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The Effect of Increases in the Capital Gain and Dividend Tax on the Effective Tax Rate for Investments in Stock

J. Kent Poff

(University of North Georgia, Dahlonega, GA 30597, USA)

Abstract: The capital gain and dividend tax rate for higher income taxpayers increased from 15% to 23.8% in 2013. Increasing the tax on capital assets is thought to decrease investment, but some disagree. This research addresses the issue by constructing a mathematical model of an investment, deriving the effective tax rate, and analyzing the changes in the effective tax rate when the capital gain and dividend tax rate changes. This research has three basic findings. First, increasing the capital gain and dividend tax rate unambiguously increases the effective tax rate, unlike an increase in the capital gain tax rate alone. Second, an increase in the capital gain and dividend rate increases the effective tax rate for stocks that increase or decrease in value. Finally, an increase in the capital gain and dividend tax rate increases the effective tax rate for stocks that pay an increasing or decreasing dividend. These results show that a change in the capital gain and dividend rate is neutral with respect to the creation of new capital (that tends to rely on growth) or buying and selling mature capital (that tends to pay a larger dividend). While the overall amount of capital available may decline because of an increase in capital gain and dividend rates, there is no distortion between new firms and mature firms.

Key words: effective tax rate; capital gain; dividend; distortion

JEL codes: H21, K34, C60

1. Introduction

A long-term capital gain has historically been taxed at a preferential effective rate and a dividend has been taxed as ordinary income at a higher rate. However, the Jobs and Growth Tax Relief Act of 2003 cut the tax on a qualified dividend[1] from ordinary income rates to the capital gain rate. However, the American Taxpayer Relief Act of 2012 increased the capital gain and dividend tax rate from a maximum of 15% to a maximum of 20% and the Affordable Care Act of 2010 added a 3.8% tax on taxpayers in the highest tax bracket effective in 2013. Therefore, the rate on a capital gain or a dividend for taxpayers in the highest tax bracket is 23.8%.

Increasing the capital gain rate is often thought to decrease investment because when taxes increase, after-tax cash flows decrease (LaRochelle, 2012). However, others argue that there is no correlation between capital gain taxes and economic growth (Burman, 2012). One might think that the effective tax rate unambiguously increases when the capital gain and dividend tax rate increases, but dividend taxes are paid in the current period and the

J. Kent Poff, Ph.D., Associate Professor, University of North Georgia; research areas/interests: economic analysis of tax and small business tax law. E-mail: j.kent.poff@ung.edu, taxdoc@charter.net.

[1] Internal Revenue Code Section 1(h) (11). In general, qualified dividends come from stock that is held for more than 60 days around the ex-dividend date of a domestic corporation.

capital gain is deferred until eventual sale of the investment.

There are three research questions addressed in this paper. First, does a higher capital gain and dividend tax rate unambiguously increase the effective tax rate? Second, does any increase in the capital gain and dividend rate have the same impact on the effective tax rate of stocks that increase or decrease in value? Finally, does any increase in the capital gain and dividend rate have the same impact on the effective tax rate of stocks that pay an increasing or decreasing dividend?

These questions are important because changes in tax law influence investor decisions. It is critical to understand how decisions are affected by changes in tax policy and whether the changes accomplish stated policy objectives. These questions are answered by constructing a mathematical model of an investment, deriving an effective tax rate, and analyzing changes in the effective tax rate for different types of investments when the capital gain and dividend rate changes.

This research demonstrates that a higher capital gain and dividend tax rate unambiguously increases the effective tax rate. In addition, an increase in the capital gain and dividend rate increases the effective tax rate for stocks that increase or decrease in value or for stocks that pay an increasing or decreasing dividend. These results suggest the capital gain and dividend tax rates that are equal and change in the same way do not distort decisions about what kind of firm to invest in (i.e., growth vs. mature firms).

2. Prior Research

Does Changing The Capital Gain Tax Change The Economy, Investment, or Stock Prices?

