THE PERSONAL INCOME TAX, DIVIDENDS, CAPITAL GAINS AND THE ALLOCATION OF CAPITAL

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ABSTRACT

THE PERSONAL INCOME TAX, DIVIDENDS, CAPITAL GAINS AND THE ALLOCATION OF CAPITAL

by

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The purpose of this paper was to explore the effect of the current method of taxing corporate income, dividend payments and capital gains, on the allocation of capital. It has been hypothesized that (1) the existence of a differential in the tax treatment of corporate income, dividend income and capital gains, creates a tax shelter encouraging firms to reinvest their earnings rather than distribute them to their shareholders and (2) this induced retention may lead to inefficiencies, i.e., investment of retained earnings at rates of return that are lower than could be obtained in other investments of equal risk, investments made outside of the firm either by the firm or its shareholders.

Our results indicate no systematic misallocation of capital due to the existence of the tax shelter. While the majority of our sample firms were affected by the differential tax treatment given dividends, capital gains retained earnings, we did not observe a difference in the performance of the tax shelter firms compared to those firms whose dividend policies were unaffected by the tax shelter.

In two of the three industries studied, the tax shelter firms actually outperformed the non-tax shelter firms, as measured by our alternative average rates of return on investment.

In order to test our hypothesis we formulated a dividend model, which is a generalization of the Lintner speed of adjustment model. The desired dividend payout ratio was made a function of several variables including four different tax variables, though no more than one tax variable was included in any given formulation of the model. Using time series data, obtained from Moody's Industrials, over the period 1939-1965, we tested the basic model for thirty-one firms in three different industries. Our results showed seventeen firms with significant regression coefficients for the tax variables. Within each industry, the performance of the tax shelter and non-tax shelter firms were compared, using as a measure of performance, three alternative average rates of return on investment.

We also formulated an expectations model. Instead of making the desired dividend payout ratio a function of the current values of our tax variables, we made it depend on the firm's expectations of future tax rates. When incorporated into our basic model, this expectations formulation yielded a distributed lag model. This model was also tested for each firm, over the period 1939-1965. The results were similar to those obtained from testing our basic model, though fewer firms had significant regression coefficients for the tax variables.

Though the results failed to confirm or deny our original hypothesis, they do indicate that the tax shelter firms tend to be more closely held, as shown by our measure of shareholder concentration, assets per shareholder. In each of the three industries, the measure of shareholder concentration was higher for the group of tax shelter firms than for the non-tax shelter firms.

We tried several other tests to see if the reason for our failure to observe a poorer performance for the tax shelter firms was related to the closeness of the management and shareholder interests as revealed by our concentration of ownership variable. A multiple regression equation was run with two independent variables, concentration of ownership and the dividend payout ratio and the average rate of return on investment as the dependent variable. Our hypothesis was that for a given level of concentration of ownership, the average rate of return on investment would vary directly with the dividend payout ratio and for a given dividend payout ratio the average rate of return would vary directly with the level of concentration of ownership. This regression analysis was carried out for several years for each industry. While the majority of the regression coefficients were not significant most of them had the correct signs. Thus the failure to observe a lower average rate of return on investment for tax shelter firms may not be so surprising. The fact that these firms are more tightly held may lead to a more efficiently run firm and this may work against the effect of the induced investment reducing the average rate of return.

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DEDICATED TO

TO MY FAMILY, MY WIFE PAT AND
MY MOTHER AND FATHER

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CHAPTER I

INTRODUCTION

The purpose of this paper is to explore the effect of the current method of taxing corporate income, dividend payments, and capital gains on the allocation of capital. It has been hypothesized that (1) the existence of a differential in the tax treatment of corporate income, dividend income and capital gains creates a tax shelter encouraging firms to reinvest their earnings rather than distribute them to their shareholders and (2) this induced retention may lead to inefficiencies, i.e., investment of retained earnings at rates of return that are lower than could be obtained in other investments of equal risk, investments made outside of the firm either by the firm or its shareholders.[1] This induced investment takes place with the consent of the present shareholders because they will have to pay a lower tax rate on the subsequent capital gains or can entirely avoid any income tax by holding the securities until death. Thus even though the pre-tax rate of return may be lower than other alternatives, the after tax rate of return will be higher for the shareholders if the earnings are retained within the firm and reinvested. For example, suppose a corporation earns $1,000,000 after corporate income taxes.

[1]Milton Friedman, Capitalism and Freedom (Chicago, Illinois: University of Chicago Press, 1962), p. 130.

If it distributes this $1,000,000 in the form of dividends, the shareholders would receive $750,000 if they are in the 25% marginal bracket, $500,000 if they are in the 50% bracket and $300,000 if they are in the 70% bracket. If the corporation instead paid no dividends and reinvested the entire amount, the value of the stock would rise and the shareholders could sell their stock and be taxed at a lower rate.[2]

The firm operating on the principle of wealth maximization will invest so long as the opportunity cost of its funds is less than the rate of return on its investment. In order to implement its capital budgeting decision the firm seeks a cut-off rate of return based on the opportunity cost of its funds. It has been argued that there is a tax shelter that will lower the opportunity cost related to retained earnings and therefore lead to induced retention of earnings and their reinvestment at a rate of return below what could be earned by the individual shareholder if there was no tax shelter. Hence capital could be better allocated if these funds were paid out and reinvested by the shareholders.

The tax shelter arises because of the difference in the effective tax rates on retained earnings and dividends. This difference alters the shareholder's opportunities and creates an incentive for earnings retention.

The effective U.S. tax rate for the long-term large scale investor, for whom the present $100 per capita dividend exclusion

[2]The capital gains tax is one half of the marginal rate or 25%, whichever is lower.

is insignificant enough to be ignored, is given by expression (1-1).

(1-1) .... $x_e = c_t + p_t a(1-c_t) + 0.50 p_t v^t (1-a)(1-c_t)$ for all $p_t \leq 0.50$

and

.... $x_e = c_t + p_t a(1-c_t) + 0.25 v^t (1-a)(1-c_t)$ for all $p_t > 0.50$

where

x_e = effective tax rate on corporate source income

c_t = statutory corporate tax rate

p_t = statutory marginal personal tax rate

a = dividend payout ratio where $0 \leq a \leq 1$

v^t = discount rate applicable to capital gains taxes expected to be realized t years later where $0 < v < 1$

From equation (1-1) we can derive the following conclusions.

1. The effective tax rate on distributed corporate source income is always higher than on undistributed corporate source income. For a = 1, i.e., a payout ratio equal to one, no retention, the effective tax rate becomes:

(1-2) .... $x_e = c_t + p_t(1-c_t)$

If there are no dividends then a = 0 and the effective tax rate on corporate source income would be:

(1-3) .... $x_e = c_t + 0.50 p_t v^t (1-c_t)$ for all $p_t \leq 0.50$

and $x_e = c_t + 0.25 v^t (1-c_t)$ for all $p_t > 0.50$

It can easily be seen that $x_e(D)$, the effective income tax rate on dividends, is greater than $x_e(U)$, the effective income tax rate on undistributed corporate profits, even if $v^t = 1$, i.e., capital gains are realized immediately.

2. For low income shareholders the effective tax rate on corporate source income will be greater than on other income of equal size, i.e., $x_e > p_t$, but for high income shareholders the reverse may be true. For those shareholders who plan to hold their securities until death there will be no capital gains tax and therefore $x_e = c_t$ and for many of these shareholders $c_t < p_t$.

Both of the above conclusions lead to the tax shelter hypothesis.

The Tax Shelter and the Cost of Retained Earnings: Normative Theory

The problem of correctly calculating the cost of retained earnings when making the decision to retain and invest or pay out dividends has received much attention in the literature dealing with the normative theory of finance.[3]

The theory has traditionally looked at the problem in either of two ways. One is the personal use criterion. This point of view stresses that earnings should be used for internal investment rather than paid out in the form of dividends only if they will add as much to the net present worth of the stock as the individual owners could obtain if they invest on their own. If the tax on personal income is different than on capital gains then the present worth of a dollar in

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[3] For example, see: Ezra Solomon, The Theory of Financial Management (New York: Columbia University Press, 1963), chap. v.

dividends is not equal to the present worth of one dollar reinvested by the company. For example, if each individual stockholder has a marginal income tax rate of 40%, and the tax on capital gains is equal to zero then, the present worth of a dollar in dividends is equal to 60 cents. If the shareholders are able to invest and receive a stream of earnings equal to 20% after all income taxes, then it would be advantageous for the firm to invest and purchase an earnings stream rather than payout dividends even if the rate of return internally fell to 12% after all income taxes.[4]

To generalize, suppose all securities are held till death. If dividends are paid out the shareholder will have $(1-p_t)y$ dollars to invest at a pre-tax rate of return of r_p, where p_t is the marginal personal income tax rate and y is the dollar amount of dividends. If the dividends are invested in corporate source income, then the rate of return after taxes will be equal to $r_p(1-p_t)(1-c_t)$ where c_t is the corporate income tax rate. If no dividends are paid out, the corporation has y dollars to invest at r_c, the corporation's rate of return before all taxes. If all future earnings are paid out in dividends, the after tax rate of return to the individual shareholder is $r_c(1-c_t)(1-p_t)$. Thus, if dividends are paid out the opportunity of the shareholder, i.e., his future earnings stream, can be represented by equation (1-4).

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[4]A dollar invested by the company at 12% and discounted at 20%, adds 60 cents to the shareholder's net worth, which is equal to the present worth of the after tax earnings stream available to the stockholder. This analysis will hold if the market correctly accounts for the reinvestment by the firm at 12%.

(1-4) .... $Y_i^* = (1-p_t)(y)(r_p)(1-c_t)(1-p_t)$

and if retained by equation (1-5)

(1-5) .... $Y_i' = (y)(r_c)(1-c_t)(1-p_t)$

If we equate the two income streams we have

(1-6) .... $(1-p_t)(y)(r_p)(1-c_t)(1-p_t) = (y)(r_c)(1-c_t)(1-p_t)$

and

(1-7) .... $r_p = r_c/(1-p_t)$

and since $0 < p_t < 1$

then $r_p > r_c$

if the two income streams are to be equal.

The second approach, which has been called the external yield criterion, is based on the alternative open to the corporation to acquire the majority control of another company. Thus, if the corporation does not have sufficient internal investment opportunities to earn a rate of return equal to the rate of return open to its shareholders it should not invest these funds internally but should seek the acquisition of other companies. Thus the firm should not invest internally at a rate of return below its cost of capital because of the tax shelter but should invest in other companies yielding a rate of return equal to or greater than its overall cost of capital.[5]

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[5]Strictly speaking, this applies only to external assets in which the company can acquire a sufficient ownership interest to permit a consolidated return for purposes of corporate income taxation. The return from minority interest in external assets must be calculated after the tax on intercorporate dividends.

The external yield criterion is the correct one for those situations where both internal and external investment opportunities at rates of return above the cost of capital exhaust the total of internally generated funds. But for those cases where the internal and external investment opportunities do not exhaust the total of internally generated funds, a firm must use the personal use criterion in order to establish the minimum standard for investment projects. Since the firm will probably have investment opportunities to purchase shares of other firms, (minority interest) it has investment opportunities equal to 85% times the return on these investments (assuming a 15% tax on inter-corporate dividends). In this case the firm would retain and invest in these projects so long as the marginal tax bracket of the average or typical shareholder was above 15%.

Ezra Solomon dismisses the tax shelter effect because he assumes external opportunities will exist and therefore the tax shelter will not affect the cost of capital.[6] He concludes the tax shelter is unimportant under the external yield criterion where enough investment projects exist to totally exhaust internally generated earnings. It is the purpose of this paper to test empirically how such a tax shelter alters corporate dividend policy and whether it leads to inefficiencies in the allocation of capital. Solomon argues only from the normative point of view, i.e., how firms should behave.

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[6]Solomon, Financial Management, p. 54.

The Holding Period and the Tax Shelter Argument

The existence of a tax rate differential between the rates on individual income taxes and capital gains is not a necessary condition for the tax shelter argument. Even if the tax rate on an individual's income was equal to the rate on capital gains, the incentive for retention on the part of shareholders would still exist. In fact, capital gains tax rates above individual rates may still create a tax shelter.

This can be seen by examining equation (1-1). If capital gains were taxed as ordinary income, the applicable tax rate would be the marginal personal rate, p_t. Equation (1-1) could then be rewritten as (1-8)

(1-8) .... $x_e = c_t + p_t a(1-c_t) + p_t v^t(1-a)(1-c_t)$

If a = 1, no retained earnings, then the effective tax rate on corporate source income would be given by (1-9)

(1-9) .... $x_e = c_t + p_t(1-c_t)$

and if a = 0, no dividends, then the effective tax rate on corporate source income would be given by

(1-10)......... $x_e = c_t + p_t v^t(1-c_t)$

The longer the holding period, the greater t and the smaller v^t, since $0 < v < 1$. In the limiting case, as t approaches infinity, v^t approaches zero and x_e approaches c_t. Thus the time differential alone yields a tax shelter, and may encourage investment in less productive uses, even though the differential between the two statutory rates is zero.

CHAPTER II

RELATED LITERATURE AND RESEARCH

In economic theory, the study of saving has traditionally been of personal saving rather than business saving. Since the business saving decision and the dividend decision are mutually determined, the neglect of business saving behavior has been the same as neglecting dividend behavior.

In part this has reflected the rather uncertain status of the corporation as a separate behavioral entity in much of economic analysis. Keynes in the General Theory emphasized personal saving behavior, and in a brief discussion of saving by corporations, governments and other institutions he suggested rather obscurely that their motives for saving were "largely analogous to, but not identical with these actuating individuals."[1] Keynes' neglect of corporate saving was not new in the development of economic analysis, and Harry G. Johnson has argued that it "reflects Marshall's inability to integrate the modern corporation into his system of economic analysis."[2]

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[1] John Maynard Keynes, The General Theory of Employment, Interest and Money (New York: Harcourt, Brace and Company, 1936), p. 108.

[2] Harry G. Johnson, "The General Theory After Twenty-Five Years," American Economic Review: Papers and Proceedings, LI (May, 1961), 5.

This neglect of business saving has been reflected in the lack of research related to the investigation of corporate dividend policy.[3]

Recognition of the Problem and Possible Solutions

David C. Smith, in an article investigating business saving behavior in Canada, reaffirms this point and goes further by emphasizing the allocative effects and the important policy question implied by our hypothesis.[4]

> The expected behaviour of aggregate corporate saving is an unsettled problem that has received considerably less attention in economic research than personal saving behaviour.
>
> . . . Does the behaviour of corporate saving in our society adversely affect the allocation of economic resources?
>
> The question is important for the position one takes on whether or not government policy should be designed to increase the distribution of corporate income and thus to increase the channelling of new corporate funds through the capital market.[5]

Though he does formulate an empirical model of business saving in Canada, he does nothing further with the allocation problem or the alternative policy possibilities.

