The Market Valuation of Deferred Taxes

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ABSTRACT

Three variants of a finite-horizon growth model are developed into regression equations to infer the stock market valuation of tax deferral gains, using approximately 2000 Compustat records from the 1970-75 period. It is concluded that deferred tax credits were recognized as sources of shareholder wealth, but subjected to a discount in comparison to reported earnings and reported equity funds. The expectation of deceleration, depreciation-correction, and price regulation are discussed as potential causes for the discount, and related to the industry-by-industry and year-by-year structure of the regression estimates.

THE MARKET VALUATION OF DEFERRED TAXES

The accounting practice of allocating to future periods the current savings from accelerated depreciation and similar tax provisions imparts a conservative bias to the reported after-tax earnings of growing firms. Whether the stock market compensates for this by capitalizing the deferred tax credits into share prices has become a controversial issue in which basic valuation principles, institutional factors, and statistical problems of measurement are closely intertwined.

An early example was the Miller-Modigliani (MM) study on the cost of capital to the electric utilities industry, in which reported earnings rather than earnings converted back to flow-through turned out to be the better predictor of firm value [1966, p. 356]. In a subsequent comment MM attributed the apparent market acceptance of reported earnings to the newness of the accounting complexities brought on by accelerated depreciation during their 1954-57 research period, but expressed confidence that in later years the public would have learned to make the needed adjustment [1967, p. 1298].

Amidst the important MM contributions to valuation theory, the treatment of deferred taxes remained an unexplored side issue. In the 1966 paper the authors saw the conversion of reported earnings to flow-through for measuring the capitalized benefit stream as a debatable proposition, yet their 1967 comments endorsed it with no equivocation. This was not fully consistent with the finite growth-horizon incorporated into their valuation model, nor did it take into account certain ramifications of price regulation in the electric utilities industry. The latter consideration led to a forceful rejection of the 1967 MM stand by Brigham and Pappas (BP), who argued that reported earnings is the logical measure of benefits to shareholders under regulation, because utility rates are set with the intention of passing on to consumers the savings from tax deferrals [1970, pp. 77-79]. This too contains an element of contradiction since BP's own survey revealed that some utilities were allowed returns on deferred tax balances [p. 106], and a later simulation by Brigham and Nantell [1974] illustrated that tax deferrals tend to raise the actual rate of return over the target rate under a regulatory lag. The possibility of indirect benefits due to greater debt capacity and to increased demand for electricity has also been suggested [BP, 1970, p. 83, p. 93].

Beaver and Dukes (BD), who examined a sample of non-regulated firms, initially believed that earnings would exhibit a stronger statistical association with security prices when converted back to flow-through, but encountered evidence to the contrary [1972, pp. 327-331]. In fact, a simulation for a follow-up paper made it appear that the market capitalized an even more understated earnings concept than the one firms used for reporting [1973, p. 556]. By that time BD pursued a new hypothesis to explain this anomaly. They reasoned that if investors perceive a depreciation pattern which is not the reported straight-line but a linear combination of accelerated and straight-line, then the larger weight attaches to the accelerated component, the more it would seem that the market ignores the cash benefits recorded as deferred tax credits or even that it penalizes firms for having them. BD concluded that their previous failure to prove the market capitalization of deferral gains should not be attributed to a naive public acceptance of reported earnings per se, but to an offsetting downward adjustment that compensates for a perceived understatement of depreciation.

In the studies cited above the concern with deferred taxes was an outgrowth of the search for the earnings concept more closely related to share price, and the results were influenced by the statistical difficulties that cyclical and random disturbances in measured earnings impart to valuation models. A previous study by this writer [Tihanyi, 1975] attempted to bypass this problem by formulating a model of deferred tax valuation in balance sheet terms. The results implied that the market tended to perform a partial conversion to flow-through and that a depreciation-correction on the scale suspected by BD did not occur.

The present study expands the scope and empirical coverage of its 1975 predecessor, which was confined to a relatively small Canadian sample. It attempts to determine the market valuation of tax deferral opportunities using three variants of an MM-type finite growth model, applied to approximately 2000 Compustat records from the 1970-75 period.

Three Versions of a Finite-Growth Model

MM's basic value equation [1966, p. 344], used here with several modifications and in a deflated form, recognizes three contributors to firm value, V: (i) the expected after-tax earnings $\overline{X(1-\tau)}$ from the now-existing assets, A, including interest but net of the tax savings on interest; (ii) the tax-savings on interest on the currently outstanding bonds, B, adjusted for personal taxation effects; (iii) the (approximate) net present value of expected future expansionary investments:

$$\frac{V}{A} = \frac{1}{\rho}\frac{\overline{X(1-\tau)}}{A} + \tau'\frac{B}{A} + \frac{T(\rho^*-C)}{C(1+C)}\,g; \qquad (1)$$

where: ρ = capitalization rate for all-equity streams appropriate to the firm's risk class; τ' = a coefficient of net tax-savings on interest;[1] C = cost of capital, a function of leverage; ρ^* = expected rate of return in perpetuity on investments to be undertaken in the next T years, during which k is the expected re-investment rate and $g = k\rho^*$ = the growth rate.