Poff (2014) constructed a mathematical model of an investment, derived an effective tax rate, and analyzed the change in the effective rate when only the capital gain rate increased. The results of the paper show that (1) an increase in the capital gain tax rate does not necessarily increase the effective tax rate (2) an increase in the capital gain rate increases the effective tax rate for firms that grow at any rate or decline slowly (3) an increase in the capital gain rate decrease the effective tax rate for firms that decline quickly and (4) an increase in the capital gain rate has no effect on the effective tax rate for firms that pay an increasing or decreasing dividend.

Economists have investigated the effect of corporate taxes on investment, but have had little success in making the link between tax incentives and investment (Hanlon & Heitzman, 2010). However, Poterba and Summers (1983) establish that taxes on a dividend have significant effects on the cost of capital and reduce investment.

Lang and Shackelford (2000) gave evidence to show that the 1997 capital gain tax cut increased share prices and that dividend paying behavior also affected share prices. In contrast, Gravelle (2003) analytically studied taxes on capital income and concluded that dividend relief is unlikely to be a significant stimulus because much of the tax benefits will be saved. In addition, Burman (2012), in testimony before the House Ways and Means and Senate Finance Committees, argued that there is no correlation between the capital gain rate and economic growth.

Dhaliwal, Erickson, and Krull (2007) studied the capital income tax cuts in the 1997 and 2003 Tax Acts and found that the effect of the 1997 act was smaller when the dividend was larger because only the capital gain rate was reduced. A similar effect was found around the 2003 Act when both capital gain and dividend rates were reduced, because the dividend rate was reduced more than the capital gain rate. Auerbach and Hassett (2006) provided evidence that the 2003 dividend tax reductions effected equity markets by boosting share prices and encouraging dividend payments, rather than by reducing the cost of capital. Dhaliwal, Krull, and Li (2007) also showed that the 2003 Tax Act effected equity markets, but showed the effect was through a reduction in the cost of capital.

Alternate Calculations of the Effective Tax Rate

Callihan (1994) did a literature review of the calculation of effective tax rates. A difficulty with the usual specification of the marginal effective tax rate is that it captures all the effects of taxes through the dividend return instead of separately capturing the tax effects of a dividend and a capital gain. In addition, there is no provision to examine multi-period cash flows. Because of the problems with the calculation, the measure of the marginal effective tax rate needs to be addressed and alternative measures considered.

Fullerton (1984) emphasized using a discounted cash flow approach to the calculation of effective tax rates. Musumeci and Sansing (2011), discussed the net present value effective tax rate that took into account the time value of money because it is important to properly value present verses future cash flows and thus not distort effective tax rates.

The current research improves upon prior work by explicitly analytically modeling the present value of multi-period pre-tax and tax cash flows. In addition, the model calculates the marginal effective tax rate and *changes* in the marginal effective tax rate to learn the conditions under which the marginal effective rate increases or decreases when the capital gain and dividend rate increases. Therefore, the researcher can determine if the proposed change is likely to implement policy objectives and under what conditions.

In the next section, a mathematical model of common stock is developed, the marginal effective tax rate is derived, and changes in the marginal effective tax rate are examined.

3. Investment Model

Competitive markets bid the price of an investment down until economic profit equals zero, but there may be economic profits earned while the market is adjusting or if there are barriers to entry. Therefore at equilibrium, an investment sells for the net present value of its after-tax cash flows: Similar to the formulation and analysis in Lang and Shackelford (2000) and (Poff, 1995, 2014), the net present value is:

$$SP(1+\phi)=c(1-u_g)SP\sum_{t=1}^{T}\frac{(1+\pi)^{t-1}(1-\alpha)^{t-1}}{(1+r)^t(1+\pi)^t}+\frac{SP(1+\pi)^T(1-\delta)^T(1-u_g)}{(1+r)^T(1+\pi)^T}+\frac{u_g SP}{(1+r)^T(1+\pi)^T} \qquad (1)$$

The selling price of the investment comes from the present value of the net cash flows earned by the investment including the dividend stream [first term on the right hand side (RHS) of the equation], the ultimate sale of the asset [the second term] and the tax saving from the recovery of the basis of the asset [the third term]

