

# GROWTH AND THE DECISION TO INCORPORATE: A FINANCIAL THEORY OF THE U.S. TAX SYSTEM

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## I. INTRODUCTION

The U.S. tax system has often been criticized for affecting the firm's incentive to incorporate by subjecting proprietors and stockholders to unequal tax burdens. This system has also been blamed for inducing misallocation of capital between the proprietary and corporate sectors through distortive effects on the pre-tax yield of capital investment. The most commonly mentioned features affecting the choice between the two forms of ownership are as follows:

1. The two-tier taxation of corporate-source income has been held by some economists to favor proprietary investment [e.g., Harberger (1966), and Feldstein and Frisch (1977)] and by others for its potential effect in the opposite direction [e.g., Bailey (1969), Schwartz and Aronson (1972), Break and Pechman (1975), Musgrave and Musgrave (1976, pp. 296-298), and Meade (1978)].
2. The partial exemption of capital gains has been referred to as a major source of bias against proprietary investment [e.g., Harberger (1968),

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Bailey (1969), Break and Pechman (1975), Musgrave and Musgrave (1976), and Meade (1978)].

3. The opportunity for deferred realization of capital gains has been held responsible for increasing the procorporate bias by further decreasing the effective tax rate on such gain [e.g., Bailey (1969), Break and Pechman (1975), and Meade (1978)].

Commonly cited sources of misallocation of capital due to differential effects on capital yield include the following:

1. Overtaxation of corporate-source income has been described as causing welfare loss by inducing a shift of capital away from the corporate sector [e.g., Harberger (1968), Shoven (1976), and Feldstein and Frisch (1977)].
2. Taxes on corporate profits and personal capital gains have been blamed for creating such a loss by subjecting to double taxation any portion saved out of corporate-source income.<sup>1</sup>
3. The difference in the tax rates of dividend and capital gains has been cited as a source of welfare loss because of its encouragement of over-retention and therefore overinvestment in established corporations [e.g., Feldstein and Frisch (1977)].

Using a time-consistent investment valuation model, this paper re-examines these partly conflicting views regarding effects of the U.S. tax system on the firm's incentive to invest and to choose one form of ownership over the other. Multiperiod valuation provides a framework for determining tax impact under an optimal payout policy pursued on behalf of well-informed investors seeking to maximize the discounted value of post-tax cash flows.<sup>2</sup>

The analysis indicates that interaction between taxes and growth at the level of the firm is more substantial and complex than previously thought. Findings concerning the resulting tax burden challenge the traditional view on a number of key issues. On the issue of relative tax burden, the results show that even at very high tax brackets that far exceed the corporate tax rate, *the tax burden borne by a corporate shareholder under given conditions of reinvestment and growth is likely to exceed that borne by a proprietor, regardless of the extent to which capital gains are deferred* (Sections IV and V). This finding provides an explanation for the widespread use of Subchapter S filing status among small corporations seeking proprietary tax treatment. According to results presented here, this arrangement enables eligible firms to benefit from limited liability, while exposing stockholders to a lesser tax burden. In 1979, when the maximum personal tax bracket was .70, more than half a million corporations (one out of five) chose to file tax returns

under Subchapter S. This evidence is hard to reconcile with the conventional truth by which corporate tax treatment—particularly in the case of closely held corporations—allows the rich to avoid tax.

On the issue of retention and tax exposure, the results show that *corporate retention tends to increase rather than decrease the tax burden borne by shareholders*. One implication of this finding is that the U.S. tax system may not encourage investors of higher tax brackets to prefer stocks of firms with lower payout ratios. This conclusion contradicts the dominant dividend clientele hypothesis, associating high income brackets with lower payout ratios and higher growth rates [e.g., Miller and Modigliani (1961), Stapleton (1972), Bailey (1974), Long (1977), Pettit (1977), and Lewellen et al. (1978)] (see Section III).

Specific results concerning the tax burden indicate the following shortcomings in the current literature:

1. Standard analysis of proprietary-source income omits the impact of capital gains tax and understates that of ordinary tax (see Section II).
2. Standard analysis of corporate-source income overstates the impact of capital gains tax and understates that of corporate profit tax (see Section III).
3. Because of the moderate contribution of capital gains tax to the overall tax burden and the interaction of this tax with the tax base, the effect of deferral of gains on that burden is smaller than commonly perceived (see Section V).
4. Without the offsetting effect of accelerated depreciation and investment tax credit, the tax burden under both forms of ownership would sharply increase with the rates of reinvestment and growth, reaching far greater proportions than acknowledged by previous authors. In view of this effect, investment tax incentives up to a point should be regarded as compensation rather than as a subsidy (see Sections II, III, and V).<sup>3</sup>

Findings concerning tax effects on the (pre-tax) return from capital investment support the view that *the U.S. tax system induces a capital shift from the corporate to the proprietary sector, not the other way around* (see Section VI). This conclusion is based on the following results:

1. The corporate investment cutoff rate is likely to exceed that of the proprietary.
2. Contrary to the prevailing view, the rate differential between dividend and capital gains taxes has no effect upon the corporate investment cutoff rate, and therefore upon the corporation's incentive to reinvest.

3. Consistent with point 3 in the previous list, the effect on the investment cutoff rate of deferral of capital gains is weaker than usually stated.
4. The fraction of earnings retained affects the relationship between the holding period and the corporate investment cutoff rate, a factor previously unnoticed in this context.

The paper concludes with a summary of the results and a short discussion of their implications for public policy and choices made by firms and individual equity holders (see Section VII).

## II. VALUATION OF A PROPRIETARY

Since the phenomenon of reinvestment and growth are economically inseparable, any study of the tax impact on investors' wealth must begin with an arbitrary selection of a growth model. Our analysis is conducted in the framework of the Gordon-Miller-Modigliani single-firm growth model, assuming time-consistent equilibrium investment policy over an indefinite time period, based on symmetric information of shareholders and managers about the firm's earnings and investment opportunities. Despite appearances to the contrary, this model is not more restrictive than the often-used single-period investment model, which can be shown to implicitly assume indefinite repetition of the one-period growth.<sup>4</sup> However, as shown by Yaari et al. (1980) and as becomes apparent in our paper, analysis under the explicit assumption of sustained growth avoids pitfalls of the single-period treatment.