It is assumed here that $\rho^* = \overline{X(1-\tau)}/A$ for methodological reasons[2] and while

$\rho^* > C$ is taken to be the typical case for the first T years, $\rho^* = C$ and $\rho^* < C$ are also admitted.[3] Beyond the year T, however, $\rho^* = C$ on new investments, which therefore make no current value contribution. The model implies the expectation of eventual deceleration as ρ^* in $g = k\rho^*$ declines, reinforced perhaps by a decline in k precipitated by the fall in ρ^*. Deceleration is a realistic feature of the model when applied to mature firms because it "captures at least the essence of the S-shaped growth path...encountered so frequently (and for good economic reasons) in empirical studies of firm and industry development" [MM, 1966, p. 344].

Which actual measure of earnings is the most logical counterpart of $\overline{X(1-\tau)}$? Suppose that the firm reports X dollars of earnings before interest and tax, net of straight-line depreciation H, and claims for tax purposes the accelerated depreciation expense H^τ. Applying the statutory tax rate τ to X gives normalized or reported earnings $X(1-\tau)$, distinct from <u>flow-through</u> earnings $X(1-\tau)+\Delta D$, where $\Delta D = \tau(H^\tau-H)$ is the current tax deferral. Both earnings definitions include interest but not the tax-saving on interest. Let d denote a market determined coefficient of equivalence between deferral gains and reported earnings, and define the capitalized earnings stream $\overline{X(1-\tau)}$ as $X(1-\tau) + d\Delta D$. Note that this is an unrestricted concept as yet, which reduces to reported earnings if $d = 0$ and becomes flow-through earnings if $d = 1$.

Substituting $[X(1-\tau) + d\Delta D]/A$ for $\overline{X(1-\tau)}/A$ and for ρ^*, and decomposing the first and the third terms of (1) gives:

$$\frac{V}{A} = \frac{1}{\rho}\frac{X(1-\tau)}{A} + \frac{d}{\rho}\frac{\Delta D}{A} + \tau'\frac{B}{A} - \frac{T}{1+C}g + \frac{T}{C(1+C)}g\frac{X(1-\tau)}{A} + \frac{dTg}{C(1+C)}\frac{\Delta D}{A}. \qquad (2)$$

Assuming that $\rho \simeq C(1+C)$ (see fn. 1) and combining the terms in which d appears:

$$\frac{d}{\rho}\frac{\Delta D}{A} + \frac{dTg}{C(1+C)}\frac{\Delta D}{A} \simeq \frac{d(1+Tg)}{\rho}\frac{\Delta D}{A};$$

and re-writing (2) in regression form with zero constant and error term U gives

Model I:

$$\frac{V}{A} = \beta_1 \frac{X(1-\tau)}{A} + \beta_2 \frac{\Delta D}{A} + \beta_3 \frac{B}{A} + \beta_4 g + \beta_5 g \frac{X(1-\tau)}{A} + U \tag{3}$$

where: $\beta_1 = 1/\rho$, $\beta_2 = d(1+Tg)/\rho$; $\beta_3 = \tau'$; $\beta_4 = -T/(1+C)$; $\beta_5 = T/[C(1+C)]$;

U = error term.

The central empirical objective of this study is to infer the value of d, now impounded into the β_2 coefficient of a multiple regression equation. It would be possible to solve for d in terms of β_1, β_2, β_4 and β_5 but these β_i are unknown parameters. The corresponding b_i estimators, in turn, are random variables, not necessarily independent, and the expressions for E(d) and σ_d would be very complicated polynomials. As a simplification, we define $d' = d(1+Tg) = b_2/b_1$ and use the approximations:

$$E(d') \simeq \frac{\hat{b}_2}{\hat{b}_1} + \frac{\sigma_1^2 \hat{b}_2}{\hat{b}_1^3} - \frac{Cov_{1.2}}{\hat{b}_1^2}; \tag{4}$$

$$\sigma_{d'} \simeq \left(\frac{\sigma_1^2 \hat{b}_2^2}{\hat{b}_1^4} + \frac{\sigma_2^2}{\hat{b}_1^2} - \frac{2Cov_{1.2}\hat{b}_2}{\hat{b}_1^3} \right)^{1/2}; \tag{5}$$

where $\hat{b}_1$, $\hat{b}_2$ are point estimates with corresponding σ_1, σ_2 standard errors and $Cov_{1.2}$ = covariation of b_1 and b_2 [Hayya, et al. 1975, p. 1339][4]. E(d') is an upward biased estimate of d from which d itself can be identified, using a (1+Tg) approximation[5] based on $\hat{b}_4$ and $\hat{b}_5$. No attempt will be made to obtain σ_d.

Assorted econometric problems could lead to bias affecting the estimate of d' in spite of the following precautions: (i) All variables are in ratio form to eliminate size-related heteroscedasticity. (ii) The appearance of capital structure B/A, growth g, and the interaction term $gX(1-\tau)/A$, in the estimating equation decreases the danger that the key $\Delta D/A$ variable should become the unintended proxy for correlated determinants of firm value. (iii) A five-year smoothing - giving decreasing weight to successively more distant observations - reduces the random disturbance in the flow variables. (For precise variable definitions see Appendix).