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[3]Some recent empirical studies that have dealt with dividend policies are: Paul G. Darling, "The Influence of Expectations and Liquidity on Dividend Policy," Journal of Political Economy, LXV (June, 1957), 209-24; John Lintner, "Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes," American Economic Review: Papers and Proceedings, XLVI (May, 1956), 97-113; John Brittain, Corporate Dividend Policy (Washington, D.C.: The Brookings Institution, 1966); P.J. Dhrymes and M. Kurz, "On the Dividend Policy of Electric Utilities," Review of Economics and Statistics, XLVI (February, 1964), 76-81; P.J. Dhrymes and M. Kurz, "Investment, Dividend and External Finance Behaviour of Firms," in Determinants of Investment Behavior, ed. by Robert Ferber (New York: Columbia University Press, 1967), pp. 427-466; and Stephen J. Turnovsky, "The Allocation of Corporate Profits Between Dividends and Retained Earnings," Review of Economics and Statistics, XLIX (November, 1967), 583-89.

[4]David C. Smith, "Corporate Saving Behavior," The Canadian Journal of Economics and Political Science, XXIX (August, 1963), 297-310.

[5]Ibid., p. 297.

As already suggested, the theoretical literature has stated clearly the incentive and allocative effects of tax policy in relation to dividends.[6] This recognition continues in a recent article by West and Bierman in which they argue that:

> . . . given the current regulations governing the taxation of personal income, there are strong reasons to believe that a reduction in dividend payments by firms that are raising capital by preemptive security issues could lead to an increase in common share values.[7]

That is, there is a strong incentive for firms to avoid the capital market and reduce dividends in order to finance investment. This avoidance of the capital market isolates the firm from the rigors of that market and permits it to avoid subjecting its decisions to the market. The shift from external financing to internal financing may reduce efficiency with respect to the allocation of capital.

Dobrovolsky recognized this and pointed out that subjecting the firm to the market may enhance economic efficiency.

> While a shift from internal to external financing need not always make the system more flexible, such a result appears probable if the economy is a competitive one and external investors are reasonably competent and well informed.[8]

Whether the subjection of a firm's decisions to the capital market forces it to enhance the efficiency of its operation is an empirical question. It is an issue on which I hope we will have

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[6]For example, see Friedman, Capitalism and Freedom, p. 130; and Solomon, Financial Management, chap. v.

[7]Harold Bierman Jr. and Richard West, "Corporate Dividend Policy and Pre-emptive Security Issues," Journal of Business, XLI (January, 1968), 71.

[8]S. P. Dobrovolsky, "Economics of Corporate Internal and External Financing," Journal of Finance, XIII (March, 1958), 41.

something to say but some preliminary evidence can be found in I. M. D. Little's study.[9] In a portion of his study, Little inquired whether the amount a firm retains influences the rate of growth of earnings. He undertook to explain earnings growth as a function of the rate of retention and asset size. Employing data provided by Moody's Service Ltd., Little studied 441 large firms for which a complete record was available for the period from 1951-1959. In addition, he worked with a second sample of 81 smaller enterprises selected at random from Moody's Index of Public Companies. Again he dealt with firms for which there were continuous records from 1951 through 1959 but this time he confined himself to companies whose trading profits were less than £ 250,000 in 1951. His results proved to be negative and are summarized below.

a) Of 13 (industrial) groups, the regression coefficient had the wrong sign in eight cases, but the coefficient was significant in none.

b) Of the 5 groups with the proper sign, only one was significant (Electrical Engineering)--probably a freak result.

c) For the whole sample of large firms, the sign was both wrong and significant.

d) For small firms, the sign was wrong but insignificant.[10]

Presently there are several studies underway to explore further these preliminary results. For example, John Lintner and Robert Glauber have undertaken a study, with the aid of American data, of Little and

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[9] I. M. D. Little, "Higgledy Piggledy Growth," Bulletin of the Oxford Institute of Statistics, XXIV (November, 1962), 387-412. Also see, I. M. D. Little and A. C. Rayner, Higgledy Piggledy Growth Again (Oxford, England: Basil Blackwell, 1966).

[10] I. M. D. Little, "Higgledy Piggledy Growth," p. 409.

Rayner's basic contention that past company growth cannot be relied upon as a portent of future growth.[11] Also, Baumol, Heim, Malkiel and Quandt have found in a preliminary study that the rate of return on retained earnings is lower than on either new debt or equity issues.[12] Their tentative conclusions add credence to the hypothesis that the capital market may in fact influence the efficiency with which a firm invests and if the tax shelter encourages firms to by-pass the market it may reduce economic efficiency.

The Tax Shelter: Recognition by Management

Explicit evidence of the recognition of the tax shelter by corporate management is difficult to come by. This may be due to the existence of an accumulated earnings tax to which the firm is liable if it withholds earnings for the purpose of helping their shareholders avoid personal income taxation. Because of its infrequent application, the law probably only acts as a deterrent to explicit public recognition by management of the existence of the tax shelter. For example, Lintner in his confidential interviewing did find a major "importance attached by management to longer-term capital gains as compared with current dividend income for its shareholders."[13]

To better aid management in adjusting dividend policy for tax purposes, Vincent Jolivet has provided calculations of the weighted

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[11]See, John Lintner and Robert Glauber, "Higgledy Piggledy Growth in America?" (unpublished manuscript, Harvard University, 1967).

[12]William J. Baumol, et al., "Earning Retention and Growth of the Firm," Financial Research Center Department of Economics, Memorandum No. 2 (New Jersey: Princeton University, 1968).

[13]Lintner, "Distribution of Incomes," p. 104.

average individual income tax rate for shareholders in the United States.[14] He reasons that corporations will find his calculations of use as a measure of "the effect of personal taxation on the cost of retained earnings in cost-of-capital calculations".[15]

Thus the public reticence on the part of corporate officials should not be taken as evidence of their ignorance of the advantages of high retention rates.

The Tax Shelter and the Shareholder: Empirical Research

Several researchers have tried to show a preference on the part of individuals with large incomes for securities that have low payout ratios. Brittain, Cox and Williamson all attempt to see if there is an association between payout or dividend yield and concentration of share ownership and control.

As part of his larger study, Brittain,[16] using data generated by W. L. Crum,[17] developed a measure of shareholder concentration, Pareto's (alpha) estimated on the basis of the relative frequency of shareholdings of 100 shares or more and 1,000 shares or more. He then used rank correlation between the measure of concentration and the payout ratio and the dividend price ratio. The latter correlation provided a somewhat better level of significance being significant at the one-tenth

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[14] Vincent Jolivet, "Tax Rate on Dividends," American Economic Review, LVI (June, 1966), 473-77.

[15] Ibid., p. 473.

[16] Brittain, Corporate Dividend Policy, p. 82.

[17] W. L. Crum, "Analysis of Stock Ownership," Harvard Business Review, XXXI (March, 1953), 36-54.

of one percent level. Crum's data were for 18 large firms in 1951. The problem with using the data is that the firms are from many different industries. Therefore the profit opportunity of each firm is different and this alone should lead to differences in the payout ratio. Therefore one cannot conclude that concentration of ownership led to the observed differences in payout ratios.

Using Table 1, Brittain also showed that according to 1959 data, higher income groups received a smaller percentage of their stock income from dividends, indicating a preference on their part for capital gains. For incomes under $10,000, dividends accounted for 79% of security income while for incomes of over $1,000,000, dividends accounted for only 41%.

TABLE 1

DIVIDENDS, NET LONG-TERM CAPITAL GAINS BY INCOME GROUP, 1959
(Money Amounts in Billions of Dollars)

Adjusted Gross Income	Total[a] Dividends (D)	Net Long-Term[b] Capital Gains (G)	$\frac{D}{D+G}$
Under $10,000	$2.440	$ .642	.79
10,000-50,000	4.050	1.816	.69
50,000-100,000	1,416	.776	.65
100,000-200,000	.845	.596	.59
200,000-500,000	.509	.595	.46
500,000-1,000,000	.191	.311	.38
1,000,000 or more	.263	.382	.41
All incomes	9.714	5.116	.65

[a]Source: Total domestic and foreign dividends received, Statistics of Income, Individual Income Tax Returns (1959), p. 4.

[b]Source: Statistics of Income, Supplemental Report (1959).

It should be pointed out that Brittain considers this evidence to be superficial. First of all, higher income individuals are probably more active traders than the individuals in the lower income groups and therefore have a greater opportunity for realized capital gains. Secondly, they are more successful traders and this is one reason why they have high incomes. Also rapid growth in the capital gains component will be lagged by a slower growth in the dividend component of their income. Another problem with this type of analysis is that much of the capital gains are unrealized and using only realized capital gains gives a downward bias to this preference measure.

On the other hand, Butters, Thompson and Bollinger in their study of the effect of taxation on investment by individuals add credence to Brittain's superficial measure, finding that shareholders in very high income classes do take personal income tax rates into account when formulating their investment policies.[18]

Cox, using cross-section data on 31 firms, correlated payout ratio with percentage of shares held by the top 5% of the shareholders.[19] He found a weak negative association, but using the dividend price ratio and his measure of concentration he found a strong negative association. Cox too does not hold profit opportunities constant as he measures the effect of concentration on payout.

Williamson used a variable "composition of the board", the percentage of the board of directors made up of management, and correlated

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[18]J. K. Butters, L. E. Thompson and L. L. Bollinger, Effects of Taxation: Investment by Individuals (Boston, Mass.: Harvard University Press, 1953), pp. 178-79.

[19]Edwin B. Cox, Trends in the Distribution of Stock Ownership (Philadelphia, Pa.: University of Pennsylvania Press, 1963), p. 88.

it with a firm's payout ratio.[20] His hypothesis was that if management was highly represented on the board of directors this would give them great discretionary power and hence they would retain a greater proportion of the firm's earnings than if they were controlled by outsiders. Williamson feels that outside directors would better protect the interests of the shareholders. He found a positive association between the retention ratio and his "composition of the board" variable.

We differ with Williamson in his feeling that these management directors do not reflect the interests of the shareholders. As was shown earlier, shareholders in higher income tax brackets would favor retention over dividends even if the rate of return earned was reduced by retention. It is our conclusion that what Williamson was measuring was the desire on the part of higher income shareholders for capital gains rather than dividends. By having a higher percentage of management on the board of directors, the attitudes of the higher income shareholders are better reflected since management is certainly in the high income bracket. Williamson recognizes this possibility that his proxy variable for discretionary behavior may also measure concentration of ownership.

> Where substantial concentration of ownership exists, there is frequently a tendency toward nepotism. This in turn may produce high internal representation rather than the high outside representation that would otherwise be predicted.[21]

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[20] Oliver E. Williamson, The Economics of Discretionary Behavior: Objectives in a Theory of the Firm (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), pp. 134-39.

[21] Ibid., p. 131.

To the degree that board representation and concentration of ownership are correlated, the "composition of the board" variable is a biased estimate of discretionary behavior.

Among the empirical studies, Brittain's work is unique in that he incorporates the tax shelter effect explicitly into his model. He developed his model to explain the radical changes in the aggregate payout ratio between 1920 and 1960 in the United States. For example, the dividend payout ratio varied from 71.2% in 1929 to 35.6% in 1947 and back to 61.8% in 1960. Brittain's explanation for these large flucutations is the large changes in personal income tax rates and the changing methods of dealing with depreciation of capital equipment. He attributes the reduction of the payout ratio between 1929 and 1947 to an increase in the personal income tax rate. For example, working mainly with aggregate time series data, Brittain estimated that 1947 corporate saving of $11 billion was $7 billion higher than it would have been under the tax rates of 1929.[22] In the period since 1947, liberalized depreciation guidelines played the major role in the increase in the payout ratio.

Brittain uses a model similar to the Lintner model, but has altered it in two important respects by (1) replacing the profits variable by a more adequate income measure to take account of more liberalized depreciation and (2) replacing the fixed long run target payout ratio with a target function which over time varies with tax rates and other variables.

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[22] Brittain, Corporate Dividend Policy, p. 201.

Except for the elimination of the constant term and the addition of several variables this is one of the models we have adopted. This model is essentially an adaptation of the usual flexible accelerator model of investment; here the role of the capital coefficient is played by the desired dividend payout ratio.

Most of the empirical work on business saving has revolved around finding significant variables that determine it. Our hypothesis goes further. It states that the tax shelter argument is one important variable determining dividend policy and therefore business saving and its existence may lead to an inefficient allocation of capital.

In the following chapters a model will be constructed to test our hypothesis. The dividend policies of firms selected from three industries will be explored to ascertain the existence of any tax shelter effect. According to our hypothesis those firms reacting or adjusting dividend policy to changes in the individual income tax rates of their shareholders should have a lower rate of return than those that are unaffected by the tax shelter.[23]

A distributed lag model using cross-sectional data which will use average assets per shareholder as a proxy for the tax shelter effect will also be tested. The reasoning here is that the more closely held the firm the more likely are the shareholders to be in the higher marginal bracket and the more aware of the tax status of these shareholders will be the management and the board of directors.

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[23] All firms are not expected to respond to changes in the personal income tax variable. Brittain also recognized this in saying, "It is not reasonable to assume that such considerations affect every corporation." (Brittain, Corporate Dividend Policy, p. 79.)

CHAPTER III

BASIC LINEAR MODEL

The hypothesis was tested using time series data to examine the effect of tax variables on the dividend policies of firms in three different industrial classifications. The three industrial groups were selected randomly from the list presented in Moody's Industrial Manual. These three groups included the shoe industry, the brewery industry and the food, grains and cereals industry. In each of the groups only the firms for which there were continuous data back to 1939 were included. Our sample then consisted of 14 firms in the shoe industry, 11 firms in the food, grains and cereal industry and 7 firms in the brewery classification.

A model attempting to explain dividend policy over this period was developed and the data for each firm were used to test the model. We were particularly concerned with the effect of the tax variables on the payout policy of each firm. Those firms that had tax variables with significant signs were put into one group and those with nonsignificant variables into another.[1] This was done for each industry. Thus the purpose of the dividend model was to select those firms within an industry which were significantly affected by changes in tax rates. The

[1]We would not expect all firms to be influenced to the same extent by income taxes in setting dividend policy. The influence will vary directly with the income level of its shareholders.

rates of return on total assets for each group were then calculated and compared. Our hypothesis was that those firms significantly affected by tax rates would have lower rates of return than those unaffected.

The Model

The underlying theoretical model is one proposed by John Lintner and generalized by John Brittain.[2] Lintner suggested a speed of adjustment model which was supported by behavioral claims made by firms that participated in his interview study. Writing current dividends as (D), profits as (P) and lagged dividends as (D_{-1}) we can express our hypothesis as:

(3-1) .... $D - D_{-1} = c(rP - D_{-1})$

Corporations are conceived as having a desired payout ratio, (r), and each period adjusting actual payout to desired payout by changing dividends by some fraction (c), of the differential between desired dividends and actual dividends. The speed of adjustment coefficient (c) measures the speed with which the firm will change dividends in response to a differential between the current desired dividends and the dividends in the previous period. If (c) equals one, the adjustment is immediate, while for (c) equal to one-tenth only one-tenth of the difference would be made up in the current period.

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[2]See, John Lintner, "The Determinants of Corporate Saving," in Savings in the Economy, ed. by Walter W. Heller (Minneapolis, Minn.: University of Minnesota Press, 1953), pp. 230-55, and Lintner, "Distribution of Incomes," pp. 97-113. Also see Brittain, Corporate Dividend Policy.