Let:

$V_j$  = equity value following earnings distribution at the end of year  $j$ , representing a given fraction of the firm's equity, where  $j = 0, 1, 2, \dots$ ; simplified by denoting  $V_0$  as  $V$ ;

$Y$  = first year pre-tax earnings per share of equity claim;<sup>5</sup>

$b$  = year-end reinvestment expressed as a fraction of current *pre-tax* earnings;<sup>6</sup>

$\pi^*$  = pre-tax average yield on new investment, assumed to depend on the amount invested ( $\partial\pi^*/\partial b < 0$ ); investments are assumed to be in a given risk class;

$g$  = growth rate of total earnings and value, where  $g = b\pi^*$ ;

$r$  = post-tax rate of return sought by equity holders, assumed to be independent of growth and tax rates;<sup>7</sup>

$t^P$  = marginal tax rate paid on proprietary income;

$t^G$  = marginal rate of capital gains tax paid by individuals on realized gains.

Trading equity claims of a growth firm, whether corporate or proprietary, entails realization of capital gains subject to tax. To avoid indeterminacy

in the impact of this tax, it is provisionally assumed that marginal investors trade their holding after distribution and reinvestment at the end of every year.<sup>8</sup> Let  $V_j$  denote the ex-distribution value of the firm at the end of year  $j$  prorated to original ownership. The taxable capital gains are calculated by subtracting from  $V_j$  the value  $V_{j-1}$  and the amount reinvested at the end of year  $j$ . Post-tax cash flows assume the following pattern:

Year	
1	$Y(1 - b - t^P) - t^G[V_1 - V - bY]$
2	$Y(1 - b - t^P)(1 + b\pi^*) - t^G[V_2 - V_1 - bY(1 + b\pi^*)]$
⋮	⋮
$j$	$Y(1 - b - t^P)(1 + b\pi^*)^{j-1} - t^G[V_j - V_{j-1} - bY(1 + b\pi^*)^{j-1}]$
⋮	⋮

where the amount reinvested is  $bY$  in year 1 and  $bY(1 + b\pi^*)^{j-1}$  in year  $j$ . Given the assumption of constant growth, the claim's present value may be calculated from the first-year cash flow by setting the valuation condition (constrained by  $1 - b - t^P > 0$ )

$$(1 + r)V = Y(1 - b - t^P) - t^G(V_1 - V - bY) + V_1$$

Substitution of  $V(1 + b\pi^*) = V(1 + g)$  for  $V_1$  yields the following solution for  $V$ , subject to  $r > g$ :<sup>9</sup>

$$V = \frac{Y(1 - b - t^P + bt^G)}{r - g + t^Gg} \quad (1)$$

To emphasize the roles played by the two taxes, this formula is restated as

$$V = \frac{Y(1 - b)(1 - t^P)}{r - g} - \frac{Ybt^P}{r - g} + \frac{Ybt^G}{r - g} - \frac{Vt^Gg}{r - g} \quad (2)$$

The first of the four terms in Eq. (2) contains the primary impact of ordinary tax resulting from taxing earnings distributed at the rate  $t^P$ . The second term represents an additional effect of the same tax being imposed on retained earnings. Following Fisher (1942, pp. 46-74), this effect may be referred to as "double taxation of savings," namely taxation of income intended for saving/investment whose return will also be subject to tax. In view of the definition  $g = b\pi^*$ , this effect is increasing in  $t^P$ ,  $b$ , and  $g$ , and decreasing in  $r$ . The third term indicates a capital gains tax shield that only partly offsets the impact of the second term under a tax regime of  $t^G < t^P$ . The fourth term represents a second effect of the same tax, identified by Fisher as an additional form of double taxation of savings. This effect may

be expressed in multiplicative form by recasting Eq. (2) as

$$V = \frac{Y(1 - b - t^P + bt^G)}{r - g} \left[ 1 + \frac{t^G g}{r - g} \right]^{-1} \quad (3)$$

where the expression in brackets is less than unity for  $t^G > 0$  and  $g > 0$ , and monotonically decreasing in both variables. Surprisingly, the effect of capital gains tax, widely emphasized in the context of corporate ownership, is consistently absent from the traditional analysis of proprietary ownership. Equation (3) indicates that this tax joins ordinary tax in penalizing investment and growth of proprietary firms.<sup>10</sup>

### III. VALUATION OF A CORPORATION

Let:

$t^C$  = marginal rate of corporate income tax;

$t^D$  = marginal rate of dividend tax.

An all-equity corporation can finance growth by retention of earnings or by issuance of new stock. Internal financing has the advantage of avoiding round-trip taxation at  $t^D$  on distribution reinvested, but has the disadvantage of greater exposure to  $t^G$  because of a higher rate of share price increase [Palmon and Yaari (1983b)]. It can be shown that under the inequality  $t^G < t^D$  the tax advantage of internal financing exceeds its disadvantage [e.g., Stiglitz (1973)]; therefore it is assumed that the corporation's growth is exclusively financed by retention such that the value of original shareholding increases at the same rate as the entire equity. To the extent that in practice growth is financed in part by issuance of stock, results derived under this assumption understate the tax burden on corporate-source income.

Valuation should reflect the fact that the entire amount of annual earnings is subject to tax at the rate  $t^C$ , but only the portion distributed is taxed again at  $t^D$ .<sup>11</sup> Under the provisional assumption of annual ex-dividend trading, a share of stock will generate in year  $j$  the post-tax dividend

$$Y(1 - b - t^C)(1 - t^D)(1 + g)^{j-1}$$

(constrained by  $1 - b - t^C > 0$ ) and will sustain a capital gains tax liability of  $t^G Vg(1 + g)^{1-j}$ . This formulation of the effect of capital gains tax differs from that adopted by most writers whereby tax liability in year  $j$  is  $t^G Yb(1 + g)^{j-1}$  [e.g., Bailey (1969, Eq. 3) and Feldstein et al. (1979, Eq. 1.2)]. The standard approach is inconsistent with the U.S. system, where the tax is applied to gains realized rather than to funds retained. It implies the condition  $Yb = Vg$ , which cannot be met if the discounted value of future

cash flows engendered by current retention fully reflects the effect of future personal taxation, causing  $Yb > Vg$ .

