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The Dividends Received Deduction in the Corporate Income Tax and Cost of Capital

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Abstract

This paper provides a model-based analysis of special tax rules for corporations that invest in stocks of other corporations. To avoid double taxation the returns from such stock investments (dividends and capital gains) are usually tax-exempted or taxed at a reduced tax rate. This allows for considerable tax avoidance strategies, which are typically ignored when valuing firms or assessing investment projects. A comparison of several major industrial countries yields the result that especially German corporations can achieve a benefit easily. Integrating assumptions about the character of restricted financial structures, it is possible to link this tax benefit to a new investment in normal-taxed assets. This allows calculating the reduction in an investment's cost of capital. All in all, the results indicate a substantial impact of the analyzed strategy on investment decisions and on valuations of firms as the benefit's magnitude is comparable to that of the common tax shield. Although a single corporation does not necessarily extend its leverage ratio by adopting this strategy, the corporate sector as a whole tends to be more levered and thus more vulnerable to economic crises. The current tax rules, therefore, foster systemic risk of the corporate sector. This could be avoided by implementing a fundamental tax reform which guarantees undistorted debt-equity decisions.

JEL classifications: G11, G32, H25

Keywords: Corporate Finance, Debt-equity Decision, Corporate Income Tax, Dividend Received Deduction

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1 Introduction

In this paper I analyze a strategy which can cause considerable tax benefits for corporations. Essentially, this strategy relies on two features of corporate taxation: On the one hand the two-tiered taxation of equity-financed investments vs. the privileged taxation of debt financed-investments, and on other hand the special tax rules lowering the tax burden on returns from stock investments in the corporate income tax.

Profits achieved by corporations are subject to double taxation, as profits are taxed with corporate income tax first. Thereafter, the remaining amount is included in the shareholders' income tax base as soon as it is distributed as dividends. This means that the intended tax burden of corporate profits is given by a combination of the corporate tax rate and the tax rate on dividends. To mitigate the tax burden of the double taxation, both tax rates usually are lower than the personal income tax rate. Typically, there is no similar double taxation of debt-funded investments of corporations. Therefore, the existence of a corporate tax is one of the well-known constellations in which the general finding of Modigliani and Miller (1958, 1963) does not hold: corporate financial structure influences the firm's value.

Principally, the corporate tax base is assessed by rules comparable – or even equal – to the rules applied to freelancers or transparently taxed companies like sole proprietorships and partnerships. But, concerning the returns of an investment in stocks, which is subject to double taxation, tax rules must distinguish corporations from transparently taxed investors in order to establish the intended tax burden for both groups. Without exempting the returns of stock investments from corporate income tax, a three-tiered taxation results instead of the intended double taxation. Therefore, countries usually apply special tax rules lowering the tax burden on received dividends and capital gains in the corporate income tax (e.g. § 8b KStG in Germany, sec. 246 IRC in the US). These rules ensure nearly full avoidance of taxation if the holding company owns or controls at least a specific percentage of the subsidiary company (qualified stock investment). However, all in this paper considered countries permit only incomplete tax exemptions for non-qualified stock investments, which, in particular, include investments in stock portfolios. This means e.g. dividends received from corporations are subject to a three-tiered taxation, as these dividends, which are already reduced by corporate income tax, are taxed a second time on the level of the shareholding corporation and a third time at the level of the corporation's owner.

Due to this incomplete tax exemption of portfolio investments, the management of the corporation can easily make the conclusion that it should not invest in a widespread stock portfolio, as long as this investment does not yield additional advantages. But if the management decides to invest in a stock portfolio, it has the opportunity to issue more debt without extending the corporation's debt-equity-ratio. Using stock investments as security for new debt, it could be preferable to invest in well-diversified stock portfolios instead of qualified stocks even if this causes additional taxation.

Until now, the literature has neglected the interdependency of these two features of corporate taxation. Usually, when assessing an investment project, the effects of different financing opportunities are considered by calculating a weighted average of the cost of capital (WACC) or by calculating a tax shield which includes the effects of the chosen way of financing the project.

To demonstrate the central implications of this interdependency, I use a model-based on a Modigliani-Miller world that considers limitations in financial structures, which can be caused e.g. by costs of financial distress (Kraus and Litzenberger, 1973; Scott, 1976). This is the most common way to explain limitations of debt financing. For simplification, I do not consider other theoretical arguments which could explain financial structures. For instance, dividend distribution policy and the debt-equity-decision could be influenced by aspects of signalling in the case of asymmetric information and by agency costs (Asquith and Mullins, 1986; Jensen and Meckling, 1976; Leland and Pyle, 1977; Narayanan, 1988; Harris and Raviv, 1991).