Among the remaining potential sources of bias, measurement errors in $X(1-\tau)/A$ and particularly in $\Delta D/A$ are believed to be the most critical. In the model the deferral of taxes is attributed solely to the depreciation-difference $H^{\tau}-H$, whereas in reality a host of other recurring and non-recurring timing differences might lead to tax deferrals and prepayments [Black, 1966, p. 8-10]. Moreover, measured $H^{\tau}-H$ will tend to follow any cyclicality in capital expenditures, and cyclicality is unlikely to disappear as a result of the five-year smoothing scheme. Insofar as a disturbance remains in measured $\Delta D/A$, the associated b_2 coefficient will be biased downward [Johnston, 1972, p. 282], which would carry through to $d' = b_2/b_1$ and, by implication, to $d = d'/(1+Tg)$ as well.

In Model II $\Delta D/A$ is replaced by gD/A as the second variable, where D = accumulated deferred tax balances. In all other aspects, including the estimation of d, Model II is identical with I. It has been shown elsewhere [e.g. BP, 1970, p. 42] that with constant g and at least n (=average service life) years of deferral accounting the accumulated balance becomes a constant proportion of total assets, hence, theoretically, $gD/A = \Delta D/A$. In terms of observed variables gD/A should be less prone to random error than $\Delta D/A$ once D/A stabilized at a g-specific permanent level, because D is a balance sheet item and g is estimated from three time series (see Appendix).

Model III incorporates somewhat different assumptions from I and II in deriving an operational variant of Eq. (1). Suppose that investors perceive $\overline{X(1-\tau)}$ as rA', where r is a productivity parameter and $A' = A - (1-d)D$ an adjusted asset base. Predicting the expected earnings from the asset base is a very primitive form of the instrumental-variable approach to valuation and the A' concept reflects the logic of the "net of tax" treatment of deferred taxes [Black, 1966, p. 14], applied to the aggregate asset base. Some part of the deferred tax balance (1-d)D is perceived as a form of depreciation, i.e. a loss in the capacity to perpetually generate the $\Delta D/A$ component of r. If in fact $\Delta D/A$ is expected to be a constant in perpetuity, then d=1, which is the balance sheet equivalent of the conversion to flow-through.

To develop Model III: by definition A = Q+D+B+L; where Q = book value of equity, L = non interest-bearing liabilities. Since the equality of market to book values has been assumed for all debt items (see Appendix) V = S+B+L, where S = market value of the common equity. Substituting $rA[1-(1-d)D] = r(Q+dD+B+L)$ for $\overline{X(1-\tau)}$, subtracting B+L on both sides, and decomposing terms one and three of Eq. (1) gives:

$$\frac{S}{A} = \frac{r}{\rho}\frac{Q}{A} + \frac{rd}{\rho}\frac{D}{A} + \frac{(r-\rho)\tau'}{\rho}\frac{B}{A} + \frac{r-\rho}{\rho}\frac{L}{A} - \frac{T}{1+C}\,g + \frac{TgX(1-\tau)}{C(1+C)}\frac{\Delta D}{A}\ . \tag{6}$$

Substituting gD for ΔD in the last term and combining it with the second:

$$\frac{rd}{\rho}\frac{D}{A} + \frac{dTg^2}{C(1+C)}\frac{D}{A} \approx \frac{d(r+Tg^2)}{\rho}\frac{D}{A}$$

on the earlier assumption that $\rho \approx C(1+C)$. Therefore Model III becomes:

$$\frac{S}{A} = \beta_1\frac{Q}{A} + \beta_2\frac{D}{A} + \beta_3\frac{B}{A} + \beta_4 g + \beta_5 g\,\frac{X(1-\tau)}{A} + U; \tag{7}$$

where: $\beta_1 = r/\rho$; $\beta_2 = d(r+Tg^2)/\rho$; $\beta_3 = (r-\rho)\tau'/\rho$; $\beta_4 = -T/(1+C)$; $\beta_5 = T/[C(1+C)]$; U = error term containing $[(r-\rho)/\rho](L/A)$.

Once again the two-stage approach of first estimating E(d') and $\sigma_{d'}$, and then determining an approximate point-estimate of d will be adopted, on the assumption that $d' = d(1+T\frac{g^2}{r}) \approx d(1+Tg)$, as in Models I and II.

Sample Structure, Dummy Variables and the Extended Model

The data selected from a merged US-Canadian[6] annual Computstat tape covered the 1966-75 period to yield the needed lagged observations for the last six of these years. Textile, Forestry and Paper, among the industries initially chosen, were dropped when additional selection criteria (absence of major discontinuities due to mergers, dispositions or accounting change during the 5-year lag-period; no missing data; positive deferred tax balances) reduced too drastically the number of usable cases. Left in the final sample were the Oil, Apparel, Chemicals, Steel, Autoparts, Electric Utilities (flow-through) and Electric Utilities (normalizing) industries. All utilities - for which tax allocation is optional - must have used deferral accounting to some degree in order to be in this study. The Compustat classification of "normalizing" applies to the utilities which usually defer at least 52 percent of the deferrable tax savings; the rest are classified as "flow-through".