Based on the new interpretation of the effect of capital gains tax, return from investment during year 1 is subject to the condition

$$(1+r)V = Y(1-b-t^C)(1-t^D) - t^G Vg + V_1$$

where  $V_1 = V(1+g)$  implies the following solution for  $V$  (subject to  $r > g$ ):

$$V = \frac{Y(1-b-t^C)(1-t^D)}{r-g+t^G g} \quad (4)$$

$$= \frac{Y(1-b-t^C)(1-t^D)}{r-g} \left[ 1 + \frac{t^G g}{r-g} \right]^{-1} \quad (5)$$

recast for analysis as

$$V = \frac{Y(1-b)(1-t^C)(1-t^D)}{r-g} - \frac{Ybt^C(1-t^D)}{r-g} - \frac{Vt^G g}{r-g} \quad (6)$$

Economic interpretation of this formula follows that of Eq. (2). The first term on the right-hand side indicates primary taxation at the composite rate  $t^C + t^D - t^C t^D$ , followed by the second term showing double taxation of savings. According to a widely held view, the corporation decreases the joint impact of corporate and dividend taxes by increasing the fraction of earnings retained [e.g., Miller and Modigliani (1961), Bailey (1974), and Miller (1977)]. The validity of this view, which is based on the belief that retained earnings escape the impact of dividend tax (more on this later!) is determined by partially differentiating with respect to  $b$  the sum of the first and second terms of Eq. (6) after substituting  $b\pi^*$  for  $g$  and setting for convenience  $Y = 1$ :

$$\frac{\partial}{\partial b} \left( \frac{t^C + t^D - t^C t^D - bt^D}{r - b\pi^*} \right) = \frac{t^D(\pi^* - r) + \pi^*(t^C - t^C t^D)}{(r - b\pi^*)^2} > 0; \quad \pi^* > r$$

The condition  $\pi^* > r$  set by the assumption of a rational investment policy implies—contrary to the prevailing view—that retention *increases* the combined impact of  $t^C$  and  $t^D$ . Since the partial derivative with respect to  $g = b\pi^*$  is also positive, it follows that the burden of the two taxes increases with the growth rate, whether caused by an increase in the size ( $b$ ) or an increase in the quality ( $\pi^*$ ) of the corporation's investment opportunities. In addition, similar to the proprietary, the second term of Eq. (5) and the last term of Eq. (6) show that the impact of capital gains tax also increases with  $b$  and  $\pi^*$ , indicating that the joint impact of the three taxes increases with growth.

Abstracting from the uncertain effect of tax relief items such as accelerated depreciation and investment tax credit, this analysis demonstrates that the

present tax regime discourages investment and growth of corporations in much the same way it affects proprietaries. Moreover, in refuting the customary view that common shareholders avoid tax by retention, this analysis rejects the rationale for the argument that investors in higher tax brackets—those alleged to gain more from retention—are likely to become the clientele of growth stocks [e.g., Miller and Modigliani (1961), Stapleton (1972), Bailey (1974), Long (1977), Pettit (1977), and Lewellen et al. (1978)]. According to the present analysis, the advantage to the individual investor from such specialized holdings would be more than offset by the marketwide effect on stock prices of a similar policy pursued by other investors of the same tax bracket.

Further insight into the difference between our results and those of the earlier and current literature can be gained by examining the two arguments underlying the traditional view that retention of corporate earnings facilitates tax avoidance by shareholders.<sup>12</sup>

According to the first argument, earnings can be turned into a consumable cash flow either by paying cash dividend or by retention followed by the sale of a stock that has appreciated in price. Consequently, if capital gains are taxed at a preferential rate, shareholders would prefer to be compensated via retention [e.g., Miller and Modigliani (1961), Schwartz and Aronson (1972), Bailey (1974), Arditti et al. (1976), and Miller (1977)]. As noted by Fisher (1942, pp. 46–74), and restated by Bradford (1981) and by Palmon and Yaari (1981), this argument overlooks the dividend tax expected to be paid on eventual distribution. Since corporate assets are not directly consumable, the ultimate and exclusive source of value of any stock is its anticipated cash payments to shareholders. If any future distribution will be subject to tax at the uniform rate  $t^D$ , reinvesting a dollar of earnings in equilibrium would result in capital appreciation of merely  $1 - t^D$  dollars. Stock trading following retention would subject current shareholders directly to capital gains tax and indirectly to the impact of dividend tax, rather than substitute one tax for the other.

According to a more recent version of the traditional argument, retention facilitates replacement of current dividend by a more tax-effective future distribution method, such as stock repurchase, which will subject shareholders only to capital gains tax [e.g., Feldstein and Green (1983) and some recent textbooks]. This argument confuses two separate issues: the *timing* and the *form* of distribution. All distributions, current as well as future, should employ the most economic method or combination of methods. If stock repurchase is the superior method, the opportunity cost of retention (i.e., future stock repurchase) is the benefit from current stock repurchase, not the smaller benefit from current dividend. That is, the cost and benefit of retention should be compared under the *same* distribution method. Compatible with the present model, retention by dividend-paying corpo-

rations in real life does not imply a decision to rely thereafter on alternative distribution methods and is fully consistent with a dividend-only policy.

In summary, analysis based on the present model indicates that the traditional claim of beneficial tax consequences of retention should be reversed: retention by a corporation relying on a given distribution method tends to increase, not decrease, the impact of personal taxes. By depriving shareholders of a cash flow, retention induces trading at appreciated prices, causing an immediate tax payment on realized gains over and above any tax that must be paid on incremental future distributions.

#### IV. RELATIVE TAX BURDEN AS A PENALTY TO CORPORATE OWNERSHIP

The tax incentive to avoid corporate tax treatment by choosing the proprietary form or seeking a Subchapter S corporation status can be discerned by comparison of the tax burden on current value (i.e., discounted tax liabilities) or the resulting net-of-tax value under the two forms of ownership, given the parameters of growth, tax, and holding period. Given the opportunity for growth at the rate  $g$  and investors' marginal tax bracket, the ratio of proprietary to corporate value under the restrictive assumption of annual trading can be calculated from Eqs. (1) and (4):

$$Z = \frac{1 - b - t^P + bt^G}{(1 - b - t^C)(1 - t^D)} \quad (7a)$$

$$= \frac{(1 - b)(1 - t^P) - bt^P + bt^G}{(1 - b)(1 - t^C)(1 - t^P) - bt^C(1 - t^P)}; \quad t^D = t^P \quad (7b)$$

where  $Z > 1$  implies an advantage for proprietary tax treatment and  $Z < 1$  an advantage for corporate tax treatment.