Where:

SP-The acquisition price of the investment

ϕ -The rate of economic profit that is earned

c-The net pre-tax dividend from the investment [i.e., the return to capital]

u_g-The capital gain and dividend tax rate under current law

T-The number of years the investment is held. $T>1$ to qualify as a long-term capital gain

π-The inflation rate

α-The rate of economic depreciation of the dividend

r-The real discount rate

δ-The rate of economic depreciation of the investment in the firm.[2]

The SP and T are expressed as whole numbers and ϕ, c, u_g, π, r, and are expressed as percentages and are assumed to be greater than or equal to zero. The variables α and δ are expressed as percentages and are positive if the asset or dividend stream is depreciating and are negative if the asset or dividend stream is appreciating.

The first term $\left[c(1-u_g)SP\sum_{t=1}^{T}\frac{(1+\pi)^{t-1}(1-\alpha)^{t-1}}{(1+r)^t(1+\pi)^t}\right]$ on RHS of the equation represents the after-tax net present value of the return to capital of the investment adjusted for inflation and depreciation. The return to capital should logically increase with inflation and decrease with economic depreciation, all discounted to the present. These adjustments start after one year and occur for T-1 periods. The return to capital is brought to the present in the denominator by the discount rate and the inflation rate for all T periods.

The second term $\left[\frac{SP(1+\pi)^T(1-\delta)^T(1-u_g)}{(1+r)^T(1+\pi)^T}\right]$ on the RHS of the equation represents the present value of the after-tax cash received from the sale of the asset at the end of T periods if the entire amount is fully taxable. The initial price of the firm [SP] is adjusted by inflation [$(1+\pi)^T$], economic depreciation [$(1-\delta)^T$] of the asset, and by taxes [u_g]. The third term $\left[\frac{u_g SP}{(1+r)^T(1+\pi)^T}\right]$ represents the present value of the tax saved from the recovery of the basis, which equals the original price. Both terms are discounted to the present by the real rate of return and inflation.

4. Effective Tax Rate

Equation 1 is solved in Appendix A. Consistent with Fullerton (1984) and Musumeci and Sansing (2011), the marginal effective tax rate [u_e] is the present value of taxes paid divided by the present value of cash inflows (see equation A.3). This research examines a prospective investment, so the relevant tax rate is the marginal effective rate (Callahan, 1994). However, for ease of exposition, I refer to the marginal effective tax rate as the effective tax rate. From equation A.6, the effective tax rate is:

$$u_e = \frac{u_g\left[(1+\phi)-\frac{1}{(1+r)^T(1+\pi)^T}\right]}{\left[(1+\phi)-\frac{u_g}{(1+r)^T(1+\pi)^T}\right]} \tag{2}$$

The effective tax rate [u_e] is generally a function of the same terms found in equation 1, but notice that the rate does not depend on the rate of growth or decline of the value of the investment [δ] or the dividend stream [α]. This result is contrasted with Poff (2014) which shows that the effective tax rate depends on the change in the value of the investment [δ], but does not depend on the change in the dividend [α].

[2] α is used to represent the rate of depreciation or appreciation in cash flows, while δ is used to represent the rate of depreciation or appreciation in the value of the investment. One would normally think that α and δ are related because in the case of common stock, high-growth firms often pay low dividends.

5. Results

To understand how the effective tax rate changes when the capital gain and dividend rate changes, the derivative of the effective tax rate (Equation 2) with respect to the capital gain and dividend rate is computed. From A.8:

$$\frac{\partial u_e}{\partial u_g} = \frac{\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]\left[(1+\phi)\right]}{\left[(1+\phi) - \frac{u_g}{(1+r)^T(1+\pi)^T}\right]^2} > 0 \quad (3)$$