Equation (3-1) was generalized in a manner similar to that adopted by John Brittain.[3] The target payout ratio (r) is made a function of the ratio of depreciation to profits after taxes, either of two tax variables, a personal income tax rate or the ratio of the personal income tax rate to the effective corporate income tax rate, the rate of change in sales and the level of interest rates. In this particular model (r) is assumed to be a linear function of these variables. The functional relationship involving (r) can be expressed by defining the above variables as:

A/P = ratio of depreciation to profits in period (t)

i = interest rate variable in period (t)

t = an income tax rate variable in period (t)

S/S_{-2} = sales in the current period dividend by sales in period (t-2)

D = dividends in period (t)

P = profits in period (t)

u = random disturbance term in period (t)

Equation (3-1) can then be generalized by making (r) a linear function of these variables:

$$(3\text{-}2) \quad \ldots\ldots\ldots \quad r = b_0 + b_1(A/P) + b_2(i) + b_3(S/S_{-2}) + b_4(t) + u$$

and substituting (3-2) into (3-1) will give us equation (3-3).

$$(3\text{-}3) \quad \ldots\ldots\ldots \quad D - D_{-1} = c[b_0 + b_1(A/P) + b_2(i) + b_3(S/S_{-2}) + b_4(t) + u]P - cD_{-}$$

[3]Brittain, Corporate Dividend Policy.

Multiplying through by (c) and (P) yields

$$(3\text{-}4) \;\ldots\ldots\ldots\; D - D_{-1} = cb_0(P) + cb_1(A/P)(P) + cb_2(i)(P) + cb_3(S/S_{-2})(P) + cb_4(t)(P) - c(D_{-1}) + c(u)(P)$$

$$(3\text{-}5) \;\ldots\ldots\ldots\; D = cb_0(P) + cb_1(A/P)(P) + cb_2(i)(P) + cb_3(S/S_{-2})(P) + cb_4(t)(P) + (1-c)D_{-1} + c(u)(P)$$

Dividing through by (P) to reduce the high intercorrelation between independent variables gives us the following equation:

$$(3\text{-}6) \;\ldots\ldots\ldots\; (D/P) = cb_0 + cb_1(A/P) + cb_2(i) + cb_3(S/S_{-2}) + cb_4(t) + (1-c)(D_{-1}/P) + c(u)$$

Letting

$$y_{1t} = (D/P)$$

$$y_{2t} = (A/P)$$

$$y_{3t} = (i)$$

$$y_{4t} = S/S_{-2}$$

$$y_{5t} = (t)$$

$$y_{6t} = (D_{-1}/P)$$

and substituting into (3-6) gives us

$$(3\text{-}7) \quad y_{1t} = cb_0 + cb_1y_{2t} + cb_2y_{3t} + cb_3y_{4t} + cb_4y_{5t} + (1-c)y_{6t} + c(u)$$

and

$$(3\text{-}8) \quad y_{1t} - (1-c)y_{6t} = cb_0 + cb_1y_{2t} + cb_2y_{3t} + cb_3y_{4t} + cb_4y_{5t} + c(u)$$

Equation (3-8) was the estimating equation for each firm in our sample. The coefficients were estimated by permitting (c) to take on values equally spaced at intervals of one-tenth in the interval (01). The value of (c) which gave us an equation with the maximum r^2 was chosen. The above technique permitted direct estimates of our coefficients b_1, b_2, b_3, and b_4.

The Non-Tax Variables: Their Measurement and Theoretical Significance

Depreciation and Dividend Policy

A measure of depreciation was included in the dividend model because it was felt that firms recognize the effect of liberalized depreciation on their profits and therefore as the ratio of depreciation to profits after taxes increases their payout would also increase. Depreciation liberalization reduces after tax profits but results in tax savings. Our hypothesis states that this saving is relevant to the dividend decision and we measure liberalized depreciation by the ratio of accounting depreciation to profits after taxes.

The effect of an increase in this variable on dividend behavior can be illustrated by an example drawn from Brittain.

> For the corporate aggregate, the ratio of depreciation allowances (A) to net profits (P) rose from 33% in 1946 to 110% in 1960. If the ratio of (A/P) has remained at its 1946 level (other things remaining equal), 1960 allowances would have been $6.9 billion instead of $23.4 billion and taxes would have been $8.6 billion higher. According to the cash flow model, this amount of tax saving led to a target level of dividends $2.5 billion higher than it would otherwise have been. The tax cut arising from the relative increase in depreciation allowances thus appears to have given a boost to 1960 dividends on the order of 25%.[4]

Thus we expect the desired payout ratio to vary directly with the depreciation profit ratio.

<u>Interest Rates and Dividend Policy</u>

Another hypothesis included in the dividend model was that the desired dividend payout ratio was associated with the cost of debt financing.[5] Two alternative hypotheses are possible. A negative association would be observed if a rise in the market rate of interest made internal financing more attractive and reduced the desired dividend payout ratio. Alternatively, a positive relationship may be observed if as interest rates rise, higher dividends are needed to maintain the price of the stock. Our results indicate that the first hypothesis is more probably true.

<u>Growth Rates and Dividend Policy</u>

Sales change over a two year period was included as a measure of a firm's future liquidity needs. The two year change was used because it worked well for Darling as a variable indicating anticipated working

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[4] Brittain, <u>Corporate Dividend Policy</u>, p. 72.

[5] The average interest rate on all Moody's rated bonds was used as a measure of the cost of debt financing.

capital needs.[6] Because of liquidity needs during a period of rapid growth, we would expect firms to be cautious and adopt a conservative dividend policy.

A negative relationship between dividends and the two year period percentage change in sales would be consistent with our hypothesis.

Taxes and Dividends

Two variables were used in the model in order to determine the effect of taxes on dividend policy. Our first variable (t) is used to express the marginal tax rate of the individual shareholder. According to our hypothesis, as the marginal tax rate of the shareholder increases the present value of the dividend payout is reduced and retention is made more attractive. Our variable (t) measures the effective marginal tax rate and not just the statutory rate. The former is subject to income effects, i.e., changes in the level of income and its distribution, and will change even if the statutory rate is constant. It was felt that corporate decision makers will not react differently to either (1) a rise in the marginal rate due to a change in the statutory rate or (2) a rise due to a movement into higher brackets because of a rise in income.[7] The use of effective rates also has the advantage that the series will vary over time while statutory rates remain constant until changed by legislative decision.

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[6] Darling, "Dividend Policy," pp. 209-24.

[7] Shareholders would probably prefer state (2) to state (1) i.e., to have their marginal rates increase because of a rise in income rather than increase with income remaining constant.

Jolivet has described a method of obtaining an effective tax rate, a weighted average of all marginal rates, the weights being the proportion of total income received by each income group.[8]

But, feeling that the tax rate on higher income taxpayers was of greater importance because of the influence of this group on corporate decision making, we adopted an alternative to the over-all average of marginal rates. We updated a time series developed by John Brittain and used it for our effective tax rate variable.[9] In order to take account of inflation moving taxpayers into higher income brackets, our series did not deal with one constant income group. Rather, the series allowed the income of the group to vary from year to year but instead kept constant their proportion of total dividends received i.e., kept constant their relative position in the distribution of dividends. Brittain here was following a method originally used by Daniel Holland.[10] For each year, adding the total of dividends received by each income group and beginning with the highest income group, a level of income was established for the group receiving 10 percent of total dividends and 25 percent of the total. This measure standardized the income base so as to permit annual measurement of tax rates for taxpayers at a given rank in the dividend distribution structure.[11]

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[8] Jolivet, "Tax Rate on Dividends," pp. 473-77.

[9] Brittain, Corporate Dividend Policy.

[10] Daniel Holland, Dividends Under the Income Tax (New York: National Bureau of Economic Research, 1962).

[11] See Appendix A for a more complete description of the derivation and a listing of the series for 1939-1965.

Another tax variable which we will call (t*) was also included. This variable is a ratio of (t) as developed above and the effective corporate income tax rate i.e., corporate income tax liabilities divided by corporate income before taxes. This variable measures the advantage to the shareholder of permitting the firm to invest for him. If both the firm and the shareholder can buy an asset that yields (y) dollars before taxes and the corporate income tax is below the individual's marginal income tax rate, it will be more desirable for the firm to purchase the asset, the greater the differential between these two rates. The firm will be taxed at the lower corporate income tax rate and the shareholder at his higher marginal rate. Therefore the after-tax yield will be higher if the firm makes the investment.[12] So long as (t*) is greater than one, it indicates that the firm is taxed at a lower rate on income than is any shareholder in the specified distribution of dividends.[13]

A negative relationship between either (t) and (t*) and the desired dividend payout ratio would be consistent with our hypothesis.

Results of the Basic Model

The estimated regression coefficients for the basic model are presented in Tables 3, 4 and 5. The variables y_{5t}, y_{7t}, y_{8t} and y_{9t} are the various tax variables and are defined as:

$$y_{5t} = t_{10}$$

$$y_{7t} = t_{25}$$

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[12]This assumes a zero capital gains tax or one that does not vary over time.

[13]For all periods tested, the ratio of the two rates was greater than one. See Appendix A for the computation of this variable over the period studied, 1939-1965.

$$y_{8t} = t^{*}_{10}$$

$$y_{9t} = t^{*}_{25}$$

Tables 9, 10 and 11 contain comparisons of the various average rates of return and a measure of concentration of ownership between firms whose dividend payout ratios are affected by taxes and those not affected.

As stated above, equation (3-8) was estimated by allowing (c) to take on values in the interval (01), equally spaced at one-tenth. The value of (c) which gave us an equation with the highest r^2 was chosen. This value is an estimate of the speed of adjustment coefficient and is shown along with the estimated regression coefficients.[14]

In order to determine the significance of the tax variables a one tail test on the tax coefficients was performed. Theory predicted that the coefficients should be negative, hence the null hypothesis was that the coefficient was either zero or greater than zero and the alternative hypothesis was that the coefficient was less than zero. We choose a confidence limit of 5%, i.e., the probability of committing a Type I error, rejecting a true hypothesis was 5%. For the shoe industry seven firms had (t) values that permitted rejecting the null hypothesis at the 5% level. These seven firms comprised the tax shelter firms. The seven other firms comprised the non-tax shelter firms. The same procedure was

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[14]Equation (3-7) was also estimated. For that equation the estimated coefficient of y_{6t}, (1-c), gives the estimated value of (c). To obtain comparable estimates of the coefficients of the other variables it is necessary to divide them by the value of (c) implied by the coefficient of y_{6t}. These results are presented in Appendix C.

followed in the case of the other two industries. For the food, grains and cereal industry, six firms had tax shelter variables which were negative and significantly different than zero. Four out of the seven firms in the brewery industry also had significant tax variables.[15] Of the entire sample of thirty-one firms, seventeen had significant tax shelter variables.[16]

Tables 9, 10 and 11 summarize our results comparing the performance of the two groups. Three rates of return were calculated over the period 1939-1965; R_1, net income after taxes divided by total assets at year end; R_2, net income after taxes plus interest expense divided by year end assets; and R_3, income before taxes plus interest expense divided by year end total assets. The tables also include a measure of shareholder concentration, S_1, total assets divided by the number of shareholders.

The best measure of the average rate of return is probably R_2. R_1 underestimates the return on firms using large amounts of debt issues to finance investment because of the exclusion of interest payments.[17] R_3, income before taxes plus interest expense divided by end of year assets, overcomes the bias which may arise if there is a large difference in the ability of firms to avoid income taxes.

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[15]B-6 has no tax variable coefficient reported in Table 5 as all the tax variables had negative net contributions to r^2.

[16]The probability of observing 17 out of 31 firms with significant tax variables, if there is no true relationship between desired payout and the tax shelter, is less than 1.47506 E-6.

[17]There are some problems with the data used to calculate R_2, particularly with interest expense which had to be estimated for several firms. Another problem which applies to all our rates of return is that they are average rates. In order to observe the reduction in the cost of capital it may be necessary to observe marginal rates of return. The problems with the data are explained in more detail in Appendix D.

Our results indicate that only in the shoe industry are the values of the rate of return measures for tax shelter firms lower than for non-tax shelter firms. In the case of both the food, grains and cereal industry and the brewery industry, the rates of return of the tax shelter firms exceeds that of the non-tax shelter firms.[18] Therefore the argument that the tax shelter leads to a misallocation of capital does not seem to be substantiated. Firms adjusting their dividend policy in response to changing tax rates do not seem to base their decision to invest on the source of funds and hence, the retention takes place because it is the cheapest source of funds to fulfill the firm's investment objectives. The shareholders approve because it provides them with a vehicle for tax avoidance. Therefore the tax shelter probably affects not the level of investment, but its method of financing.

Another reason for our results may be due to our measurement of the rate of return on investment. Marginal rates are a much better measure of the current cost of capital. It is the marginal rate that is equated to the cost of capital and thus may be significantly lowered by tax shelter induced investment.

Our regression results indicate that the tax shelter does indeed affect the desired dividend payout ratio for firms that are closely held, but additional tests failed to reveal a relationship between the dividend payout ratio and the average rate of return as we have measured

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[18]The ratios of the rates of return and the values of S_1, for non-tax and tax shelter firms, are presented in Table 12.

it. Other researchers, using different samples, have found a significant inverse relationship between a firm's dividend payout ratio and its earnings growth and average rate of return. Some of these studies were mentioned in Chapter II, particularly the work on English firms by I. M. D. Little. Similar observations for U. S. firms were made by Myron Gordon in his larger work, thus confirming Little's results. Gordon seemed surprised by his observations.

> The really surprising result is produced by return on investment . . . In both industries there is a statistically significant tendency for the retention rate to fall as the corporation's rate of return increases. We must conclude that either our estimate is a poor measure of rate of return on investment or that corporations are not primarily influenced by the price of their stock in setting dividend rates.[19]

We have shown earlier that the above results are consistent with investment theory and, given the present tax laws, with the maximization of shareholder wealth.

For our sample, the evidence does seem clear on one point. The firms affected by taxes are more closely held as measured by S_1. In each of the three industries the average S_1 for tax shelter firms is higher than for non-tax shelter firms.[20] There seems to be a definite correlation between concentration of ownership and tax avoidance. To test this further a simple regression equation was run with the current dividend payout ratio as the dependent variable and

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[19]Myron J. Gordon, The Investment, Financing and Valuation of the Corporation (Homewood, Illinois: Richard D. Irwin, 1962), pp. 231-32.

[20]The ratios of S_1 for the two groups for each industry is presented in Table 12.

S_1 as the independent variable. A pooling of cross-section and time series was used to obtain the data for each industry. The results are presented below.

Shoe Industry

$$D_t/P_t = 6.7067 - \underset{\substack{(0.0036)\\(-3.2456)}}{0.0118}\, S_1 \qquad r^2 = .106 \qquad d.w. = 1.59$$

Food, Grains and Cereal Industry

$$D_t/P_t = 5.3419 - \underset{\substack{(0.0001)\\(-3.8325)}}{0.0007}\, S_1 \qquad r^2 = .179 \qquad d.w. = 1.63$$

Brewery Industry

$$D_t/P_t = 7.7397 - \underset{\substack{(0.0148)\\(-0.4227)}}{0.0062}\, S_1 \qquad r^2 = .003 \qquad d.w. = 1.81$$

In all the cases the coefficient of S_1 is negative and except for the brewery industry it is also significantly different from zero. The evidence implies that the closely held firms use dividend policy as a vehicle for tax avoidance. It is probably easier for these firms to ascertain the marginal tax rates of their shareholders and their shareholder's tax rates are probably higher than for less closely held firms. For both of these reasons they are more responsive to tax rates when making the dividend decision.

