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CAPITAL GAINS TAXATION AND CORPORATE INVESTMENT

David A. Weisbach

This study examines the interaction of dividend taxes and capital gains taxes from the sale of stock. Capital gains taxes produce lock-in, increasing the required rate of return for a sale and reinvestment. Using a model of the new view of the corporate tax, this study shows that the lock-in effect when stock is sold determines the optimal dividend payment, increasing the required rate of return for corporate investment. As a result, capital gains taxes on sales of stock increase dividend payments and reduce investment. The new view result, that dividend taxes do not affect investment, however, survives in this setting. The study also considers differences between dividends and repurchases and sales between heterogeneous investors, both which alter the tax incentives for sales and distributions.

Keywords: dividend taxation, capital gains, new view, lock-in

JEL Codes: H2, H21, H25

I. INTRODUCTION

Standard models of the effects of dividend taxation assume that capital gains on stock are taxed as they accrue under what is sometimes called a mark-to-market system. For example, both the traditional view model in Poterba and Summers (1985) and the new view models in King (1974) and Auerbach (1979) assume stock gains are taxed as they accrue.¹ Because stock is actually taxed only when it is sold under the realization rule, these models use an effective mark-to-market tax rate that accounts for the deferral due to the realization rule.

Although mark-to-market taxation may be a reasonable simplifying assumption in many cases, it may not capture the full set of incentives on corporations and shareholders

¹ Other models of dividend taxation that assume mark-to-market taxation include Zodrow (1991), Auerbach (2002), and Auerbach and Hassett (2003). An alternative approach, used in Bradford (1981) and Chetty and Saez (2010) among others, is to assume that capital gains taxes are zero.

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that arise under a realization-based system. To illustrate, consider a shareholder with appreciated stock that he is considering selling. If the corporation distributes earnings prior to sale, the distribution reduces share value and, therefore, capital gains. The only tax is on the dividend received by the selling shareholder. If the corporation distributes earnings after the sale, the selling shareholder will have a capital gain and the buyer will receive the dividend, generating a second layer of tax. Because the distribution reduces value, the buyer will eventually have a capital loss when he sells the stock. Dividends after sale, therefore, generate a gain to the selling shareholder, a dividend to the buyer, and a loss to the buyer when he sells the stock. Because the buyer's loss comes only after the gain on the initial sale and may be subject to loss restrictions, the net present value tax if a dividend is paid after a sale will often be greater than the tax if dividends are paid before a sale. As a result, there may be an incentive to accelerate dividends. An assumption of mark-to-market taxation may not capture this dynamic because with mark-to-market taxation, sales have no tax effects.²

Moreover, realization-based taxation of sales, but not mark-to-market taxation, generates lock-in, which means that alternative investments have a higher return than otherwise to overcome the tax on a sale. If alternative investments have a higher return because of lock-in, the question is whether, or how, this affects corporate investments and dividend policy. For example, if the hurdle rate for selling a share of stock in a corporation and purchasing an alternative investment is a function of the market rate of return r and the nominal capital gains tax γ , what should the hurdle rate be for corporate investments?

In light of these considerations, I examine whether, or how, the results of models of dividend taxation change if capital gains are taxed only when realized rather than on a mark-to-market basis. To do this, I combine a model of the new view of dividend taxation, adopted from Chetty and Saez (2010), with a model of the decision to sell an asset.³ In particular, I assume there are only two periods, period 0 and a future period, time n . The corporation has retained earnings, which it uses to fund investments, so the model is a pure new view model. The shareholder may receive a distribution (reducing

² It is sometimes said in models with mark-to-market taxation that there is an incentive to accelerate dividends because dividends and capital gains are substitutes, echoing the example in the text. With continuous mark-to-market taxation, however, there is no point in time after the corporation has earnings that it can distribute as a dividend but before the shareholder is taxed on the related stock appreciation. Therefore, dividends cannot be paid prior to the taxation of the gain. To illustrate, suppose that a corporation has after-tax earnings of \$1. This is reflected in the stock price, which, under continuous time mark-to-market taxation generates an immediate tax on the gain. The dividend cannot be paid prior to the taxation of the gain, so it cannot substitute for the gain. The dividend does, however, produce a loss because it reduces corporate value, and the loss is taxed immediately after the dividend under the assumption of continuous time mark-to-market. If the dividend and loss are taxed at the same rate, the two net to zero, leaving only the initial mark-to-market tax on the gain. If the two are taxed at different rates, there may be a net positive or negative tax on the dividend.

³ I suspect that the same result holds within a traditional view model, but to keep the model as simple as possible, I limit myself to the new view.

corporate investment) and may also choose to sell a fraction of his shares (at a price that capitalizes all future taxes), and reinvest both the distribution and the sales proceeds in an alternative asset. The corporation's goal is to set a distributions policy that, joint with the shareholder's choice of how much to sell, maximizes the after-tax value of the shareholder's portfolio.

The resulting optimization produces four conclusions. First, if the buyer and seller are taxed at the same rate (i.e., there are no clienteles), the central result of the new view of dividend taxation survives in this setting: if marginal source of funds is retained earnings, the dividend tax does not distort corporate investment even when gains are taxed on a realization basis.

The lock-in effect of capital gains taxes increases the required return for selling appreciated stock and reinvesting in other assets. The second conclusion from the model is that this increased return propagates to corporate investments: the hurdle rate for corporate investment is identical to the hurdle rate for sales of stock, and both are equal to the rate of return available in the market, grossed up by a factor that reflects the effective capital gains tax. Because the hurdle rate for corporate investment is increased by the effective capital gains rate, there is an incentive to reduce corporate investment and to accelerate dividends. As the nominal capital gains rate goes up, this incentive increases.

Third, the effective capital gains tax rate depends on the timing and rate differences between the tax on seller's gain and the tax benefit of buyer's eventual capital loss. The timing difference, in turn, depends on when dividends are paid, which means that the effective capital gains rate is, in part, determined by corporate dividend policy. It cannot be taken as an exogenous input.