Six years of data for seven industries gave forty-two potential sub-samples for which homogeneity with respect to risk class, accounting practices, economic conditions, etc. could be more or less justifiably assumed. Since few of these sub-samples were large enough, a system of dummy variables allowing their combination was devised, on the assumption that year and industry effects were independent and additive and exerted their influence by potentially modifying each of the five regression coefficients. Accordingly, the extended regression format of all three models became:

$$Z = \sum_{i=1}^{5} \beta_i X_i + \sum_{i=1}^{5} \sum_{j=1}^{M} \beta_{i.j} X_i I_j + \sum_{i=1}^{5} \sum_{t=1}^{N} \beta'_{i.t} X_i Y_t + U. \qquad (8)$$

X_i is a core variable. I_j is a dummy variable representing the j-th industry, j = 1, ...M, where M = number of industries covered in the run less 1. A case, one company's data for one year, carries a score of 1 if it belongs to j; a score of -1 if it belongs to industry M+1; a score of 0 if it belongs neither to j nor to M+1. Y_t is a dummy variable for the t-th year, t=1, ...N, N = number of years covered in the run less 1. The scoring for Y_t is analogous to that of I_j.

Consider now the $\beta_i X_i + \beta_{i.1} X_i I_1 + \ldots + \beta_{i.M} X_i I_M$ subset of (8). For the cases belonging to j only $\beta_i X_i + \beta_{i.j} X_i I_j$ can be non-zero and since I_j=1, $(\beta_i + \beta_{i.j})X_i$; for the records from industry M+1 the non-zero terms sum to $(\beta_i - \sum_{j=1}^{M} \beta_{i.j})X_i$. Thus, β_i is the unweighted average of the M+1 coefficients of X_i, a convenient condition which makes it possible to use b_i and σ_i for sample-wide estimation without explicit consideration of the $b_{i.j}$ set. Parallel reasoning applies to the $\beta_i X_i + \beta'_{i.1} X_i Y_1 + \ldots + \beta'_{i.n} X_i Y_N$ subset.

The Main Regression Results

The Series A regressions (Table 1) contain one run per model for the five non-utility industries combined and one run per model combining the flow-through and normalizing utilities. Series B consists of industry by industry regressions (Table 2) and Series C of year-by-year regressions (Table 3) based on Model III. On the whole, the finite horizon growth model worked reasonably well: with a few exceptions, the coefficients have the predicted signs and largely plausible magnitudes; the adjusted (for degrees of freedom) R^2 indicate a good statistical fit for the Electric Utilities with all three models and an acceptable fit for most other groupings with Model III.[7]

The results pertaining specifically to deferred tax valuation, however, do not strongly support any conclusion. The central finding of the study is that the crude estimate of d falls into the 0 to 1 range for the non-utilities and utilities alike, using any of the three model variants (Series A). This implies that investors valued the tax deferral gains of the sample firms positively but at a discount, i.e. there appears to have been a partial conversion to flow-through in the market measure of earnings capitalized into share prices. To find $0<d<1$ is compatible with the efficient market hypothesis and a plausible result for an era of modest growth expectations; but one that has no statistical significance at customary probability levels due to the large standard error of d' for all but the utility sub-samples. What causes $\sigma_{d'}$ to be large and in what sense does that limit the conclusions?

It is obvious that the market valuation of deferred taxes is highly diverse and bears only a weak relationship to industry and year. This fundamental cause for a large estimating error in d' has been further magnified by the smallness of the industry-by-year sub-samples. Pooling in accordance with extended Eq. (8) has increased total sample size but the benefit from that is partly lost due to the multicollinearity of X_i and the dummy-interaction variables X_iI_j, X_iY_t. Dropping the interaction terms in sets or selectively would have increased efficiency but caused correlation between X_i and U, - a source of bias my admittedly unwieldy estimating equations were designed to avoid. Estimates from a sample intended to cover entire strata such as "Compustat industry j in year t" apply only to the strata examined no matter what the standard error happens to be. But a large standard error warns that the estimates are tentative even as averages for the strata actually examined, because they could be affected by coincidental aspects of the final case selection (e.g. data availability). This reservation applies to the forthcoming analysis, more so in the case of the five non-utility industries than the Electric Utilities.

The purpose of further examining the d estimates in Tables 1-3 is to glean some clues to the likely causes for the discounting of tax deferral gains in the stock market. Three factors are of particular interest: the expectation of deceleration, depreciation-correction, and regulatory shifting of deferral gains to consumers.

The Market Discounting of Tax Deferral Gains: Some Clues to the Causes

Under realistic but simplified assumptions on tax depreciation methods and the relevant ranges of growth and asset life, the firm's tax deferral rate is a positive function of the rate of growth.[8] Defining the capitalized deferral stream as $d\Delta D/A$ allows for a type of discount the market would apply to the currently observable deferral rate $\Delta D/A$ to compensate for the expected shrinkage of deferral gains when g declines after T years. If T is very large, or the expected decline in g very small, then $d \simeq 1$; this corresponds to the market capitalization of flow-through earnings under the expectation of constant growth. Conversely, the smaller is T and the more drastic is the market-perceived drop in g, the more d will approximate 0.