But regarding performance, the evidence indicates that firms which are tightly held, perform as well, if not better than, less closely held firms. Because of the closer link between ownership and management, the more closely held firm may come nearer to a wealth maximizing position than the firm that is more widely held. In particular, investment opportunities will be more carefully scrutinized. Thus we have two offsetting effects, the closely held company, whose stockholders are in high income tax brackets, will tend to retain earnings for internal investment; this might lead to lower rates of return on its investment, but offsetting this is the increased efficiency due to the close connection between management and shareholders. Since corporations can almost always buy into profitable investment opportunities in other industries if need be, it should always be possible for an efficiently run corporation to maintain its average rate of return on its investment.[21]

In order to test the latter hypothesis we included in a regression on the rate of return on investment, as measured by R_1, R_2, and R_3, both the concentration of stockholders and the dividend payout ratio, on the assumption that for a given dividend payout ratio, the greater the concentration of shareholders, the more efficiently the capital will be used.

Three groups of regressions were run for each industry, a regression group for each of three years; the years being selected randomly. For each year, six regression equations were run. The best of the regression equations for each industry and for the given year appear below.

Shoe Industry (1955)

$$R_2 = 272.48 + \underset{\substack{(0.009)\\(0.378)}}{0.003\, S_1} + \underset{\substack{(0.066)\\(1.501)}}{0.099\, D_t/P_t} \qquad r^2 = .205 \quad d.w. = 2.135$$

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[21]This is consistent with those who argue for the external yield criterion when considering the cost of retained earnings. Our results seem to support Solomon's belief that the marginal efficiency of capital schedule is approximately horizontal at the firm's cost of capital.

Shoe Industry (1947)

$$R_3 = 1644.09 \quad - \quad \underset{\substack{(0.053)\\(-0.638)}}{0.033\, S_1} \quad + \quad \underset{\substack{(0.107)\\(1.287)}}{0.138\, D_t/P_t} \qquad r^2 = .233 \quad d.w. = 2.808$$

Shoe Industry (1943)

$$R_1 = 735.39 \quad - \quad \underset{\substack{(0.021)\\(-0.916)}}{0.019\, S_1} \quad + \quad \underset{\substack{(0.027)\\(0.803)}}{0.021\, D_{t-1}/P_{t-1}} \qquad r^2 = .163 \quad d.w. = 2.60$$

Food, Grains and Cereals (1963)

$$R_1 = 561.461 \quad - \quad \underset{\substack{(0.001)\\(-0.582)}}{0.001\, S_1} \quad + \quad \underset{\substack{(0.084)\\(0.374)}}{0.033\, D_{t-1}/P_{t-1}} \qquad r^2 = 0.091 \quad d.w. = 2.06$$

Food, Grains and Cereals (1943)

$$R_1 = 253.055 \quad + \quad \underset{\substack{(0.0011)\\(0.236)}}{0.0002\, S_1} \quad + \quad \underset{\substack{(0.043)\\(1.682)}}{0.073\, D_{t-1}/P_{t-1}} \qquad r^2 = .327 \quad d.w. = 1.43$$

Food, Grains and Cereals (1939)

$$R_3 = 223.76 \quad + \quad \underset{\substack{(0.003)\\(0.515)}}{0.0017\, S_1} \quad + \quad \underset{\substack{(0.105)\\(1.505)}}{0.158\, D_t/P_t} \qquad r^2 = .278 \quad d.w. = 2.39$$

Brewing Industry (1955)

$$R_3 = -669.62 \quad + \quad \underset{\substack{(0.107)\\(2.288)}}{0.246\, S_1} \quad + \quad \underset{\substack{(0.142)\\(0.784)}}{0.111\, D_t/P_t} \qquad r^2 = .577 \quad d.w. = 1.786$$

Brewing Industry (1947)

$$R_2 = 2259.52 \quad - \quad \underset{\substack{(0.033)\\(-1.987)}}{0.066\, S_1} \quad + \quad \underset{\substack{(0.129)\\(1.201)}}{0.155\, D_t/P_t} \qquad r^2 = .529 \quad d.w. = 2.56$$

Brewing Industry (1943)

$$R_3 = 1094.484 \quad - \quad \underset{\substack{(0.052)\\(-0.695)}}{0.036\, S_1} \quad + \quad \underset{\substack{(0.371)\\(2.567)}}{0.953\, D_{t-1}/P_{t-1}} \qquad r^2 = .643 \quad d.w. = 2.51$$

While the regression results do not contradict the hypothesis, they do not strongly confirm it. The brewing industry is the only industry that has several variables with t values greater than two, specifically, in 1955 the coefficient of the variable measuring shareholder concentration has a t value of 2.288 and in the equation for 1943, the coefficient of the lagged dividend payout ratio has a t value of 2.567. Both of these variables would be significant at the 10% level of significance on a two tail test and 5% on a one tail test. While in the other equations the regression coefficients have t values less than two, most of them are of the correct sign. Of the eighteen regression coefficients in the nine equations, only five of them have incorrect signs and all of them have t values below two.

TABLE 2

SAMPLE FIRMS

I.	Shoe Industry	II.	Food, Grains & Cereals	III.	Brewing Industry
S-1	Allied Kid	F-1	Archer-Daniels Midland	B-1	Anheuser Busch
S-2	Brown Shoe	F-2	Early and Daniel	B-2	Associated Brewing
S-3	Cannon Shoe	F-3	General Foods	B-3	Duquesne Brewing
S-4	J. W. Carter	F-4	General Mills	B-4	Falstaff Brewing
S-5	Craddock Terry	F-5	International Milling	B-5	G. Heilman Brewing
S-6	Endicott Johnson	F-6	Kellogg	B-6	Minneapolis Brewing
S-7	Edison Brothers	F-7	National Oats	B-7	Olympia Brewing
S-8	General Shoe	F-8	Pillsbury		
S-9	Interco	F-9	Quaker Oats		
S-10	Julian Kokenge	F-10	Standard Brands		
S-11	Melville Shoe				
S-12	Nunn Bush				
S-13	Schiff				
S-14	Weyenberg				

TABLE 3

ESTIMATED REGRESSION COEFFICIENTS
BASIC MODEL: SHOE INDUSTRY

Firm	c	r^2	d.w.	b_o	y_{2t}	y_{3t}	y_{4t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
S-1	.9	.389	1.35	21.17	0.97		0.00			0.10	
S.E.					0.09		0.11			13.96	
(t)					10.69		0.01			0.00	
S-2	.9	.632	1.12	126.10	1.91	-24.11		-0.67			
S.E.					0.30	4.61		0.29			
(t)					6.19	-5.22		-2.23			
S-3	.9	.858	1.77	106.37	0.53		-0.32			-32.97	
S.E.					0.05		0.10			7.44	
(t)					10.29		-2.93			-4.42	
S-4	.1	.699	1.58	206.91	62.78		-17.02			-295.59	
S.E.					85.61		2.57			195.28	
(t)					0.73		-6.60			-1.51	
S-5	.9	.076	2.18	40.57			-0.19		0.05		
S.E.							0.13		0.37		
(t)							-1.41		0.15		
S-6	.7	.663	1.94	65.34	0.12		-0.10		-0.56		
S.E.					0.03		0.08		0.18		
(t)					3.34		-1.21		-3.07		

TABLE 3 - Continued.

Firm	c	r^2	d.w.	b_o	y_{2t}	y_{3t}	y_{4t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
S-7	.9	.468	1.22	79.13	0.19	-8.07			-0.35		
S.E.					0.07	1.81			0.12		
(t)					2.41	-4.44			-2.85		
S-8	.5	.452	1.94	90.34	0.16		-0.42		-1.14		
S.E.					0.36		0.14		0.40		
(t)					0.45		-2.87		-2.85		
S-9	.9	.279	1.83	152.37	-13.34		-0.40			4.09	
S.E.					5.91		0.20			13.53	
(t)					-2.25		-1.96			0.30	
S-10	.9	.437	2.22	124.94		-20.52	-0.25	0.30			
S.E.						6.78	0.21	0.61			
(t)						-3.02	-1.19	0.48			
S-11	.9	.458	1.10	142.63	0.85	-25.36					-19.76
S.E.					0.26	5.85					17.77
(t)					3.26	-4.33					-1.11
S-12	.9	.599	1.84	62.05	0.51						-29.25
S.E.					0.13						13.44
(t)					3.78						-2.17
S-13	.8	.456	0.49	14.36	1.01				-0.14		
S.E.					0.27				0.23		
(t)					3.75				-0.61		
S-14	.1	.265	1.81	40.62					-5.55		
S.E.									1.84		
(t)									-3.00		

TABLE 4

ESTIMATED REGRESSION COEFFICIENTS
BASIC MODEL: FOOD, GRAINS AND CEREALS

Firm	c	r^2	d.w.	b_o	y_{2t}	y_{3t}	y_{4t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
F-1	.9	.758	1.57	71.72	0.60		-0.15			-21.37	
S.E.					0.09		0.09			11.30	
(t)					6.19		-1.58			-1.89	
F-2	.1	.819	1.61	323.41			-16.16	-1021.73			
S.E.							1.58	234.63			
(t)							-10.17	-4.35			
F-3	.9	.169	2.66	127.97		-7.07	-0.09		-0.52		-13.00
S.E.						4.44	0.22		0.30		17.09
(t)						-1.59	-0.41		-1.71		-0.76
F-4	.9	.737	2.14	19.42	0.75				0.00		
S.E.					0.09				0.14		
(t)					8.21				-0.03		
F-5	.9	.205	1.59	101.69				-10.69			
S.E.								4.20			
(t)								-2.54			
F-6	.7	.311	0.94	119.16		-12.41			-1.07		
S.E.						4.63			0.37		
(t)						-2.67			-2.90		

TABLE 4 - Continued.

Firm	c	r^2	d.w.	b_o	y_{2t}	y_{3t}	y_{4t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
F-7	.9	.873	0.48	193.77	2.80	-45.88			-1.42		
S.E.					0.25	10.01			0.84		
(t)					11.18	-4.58			-1.68		
F-8	.9	.683	0.81	80.09	0.52	-12.20	-0.05		-0.43		
S.E.					0.08	3.44	0.09		0.33		
(t)					6.29	-3.54	-0.54		-1.32		
F-9	.9	.142	1.07	68.62	0.11				-0.43		
S.E.					0.20				0.23		
(t)					0.56				-1.88		
F-10	.9	.404	2.03	110.72	0.50		-0.23	-0.69			
S.E.					0.21		0.24	0.57			
(t)					2.30		-0.97	-1.21			

TABLE 5

ESTIMATED REGRESSION COEFFICIENTS
BASIC MODEL: BREWERY INDUSTRY

Firm	c	r^2	d.w.	b_0	y_{2t}	y_{3t}	y_{4t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
B-1	.4	.192	1.24	111.42		-16.72					-75.30
S.E.						8.15					36.79
(t)						-2.05					-2.04
B-2	.1	.873	.947	135.18		-254.72	-8.98				-128.84
S.E.						62.41	0.91				315.87
(t)						-4.08	-9.79				-0.40
B-3	.1	.200	1.06	161.04				-141.35		-146.38	
S.E.								57.99		139.99	
(t)								-2.43		-1.04	
B-4	.1	.968	1.87	127.05		-76.90	-10.98			-138.13	
S.E.						23.11	0.41			49.99	
(t)						-3.22	-26.33			-2.76	
B-5	.1	.763	1.58	232.15		-99.44	-12.44				-661.57
S.E.						52.32	1.74				235.93
(t)						-1.90	-7.14				-2.80
B-6	.9	.835	2.40	137.79	0.40	-36.85					
S.E.					0.03	10.04					
(t)					10.80	-3.66					
B-7	.9	.446	.838	165.11		-16.97			-1.06		
S.E.						4.12			0.33		
(t)						-4.11			-3.21		

TABLE 6

SHOE INDUSTRY: AVERAGE RATES OF RETURN, 1939-1965

Firms	R_1 Net Income After Taxes / Total Assets	R_2 Net Income After Taxes + Interest / Total Assets	R_3 Income Before Taxes + Interest / Total Assets	S_1 Total Assets / Number of Shareholders
Allied Kid	6.76	7.11	13.22	7,199
Brown Shoe	7.40	7.87	17.13	15,281
Cannon Shoe	6.53	7.36	14.63	7,630
J. W. Carter	9.51	9.60	16.97	3,009
Craddock Terry	5.87	6.51	13.14	12,339
Edison Brothers	8.88	9.50	18.17	13,309
Endicott Johnson	1.90	2.62	6.06	9,839
General Shoe	7.83	8.81	16.91	8,254

TABLE 6 - Continued.

Firms	R_1 Net Income After Taxes / Total Assets	R_2 Net Income After Taxes + Interest / Total Assets	R_3 Income Before Taxes + Interest / Total Assets	S_1 Total Assets / Number of Shareholders
Interco	6.44	7.09	12.57	10,660
Julian Kokenge	6.76	7.19	12.07	12,408
Melville	12.84	13.30	23.56	3,423
Nunn Bush	5.11	5.67	11.27	10,664
Schiff	7.37	8.44	16.00	24,860
Weyenberg	10.04	10.26	21.85	8,456

Source: Moody's Industrials
Various Issues

TABLE 7

FOOD, GRAINS & CEREALS: AVERAGE RATES OF RETURN, 1939-1965

Firms	R_1 Net Income After Taxes / Total Assets	R_2 Net Income After Taxes + Interest / Total Assets	R_3 Income Before Taxes + Interest / Total Assets	S_1 Total Assets / Number of Shareholders
Archer Daniels Midland	6.54	7.13	13.34	17,375
Early and Daniels	5.32	6.24	14.05	38,521
General Foods	10.45	11.49	21.49	5,085
General Mills	7.06	7.59	13.97	13,118
International Milling	5.01	6.27	10.53	391,956
Kellogg	16.58	16.65	32.23	16,951
National Oats	5.52	6.20	10.81	5,166
Pillsbury	4.00	5.27	9.23	9,429
Quaker Oats	7.74	8.14	15.02	11,894
Standard Brands	7.02	7.42	14.16	2,514

Source: Moody's Industrials
Various Issues

TABLE 8

BREWING INDUSTRY: AVERAGE RATES OF RETURN, 1939-1965

Firms	R_1 Net Income After Taxes / Total Assets	R_2 Net Income After Taxes + Interest / Total Assets	R_3 Income Before Taxes + Interest / Total Assets	S_1 Total Assets / Number of Shareholders
Anheuser Busch	10.15	10.49	20.24	18,617
Associated Brewing	9.93	10.42	17.38	2,894
Duquesne Brewing	4.88	5.57	10.71	7,673
Falstaff Brewing	11.34	11.96	24.33	8,274
G. Heilman	14.16	14.18	31.62	2,351
Minneapolis Brewing	8.76	9.01	17.80	5,129
Olympia Brewing	20.80	20.82	41.60	8,422

Source: Moody's Industrials
Various Issues

TABLE 9

BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
SHOE INDUSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Brown Shoe	7.40	7.87	17.13	15,281	Allied Kid	6.76	7.11	13.22	7,199
Cannon Shoe	6.53	7.36	14.63	7,630	J. W. Carter	9.51	9.60	16.97	3,009
Edison Brothers	8.88	9.50	18.17	13,309	Craddock Terry	5.87	6.51	13.14	12,339
Endicott Johnson	1.90	2.62	6.06	9,839	Interco	6.44	7.09	12.57	10,660
General Shoe	7.83	8.81	16.91	8,254	Julian Kokenge	6.76	7.19	12.07	12,408
Nunn Bush	5.11	5.67	11.27	10,664	Melville Shoe	12.84	13.30	23.56	3,423
Weyenberg	10.04	10.26	21.85	8,456	Schiff	7.37	8.44	16.00	24,860
Average	6.81	7.44	15.14	10,490	Average	7.93	8.46	15.36	8,784

