Does a Wealth Tax Discriminate against Domestic Investors?

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DISCUSSION PAPER

Institutt for foretaksøkonomi
Department of Business and Management Science

FOR 16/2019
ISSN: 1500-4066
November 2019

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Draft, 7. November 2019

Abstract

This paper studies the impact of a capital-income tax and a wealth tax on investor behavior in an efficient capital market under various assumptions regarding uncertainty and time horizons. We show that investors who face capital taxes have a lower discount rate, but that their willingness to pay for a company's stock is not affected by these taxes. In a second step, we show that if a company owner increases her required rate of return from the company because of capital taxes, she will harm the company's market value and thus her own wealth.

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1. Introduction

Income and wealth inequality has increased in most OECD countries the last two decades, and the rise in inequality has been particularly pronounced in the United States.[3] Among developed countries that have a wealth tax in place, such as France, Norway, Lichtenstein and Switzerland, an argument frequently made in the public debate in favor of abolishing the wealth tax, is that it places domestic investors at a disadvantage when they buy a stock. The argument being that foreign investors who do not face the wealth tax, have a greater willingness to pay for a company's stock. Furthermore, in order to cover the wealth tax cost, investors who face the tax must require a higher rate of return from companies they own compared to tax exempt investors. Therefore, the argument goes, the wealth tax has stark implications for the ownership structure in an economy. This paper studies the effect of a tax on wealth and a tax on capital-income for the purpose of examining if either of these two taxes means that an investor is willing to bid less for a company's stock.

We consider two investors (foreign and domestic) who have the same investment opportunities, but where only the domestic investor is subject to a tax on capital-income and wealth. Capital markets are assumed efficient, transparent and liquid, and all investors are price takers, have access to the same information, and interpret information in the same way. We consider an asset such as a stock, say, that is traded in the capital market. First, we derive the opportunity return on capital for the foreign and the domestic investor, and then we establish the two investors' willingness to pay for this asset where we assume that the asset value is determined by its net present value.

Our starting point is a one-period model with an uncertain asset return. We then expand the analysis to the case of an infinite horizon where the asset generates a cash flow that is a martingale. We then relax these assumptions, impose a finite time horizon, and abandon the martingale assumption. The outcome of all variants of our analysis is the same. Investors who face capital taxes have a lower discount rate, but their willingness to pay for a company's stock is not affected by the taxes. If a company owner increases

[3] See e.g., Saez and Zucman (2016) and Piketty, Saez and Zucman (2018).

her required rate of return from the company because of the wealth tax, say, she will harm the company's market value as well as her own wealth.

Our results must not be misinterpreted as one where taxes does not matter. All taxes affect disposable income, and investors who are tax exempt may therefore be able, everything else equal, to hold more stocks than investors who pay taxes. The wealth of tax exempt investors may therefore grow faster. It should be pointed out that our study does not compare the burden of taxation between countries (and investors). This is a difficult exercise and outside the scope of this paper. Our study simply shows that the investor that faces capital income taxes has the same valuation of a stock as a tax exempt investor.

Our study does not analyze how capital taxes affect the choice between two assets. The reason for this is that most OECD countries use the residence principle in taxation. Consequently, all income and wealth are taxed in the country where the investor resides, so the residence principle ensures equal tax treatment of all assets from an investor's perspective. However, if an investor can invest in an untaxed asset, or hide his investment from the tax authorities, capital taxes will affect the relative valuation of assets. Tax evasion or tax favored asset are important topics, but not the issue at hand in our study.

Very little work has been done on how capital taxes affect the valuation of an asset from an investor's perspective. The tax competition literature, for example, only considers the effect of capital taxation in a setting where countries compete to attract capital.[4] There is a small literature focusing on the effect of taxation on wealth accumulation (e.g. Seim (2017); Brülhart et al. (2016); Jakobsen et al. (2018)). This literature is remotely related to our study. Schindler (2018) studies an investor who can invest in a portfolio or in a non-diversifiable, indivisible project. He shows that the wealth tax does not distort the investment choice between the portfolio and the project. Guvenen et al. (2019) consider a situation where investors are subject to the same tax system but have different return opportunities (i.e., skills). In an efficient capital market, capital would flow to those with

[4] See e.g., Wilson and Wildasin (2004) for a survey of this literature.

the best skills until the differences in returns are equalized at the margin. In their analysis, the capital market is inefficient in the sense that the equalization of returns does not take place so that the wealth tax serves as a channel to redistribute capital to those with the best skills.