Whether the effective capital gains tax rate is higher or lower than the estimates for the effective rate used in mark-to-market models will depend on parameter values. Nevertheless, for reasonable values, it is likely that the effective capital gains rate is much lower than traditional estimates. For example, Poterba (2004) estimates that the effective mark-to-market tax rate is 25 percent of the nominal capital gains rate. Computed using the approach here, the value could easily be an order of magnitude lower than that value. Moreover, the effect of changes in capital gains rates on the hurdle rate for corporate investment is much smaller than traditional estimates.

Finally, because the model includes both sales of stock and dividends, it allows us to examine how sales of stock between different clienteles affects the optimal timing of dividends. This leads to the fourth conclusion, which is that the new view may not hold when there are sales between tax clienteles. In particular, when there are sales between tax clienteles, both the dividend tax rate and the capital gains tax can affect corporate investment decisions even if corporate investments are financed solely with retained earnings. Because there are large pools of taxable, tax-exempt, and foreign shareholders, clientele effects are likely to be important in determining the effects of dividend taxes on corporate investment.

Prior literature. The body of prior work that touches on the issues considered here is far too large to review in its entirety. Early work considering taxation and dividend

policy includes the new view models of King (1974), Auerbach (1979), and Bradford (1981), and the traditional view model of Poterba and Summers (1985). Zodrow (1991), Auerbach (2002), Allen and Michaely (2003), Hanlon and Heitzman (2010), and Graham (2013) all provide reviews. To my knowledge, none of the papers discussed in these reviews considers the interaction of dividend policy and realization-based taxation of stock.

It is worth noting several other lines of work that seem closely related. First, there is a body of work building off of Elton and Gruber (1970) that examines the interaction of dividends and capital gains, which is the topic examined here. This work, however, does not model the effects of these two taxes on optimal corporate dividend and investment policy, which is the focus here. Instead, it takes dividends as given and focuses on inferring investment choices made by different tax clienteles.

Second, Collins and Kemsley (2000) examined the question considered here, the trade-off between dividends and capital gains, using accounting terminology and assumptions rather than the economic terminology and assumptions used here.⁴ Similar to the conclusion here, they find that within a new view type model, dividends reduce capital gains taxes, and, therefore, there may be tax advantages to paying dividends. Their model in some ways is more general than the model used here, most importantly, in that it uses an infinite horizon. In other ways, it is more restrictive. For example, it requires a number of assumptions for their accounting identities to hold. The central difference, however, is that they assume exogenous turnover of stock while a key part of the model used here is that the choice of how much stock to sell is endogenous, so that the choice of dividends and stock sales is made jointly.

Finally, a number of papers within the legal literature have touched on the issues examined here, including Kingson (1976), Lang (1986), and Levmore (1988). These papers examine the legal issues presented when a selling shareholder causes a corporation to pay a substantial dividend prior to sale so as to reduce the capital gains taxes due on sale.

The paper proceeds as follows. Section II presents a standard mark-to-market new view model to serve as a benchmark. Section III modifies the mark-to-market new view model to instead be based on realization and presents the core results. The model in Section III assumes that the original investor has zero basis in his stock. With a zero basis, distributions treated as share repurchases and those treated as dividends are taxed the same way, so the analysis in Section III applies to both equally. Section IV considers the case where the original investor has a positive basis in his stock, and in this case, there are differences between dividends and repurchases. Section III also assumes that

⁴ Hanlon, Myers, and Shevlin (2003) and Dhaliwal et al. (2003) question the estimation strategy used by Collins and Kemsley and whether the model itself properly supports their estimation. While most of their criticisms relate to the empirical strategy used in that paper, Dhaliwal et al. make a number of criticisms of their model. The most important criticism, which may also apply to sections of this paper, is that clientele effects may alter the results. Section IV of this paper considers clientele effects.

all investors are taxed the same way (i.e., there are no clienteles). Section IV relaxes this assumption and considers sales between investors who are taxed differently. Section V concludes.

II. NEW VIEW MODEL WITH MARK TO MARKET CAPITAL GAINS TAXES

To model the interaction of dividends and sales, I use a modified version of the model from Chetty and Saez (2010). Their model did not have capital gains taxes or stock sales. In this section, I present their model, adding mark-to-market capital gains taxes but ignoring the possibility of new equity (i.e., assuming the firm has sufficient cash to finance its investments), so that the model is a strictly new view model. This produces the standard new view result that the dividend tax does not affect investment choices. Moreover, the required corporate rate of return is grossed up by the mark-to-market capital gains tax, a result also found in many new view models. In the next section, I modify their model to add stock sales and a capital gains tax on the sale.

Consider a firm that has after-tax profits of x at time 0. The firm can distribute a dividend of d now, and invest the remainder, $x - d$, distributing the after-corporate-tax future value at time n . Assume that the firm’s after-tax, n -period investment opportunities are represented by $f(\cdot)$, $f' > 0$, $f'' < 0$.⁵ After n periods, the firm has this return plus its original capital, which means that the firm distributes $F(x - d) = f(x - d) + x - d$ in period n . The exogenously given, n -period after-tax interest rate is $r_n > 0$.⁶ Assume for now that capital gains are not taxed. As in Chetty and Saez’s initial model, the corporation sets dividend policy to maximize shareholder value, and shareholders have complete information about corporate investment policy. This avoids many of the complexities that are present in more complete models, such as the use of dividends as signals (e.g., Bernheim and Wantz (1995)), and corporate-shareholder agency problems, as in the latter part of Chetty and Saez (2010).

The present value of the firm, V_0 , is the sum of after-tax current distributions and the present value of the after-tax future distributions

$$V_0 = (1 - \delta)d + (1 - \delta) \frac{f(x - d) + x - d}{1 + r_n},$$

where δ is the dividend tax rate. Note that because $(1 - \delta)$ appears in both terms on the right hand side, we can divide it through, and think of the value of the corporation as

⁵ Chetty and Saez have f as a pre-tax return and then add in a term for the corporate tax. The corporate-level tax has no effect on the analysis, so rather than carry the term throughout, I simply make f an after-tax return. That is, let the corporate after-tax return $f(\cdot) = \varphi(\cdot)(1 - \tau)$ where τ is the corporate tax rate.