The data for the period show a relatively high and generally rising actual rate of growth in spite of a minor (1970) and a major (1974) recession; that some of this growth was an inflationary illusion is not directly relevant since $\Delta D/A$ is a function of growth as measured in current money. Yet the market remained very hesitant in capitalizing growth prospects, as the generally low and declining $-b_4$ and b_5 coefficients (Table 3) indicate. Using the point estimates $\hat{b}_4$ and $\hat{b}_5$ from Series A, Model III (Table 1) gives 7 years for the non-utilities and 11 years for the utilities as the approximate expected growth duration T (see fn. 5), which appear to be largely consistent with the corresponding d estimates of .5 and .8. Also consistent with the hypothesized relationship of d and T is the simultaneous minima of both during the 1974 recession. But over the period as a whole, growth expectations declined whereas the general drift in d was upward. A possible explanation of the incongruity is that the tax rules became more favourable to the generation of larger deferral gains at given rates of growth, particularly when the guidelines governing acceptable depreciation periods were liberalized[9] and the investment tax credit

- an important but elective source of deferrals - was reinstituted in 1971 and raised from 7 to 10 percent maximum in 1975.

If any clue at all can be gleaned from the very tentative d estimates for single industries in Series B, it is a seemingly inverse relationship between the numerical importance of deferred tax balances and their relative value contribution. The accumulated deferred taxes to assets ratio D/A is low in the Apparel and Autoparts industries for which $d>1$, whereas D/A is higher in Oil, Chemicals and Steel for which $d<1$. For these more capital intensive industries the d estimates are low enough to suspect depreciation-adjustment of the type suggested by Beaver and Dukes, whose reasoning is reconstructed here in the terminology of the present study: Suppose that investors believe that reported straight-line depreciation H understated the value loss of fixed assets and perceive a value decline of $\delta H^{\tau} + (1-\delta)H$ with $\delta>0$. By definition the after-tax cashflow is: $X(1-\tau) + H + \tau(H^{\tau}-H)$. Subtracting the corrected depreciation gives perceived earnings as $X(1-\tau) + (\tau-\delta)(H^{\tau}-H)$ and shows that a positive δ would reduce the coefficient of the deferred tax variable in a regression and $\delta>\tau$ would cause it to turn negative. The tentative estimates BD reported were in the .625-1.125 range [1973, p. 556] for the mid-1960s; in the present study only for the Steel industry is the d-estimate low enough to imply a possible δ value in that range.[10]

On the whole, the market discounting of deferral gains appears to have been in the same general range for the regulated and unregulated industries examined in this study in spite of the different considerations applicable. Price regulation should exert a downward influence on d for the following reason: Suppose that the regulatory authority intends to shift all tax savings to consumers by setting electricity rates to yield before-tax earnings of $X-\Delta D/(1-\tau)$, whereas X would have been considered appropriate in the absence of deferral opportunities. Thus, when ΔD is received it merely offsets the after-tax loss due to lower prices. The expectation of full benefit shifting would warrant a d value of zero and render normalized earnings $X(1-\tau)$ the measure of all benefits to shareholders. Insofar as regulation is not intended to, or is not expected to succeed, in reducing to zero the ultimate gain to consumers,[11] d should be a positive value affected to some degree by factors relevant to deferred-tax valuation in unregulated industries.

The Series A utility regressions show that model choice has an important ramification for the interpretation of the results. The three variants of the finite-growth model deal in different ways with very difficult measurement problems that have no a priori correct solution since the true determinants of value are inherently unmeasureable expectations. Model I uses $(X(1-\tau)/A$ to represent expected earnings net of deferral gains and observed $\Delta D/A$ to represent expected deferral gains in each of the first T years. This is a direct matching of theoretical and observable variables but one which does not necessarily give the least error-prone proxies of expected values. The Model II substitution of gD/A for $\Delta D/A$ is an attempt to provide a measure of tax deferral gains which is less subject to random disturbance and the concommittant negative bias in the b_2 coefficient estimate. As the Series A regressions indicate, this substitution fails to bring about any improvement for the non-utilities for which the adjusted R^2 remains a low .31, but for the Electric Utilities sample adjusted R^2 increases from .69 to .73 and b_2 rises quite sharply with a net effect of raising the crude d-estimate from .1 to .8. On the ground of generally better fit one would be inclined to accept the Model II estimate of d = .8, all the more so since Model III - with an even higher adjusted R^2 - happens to confirm it as well.

The Series B, Model III regressions show the normalizing and flow-through utilities separately. Surprisingly, for the flow-through group which defers less than half of the deferrable tax savings, d turns out to be a very high 1.7. It is conceivable that this relates to investor preference for deferral accounting in the case of regulated firms that do not elect to, or are not allowed to fully adopt it.[12] For the Electric Utilities normalizing group, which has a much larger mean D/A ratio, the Series B Model III d estimate is .4, a figure largely consistent with the view that most but not all of the deferral gains are expected to benefit consumers.