The remainder of the paper is organized as follows. In the next section, we derive the basic one-period model. Section 3 expands the model into one with an infinite horizon while Section 4 considers a more general setting with a finite horizon, where we abandon the martingale assumption. Section 5 studies the investors' willingness to bid for a domestic company that is for sale, while section 6 studies the implications of increasing the required rate of return from the company because of capital taxation. The last section offers some conclusions.

2. One period

We start out with a one-period setting. Capital can be invested in an asset that is traded in the market. The uncertain return is $\tilde{r}$. In other words, by investing one dollar now (time 0), the investor will receive $1+\tilde{r}$ at the end of the period (time 1). The expected payoff is $1+r$, where $r \equiv E(\tilde{r})$, and E denotes the expectation operator. Consequently, the expected market return on the asset is r.[5]

We assume that there are two investors: (i) A foreign investor who is not subject to any taxes on capital. (ii) A domestic investor who is subject to capital taxes in the form of a capital income tax and a wealth tax. The foreign investor receives $1+\tilde{r}$ at the end of the period (time 1) on his one-dollar investment. This means that his expected return is r.

The domestic investor receives $1+\tilde{r}$ at the end of the period before tax on her one-dollar investment in the asset. She is subject to tax on both the return and the wealth. We assume that the capital tax is paid at the end of the period, and that the return tax base is market return, whereas the wealth tax base is the market value of wealth in the

[5] The capital asset pricing model explains the expected return on the asset by

$$r = r_f + \beta(r_M - r_f),$$

where r_f is the riskless rate, r_M is the expected return on the market portfolio, and β is the risk exposure of the asset with respect to the return on the market portfolio (i.e., the exposure with respect to general market movements).

beginning of the period. We denote the return tax rate by τ_r and the wealth tax rate by τ_w.

After tax, the domestic investor's one-dollar investment will give the uncertain payoff $1 + \tilde{r} - \tau_r \tilde{r} - \tau_w$. The expected payoff is $1 + r - \tau_r r - \tau_w$, where we recall that r is the expected market return on the asset. The expected return for the domestic investor is

$$k \equiv r - \tau_r r - \tau_w \, . \qquad (1)$$

If $r > 0$, it is straightforward to see from equation (1) that $k < r$ when the capital tax rates are positive. In other words, both taxes lower the expected return for the domestic investor compared to that of the foreign investor.

3. Infinite horizon and martingale cash flow

We now expand the model above into one with an infinite horizon. We consider an asset that is traded in the market. The asset generates a future cash flow that is a martingale, i.e., $E_t(\tilde{c}_s) = c_t$, $0 \le t \le s \le \infty$, where $E_t(\quad)$ denotes the expectation conditional on the information available at date t. In section 4 below, we consider a finite horizon and abandon the martingale assumption.

The current market price p_0 of the asset is

$$p_0 = \sum_{s=1}^{\infty} \frac{E_0(\tilde{c}_s)}{(1+r)^s} = \sum_{s=1}^{\infty} \frac{c_0}{(1+r)^s} = \frac{c_0}{r} , \qquad (2)$$

where r is the implicit expected market return on the asset. The uncertain market price of the asset $\tilde{p}_t$ at the future time t is

$$\tilde{p}_t = \sum_{s=1}^{\infty} \frac{E_t(\tilde{c}_{t+s})}{(1+r)^s} = \sum_{s=1}^{\infty} \frac{\tilde{c}_t}{(1+r)^s} = \frac{\tilde{c}_t}{r} \, . \qquad (3)$$

Now, consider the expected total return to the foreign investor from holding the asset from time t to time $t+1$. By using (3), we obtain

$$E_t\left(\frac{(\tilde{p}_{t+1}+\tilde{c}_{t+1})-p_t}{p_t}\right)=E_t\left(\frac{(\tilde{c}_{t+1}/r)+\tilde{c}_{t+1}-(c_t/r)}{(c_t/r)}\right)=\frac{E_t(\tilde{c}_{t+1})(1+r)-c_t}{c_t}$$
$$=\frac{c_t(1+r)-c_t}{c_t}=r\,. \tag{4}$$

Consequently, the foreign investor's expected return from holding the asset is r.