Furthermore, the model assumes a small open economy. To achieve general results, it also assumes that the corporation's owner offsets all effects on risk structure of the return rate by readjusting his private portfolio according to the changes on corporate level. Therefore, the results are independent of the investor's degree of risk aversion.

Looking for comparable strategies in the literature, similarity can be noted between strategies using the special tax rules of tax preferred pension funds (Tepper, 1981; Black, 1980). Tepper's analysis follows the same idea of offsetting all effects by readjusting the investor's portfolio. Black's strategy lets the financial leverage of the corporation unchanged while shifting bonds and stocks from the corporate level to the tax-preferred pension fund in order to generate a tax benefit.

Another argument in the literature explaining limitation in financial structures is the existence of limited loss deduction which can be important if there are non-debt tax shields or volatile profits (DeAngelo and Masulis, 1980; Bradley et al., 1984). As I do not consider non-debt tax shields, it is important to take into account that positive effects of debt financing only occur if positive tax bases exist. Therefore, the analyzed strategy is limited by the fact that it reduces corporate income tax bases. This also means that an additional investment which generates a higher tax base raises the reachable tax benefit of the strategy. In other words, if an investment is combined with a simultaneous investment in stocks, the investment's profitability increases and the minimum return rate needed for profitability (cost of capital) declines. The used model allows computing numerical results for this decline. In realistic constellations the reduction in cost of capital can even exceed one percentage point, which is a quite substantial decline.

The model yields the result that the advantage of new debt can notably exceed the additional tax burden of incomplete tax exemptions of stock investments. To achieve this benefit the corporation has to issue more equity capital. Whether the company's risk for financial distress increases or decreases by adopting the strategy depends on exogenous parameters of the model and cannot be stated in general.

The paper proceeds as follows: In section 2, the basic assumptions of the model and the considered tax rates are presented. Furthermore, the benefit of new debts is demonstrated. In section 3, the strategy is supplemented into the model. First, critical values are calculated using tax rates of several countries. Second, two alternative measures of the benefit are presented. Some conclusions are drawn in section 4.

2 The model

2.1 Assumptions

Models considering taxes and countries with different tax regimes easily raise the problem of offering arbitrage opportunities. That is why the assumption must be well-designed in order to avoid unrealistic results. Furthermore, the complexity of the model could be considerably reduced by appropriate assumptions. So, the following subsections discuss the most important assumptions of the analyzed model.

2.1.1 The impact of taxes on capital structure of firms considering global capital markets – a uniform world-wide rate of return

In the literature, capital structure decisions considering taxes are often discussed in the context of a closed economy. But in a globalized world, this is an unrealistic assumption as capital imports and exports are normal. It must be noted, however, that even under the simplifying assumption of a closed economy the consideration of taxes often causes unrealistically extreme results. This can only be avoided by integrating constraints into the model, which e.g. prevent corporations to be fully debt financed (Auerbach and King, 1983, p. 594).

In order to focus on taxes, capital structure, and cost of capital, I assume a global capital market with a uniform rate of return. For simplification, I assume every country to be so small that the portfolio decisions of investors caused by changes in tax rates do not affect the world-wide equilibrium. However, this assumption does not require the investigated countries to be really small. It only allows for supposing a uniform world-wide interest rate all corporations are confronted with as well as a uniform (risk-adjusted) return rate of investments in stocks. As this assumption can easily lead to unrealistic outcomes, I implement two constraints which are presented in the following subsections.

2.1.2 The investor's residence country – No emigration

The first constraint which is needed to attain a solution not offering arbitrage concerns the residence decisions of investors. As long as they can change their residence country without costs, different countries, which apply different tax rates to capital income, could not exist. Consequently, I neglect emigration though it is an increasingly important issue particularly in the European Union.

This has important consequences for different kinds of taxes: A tax which is raised by the residence country of the investor (residence-based tax) cannot have any effect on capital allocation, as long as the country is negligible for the global equilibrium on capital markets. Otherwise, a tax which is raised by the country the corporation belongs to (source-based tax) cannot be shifted to the shareholders, as their income is solely subject to residence-based taxation (Sørensen, 2007, p. 173). This means, a source-based tax induces a rise in the cost of capital and declines investments in the country's capital stock whereas the financial capital owned by the county's citizens remains unaffected. For the analytical solution of the following model, the corporate tax is assumed to be source-based, but the taxation of interest income, capital gains, and dividends received from natural persons is assumed to be residence-based. However, a possible limitation of interest deduction in the corporate income tax is source-based.

