the plants—can best be approximated by the straight line method.

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 50 percent higher than those of Firms S and N and 50 percent above those of Firm A, 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 is not at all realistic, but it does illustrate the essential nature of the four possible depreciation policies. Other things held constant, under straight line depreciation, profits are also constant. 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 year immediately following large capital outlays and low later on. Using accelerated depreciation for book and tax purposes also produces cycles, but they follow a reverse pattern from flow through.

When the assumption that reserves are held as cash is relaxed, it is immediately apparent that the straight line company has a relative disadvantage. At any given time, the firms using accelerated tax depreciation have cumulative net cash inflows from operations which exceed those of S by the amount of the accumulated deferred taxes. This additional cash can be used to replace debt. Since debt has a cost but the reserve does not, the straight line company is depriving itself of free capital by not using accelerated depreciation.

Using a simulation model, the above example has been expanded to allow for more realistic assumptions about growth rates, asset lives, et cetera. This simulation shows that for nonregulated firms, ac-

In this paper, we state some of the results of the simulation study without repeating the data. See E. F. Brigham, "The Effects of Alternative Depreciation on Reported Profits," The Accounting Review, January, 1968, pp. 46-61, for a complete description of the actual simulation.

The effects of depreciation generally decline relative to straight line and normalized, then rise relative to earnings calculated under these methods. However, cash flows are identical under accelerated and normalization (and also under flow through if it was allowed). That is, depreciation policy has no effect whatever on unregulated firms’ future cash flows when accelerated depreciation is used for tax purposes. Consequently, if investors can determine that cash flows of A and N (and also F) are identical, they should value A and N (and F) identically and S somewhat lower. If, however, they cannot unscramble the tangle in reported profits caused by different accounting procedures, then differences in value can occur.

Modifications for Regulated Utilities

The preceding section indicates the basic nature of the different accounting methods as they apply to unregulated firms, but certain fundamental modifications are necessary for regulated utilities. These modifications, which appear not to be recognized by all analysts, are described in this section.

In theory, the regulatory procedure calls for (1) estimating the demand schedule in a "normal" year, (2) estimating the cost schedule under normal conditions, and (3) using these two schedules to produce estimates of profits at various prices. All of this is shown graphically in Figure 2. At a price $P^*$, $Q^*$ units are demanded. The cost per unit at $Q^*$ units of output is $C^*$. The profit per unit is equal to $P^* - C^*$, and this unit profit multiplied by $Q^*$ units gives total profits. At prices other than $P^*$, different values of $Q^*$ and $C^*$ result, producing different amounts of total profit.

In the figure, total profit for $P^*$, $Q^*$, and $C^*$ is given as the cross-marked area, and it is a function of price. The utility commission knows approximately how large total profit should be—it should be a specified percentage of investment, which is known. Consequently, the commission can set the particular price that produces the desired level of profits. For example, if investment (the rate base) is $1000

$\text{Among industrial firms, flow through has been ruled out by the AICPA, so only accelerated, normalized, and straight line companies were compared in the simulation.}$

$\text{As the term is used here, "profit" means the total after-tax return on investment. It is the earnings available for common and preferred stock plus interest on debt, and it is defined as gross operating revenues minus the sum of operating expenses, depreciation charges, and taxes.}$
mill and the allowed rate of return is 6.5 percent, then profits should total $6.5 million. Under normal circumstances, a higher price results in higher profits, a lower price in lower profits.6

Actual regulation is not nearly so rigid as this simplified discussion suggests. For one thing, most regulators recognize that such rigidity would leave little or no room for managerial incentive—the profit motive would be totally removed if the companies were simply guaranteed a specified profit (subject always to sufficient demand to permit this profit to be earned). As a result, rates are set sufficiently low so that companies must strive to keep costs down and demand up in order to attain the profit goal. Further, rates are changed with a lag. If a particular company is especially efficient and able to keep its costs 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 comes up and a rate reduction is ordered. Conversely, if costs rise and profits fall, there will be a lag before a rate increase

6This is grossly simplified in order to indicate the concepts involved without getting lost in details. In the first place, the cost and demand schedules are not known exactly. Further, the actual size of the rate base is subject to dispute. Finally, utilities serve several classes of customers; this means that a number of different demand schedules are involved, and any number of different rate schedules could be used to produce the specified level of profits.
A question immediately arises, however: Should the company be permitted to earn a return on the cumulative reserve for deferred taxes? About 61 percent of all utility companies are permitted no return on the tax reserve, another 30 percent are permitted to earn a partial return (e.g., 1.5 percent versus 6.5 percent of the "normal" rate base), and (in 1965) 9 percent earned a full return on the reserve. We cannot answer the question of who should benefit from accelerated depreciation—stockholders or ratepayers. However, since the benefits of accelerated depreciation generally accrue to ratepayers, the simulation model used in our studies is programmed to calculate profits under the assumption that the reserve is completely excluded from the rate base.

FLOW THROUGH

In diametrical opposition to the philosophy of normalization are the advocates of flow through, who evidently expect continued growth to permit permanent deferral of the tax savings from accelerated depreciation. On these grounds, flow through proponents 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 (should stockholders not get some of 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 the firms are given a part of the benefits. In the simulation model, profits are calculated under the assumption that rates are reduced by an amount that completely allocates the benefits of accelerated depreciation to ratepayers.

SIMULATION RESULTS FOR REGULATED UTILITIES

Although the AICPA effectively ruled out unregulated companies’ use of flow through, it is permitted, and it is frequently used by the public utility companies. The accelerated case, on the other hand, is used by 40 percent of the nonutilities but by none of the utilities. The most common utility cases are therefore S, F, and N. Flow through utility rates are adjusted to keep returns on capital equal to what they would be on straight line—this is the definition of “giving customers the benefits of accelerated depreciation.” Consequently, S’s and F’s total reported profits and earnings per share are exactly equal; no adjustment of any kind is needed to make them comparable. The normalized utility does not have exactly the same reported profits as the other two, but the difference is insignificant.

An important conclusion from this is that, unlike the nonutility cases, no adjustment whatever is necessary to compare the reported profits of Firms S, F, and N. Reported profits of S and F are identical, and N’s are correctly stated with respect to those of S and F. Examining cash flows available to stockholders under the alternative depreciation policies also shows that earnings adjustments are unnecessary. S’s and F’s total cash flows are identical, while those of N 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 N’s differential cash flows do not belong to the stockholders. Except for the minor differences caused by the absorption of investment opportunities, the cash flows that are available to stockholders for dividends and for building up equity are the same for each of the three classes of firms. This underscores the conclusion that no adjustments should be made to utility companies’ reported profits.

This conclusion is not in accord with previously published works. Miller and Modigliani, in their study of utility companies’ cost of capital, indicate that they believe such adjustments are necessary; they tried several different adjustment procedures, including “adding back to profits any allocations to a reserve for deferred taxes.”41 Such a procedure might be appropriate for a flow through industrial company.

40In 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 basis. 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.


42Peterson, op. cit., passim, discusses the question at length.
and related to the first point, is the fact that if either economic conditions or the regulatory climate makes it difficult for a normalized utility to obtain rate increases to offset rising operating costs, the 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 high utility rates to pay off the deferred taxes. But if the economic situation does not permit this high rate structure, stockholders simply suffer reduced returns on their investment.

On the other side of the coin, the simulation study shows that 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 overregulate, 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. (The flow through company's rates are substantially lower than those of any other company at the time that it begins to need increases.) Finally, in correspondence with the authors, some utility executives have suggested that their commissions feel that flow through companies should be "compensated" for the negative qualitative factors described in the preceding paragraph. Accordingly, these commissions allow flow through companies to earn a slightly higher return than they would a normalized company.

How do these qualitative factors balance out against one another? The answer depends upon how the analyst views the future of the particular utility industry under consideration. If he 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 invest-
ment, then flow through companies' earnings should be regarded just as highly as those of normalized firms. On the other hand, if one 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.

Making this qualitative adjustment is equivalent to stating that normalizing and flow through electric utility companies do not belong to the same risk class. The rate at which expected earnings for each are capitalized to arrive at their respective current values will vary in a manner that reflects investor beliefs about the relative importance of these subjective factors. In the following sections of this paper we explore the question of investor expectations.

II. THE EFFECT OF DEPRECIATION POLICY ON INVESTOR EXPECTATIONS

In the first part of this section we compare price/earnings ratios of flow through and normalized firms. Next, we examine actual rates of return realized by investors on a sample of flow through and normalized companies. Finally, we employ multiple regression analysis to "explain" stock prices and price/earnings ratios, using the depreciation method as one of the explanatory variables. Throughout, our data source is the set of electric utility companies contained in the Standard and Poor "Compustat" tapes.

**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 toward 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

![Figure 3](content)

**Figure 3**

**P/E Ratios for Firms That Had Consistent Depreciation Policies, 1954-1966**

<table>
<thead>
<tr>
<th>Year</th>
<th>Accelerated Tax Depreciation First Took Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td></td>
</tr>
<tr>
<td>1955</td>
<td></td>
</tr>
<tr>
<td>1956</td>
<td></td>
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<td>1962</td>
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<td>1963</td>
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<tr>
<td>1964</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td></td>
</tr>
</tbody>
</table>

*switch to flow through and vice versa. The possibility for such changes makes it imperative to keep track of what a company was doing at each point in time. As Figure 3 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. The P/E ratios of the flow through companies were highest on the average in 1953 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; this point will be discussed later.

Figure 4 adds support to the hypothesis that the divergence in P/E ratios is due, in part at least, to variations in depreciation methods. Here we have graphed 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. 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 again, however, the fact that the two curves converge somewhat in the last two years.

**Effects of Depreciation Policies**

The primary purpose of this section is to examine the actual rates of return realized by investors in straight line, normalized, and flow through utility companies. To put these differential returns in prospective, however, we first look at aggregate rates of return for the entire sample, and then separate these returns into three components—one attributable to dividends, one to growth in earnings, and one to changes in the P/E ratio.

Table 2 gives the average before-tax rate of return for 59 electric utility companies for each possible holding period from 1950 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.

---


18The sample consists of 59 electric utility companies for which we had complete data going back to 1950 as well as information about their depreciation methods.
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 yield, allowed rates of return on assets, and other standards. The figure in the upper right hand corner, 12.8 percent, is the rate of return that would have been earned had a portfolio of utility stocks been held over the entire period 1930-1966.

**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 3, 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. This figure varies considerably from period to period, however, and dividends accounted for 27.2 and 76.6 percent of the returns in 1950-60.

---

**Table 3**

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Rate of Return</th>
<th>Dividends</th>
<th>Capital Gains</th>
<th>Total from Capital Gains</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-1960</td>
<td>16.5</td>
<td>27.2</td>
<td>37.6</td>
<td>45.3</td>
<td>72.8</td>
</tr>
<tr>
<td>1961-1966</td>
<td>4.4</td>
<td>76.6</td>
<td>23.4</td>
<td>23.4</td>
<td>100.0</td>
</tr>
<tr>
<td>1950-1966</td>
<td>12.6</td>
<td>39.4</td>
<td>45.3</td>
<td>15.4</td>
<td>60.6</td>
</tr>
</tbody>
</table>

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30The rate of return is the component interest rate that would have been earned on an investment in common stock assuming the dividends were reinvested in the stock of the company issuing the dividends. The return for each company in the sample is weighted by the ratio of the total market value of the firm's common stock to the total market value of the common stock of the entire sample in the year of purchase for computing the average rate of return. The calculations follow the method described in Eugene F. Brigham and James L. Fappas, "Rates of Return to Common Stockholders," *Journal of Business*, forthcoming.