In the absence of opportunities for capital gains tax deferral, the current relationships  $t^D = t^P$ ,  $t^G = .4t^P$  (or  $t^G = .5t^P$ ), and  $t^C = .46$  (or  $t^C = .5$ ), along with the constraint  $(t^C, t^P) + b < 1$  would imply  $Z > 1$ , namely *an incentive to seek the proprietary tax treatment under any admissible  $t^P$ , regardless of its relationship to  $t^C$* . Furthermore, partial differentiation of  $Z$  with respect to  $t^P$  (subject to the constraint  $t^D = t^P$ ) shows that *this incentive is inversely related to the personal tax bracket*. The various effects resulting in a net advantage of proprietary taxation are revealed by Eq. (7b), where the numerator and denominator are recast in the format of Eqs. (2) and (6), respectively. These effects can be summarized as follows:

1. Primary taxation of proprietary income is at a lower rate, as reflected by the relationship  $(1 - t^C)(1 - t^P) < (1 - t^P)$ .

2. The proprietary benefits from a tax shield at the rate  $bt^G$ .
3. Advantages (1) and (2) are partly offset by higher secondary taxation of proprietary income if investors' tax brackets are sufficiently high, since the present rate of  $t^C = .46$  implies  $bt^P > bt^C(1 - t^P)$  for  $t^P > .315$ . Conversely, secondary taxation becomes a third proprietary advantage if  $t^P < .315$ .

These results, derived under the standard simplifying assumption of accrual taxation of capital gains and the assumption (favorable to corporate ownership) of exclusive internal financing, are in sharp contrast with the traditional perception of the corporation as a shelter for taxpayers in high income brackets. The traditional approach focuses on cash flows received by present owners, failing to discriminate between earnings distribution that causes a net cash transfer to the consuming sector and stock trading among shareholders causing no such transfer [e.g., Bailey (1969), Schwartz and Aronson (1972), and Meade (1978)]. The resulting ratio is

$$Z' = \frac{1 - t^P}{(1 - b')(1 - t^C)(1 - t^P) + b'(1 - t^C)(1 - t^G)} \quad (8a)$$

$$= \frac{1 - t^P}{(1 - t^P)(1 - t^C) + b(t^P - t^G)} \quad (8b)$$

where the corporation's  $b'$  in Eq. (8a) is the familiar fraction of post-tax earnings defined as  $b' = b/(1 - t^C)$  in terms of the pre-tax fraction  $b$  in Eq. (8b). Unlike Eq. (7), the numerator in this ratio omits the impact of capital gains tax on proprietary income. In addition, the denominator in Eq. (8a) reflects the erroneous assumption of a dollar-for-dollar substitution between current dividend and stock price appreciation via retention—and thus between the dividend and capital gains taxes—overlooking the impact of future distribution tax on current appreciation (see Section III). On this assumption (coupled with the strong assumption of a perfectly elastic supply of investment projects yielding the opportunity rate), the condition  $t^G < t^P$  implies optimality of full retention, namely  $b' = 1$  and  $b = 1 - t^C$ , reducing Eq. (8) to

$$Z' = \frac{1 - t^P}{(1 - t^C)(1 - t^G)}$$

Under the current relationships  $t^C = .46$  and  $t^G = .4t^P$ , this invalid ratio is reduced to

$$\frac{1 - t^P}{.54 - .216t^P} \cong 1$$

indicating no clear tax advantage to either form of ownership. Nonetheless,

this ratio is decreasing in  $t^P$ , falling below unity for  $t^P > .59$ , such that a corporation maintaining a sufficiently high retention ratio would allegedly provide a tax advantage to investors over the .59 tax bracket even if the capital gains tax could not be deferred. If the traditional view were valid, the recent decrease in the maximum tax rate on unearned income from .7 to .5 would ensure strict superiority of proprietary taxation under any admissible retention and tax rates.

## V. VALUATION AND THE HOLDING PERIOD

The assumption of annual trading in equity claims is now relaxed in order to explore the effect of deferred realization of capital gains and the resulting tax deferral on the tax burden under the two forms of ownership. The fundamental difficulty in quantifying the benefit from tax deferral stems from its complex dependence upon an unknown pattern of individual share trading. Following Lintner (1962, fn. 22), this difficulty is often circumvented by assuming that "the tax is paid as accrued even if it is not 'realized'; any benefit from deferment of tax liability on capital gains may . . . be translated into a lower [tax] rate" [e.g., Lewellen (1969), Stapleton (1972), Stiglitz (1973), Gordon and Gould (1978), Auerbach (1979b), Feldstein et al. (1979), and Schneller (1980)]. Although useful in exploring other issues, such treatment avoids the issue at hand—the *extent* to which deferral reduces the impact of this tax. The model presented below adopts an assumption utilized by a number of earlier writers, that the unknown marginal holding period remains constant [e.g., Lawson and Windle (1967) and Bailey (1969)]. The results indicate that the incorrect treatment of this tax under the assumption of no deferral (see Section III) led earlier writers to overstate the potential benefit from deferral.

Let:

$i$  = time interval measured in years; a fixed-cycle marginal holding period, where  $i = 1, 2, \dots$ ;

$r_i, g_i$  =  $i$ -year equivalents of the one-year  $r$  and  $g$  rates where  $r_i = (1 + r)^i - 1$  and  $g_i = (1 + g)^i - 1$ .