⁶ Chetty and Saez assume that the investor can purchase an untaxed government bond with a discount rate of r_n . In other models, such as Auerbach (1979), the discount rate is an after-tax weighted cost of capital. The difference in these approaches does not affect the analysis here and we can take r_n to be determined following either approach.

the present value of the pre-dividend tax cash flows reduced by the dividend tax: the dividend tax is capitalized into firm value.

The investor wants a dividend d which maximizes the present value of his stock. Setting $dV_0/dd = 0$, we get an optimal dividend d^* such that

$$1 + f'(x - d^*) = 1 + r_n.$$

The dividend tax does not affect the firm's investment decision, which is the essence of the new view.

Suppose now that capital gains are taxed on a mark-to-market basis. If the nominal rate γ applies to realized gains, there will be an effective rate, $c < \gamma$, that provides an equivalent present value tax when applied on a mark-to-market basis.⁷ The value of the corporation is now

$$(1) \quad V_0 = (1 - \delta)d + (1 - \delta)(1 - c) \frac{f(x - d) + x - d}{1 + r_n}.$$

Solving for the optimal dividend produces

$$(2) \quad 1 + f'(x - d^*) = \frac{1 + r_n}{1 - c},$$

which is similar to the grossed-up rate of return found in Auerbach (2002, expression 2.3). The capital gains tax increases the required marginal rate of return for corporate investment, so the corporation distributes more. The dividend tax, however, does not affect distributions.

III. REALIZATION-BASED CAPITAL GAINS TAXATION

Suppose that instead of mark-to-market taxation, capital gains are taxed only when realized. With mark-to-market taxation, there was no need to consider the investor's decision of whether and how much of the corporation's stock to sell because gains are taxed regardless. If we instead model realization-based taxation, we have to also model the investor's choice of how much to sell.

To do this, assume that the investor initially holds shares in the corporation (and possibly other assets which are not modeled). The investor can receive a distribution and can choose to sell a fraction of his shares. He invests the after-tax distribution and the sales proceeds in an alternative asset. Because the investor is reinvesting his proceeds, we can think of this as the investor rebalancing his portfolio or pursuing a new investment opportunity. His (and the corporation's) goal is to set the distribution policy and choice of how much to sell to maximize the after-tax value of his portfolio.

⁷ King (1977) details the method of calculating c given γ and a turnover rate for the stock.

A. Set up of Model

The model of the corporate investment is the same as described earlier: the investor has $\$x$ invested in a corporation which has the opportunity to invest at an n -period after-corporate-tax rate of return $f(\cdot)$. The corporation can make a distribution of d in period 0. After n periods, the corporation distributes $F(x - d) = f(x - d) + x - d$.

Now, however, assume that after receiving the distribution, the investor can choose to sell a fraction s of his shares. He invests the after-tax distribution and the after-tax sales proceeds in an alternative asset. The alternative asset has an after-tax rate of return $h(\cdot)$, $h' > 0$, $h'' < 0$. If the investor puts z in the alternative asset, after n periods, the asset is worth $H(z) = h(z) + z$. In general, h need not be the same as f , although it could be. The investor (joint with the corporation) wants to choose a pair d and s , to maximize the value of his portfolio.⁸

To simplify the analysis, assume for now that the investor has a basis of $\$0$ in the stock of the corporation. The assumption of zero basis means that the distribution can be either a dividend or a share repurchase. The reason for this dual interpretation is that for tax purposes, there are two differences between the treatment of share repurchases and dividends: share repurchases are offset against a portion of the shareholder's basis while dividends are not, and share repurchases are treated as gains while dividends are subject to a special tax on dividends. The assumption of a zero basis eliminates the first difference. The remaining difference between dividend and repurchases is the applicable tax rate, but because in the model the dividend tax rate is allowed to take any value, it includes the value that would apply to repurchases. Section IV considers the effects of shareholder basis, and in that case, there will be differences between dividends and share repurchases. For simplicity, I will refer to distributions as dividends except where I am explicitly considering repurchases.⁹

The value of the investor's portfolio as of time n is made up of the portion left in the corporation and the portion invested in the alternative opportunity. After receiving the dividend, and selling fraction s , the investor has $(1 - s)$ left in the corporation, which is worth $(1 - s)(1 - \delta)F(x - d)$ in period n .

The portion of the portfolio invested in the alternative asset h , consists of the after-tax dividend and the after-tax sales proceeds. The after-tax dividend is $d(1 - \delta)$. The sales proceeds are $s(1 - \gamma)Q$ where Q is the sales price of the stock of the corporation and γ is the capital gains tax rate.

To determine Q , note that a buyer will pay at most the present value of the after-tax cash he can get out of the corporation. In addition, the buyer gets a purchase price

⁸ I do not consider here portfolio effects that might arise, for example, due to the covariance between f and h . These results would not likely affect the core results of the paper while making the model more complex.

⁹ There are a number of non-tax differences between repurchases and dividends, including that shareholders choose whether to sell their stock back in a repurchase while they do not choose to receive a dividend, and that dividends are often expected to recur while repurchases may not be. Because the model here considers only a single shareholder and because the corporation is optimizing that shareholder's value, these differences are not modeled.

basis in the stock. This basis reduces future taxes, and the buyer will pay an additional amount to reflect this benefit.