This assumption is not as self-evident as it looks like at first: it implies e.g. that a cut in rate of interest taxation, which is assumed to be residence-based, let the incentive for corporations between issuing debt or equity unchanged. Choosing the perspective of a closed economy, issuing debt would be strongly preferred by such a rate cut.

2.1.3 The investor's portfolio decision – No stock-bond substitutability

The second constraint concerns the portfolio decision of an investor. As long as bonds and stocks are assumed to be substitutable and investors in all countries are confronted with the same rate of return before taxes, taxes which discriminate between bonds and stocks have a very large impact on portfolio decisions of investors. For example, the German tax reform 2008 includes a rise in tax rates on capital gains and on dividends, meanwhile a low, preferred tax rate for interest income has been introduced as well (Homburg, 2007). These changes would have caused a nearly complete shift from stock investments to bond investment if investors deemed bonds and stocks as substitutes.

Furthermore, assuming substitutability implies the unrealistic fact that different tax regimes trigger strict clientele effects as a country's investors are either completely invested in stocks or in bonds depending on the relative tax burden on each class of assets. There are two arguments which can mitigate this fact. First, it could be argued that investors need both, bonds and stocks, to attain diversification of their portfolio[1]. But investors can reach high diversification by investing in only one class of assets. Secondly, an argumentation could be

[1] This problem is similar to the problem of creating equilibrium, if investors have invested in both classes of assets in spite of being subject to different tax rates Feldstein and Slemrod (1980), pp. 585–587.

set up on doubts about bonds and stocks being perfect substitutes, as investors' perceptions discriminate between these two classes. After this, investors do not optimize strictly between increasing the expected return and reducing the variance of the return as they do not like to exchange the structure of the expected return on bond investments with the structure of stock investments. On one side, the high probability of receiving exactly the declared amount offered by a bond contract and on the other side the volatile performance of an investment in stocks are not be seen as completely exchangeable.

For the analysis in this paper, I assume that investors hold stocks and bonds because they do not deem them substitutable. Thus, the tax-reducing strategy has to let the proportions of the return rate which relies on each class of assets unchanged (Tepper, 1981). This ensures a general result, which is applicable to all investors. Additionally, more simplification is attained by assuming bonds to be riskless.

If a strategy can cause a benefit under this assumption, it would be even more preferable if stock and bonds are substitutes. In this case the extent of the benefit would depend on individual preferences, so it could not be calculated in a general way.

2.2 The considered tax rates

In order to develop a model, which can consider different tax regimes, I differentiate between the following tax rates. However, I assume all tax rates to be proportional excluding the complications of progressive taxation. Furthermore, I neglect withholding taxes, as they normally are compensated by a tax credit. Following, the index "S" stands for the shareholder level and the Index "C" for the corporate level.

tax rates on corporate level (source-based):

τ^{C} tax rate on corporate profits

$\tau^{C,D}$ tax rate on interest expense
(representing the tax burden of possible limited interest deduction)

$\tau^{C,PF}$ tax rate on returns of corporation's stock investments

tax rates on investor level (residence-based):

$\tau^{S,i}$ tax rate on interest earnings of the investor

$\tau^{S,PF}$ tax rate on returns of investor's stock investments

The tax rates on portfolio earnings ($\tau^{C,PF}$ and $\tau^{S,PF}$) include different components. The return generated by a stock portfolio consists of dividends and capital gains which are subject to different tax rates. Furthermore, increases in value are subject to deferred taxation, as they are only taxed if they are realized by trade. That is why it is difficult to calculate these tax rates exactly. In order to allow a static model, I use the simplifying assumption that increases in value are realized completely in every period[2]. Secondly I suppose a constant percentage of dividends on the combined rate of return (α). So the tax rates used for the numerical results are calculated as follows

$$\begin{aligned}\tau^{S,PF} &= \alpha \cdot \tau^{S,div} + (1-\alpha)\cdot \tau^{S,cg} \\ \tau^{C,PF} &= \alpha \cdot \tau^{C,div} + (1-\alpha)\cdot \tau^{C,cg}\end{aligned} \quad (1)$$

The numerical results in the proceeding tables are calculated by assuming α to be 50%.

2.3 The tax benefit of debt

In the literature, it is nearly uncontroversial that financial leverage generates a tax benefit, as long as interest expenditures are deductible from corporate tax base and there is no corresponding discrimination between income from stocks and bonds at the personal level. This benefit is often noted as "tax shield" and occurs in most tax laws. If dividends and capital gains are taxed at the same or a higher rate than interest income, the existent of the tax benefit of debt is ensured. Of course, imaginable constellations exist which generate a negative tax shield (Miller, 1977, p. 266).