### A. Proprietary

Under the assumption that turnover of ownership, however infrequent, is confined to ex-distribution dates, the current share value is derived based on the cash flow of the first complete ownership cycle. A marginal holding period of  $i$  years will generate a dividend cash flow growing from  $Y(1 - b - t^P)$  to  $Y(1 - b - t^P)(1 + g_{i-1})$ . It will also entail a gross terminal capital gains tax liability of  $t^G V g_i$  less a tax shield of  $Y b t^G g_i g^{-1}$  representing the sum of earnings reinvested over the same period. A competitive rate of return

earned over the holding period implies the condition

$$(1 + r_i)V = Y(1 - b - t^P)(r_i - g_i)(r - g)^{-1} - t^G V g_i + Y b t^G g_i g^{-1} + V(1 + g_i)$$

and, by solving for  $V$ , the following valuation formula:

$$V = \frac{Y(1 - b - t^P)}{r - g} \left[ 1 + \frac{t^G g_i}{r_i - g_i} \right]^{-1} + \frac{Y b t^G}{g} \left[ \frac{r_i}{g_i} - 1 + t^G \right]^{-1} \quad (9)$$

Based on the inequality  $r > g$ , the first component in Eq. (9) is positive and monotonically increasing in  $i$  (at a decreasing rate) due to the term in brackets, which has a maximum of unity under  $i \rightarrow \infty$ . The second component, a capital gains tax shield, is also positive but monotonically decreasing in  $i$  (at a decreasing rate), since the term in brackets has a minimum of zero under  $i \rightarrow \infty$ . It can be shown that the sum of the two components, which is inversely related to the net impact of capital gains tax, is monotonically increasing in  $i$ , with a minimum under  $i = 1$  [Eq. (3)] and a maximum of  $V = Y(1 - b - t^P)/(r - g)$  under  $i \rightarrow \infty$ .

### B. Corporation

Since the pattern of dividends and their value is unaffected by a change in the holding period, the present share price may be derived directly from Eq. (6) by combining the first and second terms and substituting  $r_i$  for  $r$  and  $g_i$  for  $g$  in the third term:

$$V = \frac{Y(1 - b - t^C)(1 - t^D)}{r - g} - \frac{V t^G g_i}{r_i - g_i} \quad (10)$$

and then solving for the present value:

$$V = \frac{Y(1 - b - t^C)(1 - t^D)}{r - g} \left[ 1 + \frac{t^G g_i}{r_i - g_i} \right]^{-1} \quad (11)$$

Interpretation of Eq. (11) follows that of the first component in Eq. (9), requiring no further comment. Equation (10) reveals in its second term that the effect of deferral interacts with the current price via the impact of capital gains tax, a feature overlooked by previous writers [e.g., Bailey (1969), Bierman and Hass (1973, pp. 185-186), and King (1977, pp. 58-75)].<sup>13</sup> Such interaction means that the reduced effective tax rate cannot be determined by discounting the nominal tax rate over the holding period using the formula  $t^G/(1+r)^{i-1}$ . This approach, often taken by previous writers, wrongly assumes that deferral of trading is tantamount to postponement of a *given* tax liability—an assumption based on the invalid premise (challenged in Section III) that this liability can be stated as a product of the relevant tax rate and the predetermined amount of retained earnings. The assumption of a given tax liability cannot be used to measure the incentive

of an individual investor to defer trading, since other investors are assumed to follow suit. Specifically, since the capital gains tax base in the second term of Eq. (10) contains  $V$ , the tax liability both determines the current value and is determined by it. Thus, a deferral in realization of gains causes a decrease in the effective tax rate causing, in turn, a partly offsetting increase in the tax base and therefore in the tax liability. This interaction diminishes the tax benefit from deferral.<sup>14</sup>

### C. Deferral and the Form of Ownership

Comparison of Eqs. (9) and (11) indicates that the positive elasticity of the corporation's current value with respect to the holding period is equal to that of the first component in the proprietary's formula. Since the elasticity of the second component in Eq. (9) is negative, it follows that the overall elasticity  $(dV/di)(i/V)$  is greater under corporate tax treatment and so is the benefit from deferral. As seen in the numerical examples provided in the next section, under extreme circumstances this advantage of corporate taxation may reverse the net advantage of proprietary taxation calculated in Eq. (7) based on the restrictive assumption of annual trading.

Partial differentiation of  $Z$  with respect to  $t^P$  (given  $t^D = t^P$ ) indicates a negative effect under any  $i$  ( $1 \leq i \leq \infty$ ). This theoretical relationship suggests an explanation for the unprecedented increase in the number of public corporations going private since the 1981 tax act, which lowered the maximum personal tax rate on unearned income from .7 to .5. Unfortunately, the same evidence is also consistent with the traditional approach underlying the ratio  $Z'$ .

### D. Numerical Illustration

The magnitude of potential effects of the U.S. tax system on equity values can be discerned from hypothetical examples based on feasible parameters. Values displayed in Table 1 were calculated from price Eqs. (9) and (11) assuming for comparison a predetermined investment policy and a uniform post-tax rate of return  $r = .10$ . These examples reveal the following features.

First, without the offsetting effect of accelerated depreciation and investment tax credit, under either form of ownership the overall tax impact on current value is steeply increasing in the rates of retention and growth, and may reach devastating proportions even under moderate tax and growth rates.<sup>15</sup> Given  $t^P = t^D = .50$ ,  $t^C = .46$ ,  $t^G = .30$ , and  $i = 10$ ,<sup>16</sup> the equity of a proprietary retaining  $b = .20$  to invest at  $\pi^* = .30$  and grow at  $g = .06$  would sell for only one-third of its pre-tax value, and that of a corporation for less than one-fifth.

Second, contrary to the accepted interpretation of corporate behavior, under the tax regime of  $t^P < t^D$  retention increases the shareholders' tax

**Table 1. Proprietary vs. Corporation: The Value of an Equity Claim Under a Predetermined Investment Policy, Given  $Y = \$1$ ,  $t^C = .46$ , and  $r = .10$**

Pre-tax Rate of Return <sup>a</sup> $\pi^*$	Pre-tax Reinvestment Rate <sup>b</sup> b	Growth Rate g	Tax-Free Price	Firm Type	$t^P = t^D = .50$			$t^P = t^D = .70$		
					$t^G = .20$		$t^G = 0$ and/or $i \rightarrow \infty$	$t^G = .30$		$t^G = 0$ and/or $i \rightarrow \infty$
					i = 1	i = 10		i = 1	i = 10	
.10	0	0	\$10.00	P	\$5.00	\$5.00	\$5.00	\$3.00	\$3.00	\$3.00
				C	2.70	2.70	2.70	1.62	1.62	1.62
.10	.10	.01	10.00	P	4.57	4.52	4.44	2.47	2.38	2.22
				C	2.39	2.41	2.44	1.43	1.44	1.47
	.20	.02	10.00	P	4.05	3.94	3.75	1.86	1.65	1.25
				C	2.02	2.06	2.13	1.21	1.22	1.28
.20	.10	.02	11.25	P	5.00	5.00	5.00	2.67	2.61	2.50
				C	2.62	2.67	2.75	1.53	1.57	1.65
	.20	.04	13.33	P	5.00	5.00	5.00	2.22	2.05	1.67
				C	2.50	2.60	2.83	1.42	1.51	1.70
.30	.10	.03	12.86	P	5.53	5.59	5.71	2.91	2.89	2.96
				C	2.89	2.98	3.14	1.74	1.74	1.89
	.20	.06	20.00	P	6.54	6.81	7.50	2.76	2.69	2.50
				C	3.27	3.55	4.25	1.96	1.97	2.55

<sup>a</sup> The post-tax rate of return is  $\pi^*(1 - t^P)$  for proprietaries and  $\pi^*(1 - t^C)$  for corporations, at the corporate level.