31The procedure for splitting the total return into its component parts is described in Brigham and Fappas, op. cit., pp. 8-9.
and 1961-66, 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 1950-1961, to 57.8 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 4 and 5 do not support this hypothesis. In only 5 out of the 91 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 declining P/E ratio would cause relatively low realized rates of return for flow through companies, but this does not account for the lower rates in 44 of the 45 periods beginning after the change in 1954.

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—i.e., while all the firms were normalizing—bending after that date, the contribution of a 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 6. 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 31.7 percent of the return for those firms that changed to flow through. This suggests that the reason for 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.
### Table 6
Comparison of Component Parts of Rates of Return for Firms
Changing to Flow Through after 1953 with Firms
That Continued to Normalize

<table>
<thead>
<tr>
<th>Percent Attributable to</th>
<th>Average</th>
<th>Rate of</th>
<th>Dividends</th>
<th>Earnings</th>
<th>Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return</td>
<td>Growth</td>
<td>in P/E</td>
<td>in P/E</td>
<td>in P/E</td>
<td>Gains</td>
</tr>
<tr>
<td>Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normalizing</td>
<td>.193</td>
<td>.212</td>
<td>.286</td>
<td>.107</td>
<td>.212</td>
<td>.788</td>
</tr>
<tr>
<td>Normalizing</td>
<td>.135</td>
<td>.524</td>
<td>.564</td>
<td>.112</td>
<td>.564</td>
<td>.786</td>
</tr>
</tbody>
</table>

The indeterminacy indicated by the rate of return data—i.e., 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. This is the subject of the following section.

### Multiple Regression Analysis

There are many ways of formulating models for examining investor attitudes toward depreciation policies; we have tested several.

The first test was provided by extending the linear valuation model described and tested in Brigham and Gordon\(^\text{21}\) to include a variable for depreciation policy. This relationship was derived directly from the basic Gordon model:

\[
P = \int_0^\infty D_0 e^{-\delta t} dt 
\]

or in its more common integrated form

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

Here \(P\) is the market price of a share; \(D_0\) is dividends per share in period \(t\); \(k\) is the rate of return investors require on the share; \(b\) is the

---

retention rate for the firm; \( r \) is the rate of return earned on equity investment; and \( g = br \), the growth rate of the dividends. Both Equation (2) and one derived from it,\(^{22}\)

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

(3)
as well as a \( P/E \) formulation, are tested to determine the impact of depreciation method on stock prices, dividend yields, and \( P/E \) ratios.

As was done in the Brigham and Gordon estimation, we have added several other variables to our final regression equations. Including them reduces the possibility that our depreciation variable might appear significant merely because it is proxying for some other variables with which it is highly correlated. The additional variables are \( L/E \), a measure of the leverage employed; \( u \), a measure of earnings stability calculated as the standard error of the estimates of reported earnings per share around its trend line during the five-year period prior to the regression run; \( e \), a variable to account for possible non-homogeneity of the sample, defined as the fraction of the firm’s revenues represented by electric sales; and \( s \), an index of size.

To reduce errors in measurement of the growth variable, we followed the Brigham-Gordon procedure and included two separate growth variables in the regression: \( ga \), the geometric average growth rate of total assets over the previous five years, and \( br = \left( 1 - \frac{D_a}{Y_a} \right) \left( \frac{Y_a}{E_a} \right) \)

(4)

where \( Y_a \) is 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, and \( D_a \) and \( E_a \) are the dividends and book value per share respectively in the test year.\(^{23}\)

Finally, we use a dummy variable, \( d \), set equal to 1 if the company used flow through in the test year and 0 if it normalized or used straight line for tax purposes.

\(^{22}\)See Brigham-Gordon article for the complete derivation as well as theoretical justification of this equation.

\(^{23}\)As reported in Brigham and Gordon, this function is superior to several others as tested for measuring the growth investors expect.

Expressed in regression form, the dividend yield relationship tested is

\[
\frac{D}{P} = a_0 + a_1ga + a_2br + a_3 \left( \frac{L}{E} \right) + a_4d + a_5u + a_6e + a_7s
\]

(5)

Here \( a_0 \), 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 is the addition to the yield investors require to compensate them for the qualitative risks perceived to be inherent in flow through companies.

Equation (5) was run for each of the thirteen years since the introduction of accelerated depreciation methods (1954 through 1966). The sample in each year consisted of the 59 electric utility companies used in computing our rate of return matrices. Table 7 presents that part of the results of these regressions that is of interest here—the regression coefficients and standard errors for the depreciation variable.\(^{24}\)

Table 7
Regression Coefficients for Dividend Yield Equation

<table>
<thead>
<tr>
<th>Year</th>
<th>Regression Coefficient for Depreciation Variable</th>
<th>Standard Error of Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>.000290</td>
<td>(.00202)</td>
</tr>
<tr>
<td>1955</td>
<td>.00250</td>
<td>(.00213)</td>
</tr>
<tr>
<td>1956</td>
<td>.00383</td>
<td>(.00222)</td>
</tr>
<tr>
<td>1957</td>
<td>.00327</td>
<td>(.00250)</td>
</tr>
<tr>
<td>1958</td>
<td>.00116</td>
<td>(.00161)</td>
</tr>
<tr>
<td>1959</td>
<td>.00263</td>
<td>(.00188)</td>
</tr>
<tr>
<td>1960</td>
<td>.00176</td>
<td>(.00161)</td>
</tr>
<tr>
<td>1961</td>
<td>.00216</td>
<td>(.00136)</td>
</tr>
<tr>
<td>1962</td>
<td>.00370</td>
<td>(.00127)</td>
</tr>
<tr>
<td>1963</td>
<td>.00242</td>
<td>(.00133)</td>
</tr>
<tr>
<td>1964</td>
<td>.00049</td>
<td>(.00109)</td>
</tr>
<tr>
<td>1965</td>
<td>.00020</td>
<td>(.00105)</td>
</tr>
<tr>
<td>1966</td>
<td>.00052</td>
<td>(.00160)</td>
</tr>
</tbody>
</table>

\(^{24}\)The regression coefficients for the other variables are not presented here, as our focus is on the depreciation variable. In all cases, however, our results were entirely consistent with those reported in the Brigham-Gordon paper.
It is clear that investors do in fact differentiate on the basis of depreciation policies; \( \alpha_a \), the coefficient of the depreciation variable, 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 5 percent level) in all years, but it is in four of the last five years examined.

The size of the coefficient—ranging from 0.0082 to 0.0408—indicates that using flow through can involve a significant cost for a utility company. The 0.0408 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. This represents an increase in the cost of equity capital of 40 basis points. Averaging the coefficients over the thirteen years indicates that investors required approximately 0.28 percent additional return on flow through shares to cover the perceived additional risk. Note, however, that this risk premium had dropped to only 0.08 percent by 1966.

A similar nonlinear valuation model was used in a second test of depreciation’s effect on stock prices.\(^{29}\) The equation was of the form

\[
P = \alpha_0 (D)^{\alpha_1} (1 + br)^{\alpha_2} \left( 1 + \frac{L}{E} \right)^{\alpha_3} (1 + u)^{\alpha_4} (1 + e)^{\alpha_5} (1 + g)^{\alpha_6}.
\]

The log transformation of (6), expressed as

\[
\log P = \log \alpha_0 + \alpha_1 \log (D) + \alpha_2 \log (1 + br) + \alpha_3 \log \left( 1 + \frac{L}{E} \right) + \alpha_4 \log (1 + u) + \alpha_5 \log (1 + e) + \alpha_6 \log (s) + \alpha_7 \log (1 + g)
\]

was used in the regression. Notice that in Equation (6) all terms except \( (D)^{\alpha_1} \), when multiplied together, form a dividend multiplier. If \( \alpha_a \) is negative, the term \( (1 + d)^{\alpha_a} < 1 \) when \( d = 1 \) (as it is for a flow through company) but \( (1 + \alpha_a)^{\alpha_a} = 1 \) when \( d = 0 \) (as in the other cases). Therefore, assuming \( \alpha_a < 0 \), flow through will reduce the dividend multiplier, but the multiplier will not be affected by the other accounting treatments.

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

\[
x = (2)^{\alpha_a} \text{ or } \log x = \alpha_a \log 2.
\]

For example, if \( \alpha_a = -.084 \), \( x \) is found to be .943. This means that the dividend multiplier would be \( 1.00 - .943 = 5.7 \) percent lower for flow through than for normalized and straight line firms, other things held constant, with \( \alpha_s = -.084 \).

The coefficients and standard errors for the nonlinear model are presented in Table 8.\(^{26}\) The results again indicate that investors apply

\begin{table}[h]
\centering
\caption{Regression Coefficients for Stock Price Model}
\begin{tabular}{ccc}
\hline
Year & Regression Coefficient for Depreciation Variable & Standard Error of Coefficient \\
\hline
1964 & 0.01200 & 0.00986 \\
1965 & -0.00654 & 0.00193 \\
1966 & -10.432 & 0.00655 \\
1967 & -0.09593 & 0.07015 \\
1968 & -0.03915 & 0.07110 \\
1969 & -0.07300 & 0.06618 \\
1970 & -0.03301 & 0.07481 \\
1971 & -0.05136 & 0.07297 \\
1972 & -1.6218 & 0.00058 \\
1973 & -3.5013 & 0.00162 \\
1974 & -1.5502 & 0.00411 \\
1975 & -0.09775 & 0.00465 \\
1976 & -0.4992 & 0.00553 \\
\hline
\end{tabular}
\end{table}

a risk premium to flow through dividends. Over the thirteen years examined, \( \alpha_s \) averaged -.084 and, as was shown above, this implies a risk premium of 5.7 percent. That is, the use of flow through depre-
cation decreased the price of a share of stock by about 5.7 percent, holding other factors constant. This risk premium varied considerably from year to year; for example, in 1964 it was about 13 percent, but by 1966 the premium had declined to about 3 percent.

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

$$\frac{P}{E} = a_0 + a_1D + a_2g + a_3e + a_4s + a_5r + a_6u + a_7h + a_8 \frac{D}{E}$$

where $D/E$ is the dividend payout ratio.

The results of these regressions are reported in Table 9, and they clearly indicate that the price/earnings ratio is dependent on depreciation policy. For the years 1953 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 $-3.34$ in 1964.

<table>
<thead>
<tr>
<th>Year</th>
<th>Regression Coefficient for Depreciation Variable</th>
<th>Standard Error of Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>0.14900</td>
<td>(0.09568)</td>
</tr>
<tr>
<td>1955</td>
<td>0.35499</td>
<td>(0.29748)</td>
</tr>
<tr>
<td>1956</td>
<td>-0.8107</td>
<td>(0.64106)</td>
</tr>
<tr>
<td>1957</td>
<td>-0.99460</td>
<td>(0.71700)</td>
</tr>
<tr>
<td>1958</td>
<td>-0.20680</td>
<td>(0.57743)</td>
</tr>
<tr>
<td>1959</td>
<td>0.15748</td>
<td>(0.84418)</td>
</tr>
<tr>
<td>1960</td>
<td>0.89243</td>
<td>(1.13353)</td>
</tr>
<tr>
<td>1961</td>
<td>-1.07779</td>
<td>(1.35908)</td>
</tr>
<tr>
<td>1962</td>
<td>-2.75401</td>
<td>(0.97859)</td>
</tr>
<tr>
<td>1963</td>
<td>-2.29480</td>
<td>(0.76315)</td>
</tr>
<tr>
<td>1964</td>
<td>-3.24180</td>
<td>(0.79135)</td>
</tr>
<tr>
<td>1965</td>
<td>-2.05380</td>
<td>(0.85477)</td>
</tr>
<tr>
<td>1966</td>
<td>-1.14307</td>
<td>(0.73113)</td>
</tr>
</tbody>
</table>

indicating that a flow through company would have a P/E ratio that was 3.24 points below a normalized firm, other things held constant.