How much is the foreign investor willing to pay for this asset? The investor's discount rate follows from his opportunity return, i.e., the return he can expect on an investment in the market with the same relevant risk characteristics[6] as the asset. In an efficient market, the opportunity return and the expected return r from investing in the asset are equal. By using the expected return r as discount rate, he arrives at the following net present value

$$NPV_0^F=\sum_{s=1}^{\infty}\frac{E_0(\tilde{c}_s)}{(1+r)^s}=\frac{c_0}{r}\,. \tag{5}$$

By comparing (5) and (3), we observe that the foreign investor has the same valuation of the asset as the market.

What is the expected return to the domestic investor from holding the asset from time t to time $t+1$? In order to answer this question we must include taxes when we consider the total return. We assume that the capital income tax is paid at the end of the period, and that the tax bases are market return and values, as described in the previous section. By using equation (3), we find the expected return

[6] Within the capital asset pricing model, for instance, the relevant risk characteristic is measured by beta.

$$
\begin{aligned}
E_t\left(\frac{(\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t)-(\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t)\tau_r-p_t\tau_w}{p_t}\right)& \\
&= E_t\left(\frac{(\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t)(1-\tau_r)-p_t\tau_w}{p_t}\right) \\
&= E_t\left(\frac{\big((\tilde{c}_{t+1}/r)+\tilde{c}_{t+1}-(c_t/r)\big)(1-\tau_r)-(c_t/r)\tau_w}{c_t/r}\right) \\
&= \frac{\big(E_t(\tilde{c}_{t+1}/r)+E_t(\tilde{c}_{t+1})-(c_t/r)\big)(1-\tau_r)-(c_t/r)\tau_w}{c_t/r} \qquad (6) \\
&= \frac{\big((c_t/r)+c_t-(c_t/r)\big)(1-\tau_r)-(c_t/r)\tau_w}{(c_t/r)} = r - r\tau_r - \tau_w\,.
\end{aligned}
$$

Consequently, the expected return to the domestic investor from holding the asset is

$$
k \equiv r - r\tau_r - \tau_w\,. \qquad (7)
$$

How much is the domestic investor willing to pay for this asset? The investor's discount rate follows from her opportunity return, i.e., the return she can expect on an investment in the market with the same relevant risk characteristics as the asset. In an efficient market, her opportunity return and the expected return k from investing in the asset are equal. By adjusting the cash flow for tax payments and using the expected return after tax k as discount rate, she arrives at the following net present value

$$
\begin{aligned}
NPV_0^D &= \sum\nolimits_{t=1}^{\infty}\frac{E_0(\tilde{c}_t)-E_0(\tilde{p}_t+\tilde{c}_t-\tilde{p}_{t-1})\tau_r-E_0(\tilde{p}_{t-1})\tau_w}{(1+k)^t} \\
&= \sum\nolimits_{t=1}^{\infty}\frac{c_0-\big((c_0/r)+c_0-(c_0/r)\big)\tau_r-(c_0/r)\tau_w}{(1+k)^t} \qquad (8) \\
&= \frac{c_0-c_0\tau_r-(c_0/r)\tau_w}{k} = \frac{c_0-c_0\tau_r-(c_0/r)\tau_w}{r-r\tau_r-\tau_w} = \frac{c_0}{r}\,.
\end{aligned}
$$

By comparing (8) and (5), we observe that the domestic and the foreign investor agree on the value of the asset, and that this value equals the market price (see equation (2) above).

4. Finite horizon

We now consider a more general setting with a finite horizon where we abandon the martingale assumption. In particular, we generalize equations (2) and (3) as follows. Today's market price of the asset is now

$$p_0 = \sum_{s=1}^{T} \frac{E_0(\tilde{c}_s)}{(1+r)^s}, \tag{9}$$

whereas the market price of the asset at some future time t is

$$\tilde{p}_t = \sum_{s=1}^{T-t} \frac{E_t(\tilde{c}_{t+s})}{(1+r)^s} = E_t\left(\sum_{s=1}^{T-t} \frac{\tilde{c}_{t+s}}{(1+r)^s}\right). \tag{10}$$

As seen from today, the future asset price $\tilde{p}_t$ is uncertain. It follows from (10) that the expected return from holding the asset from time t to time t+1 is

$$E_t\left(\frac{\tilde{p}_{t+1} + \tilde{c}_{t+1} - p_t}{p_t}\right) = r\,, \tag{11}$$

see Appendix A. Equation (11) corresponds to the foreign investor's expected return from holding the asset from time t to time $t+1$.