TABLE 10

BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER RATES: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
FOOD, GRAINS AND CEREALS, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Archer Daniels	6.54	7.13	13.34	17,375	General Mills	7.06	7.59	13.97	13,118
Early and Daniel	5.32	6.24	14.05	38,521	National Oats	5.52	6.20	10.81	5,166
General Foods	10.45	11.49	21.49	5,085	Pillsbury	4.00	5.27	9.23	9,429
International Milling	5.01	6.27	10.53	391,956	Standard Brand	7.02	7.42	14.16	2,514
Kellogg	16.58	16.65	32.23	16,951					
Quaker Oats	7.74	8.14	15.02	11,894					
Average	8.60	9.32	17.78	80,297	Average	5.90	6.62	12.04	7,556

TABLE 11

BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER RATES: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
BREWERY INDUSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Anheuser Busch	10.15	10.49	20.24	18,617	Associated	9.93	10.42	17.38	2,894
Duquesne	4.88	5.57	10.71	7,673	Minneapolis	8.76	9.01	17.80	5,129
Falstaff	11.34	11.96	24.33	8,274					
G. Heilman	14.16	14.18	31.62	2,351					
Olympia	20.80	20.82	41.60	8,422					
Average	12.27	12.60	25.70	9,067	Average	9.34	9.71	17.59	4,011

TABLE 12

RATIOS OF PERFORMANCE AND OWNER CONCENTRATION VARIABLES FOR TAX AND NON-TAX SHELTER FIRMS

Industry	R_1^a/R_1^b	R_2^a/R_2^b	R_3^a/R_3^b	S_1^a/S_1^b
Shoe	0.858	0.880	0.985	1.194
Food	1.457	1.407	1.451	10.626
Brewing	1.317	1.297	1.461	2.260

$R_1^a = R_1$ for tax shelter firms

$R_2^a = R_2$ for tax shelter firms

$R_3^a = R_3$ for tax shelter firms

$S_1^a = S_1$ for tax shelter firms

$R_1^b = R_1$ for non-tax shelter firms

$R_2^b = R_1$ for non-tax shelter firms

$R_3^b = R_1$ for non-tax shelter firms

$S_1^b = S_1$ for non-tax shelter firms

CHAPTER IV

A DISTRIBUTED LAG MODEL: THE EXPECTED TAX HYPOTHESIS

In our previous model we have argued that it is the current values of our tax variables that are involved in the determination of the desired payout ratio (r). Instead, suppose firms use some estimate of future rates when deciding on the percentage of profits to be paid out as dividends. Certainly if future values of (t) are expected to fall relative to the effective corporate income tax rate, the desirability of retention and investment by the firm is reduced. According to this hypothesis, the desired payout ratio may tend to be stable relative to current (t) and (t*) and a change in (t) and (t*) will affect (r) only insofar as it affects the firm's notion of expected future tax rates.

Letting

$$y_{1t} = (D/P)$$

$$y_{2t} = (A/P)$$

$$y_{3t} = (i)$$

$$y_{4t} = (D_{-1}/P)$$

$$y_{5t} = (S/S_{-2})$$

$$y_{6t} = (t)$$

the desired payout ratio would then be expressed by equation (4-1).

$$(4\text{-}1) \quad \ldots\ldots\ldots \quad r = b_0 + b_1 y_{2t} + b_2 y_{3t} + b_3 y_{5t} + b_4 y^e_{6t} + u_t$$

where (u_t) is a random disturbance term.

Now we must define y^e_{6t} . This is so defined that when substituted into (4-1) and (3-6) it will provide a distributed lag model which is capable of explaining the progressive nature of adaptations in the behavior of the desired dividend payout ratio to changes in expected future tax rates. We assume that firms will estimate future tax rates on the basis of past values, weighting past values by a particular weighting scheme. In the literature on distributed lag models, the method of generating the lag is approached in three different forms.

1. Make no assumption concerning the form of the distribution of weights.
2. Assume a general form for the distribution of the lag and estimate the corresponding form.
3. Develop a specific model based on <u>a priori</u> considerations which yields a particular

distributed lag only incidentally.[1]

We have chosen the third approach. Therefore the expected tax rate, y^e_{6t} is defined as:

$$(4\text{-}2) \;\ldots\ldots\ldots\; y^e_{6t} = \sum_{\tau=0} x_\tau y_{6t-\tau}$$

where

$y^e_{6t-\tau}$ = the variable in period $t - \tau$

$\tau = 0, 1, 2, \ldots\ldots\ldots\ldots\ldots$

$t = 1, 2, 3, \ldots\ldots\ldots\ldots\ldots n$

We have not yet specified the form of the coefficient x_τ in equation (4-2). Assuming that firms place a greater weight on the most recent values of the tax variables in developing their expectations, we will have a sequence x_0, x_1, x_2 ...... which is continuously decreasing, i.e., the coefficient x_0 is the largest

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[1]The first approach was used by F. F. Alt and J. Tinbergen. The second approach was used by I. Fisher and L. M. Koyck, and the third was used by M. Nerlove, M. Friedman, P. Cagan and J. F. Muth. All three approaches are discussed in M. Nerlove, Distributed Lags and Demand Analysis for Agricultural and Other Commodities, Agricultural Handbook 141 (Washington, D. C.: United States Department of Agriculture, 1958). The original studies appear as follows, F. F. Alt, "Distributed Lags," Econometrica, Vol. X (1942); P. Cagan, "The Monetary Dynamics of Hyperinflations," in Studies in the Quantity Theory of Money, ed. by M. Friedman (Chicago, Illinois: University of Chicago Press, 1956), chap. ii; I. Fisher, "Note on the Short-cut Method for Calculating Distributed Lags," International Statistical Bulletin, Vol. XXIX (1937); M. Friedman, A Theory of the Consumption Function (Princeton, New Jersey: National Bureau of Economic Research, Princeton University Press, 1957); L. M. Koyck, Distributed Lags and Investment Analysis (Amsterdam, Holland: North-Holland Publishing Company, 1954); J. F. Muth, "Optimal Properties of Exponentially Weighted Forecasts," Journal of the American Statistical Association, Vol. LV (1960).

and $x_\tau < x_{\tau-1}$.[2] We assume a geometric decrease in x, i.e.,

$$(4\text{-}3) \ldots\ldots\ldots \quad x_\tau = \lambda^\tau \quad 0 \le \lambda < 1 \quad \tau = 0, 1, 2, \ldots\ldots\ldots\ldots$$ [3]

There is a definite advantage to using the form expressed in (4-3) as it simplifies greatly the difficulties that arise from trying to estimate the function.

Substitution of (4-3) into (4-2) yields

$$(4\text{-}4) \ldots\ldots\ldots \quad y^e_{6t} = \sum_{\tau=0} \lambda^\tau y_{6t-\tau}$$

$$= y_{6t} + \lambda y_{6t-1} + \lambda^2 y_{6t-2} \ldots + \lambda^2 y_{6t-\tau} \ldots +$$

$$t = 1, 2, \ldots n$$

$$0 \le \lambda < 1$$

Equation (4-4) may be substituted into (4-1) and gives us

$$(4\text{-}5) \ldots\ldots\ldots \quad r = b_0 + b_1 y_{2t} + b_2 y_{3t} + b_3 y_{5t} + b_4 \left[\sum_{\tau=0}^{\infty} \lambda^\tau y_{6t-\tau}\right] + u_t$$

and substituting into (3-6) gives us

$$(4\text{-}6) \ldots\ldots\ldots \quad y_{1t} = cb_0 + cb_1 y_{2t} + cb_2 y_{3t} + (1-c) y_{4t} + cb_3 y_{5t}$$

$$+ cb_4 \left[\sum_{\tau=0}^{\infty} \lambda^\tau y_{6t-\tau}\right] + cu_t$$

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[2]Other assumptions are certainly possible. We could have assumed that the sequence x_0, x_1, x_2 ..... is increasing in its first terms but decreases once a maximum has been reached.

[3]Koyck chooses a similar form. See, Koyck, Investment Analysis, pp. 19-22. Also a brief discussion on various forms of x_τ based on assumptions made by several researchers is given in E. Malinvaud, Statistical Methods in Economics (Chicago, Illinois: Rand-McNally and Company, 1966), pp. 479-81.

This equation is too difficult to estimate because it involves an infinite number of parameters, and also because of possible multicollinearity due to the presence of $y_{6t-\tau}$ ($\tau = 0, 1, \ldots$). This however can be avoided by differencing equation (4-6). Lagging equation (4-6) by one period and multiplying the resulting equation by (λ) we obtain:

$$(4\text{-}7) \quad \lambda y_{1t-1} = \lambda cb_0 + \lambda cb_1 y_{2t-1} + \lambda cb_2 y_{3t-1} + \lambda(1-c)y_{4t-1} + \lambda cb_3 y_{5t-1} + \lambda cb_4 [y_{6t-1} + y_{6t-2} + \ldots] + \lambda cu_{t-1}$$

Subtracting (4-7) from (4-6) and rearranging terms gives us

$$(4\text{-}8) \quad y_{1t} - \lambda y_{1t-1} = cb_0(1-\lambda) + cb_1(y_{2t} - \lambda y_{2-t}) + cb_2(y_{3t} - \lambda y_{3t-1}) + (1-c)(y_{4t} - \lambda y_{4t-1}) + cb_3(y_{5t} - \lambda y_{5t-1}) + cb_4 y_{6t} + c(u_t - \lambda u_{t-1})$$

This equation can now be estimated as it involves the parameters cb_0, cb_1, cb_2, cb_3, cb_4, and (λ). The multicollinearity problem due to $y_{6t-\tau}$ is completely eliminated in equation (4-8). But the parameter (λ) is now overidentified in the sense that the estimates of it are provided by the ratios of the coefficient of either y_{2t}, y_{2t-1} or y_{3t}, y_{3t-1} or y_{5t}, y_{5t-1}. So in order to estimate the corresponding coefficients we assume various values of (λ) in the interval (01) and the equation with respect to a value of (λ) is selected for which SSE, the sum of squares of residuals is minimum or r^2 is maximum.[4]

We can rearrange equation (4-8) more conveniently by letting

$$y_{1t}^{*} = y_{1t} - \lambda y_{1t-1}$$

$$y_{2t}^{*} = y_{2t} - \lambda y_{2t-1}$$

$$y_{3t}^{*} = y_{3t} - \lambda y_{3t-1}$$

$$y_{4t}^{*} = y_{4t} - \lambda y_{4t-1}$$

$$y_{5t}^{*} = y_{5t} - \lambda y_{5t-1}$$

$$b_0^{*} = (b_0 - b_0)$$

$$u_t^{*} = (u_t - \lambda u_{t-1})$$

and substituting into (4-9) gives us

$$\text{(4-9)} \quad \ldots\ldots\ldots \quad y_{1t}^{*} = cb_0^{*} + cb_1 y_{2t}^{*} + cb_2 y_{3t}^{*} + (1-c) y_{4t}^{*} + cb_3 y_{5t}^{*} + cb_4 y_{6t} + cu_t^{*}$$

This is the equation which we estimated.

<u>Results of the Expected Tax Model</u>

The estimated regression coefficients for the distributed lag model are presented in Tables 13, 14, and 15. Variables y_{6t}, y_{7t}, y_{8t}

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[4]See Appendix B for a full explanation of this method of estimation.

and y_{9t} are the tax variables and are defined as:

$$y_{6t} = t_{10}$$

$$y_{7t} = t_{25}$$

$$y_{8t} = t^*_{10}$$

$$y_{9t} = t^*_{25}$$

As stated above, equation (4-9) was estimated by permitting (λ) to take on values in the interval [01), equally spaced at one-tenth. The value of (λ) which gave us an equation which maximized r^2 was chosen. The estimated value of (λ) is also reported in Tables 13, 14, and 15, and is the weight in the geometric series used to describe the firm's expectations of future tax rates.

The expected tax hypothesis did not produce as many firms with tax variables significantly different from zero as the previous hypothesis. The shoe industry had four out of fourteen firms with tax variables which are significant at the 10% level when subjected to a one tail test. All, except one of these tax shelter firms, were also tax shelter firms in the basic model formulation.[5] The firm that shifted, S-13, was significant in an alternative estimation of the basic model.[6]

The food, grains and cereal industry had four firms with significant tax shelter variables when subjected to a one tail

[5] See Chapter III

[6] See Appendix C

test at a level of significance of 10%. Of these four firms, three were also tax shelter firms in the basic model and the one that shifted F-10, was a tax shelter firm in an alternative estimation of the basic model.[7] In the basic model for this industry there were six tax shelter firms.[8]

The brewery industry has four tax shelter firms according to the expected tax hypothesis. B-1, a tax shelter firm in the basic model, shifted to a non-tax shelter status.

Twelve of our sample of thirty-one firms were tax shelter firms according to the expected tax hypothesis, i.e., their dividend decisions seem to fit the expectations model.[9]

One of the problems with the estimating equation (4-9) is the presence of the lagged dependent variable as an independent variable. This was eliminated in the basic model by permitting (c) to take on values in the interval [01) equally spaced at one-tenth. It would be interesting to try various combinations of (λ) and (c) in the interval [01) in order to test the expected tax model. This would reduce the lagged dependent variable to a parameter. The new dependent variable would be dependent on the various values of (λ) and (c). If our experience with the two alternative methods of estimation of the basic model is indicative, one would anticipate

[7] See Appendix C.

[8] See Chapter III.

[9] The probability of observing twelve firms in a sample of thirty-one, if there were truly no relationship between desired dividend payout ratio and expected future tax rates, is 1.90633 E-5.

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more firms would have tax variables with significant regression coefficients and the expected signs.[10]

Tables 16, 17 and 18 give performance and owner concentration comparisons between tax shelter and non-tax shelter firms for the expected tax hypothesis. These results are similar to those presented for the basic model in the previous chapter.

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[10]Compare the results presented in Appendix C with those presented in the text in Chapter III.

TABLE 13

ESTIMATED REGRESSION COEFFICIENTS
EXPECTED TAX HYPOTHESIS: SHOE INDUSTRY

Firm	λ	r^2	d.w.	b_0	y^*_{2t}	y^*_{3t}	y^*_{4t}	y^*_{5t}	y_{6t}	y_{7t}	y_{8t}	y_{9t}
S-1	.9	.961	2.61	7.95	0.70		0.41	-0.01	1.13			
S.E.					0.25		0.18	0.06	4.51			
(t)					2.75		2.21	-0.16	0.25			
S-2	.9	.957	1.92	-7.42	1.93		0.06			1.02		
S.E.					0.32		0.09			2.64		
(t)					5.93		0.64			0.38		
S-3	.1	.919	2.40	56.23	0.31		0.42	-0.09				0.77
S.E.					0.05		0.06	0.08				11.50
(t)					5.35		6.04	-1.14				0.67
S-4	.1	.730	2.56	76.96			0.65	-0.30				-16.28
S.E.							0.11	0.19				28.10
(t)							5.59	-1.55				-0.57
S-5	.1	.153	2.64	36.53			0.28	-0.12	-0.82			
S.E.							0.20	0.13	3.15			
(t)							1.36	-0.87	-0.26			
S-6	.1	.575	1.30	61.11	0.13	6.05	0.21			-2.31		
S.E.					0.08	1.92	0.09			1.09		
(t)					1.67	-3.15	2.27			-2.12		

Table 13 - Continued.