The time paths of the regression coefficients show some interesting features. First, between 1955 and 1961 the coefficients are consistent in sign but small in size; therefore, the economic significance of depreciation was small in this period. The absolute size of the depreciation coefficient was relatively high from 1962 through 1965, but it dropped significantly after the 1964 peak and was only $-0.90$ in 1966. The size of this coefficient, incidentally, corresponds quite closely to the gap between normalized and flow through earnings shown in Figure 3. While admitting that it is speculative, we suspect that this trend of first rising, then declining importance of the depreciation factor has to do with 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 it was previously thought to be. With this recognition, the differential between the multiplier 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 (1) the premium will vary depending on the optimism or pessimism of investors and (2) it will not return to the peak level reached in 1964.

**CONCLUSIONS**

Several conclusions follow from our analysis; these are listed below.

1) No "adjustment" should be made to "correct" flow through earnings and make them comparable to normalized or straight line earnings. The regulatory process automatically makes this adjustment.

2) There is, however, a qualitative differential between flow through earnings and those of normalized or straight line firms. In general, we would judge that a reasonable analyst might make a subjective judgment that flow through earnings are slightly more risky than those of normalized or straight line electric utilities. This qualitative risk factor will be directly dependent upon (1) the analyst's
views of the economic future of the electric utility industry, (2) his views about the future level of corporate income taxes, and (3) his faith in the willingness of utility commissions to grant timely rate increases.

3) Our empirical studies support the point made immediately above—investors do seem to assign a risk premium to flow through earnings and dividends. This premium does not appear to be a constant, however. It was quite small during most of the 1950s, rose to a peak in 1964, and declined sharply in 1965 and especially in 1966.

We attribute this varying time pattern to "investor education." Specifically, in the early years, when conversions to flow through were occurring, investors were gradually becoming aware of the fact 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 it was previously thought to be. With this recognition, the differential between the multiplier 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 (1) the premium will vary depending on the optimism or pessimism of investors and (2) it will not return to the peak level reached in 1964.

Comment

CLEMENT T. LOSHING
Cleveland Electric Illuminating Company

Professor Brigham's first conclusion, which he calls quantitative and which derives from his corporate model, states that no adjustment is necessary to make flow through earnings comparable to normalized earnings. The genesis of that claim needs to be examined closely. In his corporate model, he points out that 60 percent of the normalizing companies are not permitted to earn anything on the reserve for deferred taxes. Therefore, he concludes that the benefits of liberalized depreciation for normalizing companies generally accrue to the ratepayer. In the case of the flow through companies he assumes likewise that all of the benefits are passed on to current ratepayers. He says, "the rate setting process automatically adjusts utility companies' reported profits." In other words, if regulatory commissions set the rate of return of normalizing and flow through companies exactly equal, they will be equal. This model has not produced a conclusion; it has produced an echo! It has reflected back its own constraining initial assumption that a dollar of flow through earnings is identical to a dollar of normalized earnings.

I believe the authors are aware that their model does not faithfully represent the real regulatory process, and are working toward making it more responsive to real conditions. To achieve this they must take their findings in the second part of the paper and "close the loop." That is, they must feed back into the regulatory process by which the allowed rate of return is established the fact that the money market-
place evaluates normalized and flow through earnings differently. In a
case, the burden of proof is on the utility company to convince
its regulators that an increased rate of return is appropriate. Thus
the flow through company would present his evaluation difference in
the cost of money testimony. If it is treated properly, the regulators will
permit the company to earn a greater rate of return.

The rate of return of all Class A and B electric utilities has been
continuously rising during this period of increasing use of the flow
through method. This is due at least in part to the recognition by
the regulatory bodies of the increased cost of money due to higher interest
rates and other causes. However, it may also be indicative of a tend-
ency to compensate for the lower quality of earnings of flow through
companies.

Quotations regarding the treatment of flow through earnings are
available from more than a dozen leading public utility analysts
throughout the country, and I have personally talked about the subject
with three times that many. Although they do not unanimously ad-
just the earnings of flow through companies, many do evaluate them
differently from those of normalizing companies. Let me quote from
three such analysts. (The emphasis has been supplied.)

The market is not paying as high a price for flow through earnings as it is
earnings which are not inflated by deferred taxes. Our conclusion is that
over the long term the flow through companies have gained little or
nothing in reported earnings and have lost in terms of price/earnings ratios
and therefore in market price.1

Utilities would seem to be in a vulnerable spot if credits from existing tax
incentives were withdrawn. . . . In any event, we believe investors may
begin to show an increasing preference for companies following more con-
servative accounting practices.2

Our valuation basis for the flow through group results in a 10 percent higher
valuation for those stocks not currently flowing through. . . . The greater
potential price action may be with the non-flow through stocks, so we are
retaining our present valuation basis in spite of the market disparity in
quality groups mentioned above.3

Reported earnings, then are evaluated differently. Furthermore, adjustments are made based on those evaluation differences. Before

7Duff and Phelps, Inc., Testimony of Charles O'Neill, FCC Docket No. 16558
8Hemblower & Weeks-Hemphill, Noyes, "Trend of Public Utility Flow-
9Russell W. Fenske, "Effect of 'Flow Through' and 'Normalization' on Electric
compared 17 flow through companies and 26 normalizing companies and found no significant difference in either kilowatt-hour growth or earnings per share growth. Nor did he find any difference in price to earnings ratio before 1954, but in 1961, he noted the same 2 to 3 point differential that Professor Brigham observed.

This result is confirmed again by a Drexel-Harriman-Ripley study which grouped flow through and normalizing companies by growth rates, and found that for every group the price to earnings ratio of normalizing companies is greater than or equal to that of flow through companies.7

Professor Brigham’s second “qualitative” conclusion was that the risk assumed by flow through companies is considerably greater than that of normalizing companies. This, too, is well confirmed. A study by C. N. Ostergren of American Telephone and Telegraph examined the treating of identical situations by various methods of depreciation.8 His most important result compared the percent of total revenue requirements which remained to be met during the last one-third of the life of the asset. The figures in order of increasing percentages, and thus increasing riskiness, were: accelerated depreciation for book and tax purposes, 12 percent; normalization, 24 percent; straight-line depreciation, 24 percent; and flow through, 38 percent.

One practical effect of using the flow through method is a greater reliance on external financing. A Drexel-Harriman-Ripley study9 of the prospective construction and financing of 30 companies from 1967 through 1970 showed that the 17 normalizing companies planned to obtain 40 percent of their needs from outside, whereas the 13 flow through companies anticipated 55 percent external financing. That is, the flow through companies expected to obtain 15 percentage points more of their financing from outside sources. The total financing requirements for all of the companies covered by the study was $1.5 billion per year. Flow through companies needed $800 million per year and normalizing companies needed $700 million. The flow through companies had to obtain 55 percent of their financing or $440 million from outside sources each year. Assuming the flow through

Comment

WILLIAM H. MELOY
Federal Communications Commission

Professor Brigham's analysis of the effect of liberalized depreciation on the cost of equity capital is a welcome contribution to the literature on depreciation policy for tax purposes because it cuts directly to the substance of the issue. It is hoped that the approach to the problem adopted by Brigham can provide the necessary insights that will enable utilities and commissions to cast aside the rather hollow debate revolving around the inherent rightness or wrongness of normalization versus flow through accounting methods. There has been a great tendency to make such a fetish of the accounting methodology on this question that it has shielded from examination the underlying causes and consequences involved, some of which Brigham has addressed in this paper.

THE QUALITY OF ACCOUNTING INCOME

It is clear that when the tax benefits from liberalized depreciation are flowed through to income, the firm assumes a risk that this accounting decision may require increased tax payments and reduced income sometime in the future, if a particular set of circumstances evolve. Future events may indicate that a portion of the tax benefits constituted only an interest-free loan and not an absolute expenditure saving. Under normalizing, none of the tax benefits are recognized as income until the possibility has passed that certain future events will reduce the magnitude of these benefits. When straight line depreciation is used for tax purposes, neither present nor future income measurements reflect the tax benefits forgone.

By the American Institute of Certified Public Accountants (AICPA) ruling for industrial companies adopting normalization,1 the accounting profession hauled out its conservatism postulate and said in effect that recognition of the tax benefits as income in the accounts shall be deferred until the probability of future events, ceteris paribus, retracting a portion of these benefits is absolutely zero. But the balance sheets and income statements are not carved in stone. The accounting reports reflect interim test readings of an uncompleted series of interrelated events in the continuous flow of business activity. They require a very artificial break in the continuity of events which can only be made when the accountant is willing to accept assumptions regarding future activities.

Insofar as the business enterprise is a continuous stream of activities, with those of the moment conditioned by those of the past and in turn conditioning those of the future, the process of breaking the stream into fiscal segments, for each of which reports are prepared, leaves many real connections and tends to give a spurious color of immediate reliability to data which in substantial measure depend on the course of future events.2

In order to provide comprehensive reports for a period of time that can serve as benchmarks to the financial state of the enterprise, accounting must slice through the flow of continuous activity by employing assumptions, estimates, and judgements. For example, the measurement of periodic income requires a matching of costs and revenues built upon assumptions of the magnitude of past investment costs that can and should be recognized as costs in future periods. Hence, the very concept of depreciation in accounting requires that the financial statements be provisional in character.

It is apparent, then, that irrespective of the tax depreciation problem, there are significant variances in the quality of earnings among


firms because of the risk that what has been, and is being, recorded as income will some day be proven by events to be in error, either overstated or understated. Today's income calculations are conditioned by the assumptions of past income calculations and tomorrow's calculations will be conditioned by the assumptions made today. The income statement is a contingency statement which generates a probabilistic figure, whether or not it is recognized as such. If the AICPA applied its zero probability standard to all accounting questions, the concept of periodic accounting income would lose its meaning. Indeed, all investment costs would have to be written off immediately lest the income of future periods be reduced because income was recognized today.

Moreover, any attempt to insulate the income calculations and tax liabilities in future periods from increases that might result from a single policy decision today must be illusory. Changes in the myriad of factors that will influence the income calculations and/or tax liabilities of future periods—including policy decisions by the firm in other areas, and changes in the nominal tax rate—will determine whether the policy decision of today was or was not a wise choice. And no matter what accounting conventions are employed, there can be no protection from the uncertainty that future events will demonstrate that today's policy decisions were not optimum and today's accounting calculations were not correct. Indeed, the accounting calculations cannot be correct. They can only hope to be representative of the state of financial affairs within the continuity of the firm's activities.

TAX DEPRECIATION OPTIONS UNDER RATE REGULATION

Professor Brigham's analysis of the quality of the income calculations indicates that there is a risk differential between the accounting standards of flow through and normalization within the framework of the accounting process, and so it provides a much clearer explanation of the issue than any approach using quantity differentials could do. The probability that future events will prove current income calculations to be overstated is lower under normalization accounting than it is under flow through accounting. But this does not mean that normalization is better accounting. In fact, it often means that income is understated.

The simplifying assumption of Brigham's analysis that under flow through all the tax benefits accrue to consumers is somewhat unrealistic because it requires the tacit assumption of perfect regulation. If there is one issue upon which all parties to the regulatory process find agreement, it is that regulation is far from perfect. The release of this assumption would require a qualification with regard to the significance of the magnitude of the risk premium calculations, but it would not alter the essence of the conclusions.