In particular, a purchase price of Q gives the buyer a basis of Q in the stock. Basis acts like a deduction: a basis of Q is worth τQ where τ is the applicable tax rate. Depending on how the buyer receives his future value, the tax rate applied to his basis could be either the capital gains or capital loss rate. If the buyer receives a dividend of $sF(x-d)$ at time n , the value of his stock will be zero. When he sells the stock, he will have a capital loss of Q , in which case the applicable rate is the capital loss rate. If instead, $sF(x-d)$ is paid out in a final liquidation payment by the corporation or is paid out as a redemption, the buyer will use his basis against the amount realized, which, in both cases, is taxed as a capital gain. In this case, the applicable rate is the capital gains rate because basis reduces the capital gains tax that would otherwise be due. Without loss of generality, let the applicable rate be λ , the capital loss rate. Setting $\lambda = \gamma$ gives the capital gains rate case. Also without generality, I will assume that the buyer realizes this loss at time $m \geq n$ (the period when the corporation pays out $F(x-d)$). If $m = n$, the final distribution is either a redemption or a liquidation, or the final distribution is a dividend and the sale occurs immediately after the final distribution.

With this notation, the price the buyer is willing to pay is the sum of the present value of after-dividend-tax cash flow and the present value of the tax value of the basis

$$Q = \frac{(1-\delta)F(x-d)}{1+r_n} + \frac{\lambda Q}{1+r_m},$$

where r_m is the m -period discount rate. This gives a purchase price of

$$(3) \quad Q = \frac{(1-\delta)F(x-d)}{1+r_n} \left(\frac{1}{1-\frac{\lambda}{1+r_m}} \right).$$

If the buyer purchases s shares of stock for this price, the seller has after-tax sales proceeds of

$$(4) \quad sQ(1-\gamma) = s \left(\frac{(1-\delta)F(x-d)}{1+r_n} \right) \left(\frac{1-\gamma}{1-\frac{\lambda}{1+r_m}} \right).$$

The last term in brackets, $\frac{1-\gamma}{1-\frac{\lambda}{1+r_m}} \leq 1$, can be thought of as (one minus) the effective capital gains tax rate. Denote the effective capital gains rate as $\Gamma_m = 1 - \frac{1-\gamma}{1-\frac{\lambda}{1+r_m}}$, so that the last term in brackets in Equation (4) is equal to $1 - \Gamma_m$. It is the difference between the immediate tax on the gain and the deferred benefit of the loss (taking into account both the deferral cost and the possibility that the tax rate on losses is lower than the rate on gains). It is equal to 0 (there is no net capital gains tax) if the tax rates on gains

and losses are the same and the loss is realized immediately after the gain (so that $r_m = 0$). In general, it will be greater than 0.

Combining the two pieces, the value of the portfolio as of period n is

$$(5) \quad V_n = (1-s)(1-\delta)F(x-d) + H\left((1-\delta)d + s\left(\frac{(1-\delta)F(x-d)}{1+r_n}\right)\right)(1-\Gamma_m).$$

B. Optimal Sale and Dividend

The investor wants to find a pair (d^*, s^*) to maximize the value of his portfolio. To do this, he sets the gradient of V_n equal to 0. Setting $\partial V_n / \partial s = 0$, and assuming an interior solution, we get

$$(1-\delta)F(x-d^*) = H'(s^*, d^*)\left(\frac{(1-\delta)F(x-d^*)}{1+r_n}\right)(1-\Gamma_m).$$

To shorten the expression, I write $H'(s, d) = 1 + h\left[(1-\delta)d + s\frac{(1-\delta)F(x-d)}{1+r_n}(1-\Gamma_m)\right]$ for the marginal return on the alternative investment, which is a function of s and d (and similarly for the net return h). Simplifying, the optimal value for s^* and d^* must satisfy

$$(6) \quad 1 + h'(s^*, d^*) = \frac{1+r_n}{1-\Gamma_m}.$$

The required rate of return is grossed up by the effective capital gains tax Γ_m which means that the return required for a sale is higher than the return available to investors more generally. This is because of the lock-in effect of capital gains on sale: to overcome the capital gains tax, the investor will demand a higher return on alternative investments.

Setting $\partial V_n / \partial d = 0$, we get

$$(1-s^*)(1-\delta)F'(x-d^*) = H'(s^*, d^*)\left[(1-\delta) - s^*\frac{(1-\delta)F'(x-d^*)}{1+r_n}\right](1-\Gamma_m).$$

Substitute Equation (6) for $H'(s^*, d^*)$, and simplify to get

$$(7) \quad 1 + f'(x-d^*) = \frac{1+r_n}{1-\Gamma_m}.$$

Combining Equations (6) and (7), we get

$$(8) \quad 1 + f'(x-d^*) = 1 + h'(s^*, d^*) = \frac{1+r_n}{1-\Gamma_m} = (1+r_n)\left(\frac{1-\lambda}{1-\gamma}\right).$$

The corporation chooses d^* to satisfy Equation (7). Given d^* , the investor chooses s^* so that the pair, d^* and s^* satisfy Equation (6). With these values, the returns for both the corporate investment and the alternative asset are the same, and in both cases are grossed up by one minus the effective capital gains tax, $1 - \Gamma_m$.

C. Interpretation

There are a number of observations we can make about this result. First, as is standard, the effective capital gains tax affects the choice to sell, generating lock-in. Alternative assets must have a higher return than otherwise to offset the capital gains tax. This higher return propagates to corporate investment choices, increasing the required rate of return for corporate investments and increasing period 0 dividends, so that the rate of return on corporate investments is the same as for alternative investments.

To understand why this occurs, suppose that the investor consumes the dividend rather than reinvest it.¹⁰ Instead, only the sales proceeds are reinvested. To keep the notation consistent with the model presented earlier (which computes the future value of the portfolio, V_n), assume that the utility of current consumption is valued in the future at the market rate of return. After receiving the dividend, the investor can then sell a fraction s of his stock and reinvest the sales proceeds in h .