The effective tax rate increases when the capital gain and dividend rate increases when $\frac{\partial u_e}{\partial u_g} > 0$. The denominator of Equation (3) is always positive because it is squared. Therefore, the sign of the derivative depends on the sign of the numerator of the term. By assumption of the model, $\phi, r, \pi \geq 0$ and $T > 1$. Therefore, $\left[(1+\phi) \geq 1\right]$, $\left[0 < \frac{1}{(1+r)^T(1+\pi)^T} \leq 1\right]$ and $\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]\left[(1+\phi)\right] > 0$ As a result, the numerator is positive, the denominator is positive, and the derivative is positive. Consequently, the marginal effective tax rate unambiguously increases when the capital gain and dividend rates increase. Like Lang and Shackelford (2000), when the capital gain and dividend rate increases, investors are worse off, and presumably will invest less. This result is contrasted with Poff (2014) which shows that an increase in the capital gain rate with no increase in the dividend rate sometimes increases and sometimes decreases the effective tax rate.

The underlying tax intuition of this result is that when a capital gain and a dividend are taxed at the same rates, there is no distortion because of the rates and investors will make profit-maximizing decisions. Decisions will be effected by taxes, but not distorted by different rates on a capital gain and a dividend.

6. Conclusions

There are three research questions addressed in this paper. First, does a higher capital gain and dividend rate unambiguously increase the effective tax rate? This research demonstrates that a higher capital gain and dividend tax rate unambiguously increases the effective tax rate (i.e., $\frac{\partial u_e}{\partial u_g} > 0$ in Equation 3). This is in contrast to Poff (2014) which shows that a change in the capital gain rate sometimes increases and sometimes decreases the effective tax rate.

Second, does any increase in the capital gain and dividend rate have the same impact on stocks that increase or decrease in value? This research demonstrates that an increase in the capital gain and dividend rate increases the effective tax rate for stocks that increase or decrease in value (i.e., $\frac{\partial u_e}{\partial u_g}$ in equation 3 is not a function of the growth or decline of the stock [δ]). Therefore, the increase in the effective tax rate is not affected by whether the stock increases or decreases in value. This result is consistent with Poff (2014) for firms that grow in value quickly or slowly or firms that decline slowly, but is in contrast to firms that decline quickly.

Finally, does a higher capital gain and dividend rate have the same impact on firms that pay an increasing or decreasing dividend? This research demonstrates that an increase in the capital gain and dividend rate increases the effective tax rate for stocks that pay an increasing or decreasing dividend (i.e., $\frac{\partial u_e}{\partial u_g}$ in Equation 3 is not a function of the growth or decline of the dividend [α]). Therefore, the increase in the effective tax rate is not affected by whether the dividend increases or decreases. This is consistent with Poff (2014).

As a result, an increase in the capital gain and dividend tax rate has the same effect on growth and more mature dividend firms. These results are important because changes in tax law influence investor decisions. It is important to understand how decisions are affected by changes in tax policy and whether the changes accomplish stated policy objectives.

7. Summary and Implications

The conventional wisdom is that a higher capital gain and dividend rate decreases investment because when taxes increase, after-tax cash flows decrease. This shows that increasing the capital gain and dividend rate unambiguously increase the effective tax rate and thus may decrease investment in all firms without regard to growth or decline in the value of the stock or the dividend stream. This is in contrast to Poff (2014) which shows that changing the capital gain tax alone has differing effects on different types of firms.

These results show that a change in the capital gain and dividend rate is neutral for growth and dividend stocks and thus is neutral with respect to the creation of new capital (that tends to rely on growth) or mature capital (that tends to pay a larger dividend). While the overall amount of capital available may decline because of an increase in capital gain and dividend rates, there is no distortion between new firms and mature firms.