Flow through accounting simply passes the tax benefits through to income. Before the consumer benefits, however, there must be a rate reduction brought about by the regulatory agency. Hence, for many utilities the benefits of flow through reach the consumer only if the utility's rate of return is increased sufficiently as a result of the flow through to income to warrant an equivalent reduction in rates. Under these circumstances, the utility must be earning at its maximum allowed rate of return before all the tax benefits are flowed through to rates. For utilities with relatively low earnings, flow through simply makes the income statements more respectable. Even if commissions specifically act to reduce rates and pass all the benefits of the tax reduction to the consumer, they are not likely to accomplish this task. The size of the tax benefit flowed through to the consumer is based upon a specific past test year. Hence, rates that are to be in effect for many years are reduced by this fixed amount. But in successive years the tax benefits for growing firms will increase and the amount of the increase in tax benefit will flow through to income but not to rates. For a growing utility, regulatory lag serves to divert some of the tax benefits to income even when the commission intends that all of the benefits go to the consumer. Thus one is led to the conclusion that flow through accounting rarely, if ever, can transfer all of the tax benefits to the consumer.

In light of the foregoing, I cannot agree that total reported income under straight line and flow through will be equal. Flow through profits will exceed straight line profits both because of the tax benefits that remain as profits and because of the stimulating effect upon demand, investment, and net revenues of the lower prices brought about by the tax benefits that actually were flowed through to consumers.

The important aspect about the straight line alternative in the analysis of tax depreciation is that this is the option that foregoes the opportunity to achieve the tax benefits. As a result, rates are higher and/or profits are lower than they need be. Despite the extensive debate on flow through versus normalization, there has never been
doubt raised from any quarter that the liberalized depreciation provisions do provide tax benefits. Hence, whether or not a firm would take advantage of such benefits is hardly a problem on which to vacillate. In terms of economic impact, the utility that forgives these benefits is using its monopoly power to tax the consumer and make an annual contribution to the U.S. Treasury. And when a utility and a commission allow these benefits to be forgone, one has great difficulty understanding how the interests of the consumer or the utility are being served.

It is hoped that analyses such as those provided by Professor Brigham will prompt all utilities to adopt the liberalized depreciation option provided in the tax code and provide the commissions with a greater understanding of the economic significance of income calculations derived on the basis of the alternative accounting conventions. However, I suspect that those utility and commission people who have been hesitant to adopt the liberalized depreciation tax provision because of concern about the flow through effects will not be moved until they are provided with detailed analyses of all the circumstances where flow through may require an increase in the price of utility service. Specifically, what are the assumptions surrounding the possibility of increased prices for utility service in future periods? And how significant would be the trade-off between the increased tax expense and the countervailing forces of reduced depreciation expense, rate base, and rate of return that characterize declining investment conditions? If the potential effect upon rates for the worst of all possible worlds could be shown to be nominal, the skeptics of liberalized depreciation with flow through might be brought around.

Perhaps the most significant benefit of the type of analysis employed by Brigham will be a rapid step forward in the quality of rate of return analyses that are brought before the regulatory commissions. The flow through companies have a powerful argument that their cost of capital is higher than it would be under the normalization or straight line alternatives. But in order to demonstrate their case, they will have to adopt the cost of capital approach used by Brigham, which was first introduced to the regulatory process by his colleague, Professor Myron Gordon. This seems to be a path of certain improvement in the approach to the rate of return problem.

8Testimony of Myron J. Gordon, before the Federal Communications Commission, FCC Staff Exhibit No. 17, Docket 16252, October, 1966.
ology, which becomes a uniquely sensitive regulatory variable influencing the rate of return calculation, has apparently become the dominant force influencing the decisions of some utility managers.

The utility with substantial monopoly power has many alternative sets of prices by which it can earn the allowed rate of return. In addition, it has many alternative sets of management policies that can be employed to earn this return. Under the regulatory standard of rate of return on rate base, with the Uniform System of Accounts providing the measurements for both elements, utility management may be provided with an incentive to pursue policies of uneconomic rate-base expansion to increase the absolute level of earnings. Management may also be provided with an incentive to following policies which provide for the allowable return while minimizing uncertainty and maximizing the quality of the accounting income measure.

The environment of utility rate regulation may tend to encourage extremely conservative behavior in some utility managements because the firm’s allowed return calculations permit the added costs of these conservative actions to be passed on to the consumer. For example, a financing policy that employs a low debt-equity ratio may require a higher cost of capital than a policy employing a higher debt-equity ratio. As long as the allowed rate of return is set to cover the cost of capital under the financing policy being employed by the utility, there is no incentive to adjust to a more efficient financing policy. Corporate risk is minimized at the expense of the consumer and the reported income figures are of better than blue chip quality.

Certainly, there is an incentive to employ conservative accounting procedures because these will increase the quality of the income measurement, as Brigham’s analysis illustrates. Rather than accept liberalized depreciation with flow through which would slightly decrease the quality of the income measurement, some utilities have elected to forgo the tax benefits altogether. As long as the actual income taxes paid are recognized as legitimate expenses to be covered by prices, the increased costs of this inefficient but less risky tax depreciation policy will be borne by consumers, and the quality of the


reported income will be higher than equivalent income calculated on a flow through basis.

LONG-RUN ECONOMIC EFFECTS

A preference ranking by most utility managers of the liberalized depreciation options for tax and accounting purposes would be as follows: (1) normalization, (2) straight line, and (3) flow through. Yet, an examination of these alternatives within the framework of utility rate regulation indicates that the order of preference should be reversed.

Normalization provides for a deferral of recognition of the tax benefits in the accounts. The consumer contributes funds to the utility to cover the income taxes that have been deferred or saved, depending upon future events. Thus the utility acts as a trustee for consumer capital and gets the benefit of using this capital during the “deferral” period. Obviously, a utility cannot charge consumers a rate of return on capital contributed by consumers at zero cost. As a result, the firm’s rate base upon which it can earn a rate of return must be lower than it would be if the capital were financed in the capital markets. As the utility grows, financing by consumer capital will grow, and the firm’s investment rate that is supported by investor capital will be reduced. Over time, the growth in consumer capital will provide an ever-tightening restriction on the firm’s future growth opportunities for investor capital. Eventually, consumers could end up providing a greater proportion of capital than investors. It would appear that for those utilities that will continue to grow over the long run, normalization represents “creeping co-opism.”

The straight line option requires the firm to absorb unnecessary costs over time. The benefits of either an additional source of funds at zero cost and/or stimulated growth rates and a strengthened market position are foregone. Over the long term, the utility’s financing policy will be more expensive than it need be, and the relative position of developing competitive elements in the utility’s markets will be enhanced.

5For a reflection of concern within the accounting profession about the increasing magnitudes of the normalized tax deferral and a study of their effects see 1964, see “Is Generally Accepted Accounting for Taxes Possibly Misleading Investors?” Price Waterhouse & Company, July, 1967.
Under the flow through option, the consumer is the secondary claimant for the tax benefits. He benefits only if, and to the extent that, the utility does not require the tax benefits to meet its revenue requirement. Over the long term, the growing utility will find that income will be higher than it would be under the alternative accounting options, and prices will be lower than they would be otherwise. The firm's market position vis à vis that of competitors will be strengthened and the utility may reap additional economies of technology and/or scale. Opportunities for investment growth will be enhanced.

For a utility that enters into a period of decline, the commencement of the decline will be delayed by the expanded growth opportunities and the increased internal generation of funds provided by flow through in previous periods of growth. A declining utility will have a declining depreciation expense, a declining rate base, and a reduced cost of capital to counteract any increase in income tax expense. Further, the combination of restricted investment opportunities, a low depreciation expense allocation, and positive income—al prerequisities to the increased tax costs—will provide most firms with a surplus of internally generated funds to cover the increased tax expenditure. Hence, whether or not prices of the utility's service will have to be increased must depend upon the specific circumstances under which the decline takes place, and in any event, the impact upon the firm's financial and pricing policies is likely to be inconsequential. In light of the movements in resource prices, production technology, security market conditions, and product market demand over time, the effect of declining investment conditions upon the price level of a utility's services cannot be significant.

No matter what depreciation option for tax purposes is selected for accounting purposes, it will affect the accounting measurements in future periods. By definition, the accounting measurements are provisional and based upon assumptions regarding the nature of future events. The real issue that determines the quality of the accounting reports is whether the assumptions are realistic. For the vast majority of utilities, the assumption of continued growth is the realistic assumption, and flow through provides an income measurement most representative of the state of the firm's financial affairs. For these firms, normalization tends to understate income, and straight line tends to overstate the economic costs of providing service.

**Effects of Depreciation Policies**

Unquestioned Assumption—An Uncertain Foundation

The entire issue of tax depreciation and alternative accounting standards must accept as a point of departure the assumption that straight line depreciation properly reflects the economic realities of periodic capital consumption for utilities. If this assumption does not hold true, the significance of the tax depreciation problem pales rather drastically. The tax implications of depreciation represent, at best, that portion of the iceberg that is above water. There seems little reason for expressing great concern about the possibility of a "detrimental" derivative effect of one aspect of depreciation policy in some distant period before thoroughly exploring the direct effects of the depreciation methods being used for book purposes in light of present and anticipated economic conditions. The potential effects upon future costs of a small error in book depreciation will completely overshadow any effects resulting from the flow through of tax benefits.

The applicability of straight line depreciation to the economic environment of the day has not been thoroughly examined by most utilities since the 1930's. The liberalization of depreciation tax provision of 1954 was brought about, in part, because of pressure from industrial firms that desired to use liberalized depreciation for tax purposes because they had concluded that liberalized depreciation for book purposes was necessary if the accounts were to reflect the unfolding economic events affecting these firms. Rapid obsolescence in the face of continuously increasing productivity made possible by new technology indicated that a significant portion of original investment costs would have to be depreciated in the early years of an asset's productive life or special obsolescence write-offs very probably would have to be incurred in later periods. These firms wanted the tax law to permit depreciation deductions in conformance with the economic realities that they perceived confronting them. After the passage of the tax law, the issue shifted to one of how the tax benefits should be reported by companies for which straight line depreciation approximated the rate of real capital consumption.

Utilities and regulatory commissions have not thoroughly examined the possibility that straight line depreciation may not reflect the economic realities of supplying utility service today and that liberalized depreciation for book purposes might provide a better approximation of the rate of economic depreciation. A major reason, I submit, is because of the great concern about the impact upon the standard
rate-making formula for calculating revenue requirements. Utilities fear that the rate base would decline at too rapid a rate, tending to increase rate of return calculations. Commissions fear that the increased depreciation expense would require rate increases. But such concerns are hardly a substitute for detailed examination. Depreciation policy and its economic implications must be under continuous scrutiny when a firm's markets are characterized by rapid technological change and new and changing demand characteristics.

If liberalized depreciation approximates more closely the rate of economic depreciation, then the use of straight line depreciation in the accounts tends to overstate income and reduce its quality significantly. If the net book values of the firm's old assets are not written down to the productivity values of the latest technology being added, the depreciation absorbed in past periods has been understated, and costs representing obsolete capital values must be covered by consumers or written off to stockholders in future periods.

For a utility with strong monopoly markets, these costs of obsolescence can readily be passed on to future consumers. Indeed, this may explain why many utilities have been generally indifferent to the relationship between their depreciation policies and the rate of economic obsolescence. But for utilities confronting competition in markets or sub-markets where entry is permitted, the straight line depreciation policy could place the firm at a significant competitive disadvantage. Whereas new competitors will price to cover the costs of serving with the new technology, the utility must cover additional costs because past depreciation policy did not reflect the full impact of economic obsolescence.