With these assumptions, the future value of his portfolio, including the future value of present consumption, is

$$(9) \quad V_n = (1 - \delta)(1 + r_n)d + (1 - s)(1 - \delta)F(x - d) + H\left(\left(s(1 - \delta)\frac{F(x - d)}{1 + r_n}\right)(1 - \Gamma_m)\right).$$

Setting the gradient to zero in this case gives the same result for the alternative investment, $h(s^*, d^*)$, (the return is grossed up by the effective capital gains rate), but for the corporate investment we get $F'(x - d^*) = 1 + r_n$. The required return is not grossed up by the effective capital gains tax if dividends are not reinvested in the alternative asset. What connects the two returns is the reinvestment of the dividend in the alternative, which, because of the lock-in effect, has a higher rate of return.¹¹

Second, unlike in models in which capital gains are taxed on a mark-to-market basis, the effective capital gains tax rate, $\Gamma_m = 1 - \frac{1 - \gamma}{1 - \lambda + r_m}$, depends on (1) the difference between the tax rate on gains and the rate at which losses can be recovered and (2) the timing

¹⁰ This appears to be the assumption in Chetty and Saez, who do not specify how the distribution is used.

¹¹ It is also useful to compare mark-to-market taxation (Equation (1)) with the current model (Equation (9)). In both cases, the dividend is consumed rather than reinvested, but corporate rate of return is grossed up by the effective capital gains tax only in the mark-to-market case. The reason is that in the mark-to-market case, retained earnings cannot escape the capital gains tax, while in the realization-based case they do if they are distributed prior to a sale. The reasons for the capital gains gross up in the mark-to-market case and in the core model presented here where dividends are reinvested (Equation (5)) are not the same.

difference between the gain on the stock and the eventual loss. The loss can occur only after retained earnings are distributed, so the timing difference depends on the timing of dividend payments as well as when the buyer realizes the loss by selling the stock to another buyer. That is, Γ_m is a function of n , the timing of the second period dividend and of m , the timing of the eventual sale of the stock to a third party by the buyer as well as the nominal rates.

As discussed in Poterba (2004) and King (1977), the capital gains rate in mark-to-market models is estimated by adjusting the nominal rate for deferral (by estimating the turnover rate) and possibly other features of the tax system such as stepped up basis at death. The effective capital gains rate estimated this way will often be much higher than Γ_m .

For example, Poterba (2004) estimates that the effective capital gains rate is 25 percent of the nominal rate. The 2003 Jobs and Growth Tax Relief Reconciliation Act (2003 Jobs Act) cut the nominal capital gains rate from 20 to 15 percent, which means that under this approach, the effective capital gains rate was cut from 5 to 3.75 percent.

To compare that to Γ_m , we need to know r_m as well as the nominal gains and loss rates. In 2003, corporate borrowing rates were roughly between 1.5 and 2 percent for one-year loans. If we let m be one year, take $r_m = 1.75$ percent, and let the capital gains and loss rates be the same, Γ_m was 0.43 percent prior to the 2003 Jobs Act and was cut to 0.30 percent. The capital gains taxes in the model presented here are roughly an order of magnitude lower than conventional estimates.

This difference in effective rates will have large impacts on corporate investment decisions. Using the mark-to-market approach found in Equation (2) and the values just illustrated, the required return for corporate investments would have been 7.11 percent when the capital gains rate was 20 percent and 5.71 percent when it was lowered in 2003 to 15 percent. Using Equation (8) and the same values, the required return was 2.19 percent prior to the 2003 cut and 2.06 percent after the cut.

Moreover, the effects of changes to the capital gains rate are much smaller using the approach here instead of conventional estimates. The nominal cut in the capital gains rate in 2003 was 25 percent. Under the mark-to-market approach, this led to a 19.6 percent reduction in the required corporate rate of return (from 7.11 to 5.71 percent). Using Equation (8) and the same values, the required return only went down 5.9 percent (2.19 to 2.06 percent). As a result, we should expect to see smaller changes to investment patterns from the capital gains rate reduction.

These estimates assume that $r_m = 1$ and that capital gains and losses are taxed at the same rate. This will not always be the case and in some situations, Γ_m might be much higher than the value in these calculations. For example, in many acquisition contexts, the buyer may plan on using the target corporation as part of its business, which means that it plans to hold the target indefinitely. If r_m is large, as is likely in this case, the denominator in Γ_m will approach 1 and the effective capital gains tax will approach the nominal rate. Similarly, there are regulations that, in certain acquisition contexts, take away the buyer's loss on the eventual sale of a target corporation, effectively setting

$\lambda = 0$.¹² In these cases, Γ_m may be higher than conventional estimates, and the incentive to pay dividends before the sale may be substantial.

Third, the solutions to the first order conditions presented earlier assume an interior solution. It may, however, be the case that the investor can fund the alternative investment entirely through a dividend or entirely through a sale. To understand these corner solutions, consider the case where the available rates of return in the corporation and in the alternative are above the market rate. In this case, it does not make sense to withdraw funds from the corporation but, at the same time, the investor can make high returns by investing in the alternative. On these circumstances, the investor will want to receive a zero dividend and to sell a portion of his stock, reinvesting the sales proceeds in the alternative. Equations (6) and (7) will not hold in this case.

Fourth, understanding the effects of changes to exogenous variables, such as the nominal tax rate on dividends or the tax rate on capital gains requires examining the effects assuming optimizing behavior, s^* and d^* . To examine this, I present a number of comparative statics results.

Effects of changes in m (the time until the buyer realizes his loss). It is apparent that $\partial\Gamma/\partial m > 0$, which then immediately gives $\partial V_n/\partial m < 0$. Conditional on the initial sale, the value of portfolio goes down as the turnover rate of the stock goes down. The reason is that the lower turnover rate defers the capital loss, generating a higher net present value tax.¹³

We can also see that $\partial s^*/\partial m < 0$ and $\partial d^*/\partial m > 0$. As the time until the loss is realized gets larger, the lock-in effect goes up because the effective capital gains rate goes up. As a result, the investor sells less (and demands a higher return). This propagates to corporate investment, increasing dividends and increasing the required corporate return.