Some Implications

The finding that for most sub-samples $0<d<1$ implies that the earnings capitalized into share prices cannot be captured precisely by either the normalized ($d=0$) or the flow-through ($d=1$) concept. But since d is not known in advance, the choice between the two measurable concepts will continue to face the builders of earnings-based share valuation models. The results of this study indicate that a conversion of normalized back to flow-through is just as likely to increase as it is to decrease the deviation from the market's perception of earnings. Moreover, it opens up a new source of random and cyclical disturbance which could cause a deterioration in statistical fit even if the true value of d were closer to 1 than to 0. The choice of normalized earnings is the more practical solution for earnings-based share valuation models. When the focus of the research is specifically on the valuation of deferral gains, as it has been in the present study, further experimentation with balance sheet-based measures of the expected tax deferral gain is strongly recommended.

There is no clear message to those concerned with the setting or revision of accounting standards. At the time when the APB endorsed comprehensive tax allocation, Sidney Davidson expressed the dissenting opinion that allocation should be selective and based on a case-by-case analysis of probabilities and economic facts. That the market appears to have performed a partial conversion back to flow-through, largely in accordance with perceived growth prospects, is consistent with the principle of selective allocation. But from studies like this one, it cannot be inferred whether the market would have been more or less consistent with facts and probabilities had the insider-judgments on selective allocation been built into the financial statements.

Table 1. Series A Regressions: Industries and Years Combined

Model No. and Dependent Variable	Adj. R^2 [a]	Coefficient (Standard Error) of Core Variable:[b] $\frac{X(1-\tau)}{A}$	$\frac{Q}{A}$	$\frac{\Delta D}{A}$	$\frac{gD}{A}$	$\frac{D}{A}$	$\frac{B}{A}$	g	$g\frac{X(1-\tau)}{A}$	$E(d')$ $(\sigma_{d'})$	Crude d Estimate
		b_1		b_2			b_3	b_4	b_5		
Non-Utilities (Sample Size: 1245) (No. of Industry Interaction Terms: 5(5-1)=20. No. of Year Interaction Terms: 5(6-1)=25)											
I V/A	.317	10.5 (.501)		7.17 (4.49)			1.52 (.117)	-.721 (.283)	29.1 (4.12)	.690 (.435)	.6
II V/A	.315	10.6 (.495)			8.15 (6.21)		1.56 (.111)	-.834 (.310)	29.7 (4.16)	.772 (.588)	.6
III S/A	.583		1.37 (.055)			.917 (.803)	-.500 (.103)	-1.73 (.233)	49.5 (3.09)	.678 (.595)	.5
Electric Utilities (Sample Size: 668) (No. of Industry Interaction Terms: 5(2-1)=5. No. of Year Interaction Terms: 5(6-1)=25)											
I V/A	.693	16.7 (.751)		2.27 (1.46)			.392 (.065)	3.66 (.463)	-64.8 (10.2)	.137 (.088)	.1
II V/A	.730	15.2 (.703)			12.6 (1.39)		.518 (.062)	2.68 (.429)	-50.2 (9.30)	.829 (.108)	.8
III S/A	.817		.808 (.058)			1.05 (.133)	-.002 (.037)	-2.89 (.215)	79.3 (4.45)	1.31 (.186)	.8

[a] Adjusted $R^2 = R^2 - [k-1)/(N-k)](1-R^2)$, where N = number of cases and k = number of coefficients estimated.

[b] See Appendix for variable definitions

Table 2. Series B Regressions: Model III by Industry, with Years Combined (Dependent Variable: S/A. No. of Year Interaction Terms: 5(6-1)=25)

Industry	Sample Size	Adj.[a] R^2	Coefficient (St.Error) of Core Variable: $\frac{Q}{A}$ b_1	$\frac{D}{A}$ b_2	$\frac{B}{A}$ b_3	g b_4	$g\frac{X(1-\tau)}{A}$ b_5	Sub-Sample Mean of: $\frac{S}{A}$	$\frac{Q}{A}$	$\frac{D}{A}$	$\frac{B}{A}$	g	$\frac{X(1-\tau)}{A}$	$E(d')$ $(\sigma_{d'})$	Crude d Est.
Oil	213	.499	2.10 (.156)	1.94 (1.16)	-.388 (.329)	-3.16 (.668)	75.3 (9.18)	1.32	.563	.050	.240	.209	.047	.935 (.567)	.4
Apparel	216	.653	.843 (.067)	1.44 (2.10)	-.189 (.100)	-.682 (.329)	29.4 (4.72)	.452	.474	.009	.280	.102	.055	1.73 (2.50)	1.4
Chemicals	343	.656	1.53 (.124)	.658 (1.22)	-.897 (.282)	-5.23 (.858)	130. (10.0)	.878	.516	.033	.231	.125	.063	.448 (.810)	.2
Steel	254	.447	1.06 (.061)	-1.31 (.669)	-.305 (.102)	-.257 (.226)	6.84 (4.20)	.409	.491	.039	.256	.121	.055	-1.22 (.601)	-1.1
Autoparts	219	.786	.836 (.080)	1.47 (1.38)	-.010 (.149)	-3.31 (.417)	71.1 (5.19)	.603	.478	.019	.240	.126	.063	1.84 (1.71)	.4
Electric Utilities: Normalized	400	.811	.972 (.079)	.567 (.135)	-.107 (.049)	-3.34 (.270)	94.9 (5.81)	.360	.294	.055	.498	.101	.046	.589 (.154)	1.7
Flow-through	268	.847	.717 (.065)	1.72 (.170)	.079 (.041)	-1.91 (.258)	49.7 (5.25)	.306	.294	.018	.519	.114	.043	2.42 (.204)	