Firm	λ	r^2	d.w.	b_0	y^*_{2t}	y^*_{3t}	y^*_{4t}	y^*_{5t}	y_{6t}	y_{7t}	y_{8t}	y_{9t}
S-7	.1	.934	3.33	37.50	0.02		0.60	-0.01	-2.07			
S.E.					0.02		0.06	0.04	1.16			
(t)					1.02		9.11	-0.41	-1.17			
S-8	.1	.796	2.11	66.96			0.74	-0.17		-5.21		
S.E.							0.10	0.07		1.65		
(t)							7.24	-2.41		-3.14		
S-9	.9	.784	2.17	8.21	1.09		0.54	-0.01		-1.59		
S.E.					0.31		0.13	0.15		3.44		
(t)					3.49		4.17	-0.07		-0.46		
S-10	.1	.598	2.72	123.08		-15.69	0.39	-0.03				-23.35
S.E.						8.02	0.15	0.19				26.86
(t)						-1.95	2.55	-0.20				-1.05
S-11	.1	.538	1.23	122.16	0.73	-21.77	0.12					-14.01
S.E.					0.26	6.22	0.09					16.44
(t)					2.77	-3.49	1.28					-0.85
S-12	.1	.772	2.60	36.50	0.07		0.61					-16.79
S.E.					0.16		0.15					10.16
(t)					0.46		3.96					-1.65
S-13	.1	.914	1.65	17.21	0.06		0.93	-0.00		2.40		
S.E.					0.13		0.08	0.05		0.89		
(t)					0.50		10.84	-0.02		-2.68		
S-14	.9	.560	2.59	20.58			0.20			2.70		
S.E.							0.04			2.14		
(t)							4.94			-1.26		

TABLE 14

ESTIMATED REGRESSION COEFFICIENTS
EXPECTED TAX HYPOTHESIS: FOOD, GRAINS AND CEREAL

Firm	λ	r^2	d.w.	b_0	y^*_{2t}	y^*_{3t}	y^*_{4t}	y^*_{5t}	y_{6t}	y_{7t}	y_{8t}	y_{9t}
F-1	.10	.924	2.47	18.33	0.13		0.76	0.00		-6.73		
S.E.					0.08		0.10	0.05		6.78		
(t)					1.54		7.17	0.02		-0.99		
F-2	.10	.555	1.92	250.01			0.17	-0.56			-82.35	
S.E.							0.11	0.18			24.41	
(t)							1.53	-3.10			-3.37	
F-3	.90	.479	2.88	27.04	1.41	-7.18	-0.42	-0.21	-2.32			
S.E.					0.59	9.40	0.12	0.22	3.00			
(t)					2.39	-0.76	-3.39	-0.96	-0.77			
F-4	.10	.754	2.53	14.38	0.62		0.21					-0.18
S.E.					0.14		0.18					8.24
(t)					4.13		1.19					-0.02
F-5	.10	.333	2.48	46.76			0.49			-5.77		
S.E.							0.15			3.01		
(t)							3.06			-1.91		

Table 14 - Continued.

Firm	λ	r^2	d.w.	b_0	y^*_{2t}	y^*_{3t}	y^*_{4t}	y^*_{5t}	y_{6t}	y_{7t}	y_{8t}	y_{9t}
F-6	.10	.721	2.04	68.11		-3.43	0.53		-3.87			
S.E.						2.93	0.08		1.79			
(t)						-1.16	6.02		-2.16			
F-7	.10	.992	1.65	-7.01	0.12	-0.81	0.95			0.96		
S.E.					0.17	3.72	0.05			2.55		
(t)					0.70	-0.22	17.35			0.37		
F-8	.10	.966	2.16	14.43	0.02	-0.79	0.81	-0.03			-0.49	
S.E.					0.05	1.42	0.06	0.03			2.64	
(t)					0.52	-0.56	12.89	-0.99			-0.18	
F-9	.10	.755	3.08	15.25	0.10		0.65				-0.44	
S.E.					0.13		0.08				4.03	
(t)					0.77		8.18				-0.11	
F-10	.80	.724	2.02	13.32	1.43	-11.00	-0.12	-0.33		0.60		
S.E.					0.24	11.06	0.14	0.23		3.36		
(t)					5.82	-0.99	-0.89	-1.45		0.18		

TABLE 15

ESTIMATED REGRESSION COEFFICIENTS
EXPECTED TAX HYPOTHESIS: BREWING INDUSTRY

Firm	λ	r^2	d.w.	b_0	y^*_{2t}	y^*_{3t}	y^*_{4t}	y^*_{5t}	y_{6t}	y_{7t}	y_{8t}	y_{9t}
B-1	.10	.570	2.24	42.38		-2.68	0.57					-10.03
S.E.						2.68	0.12					11.05
(t)						-0.99	4.52					-0.90
B-2	.10	.528	1.19	90.33		-18.69	0.24			-1.76		
S.E.						6.59	0.12			4.21		
(t)						-2.83	2.02			-0.41		
B-3	.10	.732	2.00	40.44			0.70			-5.94		
S.E.							0.09			2.73		
(t)							7.83			-2.17		
B-4	.10	.732	2.07	79.37	-5.32	0.36	-0.09				-12.12	
S.E.					2.07	0.09	0.03				4.05	
(t)					-2.56	3.98	-2.51				-2.99	
B-5	.10	.625	2.66	156.36		-11.14	0.31	-0.20				-41.64
S.E.						4.49	0.07	0.14				18.69
(t)						-2.47	4.11	-1.46				-2.22
B-6	.10	.851	2.53	176.11	0.44	-42.09	-0.10			-3.13		
S.E.					0.07	12.94	0.21			8.31		
(t)					5.94	-3.25	-0.47			-0.37		
B-7	.10	.627	1.73	113.22		10.30	0.42			-8.58		
S.E.						3.50	0.13			2.29		
(t)						-2.94	3.21			-3.74		

TABLE 16

EXPECTED TAX HYPOTHESIS: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
SHOE INDUSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Endicott Johnson	1.90	2.62	6.06	9,839	Allied Kid	6.76	7.11	13.22	7,199
General Shoe	7.83	8.81	16.91	8,253	Brown Shoe	7.40	7.87	17.13	15,281
Nunn Bush	5.11	5.67	11.27	10,664	Cannon Shoe	6.53	7.36	14.63	7,630
Schiff	7.37	8.44	16.00	24,860	J.W. Carter	9.51	9.60	16.97	3,009
					Craddock Terry	5.87	6.51	13.41	12,339
					Edison Brothers	8.88	9.50	18.17	13,309
					Interco	6.44	7.09	12.57	10,660
					Melville Shoe	12.84	13.30	23.56	3,423
					Weyenberg	10.04	10.26	21.85	8,456
Average	5.55	6.38	12.56	13,404	Average	8.10	8.57	16.35	9,371

TABLE 17

EXPECTED TAX HYPOTHESIS: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
FOOD, GRAINS AND CEREALS, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Early and Daniel	5.32	6.24	14.05	38,521	Archer Daniels	6.54	7.13	13.34	17,375
International Milling	5.01	6.27	10.53	391,956	General Foods	10.45	11.49	21.49	5,085
Kellogg	16.58	16.65	32.23	16,951	General Mills	7.06	7.59	13.97	13,118
Standard Brands	7.02	7.42	14.16	2,514	National Oats	5.52	6.20	10.81	5,166
					Pillsbury	4.00	5.27	9.23	9,429
					Quaker Oats	7.74	8.14	15.02	11,894
Average	8.48	9.14	17.74	112,485	Average	6.88	7.63	13.97	10,344

TABLE 18

EXPECTED TAX HYPOTHESIS: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF RETURN
BREWING INUDSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Duquesne	4.88	5.57	10.71	7,673	Anheuser Busch	10.15	10.49	20.24	18,617
Falstaff	11.34	11.96	24.33	8,274	Associated	9.93	10.42	17.38	2,899
G. Heilman	14.16	14.18	31.62	2,351	Minneapolis	8.76	9.01	17.80	5,129
Olympia	20.80	20.82	41.60	8,422					
Average	12.79	13.13	27.06	6,680	Average	9.61	9.97	18.47	8,880

CHAPTER V

DIVIDENDS, CONCENTRATION OF OWNERSHIP AND THE RATE OF RETURN ON INVESTMENT: A POOLING OF CROSS-SECTION AND TIME SERIES

Earlier we argued that the tax treatment of dividend income together with the treatment of capital gains yields a tax shelter encouraging firms with shareholders in the higher income brackets, to retain earnings and reinvest. We concluded that this may, in effect, lead to a reduction in a firm's cost of capital, and because of the diminishing marginal efficiency of investment, lower the rate of return on its marginal investment. In this section we maintain that the influence of the tax shelter effect, when examining cross-section data, can be measured by a proxy variable, average assets per shareholder, an ownership concentration variable. Our feeling is that the more highly concentrated the ownership of the firm, the more aware will be the decision maker of the marginal tax rate of the individual shareholders and the higher will be the tax brackets of these shareholders, i.e., the stockholders of the firms will have higher incomes.

Our hypothesis begins with the proposition that the rate of return on total assets is a function of past dividend payout ratios. We have chosen to weight the previous values of the pay-out ratio by a series of geometrically declining weights.[1] Our first proposition is stated in equation (5-1).

$$(5\text{-}1) \quad z_{1t} = a_o + a_1[\sum_{\tau=0}^{\infty} \lambda^{\tau} z_{2t}] + u_t$$

Where z_{1t} = the ratio of net income to total assets in period (t)

z_{2t} = the ratio of dividends to income in period (t)

u_t = random disturbance term in period (t)

Expanding equation (5-1) will give us

$$(5\text{-}2) \quad z_{1t} = a_0 + a_1 z_{2t} + a_2 \lambda z_{2t-1} + \ldots u_t$$

The difficulties of estimating this equation have already been described.[2] To eliminate the difficulties we can difference equation (5-2), lag it one period, multiply by (λ) and subtract the resulting equation (5-3) from (5-2).

$$(5\text{-}3) \quad \lambda z_{1t-1} = \lambda a_0 + a_2 \lambda z_{2t-1} + a_3 \lambda^2 z_{2t-2} + \ldots \lambda u_{t-1}$$

Subtracting (5-3) from (5-2) will give us a form we can estimate (5-4).

$$(5\text{-}4) \quad z_{1t} - \lambda z_{1t-1} = a_0 (1-\lambda) + a_1 z_{2t} + \lambda(u_t - u_{t-1})$$

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[1] This weighting scheme is identical to the one we used to test our expected tax rate hypothesis.

[2] See our discussion in Chapter IV.

Our second proposition is that the dividend payout ratio (z_{2t}) is a function of (z_{3t}), the total assets per shareholder. This is stated by equation (5-5).

$$(5\text{-}5) \ldots\ldots\ldots \quad z_{2t} = a_0' + a_1' z_{3t} + u_t$$

Substituting (5-5) into (5-4) gives us our estimating equation for our cross-section data, equation (5-6)

$$(5\text{-}6) \ldots\ldots\ldots \quad z_{1t} - \lambda z_{1t-1} = a_0(1-\lambda) + a_1(a_0' + a_1' z_{3t} + u_t) + \lambda(u_t - u_{t-1})$$

and

$$(5\text{-}7) \ldots\ldots\ldots \quad z_{1t} - \lambda z_{1t-1} = a_0(1-\lambda) + a_1 a_0' + a_1 a_1' z_{3t} + a_1 u_t + \lambda(u_t - y_{t-1})$$

and letting

$$z_{1t}^* = z_{1t} - \lambda z_{1t-1}$$

$$a_0^* = a_0(1-\lambda) + a_1 a_0'$$

$$a_1^* = a_1 a_1'$$

$$v_t^* = a_1 u_t + \lambda(u_t - u_{t-1})$$

and now rewriting (5-7)

$$(5\text{-}8) \ldots\ldots\ldots \quad z_{1t}^* = a_0^* + a_1^* z_{3t} + v_t^*$$

Equation (5-8) was estimated by choosing the value of (λ) in the interval [01) for which SSE, sum of squares of residuals, is minimum or r^2 is maximum. A pooling of cross-section and time series data for each industry and every fourth year in the interval 1939-1965 was used to estimate the coefficients.

The results indicate there is no significant relationship between shareholder concentration as measured by (z_{3t}) and the rate of return. Our hypothesis predicted a negative sign for the coefficient (a_1^*). This proved to be negative for both the shoe industry and the brewery industry but only in the case of the shoe industry was the coefficient significantly different from zero. The r^2 in each industry was extremely low as can be seen in the following estimated equations.

Shoe Industry (90 observations)

$$z_{1t}^* = 56.65 \quad - \quad \underset{\substack{(0.043) \\ (-2.415)}}{0.105}\, z_{3t} \qquad r^2 = .062 \quad d.w. = 1.68 \quad \lambda = 0.60$$

Brewery Industry (48 observations)

$$z_{1t}^* = 147.98 \quad - \quad \underset{\substack{(0.280) \\ (-0.927)}}{0.260}\, z_{3t} \qquad r^2 = .018 \quad d.w. = 1.51 \quad \lambda = 0.90$$

Food, Grains and Cereal (69 observations)

$$z_{1t}^* = 8.44 \quad + \quad \underset{\substack{(0.002) \\ (1.051)}}{0.002}\, z_{3t} \qquad r^2 = .016 \quad d.w. = 1.95 \quad \lambda = 0.10$$

Again there seems to be no relationship between performance as measured by z^*_{1t} and the concentration of ownership as measured by z_{3t}, though as indicated in Chapter III, z_{3t} does significantly affect the payout ratio, z_{2t}. This relationship is expressed in equation (5-5) and the results of testing it are given in the conclusion to Chapter III. Equation (5-4) was also estimated. We had expected a positive sign for the coefficient a_1. Our results indicated no significant relationship between previous dividend payout ratios and the rate of return. This should be somewhat surprising to those on Wall Street who associate growth companies, low payout ratios, with high future rates of return. Our conclusion is that payout ratios would not be a good predictor of future rates of return.

This pooling of cross-section and time series has shown a strong relationship between concentration of ownership and dividend payout ratios. This is consistent with our findings in Chapter III. Variable (z_{3t}) can be taken as a proxy for a measure of a firm's propensity to respond to the tax shelter. All our other hypotheses have not been consistent with the data. The lack of correlation between payout ratios and rates of return indicate that the dividend decision may indeed be independent of the investment decision and that the tax shelter phenomenon does not lead the firm to undertake inefficient internal investments.

CHAPTER VI

SUMMARY AND CONCLUSION

The purpose of this paper was to explore the effect of the current method of taxing corporate income, dividend payments and capital gains, on the allocation of capital. It has been hypothesized that (1) the existence of a differential in the tax treatment of corporate income, dividend income and capital gains, creates a tax shelter encouraging firms to reinvest their earnings rather than distribute them to their shareholders and (2) this induced retention may lead to inefficiencies, i.e., investment of retained earnings at rates of return that are lower than could be obtained in other investments of equal risk, investments made outside of the firm either by the firm or its shareholders.