In light of the expanding significance of competitive forces in many utility markets, the problem of selecting the proper book depreciation policy assumes added importance. Ironically, recent history has demonstrated that most utilities would prefer to forgo the tax benefits of liberalized depreciation with flow through rather than undertake a serious consideration of the benefits of liberalized depreciation for book purposes. As a result, the utilization of straight line depreciation for both book and tax purposes may be both overstating accounting income and increasing unnecessarily the firm's expenditures for income taxes. Utilities that are following such a depreciation policy in the face of evidence that net historical unit costs exceed the current unit costs of the latest technology are building an ever-increasing stockpile of economically obsolete costs on the books. The quality of the income calculations must deteriorate as the magnitude of the stockpile increases and an effective tax rate is paid that is higher than that being paid by other corporations. The book depreciation policy provides a strong incentive for potential competitors to enter the market, and the tax depreciation policy reinforces it.

The long-run viability of utilities in some markets that are subject to external competitive pressures may well depend upon the maintenance of a depreciation policy that properly reflects the rate of economic depreciation in an environment of rapid technological change. Moreover, the implementation of effective regulatory policy over the broad range of economic issues that influence evolving utility market structures requires considerable knowledge of the rate of economic depreciation and the relationship between historical and current costs. The time has come to look at the foundation upon which the tax depreciation issue has been debated. A detailed examination of all aspects of utility book depreciation policy in light of the dynamics of current and anticipated market developments is overdue.

* A great many utility managers and commission staffs seem to consider the possibility of a capital write-off due to obsolescence to be unthinkable in the regulatory scheme of things.
Inflation and the Rate of Return

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I welcome the opportunity to exchange views in this conference on the topic of "Inflation and Rate of Return."

The topic itself is timely. We have seen sharp increases in inflation in the past two years, and there are continuing strong upward inflationary pressures. This contrasts sharply with the relatively modest increases in the first half decade of the sixties.

Thus it appears that inflation's impact on earnings is once again emerging as a major problem for utility management and for regulatory bodies.

Current Responses to Inflationary Pressures

We now see pronounced responses to inflationary pressures which have pointed effects on regulated industry. For example:

Labor is pressing for, and obtaining, increases in wages far in excess of the percentages to which we had become accustomed in recent years. In the bond market, investors are increasingly reluctant to invest in nominal dollar obligations and are demanding higher and higher returns. Yields are at record—or near record—highs, and this is mirrored in the historically high rates being paid currently on new utility debt issues. In the equity market, investors have reacted quite directly to the inflationary environment. Utility stocks—and other so-called dollar stocks—have fared badly relative to industrials. This sug-

gests a strong concern on the part of investors regarding utilities' ability to overcome the effects of the current, materially heightened impact of inflation.

All told, then, inflation is looming as a serious problem for regulated industry. Vexing as it is, however, the problem should not be insurmountable if men of intelligence, reason, and good will resolve it on terms fair to both the consumer and the utility investor.

However, the history of the approach to inflation in the regulatory context, particularly in the last period of sharp inflation, discloses some shortcomings in our treatment of this problem.

Inflation in the Regulatory Context

In the half century prior to the landmark Hope Natural Gas decision of the U.S. Supreme Court, rendered in 1944, recognition of inflation was mandatory. Fair value, which recognizes the impact of price-level changes in a utility's rate base, was "the law of the land." The Court's decision in the Hope case, however, maintained that a fair value rate base was no longer mandatory. Instead, the Court promulgated its "end result" doctrine which, in essence, stated that regulatory commissions were free to use any approach so long as the end result was fair. It should be noted, however, that the Court did not lift all constitutional constraint, nor did it put sole reliance on an original cost rate base.

It should also be emphasized that at the time of the Hope case, which was started in 1939, the main concern of the country was to revive a faltering economy. Inflation was far removed as a national problem. However, nothing in the Court's decision should be interpreted to indicate that the Court in any way dismissed the problems that might arise with future inflation.

Reasons for Failure to Recognize Inflation

Following World War II, inflation emerged as a serious problem in public utility regulation but, in retrospect, it appears that in many quarters it did not command the attention it merited. Attempts made in the part of utilities to obtain Commission recognition of inflation met with resistance, with numerous reasons being cited for not accord-

ing any weight to this most important problem. Some of these reasons
included: (1) The contention of some commissions, especially during the first decade after World War II, that inflation was a temporary phenomenon and that prices would return to prewar levels. (2) The assertion that recognizing inflation by use of price indices is "speculative" or "hypothetical." Price level indices were criticized as being overly complex, time-consuming to construct, and expensive to implement. (3) The criticism that repricing the value of investment in existing facilities disregards the possibility of building new plant with more advanced technology. This criticism, however, did not go so far as to allow its logical complement, i.e., raising depreciation rates to provide for early retirement of the old existing plant. (4) The argument that the degree of inflation requiring recognition was relatively small because so much utility plant had been built since the end of World War II. (5) The somewhat curious position that original cost and present value are identical. This view is based on the fact that present value depends on future earnings. But, the argument went on to assert, that since Commission allowances of future earnings are based on net original cost, present value is net original cost.

It is not necessary, nor would it be particularly fruitful, to comment on each of these reasons for not recognizing the effects of inflation. The underlying thinking, however, appears to have been based on a rather broad lack of appreciation of inflation's impact on the country's economy generally, and on regulated industries in particular. Let me review what has happened.

Inflation—A Way of Life

After World War II, many responsible people chose to disregard inflation adjustments with respect to utility rates of return on the grounds that there would be a postwar correction in price levels. As all are aware, this had been the experience after World War I. However, a similar correction in price levels did not occur following World War II, and it was not until the Korean conflict was well under way that people generally accepted the fact that a measure of inflation had become embedded in the country's economy. By the time this had become generally accepted, the postwar price level had risen by over one-third. Any lingering doubts as to the structuralization of inflation were rather effectively removed during the 1958 recession, when prices increased despite a national unemployment rate of close to 7 percent.

Some observers of the inflationary phenomenon seemingly feel that inflation is an abnormal occurrence and that price stability is more normal. However, studies of price levels going back as far as 800 years demonstrate conclusively that inflation has been a persistent experience. The only noteworthy exception to the rising price trend occurred during the eighteenth and nineteenth centuries when the stimulus of the industrial revolution appears to have temporarily stemmed inflationary tides.

In the period since 1929, which includes the nation's most drastic depression, we have witnessed an average inflation of 1.5 percent per year. This means that the value of the dollar has been virtually cut in half in four decades. More recently, however, in the 1966-67 period, inflation has risen up to a 3-4 percent annual rate. This would mean that the value of the dollar would be cut in half in just about twenty years. And in recent months inflation has been recorded in excess of a 4 percent annual rate.

Industrials' Adjustment to Inflation

Industrial companies have quite generally adjusted prices and earnings in recognition of inflation. In the prosperity of the late 1920's, with virtually no inflation, industrials earned 10-15 percent on common equity. As inflation intensified after World War II, non-regulated industry was able to adjust its prices so as to compensate for the inadequacy of nominal dollar depreciation and to recognize the real value of its shareholders' investment. In consequence, reported earnings rose to the 12-20 percent range. Simultaneously, the industrials' pay-out declined from the 60 percent range down to below 40 percent. Hence, in the first five postwar years, industrials' book equity rose by over one-half. This meant that industrial investors were, in large measure, afforded protection from inflation. Concurrently, industrial share prices moved strongly upward.

Utilities' Failure to Adjust to Inflation

In contrast to unregulated industry, earnings of utilities generally were under pressure from rising costs after World War II. As a result, utility earnings were at levels recorded during the Great Depression of the 1930's. With lower earnings, utility credit deteriorated and, in many cases, utility bond ratings were reduced. Reflecting this state of affairs, utility common stock prices were at depressed levels during
the early postwar period. Utility stocks were selling barely at, or below, book value. These circumstances contributed to the relative paucity of equity financing on the part of utilities during the early postwar years, and necessitated rather widespread applications by utilities for rate increases throughout the country.

It might be said, parenthetically, that this was particularly the case in the telephone industry, which was more adversely affected than the electric utilities, since labor costs are a much larger component in telephone operations. Accordingly, AT&T's earnings' posture was under pressure because of its greater rate of growth and, consequently, its relatively larger need for new capital. The market for AT&T shares was depressed, and it was impracticable to raise equity capital through direct stock issues. Instead, in the early postwar years, convertible debentures were issued extensively in hopes that earnings improvement would stimulate conversions. However, in the late 1940s, AT&T's earnings were at depression levels, and investors were understandably reluctant to convert such debentures into common stock during those years.

**UTILITIES' IMPROVEMENT IN THE 1950's**

By the mid-fifties, the major adjustment to World War II-induced inflation had been effected. Industrial earnings on common equity leveled out at more sustainable rates, i.e., in the range of 12-13 percent. Electric utility earnings on equity, as a result of growth in demand, rate increases and stepped-up efficiencies in operations improved to the 10-11 percent range. Thereafter, the utilities were able for a considerable period to show a market performance reasonably comparable to that of the industrials—until recent events have again put utility stocks in disfavor. AT&T's improvement in earnings, for much the same reasons as that of the electrics, did not come about until the late 1950's. AT&T, too, was thereafter able to show a market performance reasonably comparable with that of the industrials until its price was depressed, first by the initiation of a broad FCC rate investigation (Docket 16238), and, more recently, by the same factors that have been depressing electric utility share prices. It is significant to note, however, that neither the electrics nor AT&T have been able to make up the ground lost to the industrials in the early years following World War II when the effects of the wartime inflation were being assimilated.
A rather pragmatic approach is for the regulatory commission simply to tolerate current rates of return which are higher than those established in the last formal proceeding—in recognition of inflation and its effects in increasing the required rate of return. This is perhaps the most common situation today since most utilities have not been in formal rate proceedings for many years, and current rate of return requirements are much higher than would have been determined in the fifties.

**USE OF "OPPORTUNITY COST" PRINCIPLE**

Still another approach, and in my view the fairest, is to permit the earnings of regulated utilities to bear a reasonable relationship to those of non-regulated industry. This accords with the opportunity cost principle of economics which would require that capital invested in utility enterprises be allowed earnings reasonably comparable to those it could earn in alternative investment opportunities, differences in risk considered.

This opportunity cost approach has the further merit of allowing the utilities an adjustment for inflation roughly equivalent to that achieved in the unregulated sector. Thus the utilities under this approach are not accorded any measure of special protection, nor are they discriminated against by allowing no recognition of the effects of inflation.

The primary requisite is for regulation to recognize the effects of inflation. The method adopted is not the important factor. Rather, to advert to the Supreme Court's Hope decision, it is the end result that counts. And the end result must focus on the need for the investment performance of utility stocks to meet the competition of Industry generally—otherwise, investors simply will not be attracted to utility equities.

**FOCUSING ON TOTAL ECONOMIC ENVIRONMENT**

I would also like to stress the view that the rate of return allowed a utility should contemplate a range of allowable earnings rather than a precisely fixed figure. As a practical matter, the appropriate rate of return cannot be pinpointed precisely in any event. Calculations purporting to show the appropriate rate of return to the second decimal point, although based on broad assumptions and quantum jumps in
their logical development, are to be viewed with considerable suspicion.

Moreover, a rate of return range—within which the utility might operate without regulatory intervention—affords a most desirable incentive for the regulated enterprise to strive to improve its earnings through the introduction of technological improvements and operating efficiencies. This incentive will result in lower costs to the customer in the long run than would come under the kind of “cost-plus” operation that is implicit in a narrowly defined rate of return.

Thus, it seems self-evident that the rate of return allowed utilities must recognize the effects of inflation. This need is particularly acute in periods when the rate of inflation is so great as to exceed the ability of the regulated enterprise to offset inflation through increased productivity.

The precise method of affording such an allowance is not too important as long as the adjustment is a fair one. Given the rather wide variety of either statutory or customer-entrenched approaches to rate of return in the various jurisdictions, it would be somewhat pointless to urge a uniform practice in this respect.