It is easy to show that a rise in debt of a corporation yield a benefit if the combined tax rate of corporate tax and taxes on stock returns (dividends, capital gains) exceeds the individual tax rate on interest income. Without adjusting the portfolio, the investor would be faced with higher financial leverage. He can avoid this by reducing the amount invested in the corporation and expanding his amount invested in riskless bonds. If the investor reacts in this way to offset the higher leverage of the corporation, the portfolio generates the same risky returns as before and any differences are only triggered by taxation. In the following, it is shown how to calculate the benefit of debt financing in terms of the used model.

Assume the investor holds bonds (B) and he is the sole owner of a corporation. Without the corporation issuing any debt, he receives a combined risky net-of-tax return ($\tilde{r}_\tau^I$), which depends on the interest rate of the bonds (i), the risky return of the assets (A) the corporation has invested in ($\tilde{r}_A$), and, of course, the tax rates:

$$\tilde{r}_\tau^I = \underbrace{\Big[(1-\tau^C)\cdot \underbrace{\tilde{r}_A \cdot A}_{\text{corporate profit}}\Big]\cdot(1-\tau^{S,PF})}_{\text{net return from corporate stock}} + \underbrace{(1-\tau^{S,i})\cdot i \cdot B}_{\text{net return from investor's bonds}} \quad (2)$$

This return could be compared with the combined net-of-tax return if the corporation has issued debt D ($\tilde{r}_\tau^{II}$). Note that, in this case, the investor only has to contribute less money because the investment in the same assets is partially financed by debt. Therefore, he can additionally invest exactly the amount of the corporate debt in new private bonds. So, the new

2 Sureth and Langeleh (2007), Balcer and Judd (1987) analyze the effects of deferred taxation of capital gains in different corporate tax system. See also Protopapadakis (1983).

amount of bonds is given by B+D. In the result, his combined return is the same as if he has directly borrowed the corporation the amount D:

$$\tilde{r}_{\tau}^{II} = \underbrace{\left[\left(1-\tau^{C}\right)\cdot \underbrace{\left(\tilde{r}_A \cdot A - i \cdot D\right)}_{\text{corporate profit}} - \underbrace{\tau^{C,D}\cdot i \cdot D}_{\text{tax burden of limited interest deduction}} \right]\cdot\left(1-\tau^{S,PF}\right)}_{\text{net return from corporate stock}} + \underbrace{\left(1-\tau^{S,i}\right)\cdot i \cdot \left(B+D\right)}_{\text{net return from investor's bonds}} \quad (3)$$

It is quite easy to calculate the difference in the combined net-of-tax returns caused by the two different ways of financing the corporation:

$$\tilde{r}_{\tau}^{II} - \tilde{r}_{\tau}^{I} = \left[\left(1-\tau^{S,i}\right) - \left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right]\cdot\left(i\cdot D\right) \quad (4)$$

With exemption of the tax rate $\tau^{C,D}$, which denotes the tax burden of a possible limited deduction of interest expenses, the term in the squared brackets is exactly the well-known condition of debt-financing being advantageous (Miller, 1977, p. 256). Note that the two tax rates on corporate level are set by the government of the country the corporation belongs to (country of source); whereas the two tax rates on investor's level are set by his residence country. Obviously, the countries do not need to be the same. This is interesting because the optimal debt policy depends on the fact where the investor lives.

If a corporation can cause a benefit from debt financing, the question why corporations are not completely debt-funded must be asked. In this paper, I pursue the popular idea that corporations face some costs of possible financial distress which hold them up from infinitely expanding their debt. This is the common explanation in textbooks (Copeland et al., 2005, pp. 570–594; Brealey and Myers, 2007, pp. 503–517) and simulating models (cf. Radulescu and Stimmelmayr, 2010, p. 456). Thus, it is optimal to extend issuing debt until the increase of the costs of possible financial distress is equal to the tax benefit of debt. In this constellation, the tax benefit of debt is a notable component of the corporation's value (Graham, 2000; Kemsley and Nissim, 2002). Of course there are other arguments explaining the choice between equity and debt which are not considered in this paper (Myers, 1984; Harris and Raviv, 1991; Myers, 2001). Principally, the calculation of the advantage denoted by equation (4) has to be extended by the cost of possible financial distress which would allow for calculating an optimal debt ratio. For simplification I neglect this in the formal analysis.

3 The analyzed strategy

Since the costs of financial distress restrain a corporation from extending its debt, this corporation can use the special tax rules applying to the returns of stock investments to extend the benefits from debt financing. This benefit can be achieved without increasing the probability of financial distress or even bankruptcy of the corporation. It is even possible, that the probability declines although a benefit exists. This strategy is subject of the following analysis. Assume a natural person is invested in three classes of assets, in a widespread stock portfolio (PF_S), in riskless bonds (B), and in equity of a corporation (E) which is used to fund an investment in normal-taxed assets. For simplification, I assume that the investor is the sole shareholder owner of the corporation. But the following results still hold if he would only own a small fraction of the corporation.