[a,b] (see Table 1)

Table 3. Series C Regressions: Model III by Year, with Industries Combined
(Dependent Variable: S/A. No. of Industry Interaction Terms: 5(7-1)=30)

Year	Sample Size[c]	Adj.[a] R^2	Coefficient (St. Error) of Core Variable:[b] $\frac{Q}{A}$	$\frac{D}{A}$	$\frac{B}{A}$	g	$g\frac{X(1-\tau)}{A}$	Sub-Sample Mean of: $\frac{S}{A}$	$\frac{Q}{A}$	$\frac{D}{A}$	$\frac{B}{A}$	g	$\frac{X(1-\tau)}{A}$	$E(d')$ (σ_d')	Crude d Est.
			b_1	b_2	b_3	b_4	b_5								
1970	302	.610	1.27 (.339)	.662 (2.13)	-.140 (.268)	-3.27 (1.82)	90.9 (34.3)	.718	.430	.025	.357	.109	.058	.590 (1.70)	.4
1971	318	.733	1.40 (.381)	1.28 (1.79)	-.243 (.266)	-4.17 (1.63)	111. (32.5)	.796	.437	.026	.346	.099	.055	1.02 (1.33)	.6
1972	360	.609	1.50 (.382)	1.31 (1.32)	-.588 (.275)	-1.68 (1.37)	65.2 (30.3)	.819	.442	.031	.331	.098	.956	.924 (.899)	.7
1973	380	.551	1.00 (.290)	1.24 (1.35)	-.232 (.218)	-1.47 (1.06)	35.3 (22.4)	.550	.431	.033	.328	.127	.057	1.36 (1.41)	1.0
1974	385	.429	.764 (.198)	.084 (.832)	-.055 (.149)	-.726 (.505)	12.9 (10.9)	.339	.426	.037	.329	.169	.060	.116 (1.04	.1
1975	359	.446	.837 (.174)	.816 (.795)	-.217 (.135)	-.308 (.450)	13.3 (9.15)	.417	.441	.040	.319	.164	.064	1.05 (1.00)	.9

[a,b](see Table 1)

[c](Total sample size is somewhat larger in Series C than in A and B due to the inclusion of cases with a full data set for Model III but not for Models I and II.

Appendix. Definition of Regression Variables in Terms of Computational Formulas and Compustat Item Numbers

S/A — Market value of common shares to assets, adjusted for minority interest = {(24)x(25)x[(11)+(38]}/[1000x(11)x(6)]

V/A — Firm value to assets, assuming book value of liabilities equals market value = 1-(D/A)-(Q/A)+(S/A)

Q/A — Book value of common shares plus minority interest, to assets = [(11)+(38)]/(6)

D/A — Deferred tax balances to assets = (35)/(6)

B/A — Interest-bearing debt, to assets = [(9)+(34)]/(6)

$X(1-\tau)/A$ — Normalized earnings before interest, less taxes allocated to the period, less approximate tax-saving on interest, to assets = $[5xE_t+4xE_{t-1}+3E_{t-2}+2E_{t-3}+E_{t-4}]/15$; where $E_t = [(13)_t-(14)_t-(16)_t - .5x(15)_t]/(6)_t$

$\Delta D/A$ — Current tax deferral, to assets = $[5x(50)_t/(6)_t + 4x(50)_{t-1}/(6)_{t-1} + 3x(50)_{t-2}/(6)_{t-2} + 2x(50)_{t-3}/(6)_{t-3} + (50)_{t-4}/(6)_{t-4}]/15$

g — Growth rate = $[(g_A+g_S+g_E)/3]-1$; g_A = 5-year growth rate of assets; g_S = 5-year growth rate of sales; 5-year growth rate of gross earnings; g_A, g_S, g_E were separtely estimated by least squares for each record, using items (6) for g_A, item (12) for g_S and item (13) for g_E.

Compustat Item Numbers:

(6) = Total Assets; (9) = Long-Term Debt; (11) = Common Equity; (12) = Net Sales; (13) = Operating Income Before Depreciation; (14) = Depreciation and Amortization; (15) = Interest Expense; (16) = Income Taxes; (24) = Share Price-Close; (25) = Common Shares Outstanding; (34) = Debt in Current Liabilities; (35) = Deferred Taxes and Investment Credit (B.S.); (38) = Minority Interest and Subsidiaries' Preferred Stock; (50) = Deferred Taxes (I.A.)