Changes in dividends, d^ , for changes in tax rates.* Dividends are uniquely determined by the requirement that $F'(x - d^*) = (1 + r_n)/(1 - \Gamma_m)$. To determine how changes in the dividend and capital gains tax rates affect the optimal dividend payment, implicitly differentiate this equation. This produces $\partial d^*/\partial \delta = 0$, which is consistent with the new view: permanent changes to the dividend tax rate have no effect on dividend payments even in a model with realization-based taxation of sales.

We also get $\partial d^*/\partial \gamma > 0$: dividends go up when the nominal capital gains rate goes up. The intuition is that the required return for corporate investment, $\frac{1+r_n}{1-\Gamma_m}$, goes up when the capital gains tax rate goes up. Therefore, corporate investment is reduced and dividends correspondingly go up. An implication is that attempting to determine whether the new view or traditional view holds by examining a change in the dividend tax rate may be confounded if the capital gains rate changes at the same time: in the new view model presented here, a simultaneous change in both rates will cause dividends to change even under new view assumptions.

¹² These can be found in Treas. Reg. § 1.1502-36.

¹³ Note, however, that if we allow the timing of the initial sale (and not just the amount) to be endogenous, a lower turnover rate will defer that sale, potentially lowering the effective capital gains rate. The net effect of lowering the turnover rate, therefore, is ambiguous.

Changes in value, V_n , for changes in dividend and capital gains tax rates. If capital gains rates (and loss rates) go up, the value of the portfolio goes down, as expected

$$\frac{\partial V_n(d^*, s^*)}{\partial \gamma} = \underbrace{s^*(1-\delta)F(x-d^*)}_{\text{after-tax FV of sold portion}} \left(\frac{\partial(1-\Gamma_m)/\partial \gamma}{1-\Gamma_m} \right) + \underbrace{(1-\delta)}_{\text{change in after-tax dividend}} \frac{\partial d^*}{\partial \gamma} .$$

The first term is the after-tax future value of the sold portion of the stock, reduced by the percentage change in one minus the capital gains rate, $\frac{\partial(1-\Gamma_m)}{\partial \gamma} / (1-\Gamma_m)$, for a change in the nominal rate. The first term is strictly negative: the after-tax value of the sold portion goes down when the capital gains tax goes up. The second term is the change in the after-tax value of the dividend. This is positive and offsets the reduction in the value of the sold portion.

If the dividend tax rate δ goes up, the change in the portfolio value is

$$\frac{\partial V_n(d^*, s^*)}{\partial \delta} = - \left[\frac{(1+r_n)}{1-\Gamma_m} d^* + (1-s^*)F(x-d^*) \right].$$

The change in the value of the portfolio is (minus) the sum of the future value of the dividend and the future value of retained corporate investment. This is exactly what we expect within a new view model: if the government increases the dividend tax, the value of the portfolio (at time n) goes down by current and expected dividends.

Changes in sales, s^ , for changes in tax rates.* To determine the change in the fraction of the stock sold for a change in the relevant tax rates, we must, implicitly differentiate $h'(s^*, d^*) + 1 = (1+r_n)/(1-\Gamma_m)$. Implicitly differentiating with respect to the dividend tax rate, δ , tax gives $\partial s^*/\partial \delta > 0$: sales increase when the dividend tax rate increases. The relative value of sales is higher when the dividend tax is higher. Note that this further confirms the endogeneity of the capital gains rate to the dividend tax, in this case because turnover rates increase with the dividend tax.

The change in the fraction sold for a change in the capital gains rate, $\partial s^*/\partial \gamma$, has an ambiguous sign. As the capital gains rate goes up, the required return for the alternative investment goes up, which, because $h'' < 0$, means the investor wants to invest less in the alternative asset. As one might expect, as capital gains rates go up, the investor has an incentive to sell less. Because the capital gains rate has gone up, however, the investor keeps less for any given amount sold. Therefore, we do not know whether the investor should sell less or needs to sell more of his original investment to invest the appropriate amount in the alternative. For this reason, the sign of $\partial s^*/\partial \gamma$ is indeterminate.

IV. EXTENSIONS

In this section, I consider two extensions to the model. First, I examine the case where the investor has basis in his stock rather than a zero basis, as was assumed earlier.

Second, I examine whether the presence of tax clienteles changes the optimal dividend policy, focusing on when the buyer and seller in the model have different tax attributes.

A. Basis

The model presented earlier treated the investor’s original basis in his stock as zero. If the investor has a positive basis, the conclusions may change somewhat. In this section, I consider the effects of basis. Because the basis recovery rules are different for dividends than for repurchases, I consider them separately.

1. Dividends

To study this issue, it is convenient to state basis as a fraction $\beta \geq 0$ of the sales price Q and to allow the tax rate on gains and losses to be equal (setting both to γ). If basis is $\beta Q = \beta \frac{(1-\Gamma_m)(1-\delta)F(x-d)}{1+r_n}$, the value of his portfolio as of time n is

$$(10) \quad V_n = (1-s)(1-\delta)F(x-d)\left(1 + \beta \frac{1-\Gamma_m}{1+r_n} \frac{\gamma}{1-\gamma}\right) + H(R),$$

where the reinvested amount R is

$$R = (1-\delta)\left(d + s(1-\Gamma_m) \frac{F(x-d)}{1+r_n} \left(1 + \beta \frac{\gamma}{1-\gamma}\right)\right).$$

This expression assumes that dividends are not offset by basis and that the investor may recover a fraction s of his basis only when he sells s of his stock. Recovering basis reduces his capital gains tax, and the tax savings along with dividends and sales proceeds are invested in the alternative asset. He recovers the rest of his basis, in period n when he liquidates his remaining investment in his original stock.

Setting the gradient to zero to find the optimal pair (s^*, d^*) , gives an expression for the investment in the alternative asset

$$h'(s^*, d^*)\left(1 + \beta \frac{\gamma}{1-\gamma}\right) + 1 = \frac{1+r_n}{1-\Gamma_m}.$$

This is the same as Equation (6) with an adjustment for basis (and when basis is zero, the two are the same). If the nominal capital gains tax rate γ is less than $1/2$, then, as basis goes up, the required marginal return for investing in the alternative asset goes down, which means that the investor invests more in the alternative asset.