How much is the foreign investor willing to pay for this asset? The investor's discount rate follows from his opportunity return, i.e., the return he can expect on an investment in the market with the same relevant risk characteristics as the asset. In an efficient market, the opportunity return and the expected return r from investing in the asset are equal. By using the expected return r as discount rate, he arrives at the following net present value

$$NPV_0^F = \sum_{t=1}^{T} \frac{E_0(\tilde{c}_t)}{(1+r)^t}. \tag{12}$$

This means that the foreign investor agrees with the market on the value of the asset, as can be seen by comparing equations (12) and (9) above.

The domestic investor's expected return from holding the asset from time t to time $t+1$ is

$$E_t\left(\frac{(\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t)-(\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t)\tau_r-p_t\tau_w}{p_t}\right)$$
$$=E_t\left(\frac{\tilde{p}_{t+1}+\tilde{c}_{t+1}-p_t}{p_t}\right)(1-\tau_r)-\tau_w=r-r\tau_r-\tau_w\,, \tag{13}$$

where we have used equation (12). Consequently, the expected return to the domestic investor from holding the asset is $k\equiv r-r\tau_r-\tau_w$.

How much is the domestic investor willing to pay for this asset? The investor's discount rate follows from her opportunity return, i.e., the return she can expect on an investment in the market with the same relevant risk characteristics as the asset. In an efficient market, her opportunity return and the expected return k from investing in the asset are equal. It turns out that the net present value computation is more complicated with a finite horizon and a non-martingale cash flow. It is shown in Appendix B that by adjusting the cash flow for the tax payments and using the discount rate k, she arrives at the following net present value

$$NPV_0^D=\sum_{t=1}^{T}\frac{E_0(\tilde{c}_t)-E_0(\tilde{p}_t+\tilde{c}_t-\tilde{p}_{t-1})\tau_r-E_0(\tilde{p}_{t-1})\tau_w}{(1+k)^t}=\sum_{t=1}^{T}\frac{E(\tilde{c}_t)}{(1+r)^t}\,. \tag{14}$$

By comparing equations (14) and (12), we see that the domestic and the foreign investor agree on the value of the asset. Moreover, this value coincides with the market price.

5. The investors are bidding for a domestic company

In this section we assume that a domestic company is for sale and that the two investors agree on the company's future cash flow as well as on the company's expected market return. From our results above we have shown that the two investors have the same willingness to pay to acquire the company, despite the fact that one of the investors is subject to capital taxes, whereas the other is not. In an efficient capital market, the investor's discount rate corresponds to the investor's opportunity return. Capital taxes lower the discount rate of the domestic investor compared to the foreign investor. The difference in the discount rates reflects that the domestic investor carries the burden of capital taxes.

Let us now assume that the domestic investor uses the expected market return r as the discount rate instead of her opportunity return k when she discounts her expected cash flow. Since $r > k$, she uses a higher discount rate as compared to equation (14), and, as a result, she computes a lower net present value.[7] Apparently, she is not willing to pay as much as the foreign investor (and the market) for the company's cash flow because she is taxed. However, this line of reasoning rests on the implicit assumption that her opportunity return after capital taxes is the expected market return r. In other words, the implicit assumption is that the alternative to acquire the cash flow is to earn the market return and pay no taxes. One way to avoid the tax is to channel investments through a tax haven without informing the tax authority, but this is a criminal offence in most countries. Another alternative is to change tax jurisdiction, but she will then have to immigrate to another country. However, these alternatives are not attractive to most investors.

6. One of the investors owns the domestic company

We now turn to the situation where one of the investors owns a domestic company. First, we consider the case where the foreign investor is the owner. What is the required rate of return for investing in his own company? It follows from our discussion above that it must be the opportunity return on a similar investment in the market as given by r. Hence, in an efficient capital market, the company's opportunity cost of capital equals the opportunity return of the foreign investor, which amounts to the expected market return r.

An important question for a domestic investor who owns a domestic company is her required rate of return for investing in her own company. We have shown above that the opportunity return before capital tax is equal for the foreign and the domestic investor. Consequently, the required rate of return for investing is the same for both investors

[7] We here assume a positive net present value.

and equal to the expected market return r. This result is contrary to the claim in the public debate that the capital tax raises the cost of capital of (domestic) companies owned by domestic investors.