Our results indicate no systematic misallocation of capital due to the existence of the tax shelter. While the majority of our sample firms were affected by the differential tax treatment given dividends, capital gains and retained earnings, we did not observe a difference in the performance of the tax shelter firms compared to those firms whose dividend policies were unaffected by the tax shelter. In two of the three industries studied, the tax shelter firms actually outperformed the non-tax shelter firms, as measured by our alternative average rates of return on investment.

In order to test our hypothesis we formulated a dividend model, which is a generalization of the Lintner speed of adjustment model. The desired dividend payout ratio was made a function of several variables including four different tax variables, though no more than one tax variable was included in any given formulation of the model. Using time series data over the period 1939-1965, we tested the basic model for thirty-one firms in three different industries. Our results showed seventeen firms with significant regression coefficients for the tax variables. Within each industry, the performance of the tax shelter and non-tax shelter firms were compared, using as a measure of performance, three alternative average rates of return on investment. These comparisons are presented in the tables that accompany Chapter III.

We also formulated an expectations model. Instead of making the desired dividend payout ratio a function of the current values of our tax variables, we made it depend on the firm's expectations of future tax rates. When incorporated into our basic model, this expectations formulation yielded a distributed lag model. This model was also tested for each firm, over the period 1939-1965. The results were similar to those obtained from testing our basic model, though fewer firms had significant regression coefficients for the tax variables. Comparisons of the performance of tax shelter and non-tax shelter firms for this expectations model are presented in the tables that accompany Chapter IV.

Though the results failed to confirm or deny our original hypothesis, they do indicate that the tax shelter firms tend to be more closely held, as shown by our measure of shareholder concentration, assets per shareholder. In each of the three industries, the measure of shareholder concentration was higher for the group of tax shelter firms than for the non-tax shelter firms.

We tried several other tests to see if the reason for our failure to observe a poorer performance for the tax shelter firms was related to the closeness of the management and shareholder interests as revealed by our concentration of ownership variable. A multiple regression equation was run with two independent variables, concentration of ownership and the dividend payout ratio and the average rate of return on investment as the dependent variable. Our hypothesis was that for a given level of concentration of ownership, the average rate of return on investment would vary directly with the dividend payout ratio and for a given dividend payout ratio the average rate of return would vary directly with the level of concentration of ownership. This regression analysis was carried out for several years for each industry. While the majority of the regression coefficients were not significant most of them had the correct signs. Thus the failure to observe a lower average rate of return on investment for tax shelter firms may not be surprising. The fact that these firms are more tightly held may lead to a more efficiently run firm and this may work against the effect of the induced investment reducing the average rate of return.

There is also a problem with trying to measure the difference between the two groups with average rates of return. Marginal rates would be a much better measure of the cost of capital. It is the marginal rate of return that the firm should equate to its cost of capital if it is to maximize shareholder wealth. Even if the marginal rates for the tax shelter firms were lower than for the non-tax shelter firms, we may not observe a difference in their average rates of return.

In this study, we were dealing with only the allocative effect within an industry and between established firms in that industry. It may be that the form of the misallocation is in the difference in the rate of return between newer firms and older firms within an industry and between industries. If an industry is a declining industry, the average rate of return on investment among firms within the industry may not be different for the tax shelter and non-tax shelter cases, but it may be different from new firms in emerging industries or newer firms in the same industry. The tax shelter will encourage the retention of earnings within this industry and in the established firms. By only studying the difference of the average return within the industry, the misallocation may not appear.

The Tax Shelter and Tax Reform

Our conclusions are of interest in the present atmosphere for tax reform. Of particular interest, is whether government tax policy should promote corporate saving. One of the present reform proposals is the integration of the corporate and the personal income taxes. It is the separation of these two levies that creates the tax shelter we have demonstrated in this paper. The integration of the two taxes has already been proposed in Canada and the United States Treasury Department is also studying it.[1] The Canadian proposal originated in the Report of the Royal Commission on Taxation, or more commonly called the Carter Commission, after its chairman, Mr. Kenneth LeM. Carter. It represents a full integration of the Canadian corporate and personal components of the income tax so as to equalize the tax on these two sources of income.[2]

Based on our analysis of our sample firms we would conclude that if such an integration proposal were adopted in the United States, dividend payout ratios would rise. But we do not feel that this will necessarily result in a reduction in corporate investment. It may actually increase the amount of funds that will flow into the corporate sector as the present discrimination against corporate source income would be eliminated. The integration would also remove the present

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[1] Report of the Royal Commission on Taxation, Kenneth Carter, chairman, Vol. IV (Ottawa, Canada: The Queens Printer, 1967), chap, xix.

[2] For a description of how this integration will be accomplished, see Appendix E.

discrimination in favor of corporate debt financing versus equity financing and would permit corporate managers to reduce payout ratios and still maintain preintegration shareholder disposable income.

Thus the implications of our study are, that while a tax shelter does exist there seems to be no additional effect of inefficient investment. This leads us to believe that the tax shelter provides an inducement to use the cheapest source of financing: retained earnings. The decision to invest itself seems to be independent of the tax shelter hypothesis. Any reduction in retained earnings through increases in the dividend payout ratio would be replaced by other methods of financing.

APPENDIX A

DERIVATION OF INDIVIDUAL TAX RATE VARIABLES

We have used four tax rate series for the period 1939-1965, t_{10}, t_{25}, t_{10}^*, and t_{25}^*. Both t_{10} and t_{25} trace the experience of dividend recipients in a given relative position over time. The series were derived on the basis of a family of four, a couple and two dependents. The value of t_{10} and t_{25} for 1939-1960 were taken from John Brittain.[1] We updated this series deriving values for 1961-1965. The necessary data were obtained from issues of the U. S. Internal Revenue Service, Statistics for Income for the above years. For each year, the cumulative percentage of total dividends accruing to incomes above the lower limit of each income class was plotted against these lower income limits on double logarithmic graph paper. Estimates of the income levels cutting off the top 10% and 25% of all dividends were obtained by graphical interpolation.

These figures were adjusted in two ways. First of all, the income data excludes personal deductions, so we had to adjust downward our estimate of statutory net income. This was done by using data

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[1] Brittain, Corporate Dividend Policy, p. 226.

provided by Kahn on personal deductions as a percentage of adjusted gross income.[2] We used his 1960 figure, 11.8%, for each year 1961-1965.

The other adjustment was the result of the use of both joint and single returns. Since only about 75% of all taxpayers reported income on joint returns, we did not entirely rely on income reported on these returns. To do so would have underestimated the true marginal tax rate. Rather a separate series for both single and joint returns, each with four exemptions, were derived and a weighted average of the two marginal rates was used. The weights were the fractions of dividends on joint returns and single returns in the bracket in which the cut-off level of income fell.

The series t_{10}^* and t_{25}^* were obtained by dividing t_{10} and t_{25} by the ratio of corporate income tax liabilities to corporate income before taxes and inventory valuation adjustment for each year, 1939-1965.

All the above mentioned variables are presented in Table A-1.

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[2] C. Harry Kahn, Personal Deductions in the Federal Income Tax (New York: National Bureau of Economic Research, 1960), p. 44.

TABLE A-1

TAX VARIABLES 1938-1965
(In Percentages)

Year	t_{10} (1)	t_{25} (2)	Effective Corporate Tax Rate (3)	t_{10}^{*} (1)/(3)	t_{25}^{*} (2)/(3)
38	62.0	23.0	30.30	2.05	.75
39	62.0	25.0	21.88	2.83	1.14
40	68.2	44.0	30.11	2.27	1.46
41	69.0	54.0	44.71	1.54	1.20
42	85.0	61.0	54.55	1.56	1.11
43	85.8	63.8	57.32	1.49	1.11
44	92.0	68.0	55.36	1.66	1.22
45	92.0	65.0	56.32	1.63	1.15
46	84.6	61.8	40.27	2.10	1.53
47	84.6	65.6	38.31	2.20	1.71
48	75.7	57.2	37.88	1.99	1.51
49	75.7	57.2	39.39	1.92	1.45
50	79.8	59.8	44.09	1.80	1.35
51	85.4	65.8	53.08	1.60	1.23
52	84.6	68.2	53.13	1.59	1.28
53	82.3	64.4	52.27	1.57	1.23
54	78.8	58.1	50.44	1.56	1.15
55	79.2	58.0	48.55	1.63	1.19
56	79.2	61.0	47.43	1.66	1.28
57	78.9	58.0	48.38	1.63	1.19
58	76.5	58.1	49.73	1.53	1.16
59	76.5	55.1	48.64	1.57	1.13
60	74.2	51.9	50.34	1.47	1.03
61	80.4	56.5	45.92	1.75	1.23
62	78.2	54.4	43.68	1.79	1.24
63	78.3	54.5	44.23	1.77	1.23
64	68.5	51.5	42.37	1.62	1.21
65	63.9	50.8	41.00	1.56	1.23

APPENDIX B

THE EXPECTED TAX HYPOTHESIS: METHOD OF ESTIMATION

The method of estimation used to estimate the relationships in the expected tax model provides consistent estimates for the coefficients of the respective variables. One of the difficulties with the model was the overidentification of (λ). This difficulty is avoided by assuming the values of (λ) to be in interval [01). Koyck has argued that if the random disturbances, say u_t in (4-9) are correlated as

$$\text{(B-1)} \; \ldots\ldots\ldots \quad u_t = \rho u_{t-1} + v_t$$

then it is possible to obtain consistent estimates of the coefficients provided ρ is equal to the coefficient of the lagged variable, i.e., provided $\rho = \lambda$.[1] He further argued that "there is empirical evidence that (B-1) is not contradictory to quite a large body of economic data."[2] Thus if we assume that the random disturbance terms follow a first-order Markov scheme, it is possible to obtain consistent estimates.[3]

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[1] Koyck, Investment Analysis, pp. 32-37.

[2] Ibid., p. 34.

[3] See also, C. Hildreth and J. Y. Lu, "Demand Relations with Autocorrelated Disturbances," Technical Bulletin 276 (East Lansing, Michigan: Agricultural Experiment Station, Michigan State University, 1960), p. 14.

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These difficulties can be demonstrated as follows. Consider equation (4-9).

$$\text{(B-2)} \quad \ldots\ldots\ldots \quad y^*_{1t} = cb^*_0 + cb_1 y^*_{2t} + cb_2 y^*_{3t} + (1-c)y^*_{4t} + cb_3 y^*_{5t} + cb_4 y_{6t} + cu^*_t$$

These equations can be expressed in matrix form.

$$\text{(B-3)} \quad \ldots\ldots\ldots \quad Z^* = Y^*b + U^*$$

Where

$$Z^* = \begin{bmatrix} y^*_{1,1} \\ y^*_{1,2} \\ \cdot \\ \cdot \\ \cdot \\ y^*_{1,27} \end{bmatrix} ; \qquad b = \begin{bmatrix} cb_0 \\ cb_1 \\ \cdot \\ \cdot \\ \cdot \\ cb_4 \end{bmatrix}$$

$$Y^* = \begin{bmatrix} 1 - \lambda & y^*_{2,1} & y^*_{3,1} & y^*_{4,1} & y^*_{5,1} & y^*_{6,1} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ 1 - \lambda & y^*_{2,27} & y^*_{3,27} & y^*_{4,27} & y^*_{5,27} & y^*_{6,27} \end{bmatrix}$$

and

$$U^* = \begin{bmatrix} cu_1^* \\ cu_2^* \\ \cdot \\ \cdot \\ \cdot \\ cu_{27}^* \end{bmatrix}$$

and let us assume that u_t^* are normally and independently distributed with zero mean and variance σ^2. Then the likelihood function of U* can be expressed as

(B-4) .... $F(U^* ; \lambda, b, \sigma^2) = (1/a\pi\sigma^2)^{27/2}$

$$\text{Exp } \{-1/a\sigma^2 U^{*\prime} U^*\}$$

But from (B-3)

(B-5) .... $U^* = Z^* - Y^*b$

and substituting into (B-4) gives us

(B-6) .... $F(Z^* ; \lambda, b, \sigma^2) = (1/a\pi\sigma^2)^{27/2}$

$$\text{Exp } \{-1/2\sigma^2 (Z^* - Y^*b)' \quad (Z^* - Y^*b)\}$$

As denoted the likelihood function depends on the parameters λ, b, and σ^2. The dependence of F(·) on λ can be seen through the definitions of Z* and Y*.

More specifically, it can be seen as follows:

$$Z^* = \begin{bmatrix} y^*_{1,1} \\ y^*_{1,2} \\ \cdot \\ \cdot \\ \cdot \\ y^*_{1,27} \end{bmatrix} = \begin{bmatrix} y_{1,1} & - & \lambda y_{1,0} \\ y_{1,2} & - & \lambda y_{1,1} \\ & \cdot & \\ & \cdot & \\ & \cdot & \\ y_{1,27} & - & \lambda y_{1,26} \end{bmatrix}$$

$$= \begin{bmatrix} y_{1,1} \\ y_{1,2} \\ \\ \\ y_{1,27} \end{bmatrix} - \lambda \begin{bmatrix} y_{1,0} \\ y_{1,1} \\ \cdot \\ \cdot \\ \cdot \\ y_{1,26} \end{bmatrix}$$

$$Z^* = Z - \lambda \bar{Z}$$

Similarly, Y^* can be expressed

$$Y^* = \begin{bmatrix} 1 - \lambda & y^*_{2,1} & \cdots & y_{6,1} \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ 1 - \lambda & y^*_{2,27} & \cdots & y_{6,27} \end{bmatrix}$$

$$= \begin{bmatrix} 1 & y_{2,1} & \cdots & y_{6,1} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ 1 & y_{2,27} & \cdots & y_{6,27} \end{bmatrix} - \lambda \begin{bmatrix} 1 & y_{2,0} & \cdots & 0 \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ 1 & y_{2,26} & \cdots & 0 \end{bmatrix}$$

$$Y^* = Y - \lambda\bar{Y}$$

and $Z^* - Y^*b = (Z - \lambda\bar{Z})$

$$- (Y - \lambda\bar{Y})b$$

Substituting this into (B-6)

$$\text{(B-7)} \;\ldots\ldots\ldots\; F(Z^*; \lambda, b, \sigma^2) = (1/2\pi\sigma^2)^{27/2}$$
$$\text{Exp}\,\{-1/2\sigma^2[(Z - \lambda\bar{Z}) - (Y - \lambda\bar{Y})b]'$$
$$[(Z - \lambda\bar{Z}) - (Y - \lambda\bar{Y})b]\}$$

Now the parameters λ, b, σ^2 are estimated by maximizing this likelihood function. To do that, we take the logarithm to the above equation and the relevant part of the logarithm of the likelihood function is given by

$$\text{(B-8)} \;\ldots\ldots\ldots\; L(Z^*, \lambda, b, \sigma^2) = 27/2 \log - 1/2\sigma^2[(Z - \lambda\bar{Z}) - (Y - \lambda\bar{Y})b]'$$
$$[(Z - \lambda Z) - (Y - \lambda\bar{Y})b]$$

and the values of λ and b that minimize S are those which minimize $L(Z ; \lambda, b, \sigma^2)$.[4]

So to find estimates of the parameters λ and b, we minimize S. But direct methods of finding the minimum appear quite cumbersome and hence certain iterative procedures are adopted.[5]

Various values for λ, equally spaced at intervals of length one-tenth in the admissible interval [01) are given and S is minimized with respect to b.