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Appendix A

This appendix briefly describes the derivation of equation 3. Using standard methods of solving a geometric progression, equation 1 becomes:

$$(1+\phi)=\frac{-c(1-u_g)[(1-\alpha)^T-(1+r)^T]}{(1+\pi)(1+r)^T(\alpha+r)}+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T} \quad \text{(A.1)}$$

A.1 is rearranged and solved for the return to capital [c]:

$$c=\frac{(1+\pi)(1+r)^T(\alpha+r)\left[-(1+\phi)+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T}\right]}{(1-u_g)[(1-\alpha)^T-(1+r)^T]} \quad \text{(A.2)}$$

The effective tax rate [u_e] is the present value of taxes paid divided by the present value of cash inflows. From A.1, the present value of taxes paid includes the tax on the dividend stream plus the capital gain tax on the sale of the investment minus the recovery of the basis of the investment. The cash inflows include the dividend stream and sale of the investment. Therefore the effective tax rate is:

$$u_e=\frac{\frac{-cu_g[(1-\alpha)^T-(1+r)^T]}{(1+\pi)(1+r)^T(\alpha+r)}+\frac{(1-\delta)^Tu_g}{(1+r)^T}-\frac{u_g}{(1+r)^T(1+\pi)^T}}{\frac{-c[(1-\alpha)^T-(1+r)^T]}{(1+\pi)(1+r)^T(\alpha+r)}+\frac{(1-\delta)^T}{(1+r)^T}} \quad \text{(A.3)}$$

Since the effective tax rate [u_e] is a function of the dividend stream paid [c], equation A.2 is substituted into A.3:

$$u_e=\frac{\frac{-(1+\pi)(1+r)^T(\alpha+r)\left[-(1+\phi)+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T}\right]u_g\left[\frac{(1-\alpha)^T-(1+r)^T}{(1+\pi)(1+r)^T(\alpha+r)}\right]}{(1-u_g)[(1-\alpha)^T-(1+r)^T]}+\frac{(1-\delta)^Tu_g}{(1+r)^T}-\frac{u_g}{(1+r)^T(1+\pi)^T}}{\frac{-(1+\pi)(1+r)^T(\alpha+r)\left[-(1+\phi)+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T}\right]}{(1-u_g)[(1-\alpha)^T-(1+r)^T]}\left[\frac{(1-\alpha)^T-(1+r)^T}{(1+\pi)(1+r)^T(\alpha+r)}\right]+\frac{(1-\delta)^T}{(1+r)^T}} \quad \text{(A.4)}$$

By simplification of common terms [$(1-\alpha)^T-(1+r)^T$] and [$(1+\pi)(1+r)^T(\alpha+r)$], A.4 becomes:

$$u_e=\frac{\frac{-u_g\left[-(1+\phi)+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T}\right]}{(1-u_g)}+\frac{(1-\delta)^Tu_g}{(1+r)^T}-\frac{u_g}{(1+r)^T(1+\pi)^T}}{\frac{-\left[-(1+\phi)+\frac{(1-\delta)^T(1-u_g)}{(1+r)^T}+\frac{u_g}{(1+r)^T(1+\pi)^T}\right]}{(1-u_g)}+\frac{(1-\delta)^T}{(1+r)^T}} \quad \text{(A.5)}$$

Multiplying A.5 by $\frac{1-u_g}{1-u_g}$, rearrangement of terms, and simplification, the equation becomes:

$$u_e = \frac{u_g\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]}{\left[(1+\phi) - \frac{u_g}{(1+r)^T(1+\pi)^T}\right]} \tag{A.6}$$

Using the quotient rule:

$$\frac{\partial f(u_g)}{\partial u_g\, g(u_g)} = \frac{f^{'}(u_g)g(u_g) - f(u_g)g'(u_g)^{'}}{g^2(u_g)}:$$

$$\frac{\partial u_e}{\partial u_g} = \frac{\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]\left[(1+\phi) - \frac{u_g}{(1+r)^T(1+\pi)^T}\right] - u_g\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]\left[-\frac{1}{(1+r)^T(1+\pi)^T}\right]}{\left[(1+\phi) - \frac{u_g}{(1+r)^T(1+\pi)^T}\right]^2} \tag{A.7}$$

Using the distributive property, rearranging, and simplification, A.7 becomes:

$$\frac{\partial u_e}{\partial u_g} = \frac{\left[(1+\phi) - \frac{1}{(1+r)^T(1+\pi)^T}\right]\left[(1+\phi)\right]}{\left[(1+\phi) - \frac{u_g}{(1+r)^T(1+\pi)^T}\right]^2} \tag{A.8}$$