<sup>b</sup> The post-tax reinvestment rate is higher than b:  $b/(1 - t^P)$  for proprietaries and  $b/(1 - t^C)$  for corporations. The latter are assumed to minimize shareholders' tax exposure by financing growth exclusively with internal funds.

burden even in the absence of real growth opportunities. Given these tax rates and holding period, an increase in retention from  $b = 0$  to  $b = .20$  to invest at  $\pi = r = .10$  would increase the burden from \$7.30 (i.e., \$10 - \$2.70) to \$7.94 (i.e., \$10 - \$2.06).

Third, the effect of deferred trading on the overall tax burden is likely to be small, in part because of a small contribution of capital gains tax to that burden and in part because of interaction between this tax and its base. Given  $t^P = t^D = .50$ ,  $t^C = .46$ ,  $b = .20$ , and  $\pi^* = .30$  ( $g = .06$ ), the introduction of capital gains tax of  $t^G = .30$  would increase the proprietary burden only by 5.5% (from \$12.50 to \$13.19) if  $i = 10$ , and by slightly more, 7.7% (to \$13.45) if  $i = 1$ . The respective increases under corporate ownership would be 4.4% and 6.2%. As expected from our discussion, these figures indicate an effect far smaller than that estimated by Bailey (1969) and claimed by Harberger (1968), Break and Pechman (1975), and Meade (1978), to name a few.

Fourth, as seen from Eq. (7) and the entries in Table 1, the tax system is likely to favor proprietary ownership, and significantly so. Given  $t^C = .46$ , proprietary tax treatment would be preferable even under the extreme conditions of  $t^P = t^D = .70$ ,  $t^G = .30$ ,  $b = .20$ , and  $i = .10$ . Nevertheless, corporate tax treatment may become marginally preferable if a very high personal tax bracket is coupled with a long deferral of trading or with the elimination of capital gains tax.

## VI. MISALLOCATION AND THE FORM OF OWNERSHIP

Tax-induced misallocation of capital between the proprietary and corporate sectors can be inferred from differential effects on pre-tax investment cutoff rates. In the case of corporations, marginal funds are assumed to be raised internally to minimize tax impact. This approach tends to *understate* the equilibrium return on capital by ignoring the use of external financing and with it the unique contribution of new enterprises to economic growth. In principle, the resulting bias could be corrected by comparing cutoff rates derived under the assumption of a given proportion of external financing in both sectors.

Let:

$\pi$  = pre-tax hurdle *average* yield on new investments, the cutoff value of  $\pi^*$ ;  
 $\pi'$  = pre-tax cutoff *marginal* yield on new investments (the pre-tax counterpart of the cost of capital), where by definition  $\pi' = d(b\pi^*)/db = \pi^* + b(\partial\pi^*/\partial b)$  at  $\pi^* = \pi$ .

### A. Proprietary

Under the simplifying assumption of  $i = 1$ , the marginal pre-tax cutoff rate is derived by differentiating Eq. (3) with respect to  $b$  after substituting

$b\pi^*$  for  $g$ , and then solving for  $\pi' = \pi^* + b(\partial\pi^*/\partial b)$  at  $\pi^* = \pi$ . Potential trade-off between the size of investment  $b$  and its yield  $\pi^*$  implies  $\partial\pi^*/\partial b < 0$ , calling for the condition

$$\frac{dV}{db} = \frac{\partial V}{\partial b} + \left(\frac{\partial V}{\partial \pi^*}\right)\left(\frac{\partial \pi^*}{\partial b}\right) = 0$$

This yields the rate

$$\pi' = \frac{r}{1-t^P} + \frac{b^2(1-t^G)}{1-t^P} \cdot \frac{\partial \pi}{\partial b} \quad (12)$$

which is increasing in  $t^P$  and  $t^G$  and decreasing in  $b$ .

In principle, the procedure used to derive  $\pi'$  from Eq. (3) under  $i = 1$  can be employed to derive it from Eq. (9) under  $1 \leq i \leq \infty$ . Although a general closed-form solution does not exist, the cutoff rate can be calculated with the desired degree of accuracy for any given combination of  $i$ ,  $r$ ,  $b$ ,  $\partial\pi^*/\partial b$ ,  $t^P$ , and  $t^G$ . It can be verified that because  $V$  stated by Eq. (9) increases with  $i$ ,  $\pi'$  monotonically decreases with  $i$ . Thus it follows that the cutoff rate in Eq. (12) derived under  $i = 1$  represents a maximum, whereas a minimum rate corresponding to  $i \rightarrow \infty$  can be derived by setting  $t^G = 0$  in the same equation. The standard approach, which neglects the secondary effect of any trade-off between the size of investment and its rate of return, implies the assumption  $\partial\pi/\partial b = 0$  by which Eq. (12) is reduced to  $\pi' = r/(1-t^P)$ . This cutoff rate is independent of  $i$  and  $b$ , and identical to the hurdle rate  $\pi$ .