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[4]Hildreth and Lu, "Autocorrelated Disturbances," pp. 11-12.

[5]*Ibid.*, pp. 11-14.

APPENDIX C

ALTERNATIVE ESTIMATION OF THE BASIC MODEL

Our original inclination was to test the basic model in the form of equation (3-7), i.e., treat y_{6t}, lagged dividends, as an independent variable. For several firms the presence of the lagged dependent variable as an independent variable tended to obscure the effect of other independent variables, particularly our tax variables. By permitting (c) to take on various values in the permissible interval (01), the coefficient of y_{6t}, (1-c), was determined. Thus for each value of (c) we obtained a different value of y_{6t} which we subtracted from y_{1t} and created our new dependent variable. It is this residual between y_{1t} and $(1-c)y_{6t}$ for various values of (c) which we are attempting to explain in Chapter III in our estimation of the basic model.

The dominance of y_{6t} in equation (3-7) can be illustrated by examining the equation for firm F-7, National Oats. Referring to Table C-2, the variable y_{6t} for National Oats has a regression coefficient equal to 0.98 with a t value of 53.78. No other variable has a significant sign. The only other variable that contributes to the explanation of the dependent variable is y_{3t}, interest rates, but its t value is below 0.01. By permitting (c) to take on our specified values, the equation we estimated and reported in Table 4, Chapter III, contains three variables that contribute to the explanation of the residual, $[y_{1t} - (1-c)y_{6t}]$. All are significant at the 10% level on a one tail test.

The results from estimating equation (3-7) are presented in the tables in this appendix. Though several firms move from tax shelter firms to non-tax shelter firms and vice versa, the conclusions presented in the text are not altered.

TABLE C-1

ESTIMATED REGRESSION COEFFICIENTS
ALTERNATIVE ESTIMATION OF BASIC MODEL: SHOE INDUSTRY

Firm	r^2	d.w.	y_{2t}	y_{3t}	y_{4t}	y_{6t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
S-1	0.949	2.59				0.80			-5.03	
S.E.						0.03			7.74	
(t)						21.11			-0.65	
S-2	0.799	1.19	0.88	-11.87		0.56	-0.13			
S.E.			0.33	4.49		0.13	0.26			
(t)			2.61	-2.63		4.11	-0.49			
S-3	0.914	2.62	0.29		-0.12	0.42			-11.67	
S.E.			0.08		0.10	0.12			9.15	
(t)			3.59		-1.19	3.40			-1.27	
S-4	0.766	2.41			-0.29	0.68				-13.86
S.E.					0.18	0.11				27.78
(t)					-1.56	6.17				-0.49
S-5	0.197	2.54			-0.10	0.33		-0.11		
S.E.					0.13	0.19		0.30		
(t)					-0.80	1.72		-0.37		
S-6	0.538	1.08		-3.84		0.28		-0.18		
S.E.				1.40		0.08		0.10		
(t)				-2.74		3.18		-1.67		

TABLE C-1 - Continued.

Firm	r^2	d.w.	y_{2t}	y_{3t}	y_{4t}	y_{6t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
S-7	0.941	3.04				0.65		-0.20		
S.E.						0.04		0.08		
(t)						15.11		-2.30		
S-8	0.825	2.18			-0.17	0.75		-0.48		-13.05
S.E.					0.06	0.09		0.16		9.30
(t)					-2.64	7.58		-2.96		-1.40
S-9	0.676	1.86		-4.16		0.70				
S.E.				3.96		0.11				
(t)				-1.05		6.22				
S-10	0.627	2.57		-9.70		0.49				
S.E.				5.96		0.13				
(t)				-1.62		3.58				
S-11	0.552	1.17	0.71	-21.34		0.14				-15.63
S.E.			0.26	6.20		0.09				17.26
(t)			2.70	-3.43		1.45				-0.90
S-12	0.796	2.56				0.66				-18.12
S.E.						0.09				9.75
(t)						7.13				-1.85
S-13	0.933	1.68				1.00		-0.16		
S.E.						0.05		0.07		
(t)						17.13		-2.22		
S-14	0.499	1.29		-0.88		0.41				
S.E.				1.84		0.08				
(t)				-0.48		4.65				

TABLE C-2

ESTIMATED REGRESSION COEFFICIENTS: ALTERNATIVE ESTIMATION OF BASIC MODEL: FOOD, GRAINS AND CEREAL

Firm	r^2	d.w.	y_{2t}	y_{3t}	y_{4t}	y_{6t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
F-1	0.928	2.23	0.13			0.74			-12.73	
S.E.			0.08			0.09			5.97	
(t)			1.57			7.93			-2.12	
F-2	0.60	1.90			-0.57	0.20			-86.68	
S.E.					0.17	0.11			24.74	
(t)					-3.26	1.76			-3.50	
F-3	0.17	2.41		-4.93		0.04		-0.50		
S.E.				3.37		0.13		0.26		
(t)				-1.46		0.31		-1.91		
F-4	0.785	2.51	0.56			0.28				
S.E.			0.13			0.16				
(t)			4.18			1.68				
F-5	0.40	2.40				0.46	-0.71			
S.E.						0.16	0.34			
(t)						2.86	-2.06			
F-6	0.760	1.98				0.61	-0.35			
S.E.						0.07	0.17			
(t)						8.04	-2.01			

TABLE C-2 - Continued.

Firm	r^2	d.w.	y_{2t}	y_{3t}	y_{4t}	y_{6t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
F-7	0.992	1.58		0.02		0.98				
S.E.				2.24		0.01				
(t)				0.00		53.78				
F-8	0.970	2.11			-0.02	0.84				
S.E.					0.02	0.03				
(t)					-1.10	27.83				
F-9	0.805	3.03				0.66				-3.63
S.E.						0.07				6.69
(t)						9.27				-0.54
F-10	0.549	2.46	0.24			0.29	-0.74			
S.E.			0.20			0.11	0.38			
(t)			1.19			2.57	-1.93			

TABLE C-3

ESTIMATED REGRESSION COEFFICIENTS: ALTERNATIVE ESTIMATION OF BASIC MODEL: BREWING INDUSTRY

Firm	r^2	d.w.	y_{2t}	y_{3t}	y_{4t}	y_{6t}	y_{5t}	y_{7t}	y_{8t}	y_{9t}
B-1	0.625	2.11		-1.88		0.62				-7.00
S.E.				2.42		0.11				10.99
(t)				-0.77		5.23				-0.63
B-2	0.552	1.00		-17.63		0.25				
S.E.				5.87		0.12				
(t)				-3.00		2.13				
B-3	0.741	1.89				0.71		-0.58		
S.E.						0.08		0.27		
(t)						8.03		-2.15		
B-4	0.769	1.98		-5.21	0.10	0.37			-12.27	
S.E.				1.83	0.03	0.08			3.85	
(t)				-2.83	-2.62	4.28			-3.18	
B-5	0.724	2.63		-14.06	-0.20	0.36		-0.58		-42.83
S.E.				4.20	0.12	0.07		0.31		17.42
(t)				-3.34	-1.59	5.10		-1.91		-2.45
B-6	0.628	2.08		-0.96		0.95				
S.E.				14.74		0.15				
(t)				-0.06		6.18				
B-7	0.661	1.73		-9.06		0.49		-0.84		
S.E.				3.38		0.12		0.23		
(t)				-2.67		3.81		-.355		

TABLE C-4

ALTERNATIVE BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP SHOE INDUSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Endicott Johnson	1.90	2.62	6.06	9,839	Allied Kid	6.76	7.11	13.22	7,199
General Shoe	7.83	8.81	16.91	8,254	Brown Shoe	7.40	7.87	17.13	15,281
Nunn Bush	5.11	5.67	11.27	10,664	Cannon Shoe	6.53	7.36	14.63	7,630
Schiff	7.37	8.44	12.56	24,860	J.W. Carter	9.51	9.60	16.97	3,009
					Craddock Terry	5.87	6.51	13.14	12,339
					Edison Brothers	8.88	9.50	18.17	13,309
					Interco	6.44	7.09	12.57	10,660
					Julian Kokenge	6.76	7.19	12.07	12,408
					Melville Shoe	12.84	13.30	23.56	3,423
					Weyenberg	10.04	10.26	21.85	8,456
Average	5.55	6.38	12.56	13,404	Average	8.10	8.57	16.33	9,371

TABLE C-5

ALTERNATIVE BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP
FOOD, GRAINS AND CEREAL, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Archer Daniels	6.54	7.13	13.34	17,375	General Mills	7.06	7.59	13.97	13,118
Early and Daniel	5.32	6.24	14.05	38,521	National Oats	5.52	6.20	10.81	5,166
General Foods	10.45	11.49	21.49	5,085	Pillsbury	4.00	5.27	9.23	9,429
International Milling	5.01	6.27	10.53	391,956	Quaker Oats	7.74	8.14	15.02	11,894
Kellogg	16.58	16.65	32.23	16,951					
Standard Brands	7.02	7.42	14.16	2,514					
Average	8.48	9.20	17.63	78,733	Average	6.08	6.80	12.25	9,901

TABLE C-6

ALTERNATIVE BASIC MODEL: COMPARISON BETWEEN TAX SHELTER AND NON-TAX SHELTER FIRMS: RATES OF RETURN AND CONCENTRATION OF OWNERSHIP BREWING INDUSTRY, 1939-1965

Tax Shelter	R_1	R_2	R_3	S_1	Non-Tax Shelter	R_1	R_2	R_3	S_1
Duquesne	4.88	5.57	10.71	7,673	Anheuser Busch	10.15	10.49	20.24	18,617
Falstaff	11.34	11.96	24.33	8,274	Associated	9.93	10.42	17.38	2,894
G. Heilman	14.16	14.18	31.62	2,351	Minneapolis	8.76	9.01	17.80	5,129
Olympia	20.80	20.82	41.60	8,422					
Average	12.80	13.13	27.06	6,680	Average	9.61	9.97	18.47	8,880

APPENDIX D

THE DATA

The data for each firm were obtained from various issues of Moody's Industrial Manual, 1938-1966. Three industries were selected randomly from the tables of industry classifications in Moody's. The selected industries were the shoe, food, grains and cereal, and the brewery industries. Those firms without continuous data back to 1938 were eliminated.

The shoe industry has the most firms and for most of these firms we were able to obtain continuous data for all the independent variables. Of the fourteen firms, only J. W. Carter and Craddock Terry were missing data for independent variables. Both are missing observations on depreciation expense. Endicott Johnson has observations for all variables but only for twenty-two years, 1938-1960. We have eliminated 1961-1965 due to the existence of negative profits and our inability to interpret the ratio of dividends to these negative profits.

The food, grains and cereal industry has four firms with missing variables. We have no depreciation expense data for Early and Daniel and the time series is for 1938-1964. The observations for 1965 were dropped because of the negative profit term in that year. Pillsbury has no observations for 1938 in the expected tax model for the same reason. National Oats has no observations on sales and International Milling is missing variables for depreciation expense as well as sales.

Among the brewery firms only Minneapolis has a complete set of independent variables. Falstaff and G. Heilman are missing depreciation expense while Anheuser Busch and Olympia are missing both depreciation expense and sales.

Since both Associated and Duquesne had negative profit terms for several years, we thought of disgarding them. But if we change P_t in our estimating equation to $\mathcal{C}_t$, cash flow, profits after taxes plus depreciation expense, the negative profits are overcome by a larger positive depreciation component. In all estimating equations for these two firms, the dependent variable includes dividends divided by cash flow rather than dividends divided by profits.

Additionally, for some firms in each of the industry classifications the data for individual years had to be estimated from available data on a three, six or nine month basis. In those very few cases where the data for the year was for part of the year, e.g., three, six or nine months, we extended it as if the rest of the year were to be identical with what had already occurred. Hence, if in a particular case we had data for six months, to put it on a yearly basis we doubled the six month figures.

In the text, we have mentioned some of the problems associated with our alternative measures of the average rate of return. For many firms, it was necessary to estimate interest expense and for some we had to construct estimates of income taxes. We were usually able to estimate interest expense from the balance sheet data, namely notes and bonds outstanding. Usually the rate paid on outstanding notes was included on the balance sheet. In those cases where the interest rate paid on the specific notes outstanding was not available, we used the average rate on all ratings given by Moody's, i.e., our y_{3t} variable, and multiplied this rate by the dollar amount of notes included on the balance sheet. The necessity of estimating interest expense reduces the reliability of our alternative measures of the rate of return, R_2 and R_3.

APPENDIX E

THE CARTER COMMISSION PROPOSAL FOR THE INTEGRATION OF THE CORPORATE AND PERSONAL INCOME TAXES, AND ITS EFFECT ON THE TAX SHELTER HYPOTHESIS[1]

Basically the Carter proposal accomplishes full integration by converting the corporate income tax into a withholding levy, and setting the withholding tax rate equal to the highest marginal tax bracket. Full credit is then given to the individual shareholder on all income taxes paid on the corporate level on both distributed and undistributed profits. This is done in two ways depending upon whether the earnings are paid out or retained. If all earnings were paid out, then each shareholder would be taxed at the appropriate marginal rate on:

$$D' = gD = D/(1-c_t)$$

where

D' = grossed-up dividends

and $g = 1/(1-c_t)$ is the grossing-up factor

Having computed this tax the shareholder is entitled to deduct the taxes withheld on his shares at the corporate level. For a firm that

[1]This section relies heavily on George F. Break's article, "Integration of the Corporate and Personal Income Taxes," National Tax Journal, XXII (March, 1969), pp. 39-56.

had a payout ratio of 100% the total tax, T_{cp} on corporate source income would be

$$T_{cp} = c_t P_r + (p_t - c_t)D'$$

$$= c_t P_r + (p_t - c_t)P_r$$

since

$$D' = D/(1-c_t)$$

$$= a(1-c_t)P_r/(1-c_t)$$

$$= P_r \text{ where } P_r = \text{profits before taxes}$$

and therefore

$$T_{cp} = p_t P_r$$

and the effective tax rate on corporate source income is p_t as required by integration.

In the case where no dividends are paid we would have:

$A' = gA = A/(1-c_t)$ where

A' = grossed-up retained profit allocations

A = actual retained profits allocations

$g = 1/(1-c_t)$ grossing-up factor

For a firm that pays no dividend, $a = 0$, the total tax on corporate source income would be:

$$T_{cp} = c_t P_r + (p_t - c_t)A'$$

$$= c_t P_r + (p_t - c_t)P_r$$

since

$$A' = A/(1-c_t)$$

$$= (1-c_t)P_r/(1-c_t) = P_r$$

therefore

$$= p_t P_r$$

For the case where $0 < a < 1$, the total tax on corporate source income would be:

$$T_{cp} = c_t P_r + (p_t - c_t)(D' + A')$$

$$= c_t P_r + (p_t - c_t)P_r$$

since $D' = aP_r$ and $A' = (1-a)P_r$

therefore

$$= p_t P_r$$

so long as the payout ratio does not equal one, the shareholders would write up the value of their shares by the full amount of the retained after tax earnings of the firm. They would then realize a tax free capital gain equal to the amount of the retained earnings.

Since the Carter proposal sets the corporate withholding rate equal to the top personal marginal rate there will be no underwithholding. Besides reducing the lock-in effects that exist with present unrealized capital gains, the Carter proposal eliminates the tax shelter by equating c_t with p_t.

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