**Inflation Renders Conventional Wisdom Obsolete**

Whatever the approach employed, a range in the allowed rate of return for the utility is imperative. Indeed, it seems to me that we must find ways of progressing beyond the “conventional wisdom”—to use Professor Galbraith’s term—regarding regulation. The simplistic emphasis on rate base and rate of return that has dominated the regulatory arena in the past may not be sufficient for the needs of the future.

Our economy is becoming increasingly research oriented, and we are living in an era of rapid technological change. It is critically important that the regulated industries which represent the essential infrastructure of our economy be able to keep pace, to stay with the pack, so to speak, in this environment.

One obvious need in this respect is the allowance of realistic depreciation rates so that capital may be recovered over the shortened economic life of today’s plant. But, more importantly, regulation must be so oriented as to encourage increases in productivity through the introduction of new technology and operating efficiencies.

The regulatory environment must also encourage innovation on the part of the regulated industries so as to assure the public the most complete and up-to-date services, services that complement the advances elsewhere in our economy.

**The Consumer Benefits**

Regulation might well take into account the measure of customer acceptance of both the quality and the price of the regulated industry’s services, as well as the relationship between its prices and the prices of other products and services. If the regulated firm scores well on these counts, is the customer best served by nipping away a narrowly defined “excess” margin of earnings? Or might he net better be served if the latitude afforded by these earnings were used by the regulated firm to proceed more rapidly with technological advances—and innovation in its services and operations—that will lead to better service, sooner, and at lower cost to the customer?

It seems certain that the latter course will eventually produce lower rates than would otherwise be obtainable, and, in the long run, both the consumer and society as a whole would benefit.

The consumer benefits under such an approach. While forgoing a small rate reduction now (when he is already obtaining good quality service at attractive prices vis-à-vis those of other goods and services), he assures the early introduction of a stream of future service improvements and cost reductions that otherwise would be delayed and come in smaller measure.

Society at large benefits because the regulated firm is enabled to make its full contribution to the achievement of our national goals of full employment, economic growth, and rising standards of living. In light of today’s conditions, society benefits additionally from the greater ability of the regulated firm to shoulder its full share of the responsibility of all businesses for solutions to our urban problems.

**Econometric Applications**

I might interject here that I have been quite interested in the earlier discussions in this conference relating to the use of econometric models in the solution of problems in regulation, particularly in the establishment of allowable revenues. Undoubtedly, we shall see a burgeoning
employment of these management science techniques in both the in-
ternal operations of regulated industry and in the regulatory process
as well. Indeed, much in this line is being accomplished at present.
But in the current state of our knowledge, there is danger cf being
misled by the perhaps superficial precision of these approaches. The
use of demand curves, output requirements, desirable investment re-
sponses, and the like, by an individual regulatory agency dealing with
an individual regulated enterprise requires a fairly precise determina-
tion of inputs. It further presupposes that the regulatory agency is
privy to, and in agreement with, some clearly-defined matrix of na-
tional economic objectives and sub-allocations—a sort of "Gosplan" if
you will.

Unfortunately, experience around the world to date with "Gosplans"
have not been too convincing. So, while we may well be working toward
greater use of these promising new tools, a note of caution regarding
their possible premature employment seems to be in order.

What I am suggesting at this stage is that the regulatory process
should focus on the totality of consumer benefits and not narrowly on
today's price alone. Only a minor portion of a utility's revenues is
carried down to rate of return. The great potential for benefit to the
consumer lies in the "above the line" charges. It is the latter that can
be most favorably affected by the thrust of our modern technologically-
oriented economy and by innovations in services or operating methods.
And the latitude afforded by an adequate level of earnings, as distin-
guished from a pinch-penny level, is a necessary element in the full
pursuit of these benefits.

These concluding remarks may superficially appear to depart some-
what from my topic, "Inflation and Rate of Return." My license to
make them, however, lies in the fact that recognition of the effects of
inflation in rate of return is a condition precedent to the broader ap-
proach to regulation that seems necessary today. Without such recog-
nition, it would be futile indeed to contemplate an environment in
which regulated industry could hope to keep pace in our modern
economy.

Comment

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I find myself in agreement with many of the points in Mr. Scamlin's
paper. There are two places, however, where I feel some observations
are in order.

As we look at the inflation problem, over the long-run period, what
can be seen for the future insofar as price changes are concerned?
One of the exercises a forecaster requires himself to go through is to
look back over his shoulder in the process of making his forecast of
the future. That may seem to be a curious way to make a forecast,
but if you stop to think about it, this is the way most forecasters work.
They comprise a sort of backward-looking fraternity of people. Curiously,
and in contrast with what my grandfather would tell me if I
asked him this question, I do not find data that assure me that we have
had secular inflation in the United States over the last 150 years. I
will grant you that the data are not comprehensive. But fragmentary
as they are and as systematically assembled as we can make them—as
the Bureau of Labor Statistics can make them—they say something like
this (I am starting at an arbitrary beginning point, I suppose, but I
hope it is not capricious): If you go back to, say, 1810 or 1815, BLS
figures on wholesale price index stood at about 60. Using that as our
beginning number, take that period all the way up through 1946, where
the index stands at only 68, or 10 percent above the level of our initial
point. Now that does not mean that it just floated along approximately
level for 150 years. It went through some pretty wild gyrations, but
the point is that the wholesale price index has not shown a clear upward trend. However, we have a whole new ball game beginning in 1946 for a number of reasons.

Suppose we take a look at the period from 1946 on, because this is a different kind of world from the past; a look at the last couple of decades does reveal some distinctive features in the price indexes.

It tells us one or two things that are interesting and complicating. The 1946-47 period produced rather sharp price inflation. Looking back you forget that there was only a brief period—twelve to fifteen months—immediately after the end of World War II and the removal of price ceilings when we had sharp increases in prices. The numbers (again if I use the wholesale price index, just to remain consistent) show an increase of about 22 points; that is, the wholesale price index moved from about 66 to about 88 in roughly a year or a year and a quarter. Then we proceed for two or three years with the price index floating along relatively level. Then came the Korean period—June, 1950, up to March of 1951—roughly nine months. The numbers for this period show a sharp rise from 84 in mid-1950 to 97 by early 1951. From there the index declined gently until the 1955-57 period. Prices rose by about 7 percent from 1953 to 1958, and then stabilized at this level (100 on the WPI) for several years between 1953 and 1964. During 1965, we began the fourth round of inflation, which we are experiencing now. Currently, the wholesale price index is 107. It has gone up 6 points since 1968.

What we have had in an overall sense is an inflation of approximately 90 percent in the past twenty-two years. But the difficulty is that it is not steady and regular, and therefore we cannot say that we have an on-going, dependable process as measured by the wholesale price index. (Using the consumer price index or the GNP deflator index, we get something like the same result, but this same generally cyclical characteristic of inflation is evident whichever the major indexes we use.)

To sum up: If you could count on regular, dependable rates of price inflation, the problem of regulation would be less difficult, for regulatory authorities would have the relatively simple question of deciding whether to make adjustments in revenues via the rate base or whether to make adjustments via the rate of return. The really awesome problem that the regulatory agency faces is that neither they nor anyone else can tell what rate of inflation is in prospect, and you do not adjust the rates every few months. Once rates are set, they pretty much stay fixed for a substantial period of time, and the regulatory agency is not able to make minute-to-minute adjustments. This is the truly complicated factor, and this is the thing that I think must be recognized by utility managers rather than the relatively simple question of rate base versus rate of return.

Now, what are the prospects for the future based upon this situation? My own optimism shows through when I say there is some possibility for better price performance in the future, despite the acknowledged fact that we as a nation have deliberately set out on a course of full employment with maximum growth, a course which obviously has implications for price level stability. There may have to be some trade-off here, but I think there is some ground for feeling more optimism than Mr. Scalon's statement would imply. Let me suggest the possibilities. Insofar as monetary policy is concerned, and this is a portion of national policy that I am most familiar with, here are some of the reasons for believing that the poor track record of monetary policy may well be improved in the future. First, during the period 1946 to 1951, we locked off monetary policy by requiring the Federal Reserve to stabilize interest rates in the United States. Those of you who were involved in capitalizing your firms during that early postwar period recall very well that the long-term government interest rate held firmly at 2.5 percent. That's one reason why monetary policy was relatively ineffective in maintaining any degree of stability in prices and goods and services markets. And this was because we had our eye on stabilizing interest rates. If we are going to stabilize interest rates at whatever cost, it means we are going to furnish the economy whatever amounts of credit that business and other users require regardless of the impact on prices. There was a trade-off required and we traded stability of goods and service prices for stability of interest rates.

But what about the period from 1951 on? Didn't we have more inflation after that, even though the Federal Reserve had gained independence in applying monetary measures? Yes, indeed we did. I have some personal recollection of what occurred in that period. We had not had any kind of effective monetary policy for an entire generation, going all the way back to the 1920's. Even during the 1920's in the United States we had very little experience with the operation of a monetary control device. Therefore, in 1951 we had to start with a
brand new cadre of monetary controllers. When the Federal Reserve conducted open market operations, when the Federal Reserve changed the discount rate, and when reserve ratios were altered, it was impossible to predict with accuracy what the result would be. The monetary authority had little basis in experience with the kind of money and capital market we were operating in the United States in the 1950's. As a result, the Federal Reserve was necessarily cautious, perhaps overly cautious. There was a tendency to err on the side of too little rather than too much. Past errors, I realize, do not assure future wisdom, but I feel there is a real possibility that we will see a much higher degree of skill in the decade of the 1970's than we have seen in the two past decades.

Given that the monetary authorities will operate with more skill and expertise in the decade ahead, what are the prospects for financing the enormous capital expansion that is in prospect? Forecasts of long-run growth of the American economy nowadays are in agreement that the required rate of growth is closer to 5 percent annually than 3 percent as in the past. The reason rests on the greatly accelerated rate at which the labor force will grow in the next ten years, and the fact that we are committed to a policy of full employment. We are going to roughly double the increment to the labor force each year in the next ten years compared to the last ten years. And we have a commitment to full employment in this country which most people feel we are going to meet.

But what does this have to do with the utility industry and interest rates? It has this to do with it. If we are going to increase GNP at a rate approximately half again the rate we have had in the past, we had better plan to allocate something like half again as much annual output to long-term capital expenditures as we have in the past. During the past ten or fifteen years we have put in something like 9.5 or 10 percent of GNP into capital goods. Using that as a figure, we must think in terms of 13 to 14 percent of GNP going into capital expenditures.

Where are we going to get it? One thing we all learned from John Maynard Keynes is that investment cannot exceed saving. If we are going to invest at a significantly higher rate, we will require an enlarged volume of savings. Demand for capital is going to be intense in this next ten years, and presumably the Federal Reserve will attempt to limit the growth of bank credit to noninflationary levels. As a result, I think we should not look for a return of low interest rates. And this observation is fully as significant to the utility rate problem as the whole matter of inflation. The utility industry is the largest user of long-term capital market funds in the world, and the cost of obtaining the funds needed to meet its required growth during the coming decade could well be double the present imbedded cost of funds in the industry.
V

Information Requirements
for
Regulatory Decision Making
Information Requirements for Regulatory Decisions

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When a regulator makes a decision that a particular expenditure constitutes an appropriate increment to a public utility's rate base, his action affects the firm, its shareholders, and the surrounding economy. His decision may enable the firm to combine resources in a more efficient manner, or it may allow inefficiencies to be preserved in the production process. It may lead to windfall gains by shareholders or to the frustration of their legitimate expectations. It may allow a community to expand and thrive, or it may impose so high a cost upon the area that its future growth is limited.