Setting the partial derivative of the value of the portfolio with respect to d equal to zero gives

$$(f'(x-d^*) + 1)\left(1 + \beta \frac{1-\Gamma_m}{1+r_n} \frac{\gamma}{1-\gamma}\right) = h'(s^*, d^*) + 1.$$

Dividends are set so that the marginal return to corporate investment multiplied by a factor reflecting the present value of basis recovery equals the marginal return to the alternative investment. This means that marginal returns to corporate investments are lower than otherwise: dividends are reduced because of the disadvantageous rule for basis recovery for dividends.

2. Repurchases

Share repurchases, unlike dividends, are offset by a pro rata portion of basis. Relative to dividends, therefore, repurchases are tax advantaged. Because they use a portion of basis, however, they reduce the basis that can be used on a subsequent sale, partially offsetting this advantage. We might, therefore, expect somewhat higher distributions if they come in the form of a repurchase rather than a dividend, and possibly, lower sales.

To model this, note that if the investor receives a share repurchase of d , he can recover basis of βd . If he then sells a fraction s of the stock, the basis recovery is reduced by $s\beta d$ compared to what he would otherwise have been allowed to use. Therefore, the tax benefit of a repurchase followed by sale (relative to a dividend followed by a sale) is $(1 - s)\beta d$. If this is valued at the nominal capital gains rate, the benefit of a first period repurchase rather than a dividend is $(1 - s)\beta\gamma d$. Assume that this amount (along with the distribution and any sales proceeds) is reinvested in h . At time m , however, the investor has that much less left in his original stock holdings, and, therefore, pays an additional tax at that time.

The difference between a share repurchase and a dividend, therefore, is the additional recovery of basis in the first period, with value $(1 - s)\beta\gamma d$ and a reduced recovery of the same amount in the final period. We can, therefore, write an equation that covers both the dividend and repurchase cases by using an indicator variable equal to 1 or 0, depending on whether the distribution is in the form of a repurchase or dividend

$$(11) \quad V_n = (1 - s)(1 - \delta)F(x - d)\left(1 + \beta \frac{1 - \Gamma_m}{1 + r_n} \frac{\gamma}{1 - \gamma}\right) - I(1 - s)\beta\gamma d + H(R),$$

where the reinvested amount R is

$$R = (1 - \delta)\left(d + s(1 - \Gamma_m) \frac{F(x - d)}{1 + r_n} \left(1 + \beta \frac{\gamma}{1 - \gamma}\right)\right) + I(1 - s)\beta\gamma d.$$

Equation (11) encompasses all the cases considered so far. Setting $\beta = 0$ covers the base case considered earlier, which includes both dividends and repurchases. If $\beta > 0$, setting $I = 0$ gives the result for a dividend. If $\beta > 0$, setting $I = 1$ gives the result for a share repurchase.

If we take the first order condition with respect to s , we get

$$1 + h'(s^*, d^*) = \frac{(1 - \gamma)F(x - d^*)\left(1 + \beta \frac{1 - \Gamma_m}{1 + r_n} \frac{\gamma}{1 - \gamma}\right) - I\beta\gamma d^*}{(1 - \gamma)F(x - d^*) \frac{1 - \Gamma_m}{1 + r_n} \left(1 + \beta \frac{\gamma}{1 - \gamma}\right) - I\beta\gamma d^*}.$$

If $I = 1$ and $\beta > 0$ (so that the expression is a repurchase when there is basis), the expression cannot be further simplified, however, making the expression hard to interpret. Comparing it to the dividend case ($I = 0$), the repurchase case subtracts the same amount from the numerator and the denominator, so $1 + h(s^*, d^*)$ should have a lower value. This means that there is more invested in the alternative asset in the repurchase case, a result that occurs because of the additional basis recovery for repurchases.

B. Clienteles

There is a substantial literature examining the effect of tax clienteles on dividend payments, much of it stemming from the dividend clientele hypothesis of Miller and Modigliani (1961). Miller and Modigliani argue that stocks with high dividend ratios attract investors with low marginal tax rates and stocks with low dividend payouts attract investors with high marginal tax rates. Allen and Michaely (2003) provide a survey. Recent work includes Kawano (2014) and Desai and Jin (2011), among others.

A related hypothesis, known as the dynamic clientele hypothesis, is that investors with different tax attributes trade around dividend dates to generate tax arbitrages. Recent work examining this effect includes Zhang, Farrell, and Brown (2008), Rantapuska (2008), and Dhaliwal and Li (2006). Anecdotal evidence of this type of arbitrage led to a number of recent changes to the tax law, including a holding period requirement to claim the foreign tax credit (section 901(k)) and a look-through rule for equity derivatives to prevent trading to avoid withholding taxes (section 871(m)).

I examine an issue that is related to the dynamic clientele hypothesis but to my knowledge has not yet been studied: how trading between clienteles affects optimal dividend and investment policy. That is, how do dividend and capital gains taxes affect corporate investment if shareholders are heterogeneous and trade?

A complete examination of this question is beyond the scope of the model used here. It would require modeling both how clienteles choose their portfolios in equilibrium (such as along the lines of Brennan (1970) or more recently, Guenther and Sansing (2006)) and how those clienteles trade with one another within that equilibrium.

Instead I consider how some possible trades between clienteles would affect corporate investment choices without trying to model the extent to which those trades would occur in equilibrium. We might think of these trades as potentially affecting corporate investment decisions in two cases. The first is if the trades offer arbitrage opportunities. Corporate investment policies may change to maximize shareholder value if there is consistent arbitrage between clienteles. The second is large block trades and mergers and acquisitions, where the corporation knows that there will be a stock sale between clienteles and can set dividend policy accordingly. The sale of a subsidiary is an example of this latter type of trade.