The corporation has two opportunities. At first, there is the "normal way" of funding the investment, which means the corporation to issue debt and equity in an optimal ratio determined by the tax benefit of financial leverage and the cost of possible financial distress (opportunity I). I assume this ratio to be exogenous and denoted by π. So, the corporation can finance the amount of $\pi \cdot A$ with debt and has only to issue equity capital in the amount of $(1-\pi)\cdot A$. Following, opportunity I is used as a reference.

In principle, it is possible to integrate a function describing the cost of possible financial distress and to calculate the value of π by maximizing the net-of-tax return of the investor (Kraus and Litzenberger, 1973; Scott, 1976; Bradley et al., 1984). But this approach would need difficult assumptions which would heavily determine the numerical findings. Thus, I choose to show the influence of variations in π after solving the model, taking π as an exogenous parameter.

By contrast, opportunity II consists of additional investing into a stock portfolio, which is hold by the corporation. To fund this portfolio investment, the corporation issues more equity capital as well as more debt. In spite of financial constraints, it can extend its debts, because the stock portfolio can be used as security for them. Again, I assume the ratio of corporate portfolio to new debt is exogenous and constant (denoted by ρ). Due to the possibility of different risk structures of an investment in stocks (allowing good diversification) and an investment in real assets, I use the different parameters π and ρ.

When the investor chooses opportunity II instead of opportunity I, he has to readjust the proportion of his three classes of assets, as the returns of the investment in the corporation depend on the risky rate of return of the widespread stock portfolio ($\tilde{r}_M$) as well as on the risky return rate of the normal-taxed investment ($\tilde{r}_A$). Furthermore, he has to consider the new financial leverage of the corporation, which can be higher or lower than before. In order to illustrate the strategy, the following section gives, at first, an example of adjusting the portfolio in a world without taxes. The effects of taxation are postponed to the next section.

3.1 Solving the model without taxes

3.1.1 An example without taxes

I start with an example illustrating how the investor principally reacts if the corporation invests in a stock portfolio.

Example 1

Suppose that an investor has 5,500 Euro of capital, which he wants to invest. First, the opportunity of corporate portfolio investment is ignored (opportunity I). The considered corporation only invests in normal-taxed assets in an assumed amount of 1,000 Euro funded by debt and equity capital in the granted proportion of 50% ($\pi = 50\%$). Therefore, the investor's equity capital has a value of 500 Euro. Further, assume that the investor holds a stock portfolio in the amount of 3,000 Euro and riskless bonds in the amount of 2,000 Euro. The balance sheet of the corporation shows equity (500 Euro), debt (500 Euro) and normal-taxed assets (1,000 Euro). (cf. Figure 1)

Now, assume that the corporation additionally invests 500 Euro in a stock portfolio (opportunity II). 300 Euro can be funded by new debt ($\rho = 60\%$). The remaining amount of 200 Euro has to be funded by new equity capital contributed by the investor. Consequently, the complete contribution of capital by the investor increases to 700 Euro. Adjusting his portfolio, the investor has to decide whether he reduces his investments in bonds or his investment in the stock portfolio. Now his portfolio depends on the stock portfolio, which he has directly invested in, and on the new stock portfolio the corporation has just bought. As he wants to avoid a higher influence of the stock portfolio's performance, he reduces his private stock portfolio by exactly the amount of the corporate stock portfolio (500 Euro). Finally, he can exceed his investment in bonds by 300 Euro. (cf. Figure 2)

Opportunity I

Investor's assets (in Euro)

Equity of the corporation	500
Stock portfolio	3,000
Bonds	2,000
Sum	5,500

Balance sheet of the corporation

Assets (in Euro)		Equity & Liability (in Euro)	
Normal-taxed assets	1,000	Equity	500
		Debt	500
	1,000		1,000

Figure 1: Investor's assets an balance sheet under opportunity I

Opportunity II

Investor's assets (in Euro)

Equity of the corporation	700
Stock portfolio	2,500
Bonds	2,300
Sum	5,500

Balance sheet of the corporation

Assets (in Euro)		**Equity & Liability (in Euro)**	
Normal-taxed assets	1,000	Equity	700
Stock portfolio	500	Debt	800
	1,500		1,500

Figure 2: Investor's assets an balance sheet under opportunity II

3.1.2 General solution without taxes

Neglecting taxes, the adjustment of the investor's portfolio, in the way described in the example, offsets all differences in the return of his portfolio. Thus, the combined rate of return is independent whether or not the corporation invests in a stock portfolio. In this section, this is demonstrated analytically.