In a real sense, a regulator plays three exceedingly difficult roles when he considers his decision about making additions to the rate base. He acts as a proxy for the price mechanism, the legal mechanism, and the voting mechanism.

As a substitute for the price mechanism, the regulator must determine how the new capital that is presented for inclusion in the rate base will influence the output and distribution of goods and services throughout the economy. This problem is further complicated by the fact that the regulator must also try to ascertain whether or not the adjustments that will take place as a consequence of his actions repre-
sent a move toward improving the welfare of the community as a whole.

As a substitute for the legal mechanism, the regulator protects the intentions of prior legislative decisions as well as, among other things, the legitimate claims of the utility's shareholders with respect to the level and rate of earnings that the firm enjoys. The standards that the regulator will apply in this area, however, are not those of economic efficiency but rather those of consistency, prudence, and equity.

Finally, as a substitute for the voting mechanism, the regulator must treat the utility as an object of the community's social preferences. For example, a utility's particular production process might contribute to air pollution. The regulator then becomes the vehicle through which the community's non-economic preferences about how goods are produced are articulated and communicated to the management.

Given these three roles, the problem we wish to face is this: what are the information needs of regulatory bodies? To achieve some modicum of success in formulating an answer to this problem, we shall concentrate only upon the regulator's role as a substitute for the price mechanism and by-pass his function as a substitute for the legal and voting mechanisms. Even within this reduced area, the number of problems remains very large. We shall, therefore, further limit our specifications of the information requirements to those variables of the economic system which lie within the control of the utility company itself. In our formulation then, the overlap between the information requirements of, say, the utility's board of directors and the regulatory body will be great.

We assume at the start that the regulator knows what his preferences are for the utility's level of output in each period throughout the planning horizon. These preferences may have been formed by forecasting the service requirements of the outside economic environment or by a belief about the beneficial effects that a particular level of utility output will have on the level of employment and growth of the community serviced.1

Moreover, we further assume that, as a proxy for the price system, the regulatory commission will want the utility to sell the output produced at the lowest price consistent with the constraints that are imposed upon the firm. Prices higher or lower than this level imply a social misallocation of resources.

Given the fact that a regulator knows his preferences for the state of affairs he wishes to see realized, rational decision-making procedures then require that he go on to develop information about the functional relationships that characterize the firm; for knowledge of these relationships is necessary if he is to make choices with respect to the prices that the utility can charge and with respect to the other instrumental variables under his control that will permit the output goals to be achieved through time.

It is our contention that the information requirements of a public utility regulator can be specified as knowledge of the parameters of the following decision problem: given the set of functional relationships that describe the firm, minimize the price of the utility's services over a planning horizon subject to the constraint that the outputs produced in each period are greater than, or equal to, specified target levels.

The import of these remarks for the information requirements necessary to evaluate technological change is clear; rather than monitoring the effect of a change in activities upon a single financial variable, such as the rate of return, the regulator must develop information on how the change will influence the parameters and form of a system of equations.

Before we discuss in greater detail the decision-making framework proposed above, it may be useful to review the present information system of many regulatory bodies.

The Accounting Model

Much of the data now collected by regulatory bodies to supply the information necessary to measure the performance of a utility is motivated by two accounting tautologies. The first states:

$$ R = O + (V - D)r $$

where $R$ = total return, $O$ = operating costs, and a return to capital measure is given by the product of the rate of return ($r$) times the rate base; the original value of the plant and equipment ($V$) less accumulated depreciation ($D$).
The second equation recognizes that the return is distributed to bondholders and shareholders:

\[ r(V - D) = IL + kE \]

where \( r \) is the interest rate paid on liabilities, \( I \), and \( k \) are the returns on equity, \( E \).

The deficiencies in this framework from the point of view of giving the regulator information that he can use in making decisions can be briefly stated.

1) The accounting equations do not explicitly incorporate all of the major variables that are of interest to the regulatory commission. It is obvious, for example, that the level of present and future services does not appear as a formal target variable in the equations used in the decision process. As a consequence of this omission, there is a real risk that a regulator seeking to administer the price at which services are sold through rate-of-return considerations alone may unknowingly fix other variables of concern, such as outputs or resource uses, at levels which he would deem undesirable.

2) The variables included in the accounting identities are related to one another in ways other than those implicit in the accounting tautologies.

For example, the interest rate \( r \) is linked to the proportion of debt in the capital structure; as the proportion of debt increases, the rate of interest that the utility must pay for the funds it borrows increases. Operating costs \( O \) are a function of the level of output \( Q \); which, in turn, is one component of the total revenue function, and so forth. In general, then, there is a systematic relationship among events in the utility and between the utility and its environment which cannot be captured by the accounting framework.

3) There is no decision technology for choosing among alternative states of affairs.

Whenever a regulator chooses a certain level of revenues, a certain price, a certain rate of return, or a certain capital structure, that choice will have effects throughout the firm as well as on the environment. Some of the effects will occur in the current period under study; some will occur in future periods. In choosing one variable over another, the regulator is, in effect, choosing one rather complex state of affairs over another. The accounting framework neither allows him to predict the state of affairs which will result from such a decision nor to consider alternative states of affairs before deciding.

A PROGRAMMING MODEL

An alternative framework to the accounting tautologies for determining the information requirements of a regulatory authority is given by a model systems approach.

In another paper, which will appear shortly in the Journal of Land Economics, we have shown how the firm's demand curve, production function, and supply schedule of inputs can be considered as constraints in a programming model. We then went on to show how these functions can be combined with an objective function, such as profit maximization, to determine the firm's income statement, balance sheet, and output mix.

From a regulator's point of view, the objective function of maximizing profits over a planning period may be an inadequate statement of corporate goals. A more appropriate goal may be to minimize the price of a product and/or to have output be greater than, or equal to, specific target levels. The specification of which function is the objective and which is the constraint, however, is less important than recognizing that our statement of the economic problem of public utility regulation can be captured with a programming format; for were such a framework adopted, the emphasis in regulation would shift from monitoring the utility through indirect measures of output, such as the rate of return, to recognizing the relationships that must hold within the firm itself for it to meet its output requirements.

CONSIDERATIONS IN DEVELOPING A MODEL

To build a model such as the one described above, the regulator must develop information about the form of the constraints and the value of the co-efficients that enter the model through time. We recognize that, while the parameters of the model specified can be empirically determined, such information may be difficult to obtain. The interdependencies between the variables, as well as shifting interdependencies between the firm and its changing exogenous environment, render the task difficult. In addition, the form of the constraints, the value of the parameters and the actual products that are produced by the utility can change as a result of technological developments; hence these events themselves raise important information requirements. Even so, the extent to which it is feasible to obtain information depends in large part on the decision value of the information.
We have argued that, once the regulator knows his output preferences and the functional relationships that constitute the utility, decisions can be made with respect to specific policies so that the firm will achieve the goals that have been set. We now wish to specify the functional relationships that describe the aspects of the firm we are interested in and show how the various parts of the system are joined together.

The Demand Curve. For the purpose of our illustration, we assume that the demand curve of a utility’s service is highly elastic with respect to income and highly inelastic with respect to price. As income increases through time, the consumption of the utility’s service will, therefore, increase. However, since changes in prices will not effectively ration the increased demand, the only way the utility can meet its output requirements is to expand its plant or change its production function to meet its new output requirements.

The Production Function. The production function links output to capital and other inputs such as labor and materials. In Figure 1, the production function, holding labor and material constant, is drawn to show that diminishing returns exist with respect to capital. Like the demand curve, the parameters of the production function are a matter of empirical determination: if the function were drawn as a straight line through the origin, it would indicate constant returns to scale, while a convex function would indicate increasing returns to scale.

Assume that the production function is stable through time, but the utility’s demand curve shifts upward with the changes in income that occur. Then, if the price of the utility’s services remains fixed, output requirements will rise from \( Q_0 \) to \( Q_1 \); and the increase in capital that will be required to validate this increase in output will be \( K_{1+1} - K_1 \) amount. The question we ask then is, “Will this volume of capital be forthcoming?” More specifically, can this volume of capital be financed by the utility if it continues to charge a price of \( P \)?

Note that, since the demand for the utility’s output is price inelastic, a rise in price will not discourage the demand for the product. Therefore there is some minimum price which will enable the utility to generate the funds that are required to attract the resources necessary for the output requirements of further periods. Let us call this price the least-upper-price.

If a price higher than this least-upper-price were set, the public would pay a price that could support a larger volume of output than it requires; in this sense, it would be overpaying for the utility’s services. If the price were set below this minimum figure, then the required stock of capital would not be forthcoming; the public would not be served, and the shareholders would not be compensated.

What must be discussed, then, is the functional linkage that exists between the prices that a utility charges and the volume of funds it raises that can be applied to financing its plant and equipment outlays.

Prices and Available Funds

The funds that a corporation uses to pay dividends to its shareholders and expand its plant and equipment outlays can be realized through either current operations or borrowings.

The volume of funds generated internally depends upon the corporation’s gross revenues, its cost of operations, and its past financing decisions. The volume of funds that a firm can borrow from outside lenders depends upon both the interest rate it is prepared to pay for the funds and the size and stability of the revenue stream it will generate. In general, the higher the rate of interest that the firm is prepared to pay and the more stable its flow of revenues, the greater the volume of funds it can secure from outside lenders. There are trade-offs here, however, in that large volumes of borrowings will tend to increase the relative variability of the earnings stream through financial leverage.
The net effect of these considerations is that the function which links the funds that a utility can raise to finance plant and the prices it currently charges for its product is one that, other things being held constant, rises at an increasing rate. Figure 2 shows this relationship.

Let us now combine the analysis of the target output requirements that regulators will seek to achieve in a future period \((t + 1)\) and the funds that the utility must raise in the current period to support these goals.

We have seen that the production function links output to capital. If the desired output in period \(t + 1\) is \(Q^*\), the production function in quadrant 1 of Figure 3 shows that \(K^*\) capital will be required in that period. The linkage between required capital in period \(t + 1\) and the funds that the utility must generate today is shown in quadrant 4.

Some volume of currently generated funds must be used to sustain operations. The relevant function linking current funds to future capital requirements therefore crosses the funds axis at point \(f\). If the capital required in future periods can be financed primarily out of future earnings, then a small increment in the volume of current funds over those necessary to support current operations is required. The functional relationship in that case is almost horizontal. If a large amount of current funds is required to sustain future capital outlays, however, the relationships specified in quadrant 4 will be relatively steep.

Once the volume of funds that are required to sustain present and future output requirements is found (and in Figure 3 this value is \(P^*\)), the price which must be charged today can be found from an analysis of the function plotted in quadrant 3. This price \((P^*)\) is the least-upper-price that we were searching for; \(f\) is the minimum price that will assure that both present and future output requirements will be met.

\(^2\)Specifically, these are the level of current output, current costs, variability of earnings, and the prevailing interest rate.
The analysis presented above sketched out the functions that link the firm's physical output to its financial resources. Several comments are now in order.

1) Determining the parameters of the functions described above constitutes the principal information requirements of the regulatory body. To secure this information is not an easy task: changes in technology, for example, will change the production function; changes in money market conditions will bring about shifts in the finance linkage, and so forth.

2) The performance of the public utility is properly measured by its impact upon the economy as a whole. This means that its relevant parameters are its physical output and the prices the public pays for the services received. Alternative measures, such as the ratio of one financial flow to another, may lead to ambiguous empirical results, since any particular ratio can be achieved in more than one way.