## B. Corporation

Following a similar procedure, the corporate pre-tax cutoff rate<sup>17</sup> under  $i = 1$  is derived from Eq. (5)

$$\pi' = \frac{r}{(1-t^C)(1-t^G)} + \frac{b^2}{1-t^C} \cdot \frac{\partial \pi}{\partial b} \quad (13)$$

and under  $i \rightarrow \infty$  from Eq. (11), or directly from Eq. (13) by substituting  $t^G = 0$ . The expression in Eq. (13) is consistent with results of Gordon and Gould (1978, Eq. 11), and Auerbach (1979a, Eq. 23), showing no effect of dividend tax on the investment cutoff rate. For the same reason it is inconsistent with the traditional view that the rate differential between the dividend and capital gains taxes induces existing corporations to overinvest [e.g., Feldstein and Frisch (1977)].<sup>18</sup>

The corporate cutoff rate for any  $i$  is derived from Eq. (11) in the same way that the proprietary rate was derived from Eq. (9). Since  $i$  and  $\pi^*$  are independent and substitutable for one another in their partial positive effects on the price in Eq. (11), the *critical*  $\pi^* = \pi'$  is inversely related to  $i$ . This

cutoff rate differs from that often calculated by substituting for  $t^G$  in Eq. (13) the discounted tax rate  $t^G/(1+r)^{i-1}$ . Since the standard treatment was shown in Section V to overstate the effect of tax deferral, substitution of this discounted tax rate in Eq. (13) results in a cutoff rate that understates the one derived from Eq. (11). This feature is reflected in the following numerical example.

Given  $r = .10$ ,  $t^C = .50$ ,  $t^G = .25$ , and  $b = 0$ , under the assumption of  $\partial\pi/\partial b = 0$  an increase from  $i = 1$  to  $i = 10$  causes a decrease in the cutoff rate based on Eq. (11) from .267 to .237. The same change causes a greater decrease from .267 to .224 in the standard rate calculated by Eq. (13). If retention is higher at  $b = .30$ , a similar change in  $i$  causes a smaller percentage decrease to .241 in the rate based on Eq. (11), yet an unchanged decrease to .224 in the standard rate. Unlike the standard treatment, which ignores the interaction between capital gains tax and its base, these results indicate that the corporate cutoff rate is affected by  $b$  through the effect on  $g$  (see note 14) even if  $\partial\pi^*/\partial b = 0$ , as  $1 < i < \infty$ . Consistent with this numerical example, it can be shown analytically that the negative effect of  $i$  on this rate is decreasing in  $b$ .

### C. Intersectoral Distortion

Tax-created distortion of the relative return from investment under the two forms of ownership would induce a shift of capital between the proprietary and corporate sectors, up to the point where post-tax marginal returns are equalized. The extent of distortion can be measured by the ratio of pre-tax cutoff rates  $\pi'_p/\pi'_c$ , where the subscripts indicate the form of ownership. According to Eqs. (13) and (14),

$$\frac{(1-t^C)(1-t^G)}{1-t^P} \leq \frac{\pi'_p}{\pi'_c} \leq \frac{1-t^C}{1-t^P}$$

where the minimum ratio holds under  $i = 1$  and the theoretical maximum ratio under  $i \rightarrow \infty$ . Although in principle this ratio could be smaller or greater than unity, under the approximate marginal tax rates  $t^C = .46$ ,  $t^P = .40$  [Feldstein and Frisch (1977)], and  $t^G = .4t^P = .16$  currently in effect in the U.S., this ratio is between .75 and .90, inducing capital shift away from the corporate sector to the proprietary sector.

A two-sector analysis offers a broader context for examining the claim that preferential treatment of capital gains under the U.S. system induces overinvestment by established corporations. As argued previously, evidence supporting this claim [e.g., Feldstein (1973)]<sup>19</sup> cannot be explained by changes in the rate differential  $t^D - t^G$ , since  $t^D$  does not enter the corporate cutoff rate formula. The *ratio* of cutoff rates suggests an alternative explanation for this evidence. Given the approximate equality  $t^D \cong t^P$ , observed

effects attributed to changes in the difference  $t^D - t^G$  may disguise independent effects of  $t^P$  and  $t^G$ . Specifically, since the ratio  $(1 - t^C)(1 - t^G)/(1 - t^P)$  is directly related to  $t^P$  and inversely to  $t^G$ , an increase of  $t^D$  (and  $t^P$ ) or a decrease of  $t^G$  should induce a shift of proprietary capital toward the corporate sector. Based on this ratio, however, such a shift would not necessarily involve an increase in the extent of distortion; on the contrary, calculations showing  $\pi'_p/\pi'_c < 1$  suggest that under present conditions in the U.S. such a shift would decrease distortion.

## VII. SUMMARY AND CONCLUSIONS

This paper examines two distortions often attributed to the U.S. tax system: uneven burden on equity income generated under corporate and proprietary ownership, and the resulting differential effects on marginal returns of equity capital. It is shown that non-neutrality may exist on both counts, but its nature and extent differ from previous formulations.

Regarding the first distortion, it is shown that the tax burden on equity holders in any feasible tax bracket is likely to be heavier under corporate ownership than under proprietary regardless of the rate of retention and the extent to which deferred trading of ownership claims results in deferred payment of capital gains tax. Previous writers are shown to have understated the effect of corporate income tax, overstated the effects of capital gains tax and its deferral under corporate ownership, and overlooked the effect of this tax under proprietary ownership. Under both forms of ownership, the overall tax burden steeply increases with the rate of growth.

Regarding the second distortion, it is shown that through unequal effects on the return from investment, the U.S. tax system induces a shift of capital from the corporate to the proprietary sector. It is further shown that, contrary to the prevailing view, corporate investment is not induced by the rate differential between the taxes on dividend and capital gains.

These distortions are an inseparable part of a more fundamental distortion inherent to the income-based U.S. tax system: the distortion in the relative value of consumption and savings. The results of this paper indicate that the extent of this fundamental distortion is more substantial than previously thought. Since many writers, beginning with Thomas Hobbes, argue for a consumption-based tax system as a remedy, these results offer a new perspective of the potential benefit from undertaking the necessary reform.

Beyond the broad issues of tax policy, the findings of this paper have the following implications.

1. A solution is offered to the so-called dividend puzzle, a term describing the payment of dividends by corporations despite an alleged tax advantage in full retention of earnings. It is shown that retention tends to increase

rather than decrease shareholders' tax exposure by adding the burden of capital gains tax. Earnings will be retained only if the firm's investment opportunities are sufficiently favorable to offset the additional tax burden.