There are a large number of different types of investors, generating a large number of possible trades. For example, if we consider just taxable individuals (in, say, the high-

est bracket), foreigners, tax-exempts, corporations, and mark-to-market entities (such as banks), there are 25 pairwise combinations, and in reality there are more types of investors than just these five. To keep the analysis tractable, I consider just four pairwise trades. The first two are arbitrage trades. The second two are possible block trades.

1. Individual to Corporate (Dividend Capture Arbitrage)

Suppose an individual sells stock to a corporation. Individuals are taxed as in the model earlier. Corporations are generally tax-exempt or partially tax-exempt on the receipt of dividends because of the dividend received deduction but can claim capital losses on the sale of their stock. Assuming for simplicity that dividends received by corporations are fully exempt from taxation, the after-tax sales proceeds (Equation (4)) becomes

$$s(1-\gamma)Q = s \frac{f(x-d) + x-d}{1+r_n} (1-\Gamma_m).$$

Substituting this into Equation (5), and solving for the pair (s^*, d^*) , gives

$$1 + h'(s^*, d^*) = 1 + f'(x-d^*) = \frac{1+r_n}{1-\Gamma_m} (1-\delta).$$

The corporate rate of return is lower by a factor of $(1-\delta)$. This means that the corporation will invest more and pay lower dividends.

This trade, commonly known as a dividend capture strategy, is an arbitrage trade because the components are taxed inconsistently. The buying corporation is not taxed on the dividend but can deduct the capital loss. In an arbitrage trade, the purchasing corporation will buy the stock cum dividend and sell the stock back into the market ex dividend, so that $r_m \approx 0$.¹⁴ In this case, the effective capital gains tax Γ_m is zero. The required marginal corporate return for investment becomes $(1+r_n)(1-\delta)$, which is below the market rate because of the gains from the arbitrage.

2. Individual to Tax-exempt

Suppose an individual sells the stock to a tax-exempt entity, again trying to take advantage of tax rate differentials. The individual will pay tax on any dividends and sales proceeds while the tax-exempt purchaser will have no tax on the dividend and will not be able to claim a loss on its eventual sale of the stock. We might think that because the individual pays tax on the dividend while the tax-exempt investor does not, that dividends should go down. This need not, however, be the case.

¹⁴ Section 246 of the Internal Revenue Code requires the corporation to hold the stock for 46 days to claim the dividends received deduction, so the corporation will have to hold it at least that long.

The after after-tax sales proceeds are

$$s(1-\gamma)Q = s(1-\gamma) \frac{f(x-d) + x - d}{1+r_n}.$$

Substituting into Equation (5), produces an optimal pair (s^*, d^*) that satisfies

$$1 + h'(s^*, d^*) = 1 + f'(x - d^*) = (1 + r_n) \left(\frac{1 - \delta}{1 - \gamma} \right).$$

In the United States, it has historically been the case that $\delta \geq \gamma$, which means that the fraction at the end is less than or equal to 1. As a result, corporate investments will be higher than (or equal to) those that would be made without tax and, dividends will go down as expected. Under current law, however, $\delta = \gamma$, which means that the required corporate return is the same as the untaxed return. Dividends will be lower than in the individual-to-individual base case but not so low that the corporate return is below the market return. Moreover, unless the capital gains tax is 0, this arbitrage does not increase corporate investment as much as the dividend capture strategy described earlier.

3. Tax-exempt to Individual

Suppose that the original holder of the stock is tax-exempt and it sells the stock to an individual, which is the reverse of the trade just examined. Because the reverse trade generated tax benefits, we might think this trade generates tax costs. The sales proceeds are

$$sQ = s(1-\delta) \left(\frac{f(x-d) + x - d}{1+r_n} \right) \left(\frac{1-\gamma}{1-\Gamma_m} \right).$$

Substituting this into Equation (5) gives

$$1 + h'(s^*, d^*) = 1 + f'(x - d^*) = \frac{1+r_n}{1-\Gamma_m} \left(\frac{1-\gamma}{1-\delta} \right).$$

This value is the same as the base model considered earlier (individual selling to an individual), multiplied by the fraction at the end. The fraction is greater than or equal to 1 under the assumption that $\delta \geq \gamma$, which means that the required corporate return will be higher than in the individual to individual case. Under current law, however, $\delta = \gamma$, which means that this trade has no effect (relative to the base case) on corporate investment.

4. Corporate to Corporate

Finally, consider the sale of stock from one corporation to another. A common example might be the sale of a subsidiary. The after-tax sales proceeds are

$$s(1-\gamma)Q = \frac{F(x-d)}{1+r_n}(1-\Gamma_m).$$

Solving for the optimal pair (s^*, d^*) gives

$$1+h'(s^*, d^*) = 1+f'(x-d) = \frac{1+r_n}{1-\Gamma_m}.$$

This formula is the same as in the individual to individual sale case. As noted, however, for the sale of a subsidiary, the effective capital gains tax, Γ_m , may be close to the nominal rate, γ , because r_m may be high and because there may be restrictions on the ability of the buying corporation to claim losses in the stock.

V. CONCLUSIONS

My goal was to consider how a realization-based capital gains tax changes corporate investment incentives within a new view setting (i.e., where corporate investment comes from retained earnings). The core new view result that permanent changes to the dividend tax rate do not affect the timing of dividends survives in this setting. Capital gains taxes, however, increase the required corporate rate of return, resulting in lower corporate investment and higher dividend payments. The effective capital gains rate in a realization-based model, however, may be much lower than traditional estimates. It depends on both the timing of dividends and the timing of sales, and therefore, cannot be taken as exogenous. Sales between heterogeneous taxpayers further alter these results: when there are sales between heterogeneous taxpayers, the core new view results may no longer hold even if investment is financed solely with retained earnings.

There are a number of limitations to the model presented here. Among other limitations, it considered only two periods and a single sale of stock. It also assumed perfect information and no agency costs. Relaxing these limitations may alter the conclusions.

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