Despite the combined return rate of the investor's portfolio is uncertain, the identity of the return rates of the two opportunities could be shown without assuming specific utility function of the investor or his specific degree of risk aversion. This is a result from assuming debt and stocks are deemed not substitutable (cf. sec. 2.1.3).

The combined return which emerges under opportunity I ($\tilde{r}^I$) is given by the sum of the returns of the three classes of assets which were hold by the investor:

$$\tilde{r}^I = \underbrace{\tilde{r}_A \cdot A - i \cdot D^I}_{\text{return of corporate stock}} + \underbrace{\tilde{r}_M \cdot PF_S^I + i \cdot B^I}_{\text{return from other capital assets}} . \tag{5}$$

Following the Index "I" ("II") represents a variable belonging to opportunity I (II). So, PF_S^I denotes the value of the stock portfolio the investor has invested in and PF_C^{II} the value of the corporation's stock portfolio.

If the corporation buys a stock portfolio, the investor needs to contribute more capital to the corporation than under opportunity I. But it can use new leverage to fund the part ρ of the investment:

$$D^{II} = D^I + \rho \cdot PF_C^{II} . \tag{6}$$

Consequently, the investor has to contribute equity E^{II}:

$$E^{II} = E^{I} + (1-\rho)\cdot PF_C^{II} \quad (7)$$

The reduction of the private portfolio is defined by the value of the stock portfolio the corporation has invested in (PF_C^{II}):

$$PF_S^{II} = PF_S^{I} - PF_C^{II} \quad (8)$$

The new amount of bonds is enhanced by the reduction of the investment in the stock portfolio and reduced by the need for new contributed capital:

$$\begin{aligned} B^{II} &= B^{I} + \underbrace{PF_C^{II}}_{\text{reduction of the stock portfolio}} - \underbrace{(1-\rho)\cdot PF_C^{II}}_{\text{new contributed capital}} \\ &= B^{I} - \rho\cdot PF_C^{II} \end{aligned} \quad (9)$$

Principally, the combined return ($\tilde{r}^{II}$) can be calculated in the same way as $\tilde{r}^{I}$:

$$\tilde{r}^{II} = \underbrace{\tilde{r}_M\cdot PF_C^{II} + \tilde{r}_A\cdot A - i\cdot D^{II}}_{\text{return from corporate stock}} + \underbrace{\tilde{r}_M\cdot PF_S^{II} + i\cdot B^{II}}_{\text{return from other capital assets}} \quad (10)$$

Using equations (6), (8) and (9) yields

$$\begin{aligned} \tilde{r}^{II} &= \tilde{r}_M\cdot PF_C^{II} + \tilde{r}_A\cdot A - i\cdot \underbrace{D^{II}}_{=D^{I}+\rho\cdot PF_C^{II}} + \tilde{r}_M\cdot \underbrace{PF_S^{II}}_{=PF_S^{I}-PF_C^{II}} + i\cdot \underbrace{B^{II}}_{=B^{I}-\rho\cdot PF_C^{II}} \\ \tilde{r}^{II} &= \tilde{r}_A\cdot A - i\cdot D^{I} + \tilde{r}_M\cdot PF_S^{I} + i\cdot B^{I} \\ \tilde{r}^{II} &= \tilde{r}^{I} \end{aligned} \quad (11)$$

This result shows that, without considering taxation, there is neutrality for corporations about investing in stocks or not. So, both opportunities are identical.

3.2 Integrating taxes

3.2.1 Conditions of a tax benefit

In this section, the model is supplemented with the effects of taxation. Again, the five tax rates introduced in section 2.2 are considered. The analysis of the foregoing section is take as a reference. Equation (5), which describes the combined return of opportunity I, has to be extended to

$$\begin{aligned}
\tilde{r}_\tau^{I} = & \underbrace{\left[\left(1-\tau^{C}\right)\cdot\underbrace{\left(\tilde{r}_A\cdot A - i\cdot D^{I}\right)}_{\text{corporate profit}} - \underbrace{\tau^{C,D}\cdot i\cdot D^{I}}_{\substack{\text{tax burden of limited}\\ \text{interest deduction}}}\right]\cdot\left(1-\tau^{S,PF}\right)}_{\text{net return from corporate stock}} \\
& + \underbrace{\left(1-\tau^{S,i}\right)\cdot i\cdot B^{I} + \left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot PF_S^{I}}_{\text{net return from other private capital}} \\
\Leftrightarrow & \\
\tilde{r}_\tau^{I} = & \left[\left(1-\tau^{C}\right)\cdot\tilde{r}_A\cdot A-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot i\cdot D^{I}\right]\cdot\left(1-\tau^{S,PF}\right) \\
& + \left(1-\tau^{S,i}\right)\cdot i\cdot B^{I}+\left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot PF_S^{I}.
\end{aligned} \tag{12}$$

The return rate of the widespread stock portfolio $\tilde{r}_M$ does not consider the taxes which any single corporation that belongs to the portfolio has to pay. This is correct because these taxes are assumed to be source-based and the world-wide capital market eliminates any effects of these taxes on the return rate (cf. sec. 2.1.1 and 2.1.2).