Now, suppose that the domestic investor attempts to shift the capital tax burden to the company. In particular, she fixes the "required rate of return" from the company R such that her expected return after tax equals that of the foreign investor, i.e., the expected market return r. The rationale for this might be that she feels entitled to the same expected return as the foreign investor. We can find this "required rate of return" R from

$$R - R\tau_r - \tau_w = r \quad \Rightarrow \quad R = \frac{r + \tau_w}{1 - \tau_r}. \tag{15}$$

It can be seen from equation (15) that the domestic investor's "required rate of return" R is higher than the expected market return r, and, consequently, higher than the foreign investor's required rate of return.

Where does this lead us? The opportunity cost of capital for the company is still the expected market return r. If the company must pay the "required rate of return" R on capital provided by the owner, this rate is not in compliance with the arm's length principle, and does in fact represent a transfer of economic values from the company to its owner, and harms the company's value creation. In a competitive market, it will be difficult, if not impossible, for the company to shift this extra cost on to its customers (or other stakeholders). It will also cause the company to reject projects that would otherwise add market value, but do not meet the "required rate of return" R set by the owner. In other words, in her attempt to shift the capital tax burden to her company, she reduces the market value of her company and thereby her own wealth. This is not rational economic behavior.

7. Conclusion

We have shown that both the capital income tax and the wealth tax lower the expected return from investing in an asset. In an efficient capital market, the expected return equals the opportunity return (and consequently the discount rate) for each investor. As a result, capital taxes lower the discount rate of an investor who faces capital taxes compared to an investor who is tax exempt. The discount rate is lowered to the point where the domestic (taxed) investor's net present value of the asset equals that of the (tax exempt) foreign investor, such that both values are equal to the market price. This shows that the law of one price applies in an efficient capital market, even though investors are subject to different tax treatment. To conclude, then, capital taxes do not affect an investor's willingness to bid for an asset, but they do reduce disposable income. The latter effect is a common feature of all type of taxes and not something that should be held against capital-income taxes or the wealth tax in particular.

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Appendix A. Derivation of equation (11).

In this appendix, we consider the expected market return from holding the asset for one period. Our starting point is equation (10) and we proceed as follows:

$$\begin{aligned}\tilde{p}_t &= \sum_{s=1}^{T-t} \frac{E_t(\tilde{c}_{t+s})}{(1+r)^s} = \frac{E_t(\tilde{c}_{t+1})}{1+r} + \sum_{s=2}^{T-t} \frac{E_t(\tilde{c}_{t+s})}{(1+r)^s} \\ &= \frac{E_t(\tilde{c}_{t+1})}{1+r} + \frac{1}{1+r} \sum_{s=1}^{T-(t+1)} \frac{E_t(\tilde{c}_{t+1+s})}{(1+r)^s} \\ &= \frac{E_t(\tilde{c}_{t+1})}{1+r} + \frac{1}{1+r} E_t\left(\sum_{s=1}^{T-(t+1)} \frac{E_{t+1}(\tilde{c}_{t+1+s})}{(1+r)^s}\right) = \frac{E_t(\tilde{c}_{t+1})}{1+r} + \frac{E_t(\tilde{p}_{t+1})}{1+r} \\ &= \frac{E_t(\tilde{c}_{t+1} + \tilde{p}_{t+1})}{1+r}.\end{aligned}$$

Equation (11) follows immediately from this expression.

Appendix B. Derivation of equation (14).

First, we consider the special case where wealth tax is the only tax instrument with tax rate τ. The net present value for the domestic investor who is subject to this wealth tax is

$$NPV_0^D = \sum_{t=1}^{T} \frac{E_0(\tilde{c}_t) - \tau E_0(\tilde{p}_{t-1})}{(1+k)^t}. \tag{B1}$$

where k is the discount rate that follows from the investor's opportunity return on capital. We want to explain this net present value in terms of the expected future cash flow. The first step is to use (9) to substitute the future expected market prices for the future expected cash flow elements. We proceed as follows