2. A corrected method is provided for assessment of the firm's cost of equity capital in the presence of personal taxes, including the effect of capital gains tax and its deferred payment. A theoretically valid cost of capital is a necessary ingredient of a rational investment policy of any firm and therefore of public policy in pricing the services of regulated utilities.

3. Individual investors are furnished with a valid theoretical basis for assessing the advantage of investment in tax-sheltered equity funds, and corporations operating such funds with a basis for choosing the best combination of stocks.

4. Financial economists are provided with a theory that may be useful in analyzing recent corporate practices apparently motivated by tax considerations. These include corporate acquisitions, leveraged buyouts, and asset divestitures.

## NOTES

1. The term double taxation of savings is used by Fisher (1942) to describe a phenomenon inherent to an accretion-based system that taxes income rather than consumption. As noted by Mill (1884; Book V, p. 543), Marshall [1917; in Pigou (1956, p. 351)], and Pigou (1928, pp. 135-136), and as eloquently argued by Fisher (1942, pp. 46-74, 220-225), if income saved is not exempt from tax, the return from saving is taxed twice. The welfare loss caused by double taxation of savings under the U.S. tax system is estimated by Harberger (1964) and Feldstein and Frisch (1977).

2. The issue of tax incidence is ignored throughout this paper.

3. The absence from the analysis of features such as overdepreciation and investment tax credit is justified by the similarity of their effects under the two forms of ownership. The exclusion of these effects simplifies the exposition but precludes full appraisal of the tax consequences of growth.

4. Previous authors have used the two theoretical frameworks interchangeably. For example, Feldstein et al. (1979) use perpetual growth, while Feldstein and Green (1983) use one-period growth. A more fundamental issue concerns the assumption of symmetrically informed shareholders and managers. For an analysis of investment equilibrium under asymmetric information, see Miller and Rock (1985). With minor modifications, our results can be derived from the Miller-Rock equilibrium.

5. Note that under both forms of ownership, interest expense of a levered firm would be treated as any other expense, requiring no special treatment here. In the presence of debt, this model and the corporate model that follows require the additional assumption of a constant debt ratio. Consistently, the ratio  $b$  defined later applies only to the portion of investment financed by equity, and the rate  $r$  allows for financial risk commensurate with the firm's debt ratio.

6. This notation is often used to denote reinvestment as a fraction of *post-tax* earnings. The use of a pre-tax fraction facilitates derivation of the pre-tax investment cutoff rate in Section VI.

7. To the extent that higher growth rates entail a higher degree of uncertainty, the analysis throughout the paper overstates the effect of growth on current value. This bias is ignored in

order to allow comparison of the results with those of previous studies. The assumed independence of  $r$  with respect to taxes is legitimate in the context of partial equilibrium and conducive to exploring tax policy changes aimed exclusively at the proprietary or corporate sector. Justification of this assumption in general equilibrium can be found in Summers (1981). Consistently,  $r$  is assumed to be independent of the form of ownership. In reality, the advantage of limited liability may be offset by higher credit risk, agency costs, and costs of government regulation, especially in large corporations.

8. It is shown by Palmon and Yaari (1983a) that if the rate of capital loss credit is below the rate of capital gains tax, trading of common stock at another point in the dividend cycle may impose an additional penalty on investors. This result is equally applicable to the trading of proprietary equity. The assumption in the text is nonrestrictive in view of the common practice of frequent distribution.

9. As indicated by Eq. (1), the condition  $r > g$  is sufficient but not necessary to ensure convergence under  $t^G > 0$ . Nevertheless, this is a necessary macroeconomic condition under the assumption of perpetual growth.

10. Partial differentiation of  $V$  with respect to  $t^G$  shows that  $\pi^* > r/(1 - t^P)$  is a necessary and sufficient condition for  $\partial V/\partial t^G < 0$ . It is shown in Section VI that this condition is implied by a rational investment policy.

11. Being of a secondary order of magnitude, unconventional distribution methods are excluded from the model. Also excluded are opportunities for shareholder tax arbitrage. Simons (1950) and Miller and Scholes (1978) argue that such opportunities exist, but there is no evidence that they are empirically significant. On the contrary, the law facilitating the loophole described by Miller and Scholes was introduced only in 1969 and, as pointed out by Feenberg (1981) and Feldstein and Green (1983), even since that time could not have affected more than one-tenth of one percent of all taxpayers receiving dividends, or 3 percent of dividend income.

12. Not to be confused with the valid argument that retention is a more tax-effective method than issuance of stock in financing any given investment project.

13. Lawson and Windle (1967) offer a consistent analysis of the effect of deferral on the corporation's investment hurdle rate, but their study does not avoid other fundamental errors discussed in Section III.

14. In the derivation of Eq. (11), where the focus is on the impact of capital gains tax, there is no need to define an effective tax rate in relationship to deferral. Nevertheless, this equation accommodates such a definition. Equation (11) can be interpreted as an expansion of Eq. (5), in which a reduced effective tax rate  $t_i^G$  replaces  $t^G$ , subject to the definition

$$t_i^G = t^G \left( \frac{r}{g} - 1 \right) \left( \frac{r_i}{g_i} - 1 \right)^{-1}$$

where the expression multiplying  $t^G$  asymptotically decreases from unity under  $i = 1$  to zero under  $i \rightarrow \infty$ . For any given  $i$  subject to  $1 < i < \infty$ , this rate is higher than the effective rate often calculated directly by discounting  $t^G$ , using  $t^G/(1+r)^{i-1}$ .

15. Note that in some cases the partial effects of  $b$  or  $i$  are negative, in an apparent conflict with theoretical arguments made previously. In those cases,  $\pi^*$  is below the relevant hurdle average rate of return, such that  $b$  is not optimal. Further discussion of this issue in Section VI.

16. Bailey (1969) reports a NYSE long-run aggregate annual turnover of .15, implying an average holding period of  $1/.15 = 6.7$ .

17. As seen by corporate management, the post-corporate-tax cost of retained earnings is  $\pi'(1 - t^C)$ .

18. In view of the inequality  $t^G < t^D$  and the opportunity to further reduce the impact of capital gains tax by deferral, it is still likely that the U.S. tax system induces corporations to use internal rather than external equity for financing any given level of investment (see note 12).

19. Most of the evidence is not designed to discriminate between induced investment as opposed to induced retention; presence of the second effect is consistent with absence of the first (see notes 12 and 18).

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