Footnotes

[1] $\tau' = [1-(1-\tau)(1-\tau_{PS})/(1-\tau_{PB})]$; where τ = corporation tax rate; τ_{PS} = personal income tax rate applicable to returns on shares; τ_{PB} = personal income tax rate applicable to returns on bonds. Since generally $\tau_{PS} < \tau_{PB}$, $\tau' < \tau$ and possibly $\tau' \leq 0$. This formula represents a new stand by Miller [1977, p. 267] on the long-debated issue of the value of leverage in the presence of taxes, and has the effect of bringing V of the levered firm closer to that of the unlevered firm, compared to the earlier MM value equations. The revision also means a reduction in the previously implied numerical difference between C and ρ. I take advantage of the latter in the derivation of Eqs. (3) and (7) by assuming that $C(1+C) \simeq \rho$, in order to facilitate an easier interpretation of a regression coefficient.

[2] Assuming that the expected rate of return on new investments, ρ^*, equals the expected rate of return on the now-existing asset base, $\overline{X(1-\tau)}/A$, is a departure from generality but opens up the possibility of measuring ρ^* and allows the decomposition of the growth term as shown in Eq. (2). MM, whose sample was much more homogeneous than mine, left ρ^* together with C and T impounded in the growth coefficient but warned others not to consider that procedure generally desirable.

[3] If $\rho^* = C$, $T = 0$. If $\rho^* < C$ and $g < 0$, then the growth term is positive and T becomes the number of years the firm is expected to take for divesting substandard deployments of capital. If $\rho^* < C$ and $g > 0$, then the growth term turns negative and T becomes the number of years the firm is expected to make substandard expansionary investment, for whatever anomalous reasons it is believed to do so.

[4] The conditions under which (4) and (5) give close approximations relate to the actual magnitudes of $\hat{b}_1/\sigma_1$, $\hat{b}_2/\sigma_2$ and the correlation coefficient of b_1 and b_2. They were satisfied in all regressions reported in Tables 1-3.

[5] The "crude d estimates" of Tables 1-3 are based on the formula $d = E(d')/(1+\bar{g}T)$, where $\bar{g}$ is the mean value of g for the cases in question and $T = [-\hat{b}_4(1+C) + \hat{b}_5 C(1+C)]/2$ with $C = .1$. This approximation places the T estimate in between the usually lower range implied by the $\hat{b}_4$ and the somewhat higher range implied by the $\hat{b}_5$ shown in Tables 1-3, assuming realistic values of the cost of capital C. The T estimate is not sensitive to small variations in C.

[6] The causes and accounting treatment of tax deferrals in the U.S. and Canada are very similar. Canadian corporations use a declining-balance-based capital cost allowance system for taxation, in which the declining balance rate is pre-determined for each class of assets. Since 1972 a two-year write-off option for manufacturing machinery and equipment has been in effect.

[7] The regressions were obtained with the multiple regression package of SPSS [Nie, etc. 1975] for CDC-6400, using Option 19 to force the line through the origin. Tables 1-3 show the core coefficients only but the runs included the appropriate dummy interaction terms.

[8] Assuming that H^{τ} in $\Delta D = \tau(H^{\tau}-H)$ is determined by SYD over the same service period n as reported straight line depreciation, and assuming an age structure of assets consistent with a rate of growth g in capital expenditures for at least n years, $\Delta D/A$ can be shown to be a positive function of g if suitable assumptions are made on the exact timing of cashflows and accounting entries. If these assumptions are altered, the positive relationship will still hold except for certain unrealistic combinations of g and n. More accelerated methods than SYD over n years will strengthen the positive relationship between $\Delta D/A$ and g. It may be also noted that at given values of g within a realistic range, $\Delta D/A$ first rises then declines with n.

[9] Using macro-level estimates, Coen concluded that the pre-1971 guidelines largely corresponded to actual service lives as revealed by investment behavior, whereas the 1971 guidelines reduced the average tax life to about 19 percent below revealed service lives for the 21 industries examined. [1975, p. 69].

[10] It is interesting to note that Coen [1975, p. 70-71] found a shorter "revealed service life" than the 1971 tax guidelines allowed and economic depreciation which exceeded tax depreciation in present value terms for Primary Metals. This would justify $\delta > 1$ and explain the $d \approx -1$ estimate shown for the Steel group of my sample in Series B. Coen's results also imply that for most industries investors would have less reason to consider H^T as a true measure of depreciation in the case of structures than in the case of machinery and equipment, which in turn could explain why δ-depreciation seems to affect capital intensive industries the most.

[11] Out of 86 utility companies surveyed by Brigham and Pappas in 1965 [1970, p. 106], 26 were allowed to earn partial returns on deferred tax balances and 8 earned full returns. Shareholders might also benefit from the deferral of taxes indirectly, particularly if the regulatory gap is substantial [Brigham and Nantell, 1974, p. 442].

[12] According to Brigham and Nantell [1974] flow-through accounting tends to reduce utility rates early in the life of capacity additions, making the future returns to shareholders dependent upon favorable rate adjustments later on, and exerting a downward pressure on price-earnings multiples. If this were so, then the deferred tax reserves of these basically flow-through companies might be valued for reducing shareholder dependence on the vagaries of the rate-setting process.

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