$$NPV_0^D = \frac{E_0(\tilde{c}_1) - \tau p_0}{1+k} + \frac{E_0(\tilde{c}_2) - \tau E_0(\tilde{p}_1)}{(1+k)^2} + \frac{E_0(\tilde{c}_3) - \tau E_0(\tilde{p}_2)}{(1+k)^3} \cdots + \frac{E_0(\tilde{c}_{T-1}) - \tau E_0(\tilde{p}_{T-2})}{(1+k)^{T-1}}$$
$$+ \frac{E_0(\tilde{c}_T) - \tau E_0(\tilde{p}_{T-1})}{(1+k)^T}$$
$$= \frac{1}{1+k}\Bigg(E_0(\tilde{c}_1)$$
$$- \tau\left(\frac{E_0(\tilde{c}_1)}{1+r} + \frac{E_0(\tilde{c}_2)}{(1+r)^2} + \frac{E_0(\tilde{c}_3)}{(1+r)^3} + \cdots + \frac{E_0(\tilde{c}_{T-1})}{(1+r)^{T-1}} + \frac{E_0(\tilde{c}_T)}{(1+r)^T}\right)\Bigg)$$
$$+ \frac{1}{(1+k)^2}\left(E_0(c_2) - \tau\left(\frac{E_0(\tilde{c}_2)}{1+r} + \frac{E_0(\tilde{c}_3)}{(1+r)^2} \cdots + \frac{E_0(\tilde{c}_{T-1})}{(1+r)^{T-2}} + \frac{E_0(\tilde{c}_T)}{(1+r)^{T-1}}\right)\right)$$
$$+ \frac{1}{(1+k)^3}\left(E_0(\tilde{c}_3) - \tau\left(\frac{E_0(\tilde{c}_3)}{1+r} \cdots + \frac{E_0(\tilde{c}_{T-1})}{(1+r)^{T-2}} + \frac{E_0(\tilde{c}_T)}{(1+r)^{T-1}}\right)\right) + \cdots$$
$$+ \frac{1}{(1+k)^{T-1}}\left(E_0(\tilde{c}_{T-1}) - \tau\left(\frac{E_0(\tilde{c}_{T-1})}{1+r} + \frac{E_0(\tilde{c}_T)}{(1+r)^2}\right)\right)$$
$$+ \frac{1}{(1+k)^T}\left(E_0(\tilde{c}_T) - \tau\frac{E_0(\tilde{c}_T)}{1+r}\right).$$

We now rearrange in order to obtain one term for each cash flow element

$$NPV_0^D = \frac{E_0(\tilde{c}_1)}{1+k}\left(1 - \tau\frac{1}{1+r}\right) + \frac{E_0(\tilde{c}_2)}{(1+k)^2}\left(1 - \tau\left(\frac{1}{1+r} + \frac{1+k}{(1+r)^2}\right)\right)$$
$$+ \frac{E_0(\tilde{c}_3)}{(1+k)^3}\left(1 - \tau\left(\frac{1}{1+r} + \frac{1+k}{(1+r)^2} + \frac{(1+k)^2}{(1+r)^3}\right)\right) + \cdots$$
$$+ \frac{E_0(\tilde{c}_{T-1})}{(1+k)^{T-1}}\left(1 - \tau\left(\frac{1}{1+r} + \frac{1+k}{(1+r)^2} + \frac{(1+k)^2}{(1+r)^3} + \cdots + \frac{(1+k)^{T-2}}{(1+r)^{T-1}}\right)\right)$$
$$+ \frac{E_0(\tilde{c}_T)}{(1+k)^T}\Bigg(1$$
$$- \tau\left(\frac{1}{1+r} + \frac{1+k}{(1+r)^2} + \frac{(1+k)^2}{(1+r)^3} + \cdots + \frac{(1+k)^{T-2}}{(1+r)^{T-1}} + \frac{(1+k)^{T-1}}{(1+r)^T}\right)\Bigg).$$

The finite horizon version of Gordon's formula, which is known from equity valuation, states that

$$\frac{1}{1+r}+\frac{1+k}{(1+r)^2}+\frac{(1+k)^2}{(1+r)^3}+\cdots+\frac{(1+k)^{T-2}}{(1+r)^{T-1}}+\frac{(1+k)^{T-1}}{(1+r)^T}=\frac{1}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)^T\right).$$