3) It is suggested that the criteria for selecting the price that the utility charges for its services is the lowest price consistent with the ability of the utility to meet the output requirements that are imposed upon it through time. If this view is adopted, then the regulatory problem can be restated as a programming problem where the objective is to minimize the cost of the utility's services to the public subject to the constraints that specific output criteria are met and the functional relationships that describe the firm are not violated. The simplex algorithm itself will then select the particular production function and capital structure that the firm should adopt to achieve its objective function. This framework can be readily extended to apply to n different products. To make this extension, however, the regulator must develop information about the parameters of each product's demand, production, and supply of input schedules and specify the interrelationships that exist between them.

4) Were such a framework adopted, it would recast the locus of decision-making information from an accounting framework to an economic one.

Comment

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When I sat down with the paper by Professors Lerner and Moog and began making notes for this comment, after filling a few pages, I stopped to review what I had written. I was jolted by the direction my notes were taking. The truth is that I would prefer the role of a champion of the Lerner-Moog contribution, rather than that of a discussant in the posture of a critic. Had Professor Trebing reversed Professor Lerner's and my places on this program and invited me to present the main paper, my message would have been very similar to Professor Lerner's. To be sure, I would not have reproduced the grand design of the Lerner-Moog model, but I would have ended up pleading for much the same type of quantitative and analytical approach.

As you will see, I have not held back in my assigned role as a critic—it is an easier role than that of a craftsman—but my remarks are intended as constructive criticism. Too often we rush to attack the handiwork of an innovator and in the process we lose sight of the intrinsic merit of his contribution which, in this case, is substantial and truly creative.

Another reason for my uneasiness as a critic is that the staff of the Federal Power Commission is in the forefront among regulatory agency staffs in the use of econometric evidence in formal proceedings. The

Note: These remarks by Dr. Wald reflect his personal views and do not necessarily represent those of the Federal Power Commission.
FCC's Office of Economics made regulatory history by sponsoring an econometric model for the natural gas industry in the Permian Basin Area Rate Proceeding. The model was largely the product of Dr. Harold Wein, formerly Chief of the Office and now on the faculty of Michigan State University, and also a member of the Executive Committee of the Institute of Public Utilities. Because the work which Dr. Wein started is still going forward at the FCC, I must confess to having a vested interest in furthering econometrics as a regulatory tool. I am delighted to join with Professor Lerner in that important mission.

One other introductory comment occurs to me. Many of the accepted methods of public utility rate regulation have long offended the sensibilities of economists. The basic concerns voiced by Lerner and Moag are not new; only their exposition and suggested remedies are new. It is time for someone on the speaker's platform to sound a note which has not been heard at this conference. Otherwise, we risk losing our perspective. The fact is that the energy and communications industries are showpieces of the American economy. The companies are prospering, their service is continually being improved, and their rates are often being reduced. The academicians frequently allege resource misallocations because of misguided regulation, and there undoubtedly are some, but I would observe that it is not easy to prove major instances of laggard technology, uneconomic investment, or blunted management incentives. One might expect to discover disagreement over the way benefits have been shared between stockholders and consumers but, interestingly enough, the main attack by economists on regulation has not concentrated on overcharges or inadequate profits.

Lerner and Moag have spotlighted a basic irrationality of conventional ratemaking practices. Viewing the regulator's role as a proxy for the market price mechanism, they conclude that the regulator risks making wrong decisions because he ignores demand elasticities, production functions, and the linkage between prices and the availability of funds for capital expansion. The authors demonstrate persuasively that the regulator who looks only at rate-of-return considerations may unknowingly fix prices at a level that is inconsistent with socially desirable output goals for the regulated utility. They recommend that regulatory bodies should estimate the parameters of the functional relationships linking physical output to financial resources and use a "model systems approach" to fix prices at the minimum level consistent with the utility's output requirements and legal constraints on ratemaking decisions. They describe a programming model and the associated information requirements that should permit regulators to predict the production adjustments which will flow from their ratemaking decisions.

The Regulatory Setting

The first questions I wish to ask the authors are these: To what extent is their diagnosis of the regulatory process a true-to-life portrayal, and to what extent is it a theoretical abstraction and little more? Is it possible that much of the nonsense which they and other hostile academic critics see in existing regulatory practices is not all that serious?

The authors' basic concern, as I indicated above, is that the rates fixed by commissions may not elicit the economically optimal level of output. They demonstrate that traditional ratemaking practices, which rely upon a historical rate base and a historical cost of service, will result in overpricing the utility service if unit costs are falling and underpricing if unit costs are rising. Overpricing is bad because consumers are deprived of services for which they would be willing to pay if price equalled cost. Conversely, underpricing is bad because it deters utilities from investing new capital in order to expand output and satisfy increased consumer demand. In my view, this diagnosis, while logically sound, is subject to important qualifications which tend to discount its practical significance.

First, if you assume constant unit costs over the utility's planning horizon, the possible distortions described by the authors largely disappear. The test year cost-of-service approach, which is universal in public utility ratemaking, implicitly postulates constant unit costs. This will often be a satisfactory working assumption, at least for the short run. With constant unit costs, the solutions to the diagrams in the paper before us would not depict ratemaking errors. The authors use cost curves which increase with output in their attempt to expose the folly of regulatory commissions. They are of course correct in exhorting commissions and utilities to investigate production functions, but their paper simply hypothesizes a troublesome ratemaking problem and leaves its practical significance unanswered.
Secondly, we should recognize that the Lerner-Moag diagnosis assumes extremely fine tuning of management's responses to prices fixed by regulatory bodies. For example, they show that, in a situation of increasing unit costs, the traditional ratemaking method will dictate a price below the incremental cost of the additional output that accompanies a growing economy. Knowing that there always are uncertainties about unit costs and the actual growth of demand to be experienced in the year ahead, I find it difficult to believe that management will veto an expansion of output simply because, for the interim, they estimate that prices are being regulated too tightly.

The authors' geometric analysis is premised on instantaneous responses. It assumes that utilities know their production functions and the demand curves for their markets. The way things happen in the real world, however, is very different from the solutions obtained in the world of geometry.

The danger described by the authors is not that output will be curtailed, but rather that earnings may be temporarily depressed, which is a legitimate risk of equity investors. Regulatory lag, more often than not, favors rather than hurts the utility. A utility which experiences increased costs has a legal right to file for higher rates. The Federal Power Commission has the authority to suspend rate increases for a maximum of five months, after which period they may be put into effect and collected subject to possible refund at the conclusion of the rate proceeding. In other words, the regulatory process provides procedures for correcting wrong decisions of the type described by the authors.

**IMPLEMENTATION OF THE LERNER-MOAG MODEL**

Let us proceed to another set of considerations with respect to the Lerner-Moag model. We have been shown a series of diagrams of hypothetical demand curves, production functions, and relationships between levels of output and available funds. The equations for these diagrams must be fitted to the observed data on a company-by-company basis. An industry-wide production function will not serve the authors' purpose, nor will an industry-wide demand curve. To implement their proposal on a broad scale would require hundreds of programming models for the regulated companies, and probably almost the same number of parallel models, because the utilities and the regulatory commissions may not agree on the appropriate values of the parameters in the estimating equations. The enormity of the task, especially when it is matched against the meager accomplishments along these lines, prompts me to question whether it is a truly practical proposal for the regulatory problems we face today.

Another complicating factor is that utility companies are multiproduct firms. Gas companies, for example, sell both interruptible and firm service. They serve both full requirements and partial requirements customers. Some customers are served at a high load factor and others at a low load factor. These companies sell under several different rate schedules. This is appropriate because, from the economist's viewpoint, each class of service is a different product. There is a parallel situation with respect to the many different types of service in the electric and telephone industries. To implement the proposal before us today, we will need to estimate the demand curve for each class of service and also the related production functions. Perhaps a brilliant econometrician will be able to tell us how to handle capacity costs that are common costs for a whole group of services, although I expect that his answers will not always win the full endorsement of his professional colleagues.

The problem of encouraging optimum efficiency of performance is never reached in the Lerner-Moag paper. Will their production functions reflect the backwardness and poor performance of the inefficient firm? The authors certainly do not want to endorse unpolicied cost-plus regulation, which means that they cannot blindly accept the reported data on costs and investment. The authors may have plans for building prudent management standards into their production functions, but rates based on such an approach could result in financially starving an inefficient firm and preventing it from raising new capital.

Although the topic of this conference is rate of return, the cost of equity capital is a subject which is left open-ended in the Lerner-Moag paper. I would find it difficult to derive a relationship between output levels and availability of capital funds without introducing a specific assumption about the cost of equity capital or the price of the company's common stock. Regulated companies generally have ready access to the capital market. If there is a constraint on the amount of their borrowing, it is probably because the additional interest cost may have an adverse effect on the market price of their
stock. When the authors refine their model, they may wish to introduce a cost of money equation.

Suitability for Regulatory Proceedings

The sweep of the authors' proposal is perhaps broader than they realize. They are suggesting that a regulatory commission might reduce or increase a company's rates prospectively, based on studies which forecast a declining or rising cost trend, even though in the current year the company is earning no more than the allowed return. Since the forecast will not be limited to known changes in costs, such as the retirement of a high-cost facility or a procurement contract which reduces or increases the cost of fuel, their suggestion involves a new concept of rate regulation. They are saying, quite correctly, that ratemaking properly should not look to the actual rate of return, but rather to the return that will be realized as output expands. Nevertheless, the commissions will want to have several years of experience with the Lerner-Moag model before they are ready to base rates on projected revenues and costs.

Finally, I might mention the novel problems associated with the introduction of econometric testimony in evidentiary proceedings. Having had some experience with these problems at our commission, we have given considerable thought to possible ways of handling them. The language of the econometrician, not to mention the magic of his craft, is foreign to hearing examiners and most commissioners, yet they are the decision-making officials who must weigh the econometrician's evidence. Perhaps we should begin thinking of new procedural arrangements, because I am confident that econometric testimony of one sort or another will be introduced with increasing frequency in future regulatory proceedings. One possibility is to have the presiding examiner call upon an outside expert, someone who is recognized as an authority on the subject, to advise him, as some judges have done in court cases involving highly technical testimony. Methods of dealing with this problem should be placed high on the agenda of possible reforms in regulatory procedures.

Conclusion

My conviction, as I stated at the outset, is that an investment in perfecting the analytical tools to develop the type of information out-

lined by Lerner and Moag would be very worthwhile. While more work is needed on their specific proposal before it will be useful in ratemaking, there are other potential uses which seem to offer more immediate promise both for utility companies and commissions. For example, with better information about the behavior of demand in response to changes in prices and incomes, we could do a more enlightened job of designing the structure of utility rates. At present our knowledge is so limited that we may be overlooking some opportunities to reduce selected rates, stimulate new demand, generate a larger contribution to overhead costs, and in the end bring added benefits to both consumers and stockholders. More precise knowledge of cost behavior would also be extremely valuable, both because rate design cannot be divorced from incremental costs and because production planning should focus on long-run cost minimization.

The Lerner-Moag approach might well be extended to regulatory activities concerned with the certification of facilities. Often a commission's certificate work has a larger impact on consumers than its ratemaking investigations. When projects are certified which are not wholly consistent with optimal development from the standpoint of potential cost minimization and improved reliability of service, there is a deadweight loss which will probably be carried by the public for many years. An expanding area of FPC's work relates to competitive proposals which must be evaluated to determine which one will best serve the general public. An analytical framework utilizing econometric studies fitted into a programming model will facilitate more informed decision making in these types of cases.

In their paper, the authors raise many questions which regulatory commissions have glossed over in the past but are likely to ask with increasing frequency in the period ahead. The authors contend that the more powerful analytical tools which are now coming into use indicate that it is no longer necessary for the commissions and utility company executives to operate on the basis of rough-and-ready approximations. The authors have given us a preview of a "model systems approach" which merits careful consideration by everyone who has a stake in the performance of the regulated industries.
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