Facing opportunity II, the equation is even more extensive:

$$\begin{aligned}
\tilde{r}_\tau^{II} = & \underbrace{\left[\left(1-\tau^{C}\right)\cdot\left(\tilde{r}_A\cdot A - i\cdot D^{II}\right) - \underbrace{\tau^{C,D}\cdot i\cdot D^{II}}_{\substack{\text{tax burden of limited}\\ \text{interest deduction}}} + \left(1-\tau^{C,PF}\right)\cdot\tilde{r}_M\cdot PF_C^{II}\right]\cdot\left(1-\tau^{S,PF}\right)}_{\text{net return from corporate stock}} \\
& + \underbrace{\left(1-\tau^{S,i}\right)\cdot i\cdot B^{II} + \left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot PF_S^{II}}_{\text{net return from private capital}} \\
\Leftrightarrow & \\
\tilde{r}_\tau^{II} = & \left[\left(1-\tau^{C}\right)\cdot\tilde{r}_A\cdot A-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot i\cdot D^{II}+\left(1-\tau^{C,PF}\right)\cdot\tilde{r}_M\cdot PF_C^{II}\right]\cdot\left(1-\tau^{S,PF}\right) \\
& + \left(1-\tau^{S,i}\right)\cdot i\cdot B^{II}+\left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot PF_S^{II}.
\end{aligned} \tag{13}$$

In order to compare the two opportunities, the investor has to readjust the proportion of the three classes of assets (corporate stock, portfolio and bonds). But the equations from section 3.1.2 cannot be adopted one to one as the effects of taxation have to be taken into account. The value of new corporate debt can still be calculated by using (6).

$$D^{II} = D^{I} + \rho\cdot PF_C^{II}. \tag{6}$$

Also, the equity is still defined by equation (7)

$$E^{II} = E^{I} + (1-\rho)\cdot PF_C^{II} \qquad (7)$$

Because the investor does not want his earnings to depend more on the risky return of the stock portfolio $\tilde{r}_M$, he will reduce his private portfolio PF_S^{II}. At this point, the analysis differs from this in section 3.1.2. Anticipating the taxes, which reduce the returns generated by the portfolio on corporate level, the investor reduces his private portfolio less than the amount of new stocks bought from the corporation:

$$PF_S^{II} = PF_S^{I} - \left(1-\tau^{C,PF}\right)\cdot PF_C^{II} \qquad (14)$$

Finally, the amount which he invests in new bonds can be calculated by using the budget constraint:

$$E^{II} + B^{II} + PF_S^{II} = E^{I} + B^{I} + PF_S^{II} \qquad (15)$$

Eliminating E^{II} and PF_S^{II} with equations (7) and (14) yields:

$$\begin{aligned} B^{II} &= B^{I} + \left(1-\tau^{C,PF}\right)\cdot PF_C^{II} - (1-\rho)\cdot PF_C^{II} \\ &= B^{I} + \left(\rho-\tau^{C,PF}\right)\cdot PF_C^{II} \end{aligned} \qquad (16)$$

Knowing these equations, the difference between the net-of-tax returns of opportunity I and II can be calculated. In a first step, the difference can be simplified as follows:

$$\begin{aligned} \tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} = & \left[\left(1-\tau^{C,PF}\right)\cdot\tilde{r}_M\cdot PF_C^{II} - \left(1-\tau^{C}+\tau^{C,D}\right)\cdot i\cdot\left(D^{II}-D^{I}\right)\right]\cdot\left(1-\tau^{S,PF}\right) \\ & + \left(1-\tau^{S,i}\right)\cdot i\cdot\left(B^{II}-B^{I}\right) + \left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot\left(PF_S^{II}-PF_S^{I}\right) \\ = & \left(1-\tau^{S,PF}\right)\cdot\tilde{r}_M\cdot\left(\left(1-\tau^{C,PF}\right)\cdot PF_C^{II} + PF_S^{II} - PF_S^{I}\right) \\ & - \left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot i\cdot\left(D^{II}-D^{I}\right) \\ & + \left(1-\tau^{S,i}\right)\cdot i\cdot\left(B^{II}-B^{I}\right) \end{aligned} \qquad (17)$$