Simplify the NPV expression by using Gordon's formula

$$\begin{aligned}NPV_0^D =& \frac{E_0(\tilde{c}_1)}{1+k}\left(1-\frac{\tau}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)\right)\right)+\frac{E_0(\tilde{c}_2)}{(1+k)^2}\left(1-\frac{\tau}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)^2\right)\right)\\ &+\frac{E_0(\tilde{c}_3)}{(1+k)^3}\left(1-\frac{\tau}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)^3\right)\right)+\cdots\\ &+\frac{E_0(\tilde{c}_{T-1})}{(1+k)^{T-1}}\left(1-\frac{\tau}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)^{T-1}\right)\right)\\ &+\frac{E_0(\tilde{c}_T)}{(1+k)^T}\left(1-\frac{\tau}{r-k}\left(1-\left(\frac{1+k}{1+r}\right)^T\right)\right),\end{aligned}$$

to obtain

$$\begin{aligned}NPV_0^D =& \left(1-\frac{\tau}{r-k}\right)\left(\frac{E_0(\tilde{c}_1)}{1+k}+\frac{E_0(\tilde{c}_2)}{(1+k)^2}+\frac{E_0(\tilde{c}_2)}{(1+k)^3}+\cdots+\frac{E_0(\tilde{c}_{T-1})}{(1+k)^{T-1}}\right.\\ &\left.+\frac{E_0(\tilde{c}_T)}{(1+k)^T}\right)\\ &+\frac{\tau}{r-k}\left(\frac{E_0(\tilde{c}_1)}{1+r}+\frac{E_0(\tilde{c}_2)}{(1+r)^2}+\frac{E_0(\tilde{c}_3)}{(1+r)^3}+\cdots+\frac{E_0(\tilde{c}_{T-1})}{(1+r)^{T-1}}\right.\\ &\left.+\frac{E_0(\tilde{c}_T)}{(1+r)^T}\right).\end{aligned} \tag{B2}$$

In the special case with only wealth tax with rate τ, where the investor's discount rate is $k = r - \tau$, it follows immediately from equation (B2) that

$$NPV_0^D = \sum\nolimits_{t=1}^{T} \frac{E_0(\tilde{c}_t)}{(1+r)^t}. \tag{B3}$$

In other words, the domestic investor agrees with the net present value computed by the foreign investor (compare equations (B3) and (12)) as well as with the market price (compare equation (B3) with equation (9)).

We now turn to the case with taxes on both return and wealth. The net present value then takes the form

$$NPV_0^D = \sum\nolimits_{t=1}^{T} \frac{E_0(\tilde{c}_t) - \tau_r E_0(\tilde{p}_t + \tilde{c}_t - \tilde{p}_{t-1}) - \tau_w E_0(\tilde{p}_{t-1})}{(1+k)^t},$$

see the mid-term of equation (14). By using $E_0(\tilde{p}_t + \tilde{c}_t - \tilde{p}_{t-1}) = rE_0(\tilde{p}_{t-1})$ (that follows immediately from equation (11)), and rearranging, the net present value can be expressed as

$$NPV_0^D = \sum\nolimits_{t=1}^{T} \frac{E_0(\tilde{c}_t) - (\tau_r r + \tau_w) E_0(\tilde{p}_{t-1})}{(1+k)^t}. \tag{B4}$$

Observe that the net present value expression in equation (B4) is similar to that in equation (B1) above. By interpreting $\tau = \tau_r r + \tau_w$, it follows that the net present value with two capital tax instruments is

$$\begin{aligned} NPV_0^D = {} & \left(1 - \frac{\tau_r r + \tau_w}{r-k}\right)\left(\frac{E_0(\tilde{c}_1)}{1+k} + \frac{E_0(\tilde{c}_2)}{(1+k)^2} + \frac{E_0(\tilde{c}_2)}{(1+k)^3} + \cdots + \frac{E_0(\tilde{c}_{T-1})}{(1+k)^{T-1}} \right. \\ & \left. + \frac{E_0(\tilde{c}_T)}{(1+k)^T}\right) \\ & + \frac{\tau_r r + \tau_w}{r-k}\left(\frac{E_0(\tilde{c}_1)}{1+r} + \frac{E_0(\tilde{c}_2)}{(1+r)^2} + \frac{E_0(\tilde{c}_3)}{(1+r)^3} + \cdots + \frac{E_0(\tilde{c}_{T-1})}{(1+r)^{T-1}} \right. \\ & \left. + \frac{E_0(\tilde{c}_T)}{(1+r)^T}\right), \end{aligned} \tag{B5}$$

see equation (B2) above.

The discount rate in this case is $k = r - \tau_r r - \tau_w \iff r - k = \tau_r r + \tau_w$, and by inserting this into (B5) it follows immediately that

$$NPV_0^D = \sum_{t=1}^{T} \frac{E_0(\tilde{c}_t)}{(1+r)^t}.$$

QED.

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