By using equation (14), it can be shown that the difference does not depend on the amount of the private portfolio anymore:

$$\tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} = \left(1-\tau^{S,i}\right)\cdot i\cdot\left(B^{II}-B^{I}\right) - \left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot i\cdot\left(D^{II}-D^{I}\right). \qquad (18)$$

This means that the result is independent of the investor's preferences for investing in bonds or stocks. The definitions (6) and (16) allow for writing the equation in a manner, which only depends on exogenous variables, particularly the tax rates, and on PF_C^{II} (see appendix for details):

$$\tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} = PF_C^{II}\cdot i\cdot\left[\rho\cdot\left(\left(1-\tau^{S,i}\right) - \left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right) - \left(1-\tau^{S,i}\right)\cdot\tau^{C,PF}\right] \qquad (19)$$

If this difference denotes an advantage or a disadvantage is determined by the term in the squared brackets. A negative term means the stock investment reduces the owner's net income. Analogously, an advantage emerges if the term is positive. Thus, an advantage is ensured if the percentage of new debt used to fund the portfolio investment (ρ) exceeds a critical value (ρ^{crit}):

$$\tilde{r}_{\tau}^{II} - \tilde{r}_{\tau}^{I} > 0$$

$$\Leftrightarrow \quad \rho > \rho^{crit} = \frac{\left(1-\tau^{S,i}\right)\cdot\tau^{C,PF}}{\left(1-\tau^{S,i}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)}. \quad (20)$$

Obviously two preconditions need to be fulfilled to ensure a low value of ρ^{crit}: First, the denominator must be as high as possible. This is the case if the benefit of debt-financing is high. Vice versa, if there is no such benefit – the denominator is zero – a corporation cannot achieve advantages by using the analyzed strategy. Second, the numerator declines if there is a low taxation of the returns of portfolio stocks.

3.2.2 Critical values considering real tax rates

Two questions can be asked at this point: Are there realistic combinations of tax rates causing reachable values of ρ^{crit}? And, how important is the benefit which can be achieved by the analyzed strategy? Table 1 shows the tax rates belonging to different country's tax laws.

In the case of the US, it is important to consider Sec. 246A IRC, which reduces the dividends received deduction where portfolio stock is debt financed. Normally, 70% of the received dividends are tax-exempted. But if the stock portfolio is financed by debt, this exemption is reduced to the fraction of the portfolio, which is not debt-financed. Obviously, the analyzed strategy is affected by this rule in a significant way, but in this paper it is impossible to clarify if a corporation could, at least partially, avoid the application of this rule.

The tax rates of the other countries are subject to many tax exemptions and tax reliefs. Therefore, the tax rates figured in Table 1 are based on assumptions and cannot be generalized.

	corporate tax rates						investor’s tax rates		
Country \ tax rates	τ^{C}	$\tau^{C,D}$[3]	$\tau^{C,div}$		$\tau^{C,cg}$		$\tau^{S,div}$	$\tau^{S,cg}$	$\tau^{S,i}$
			qualified holding	non qualified holding	qualified holding	non qualified holding			
Germany (DE)	29.83%	3.50%	1.5%	14%	1.5%	1.5%	26.38%	26.38%	26.38%
Spain (ES)	35,74%[4]	0%	0%	17,87%	30%	30%	21%	21%	21%
France (FR)	34.43%[5]	0%	1,7%	34.43%	1.7%	34.43%	30,1%	30,1%[6]	30,1%
Italy (IT)	30,4%[7]	0%	1.375%[8]	1.375%	1.375%	27.5%	12,5%	12,5%	43%
Japan (JP)	41%[9]	0%	2%	20,5%	41%	41%	43,6%	20%[10]	50%
Poland (PL)	19%	0%	0%	19%	19%	19%	19%	19%	32%
Russia (RU)	20%	0%	9%	9%	20%	20%	9%	13%	13%
United Kingdom (UK)	28%	0%	0%	0%	28%	28%	36,1%[11]	18%[12]	40%
United States of America (US)[13]	35%	0%	0%	10.5% - 35%[14]	35%	35%	15%	15%	35%

Table 1: Tax rates of different countries[15]

3 Without application of thin capitalization rules.
4 A reduced rate applies to small and medium-size enterprises.
5 The rate includes the social surtax.
6 This includes special social security surcharges amounting to about 11%.
7 The corporate tax rate 27.5 % plus IRAP (regional tax on productive activities). The ordinary IRAP amounts to 3.9 %. Financial revenue is not relevant in determining the taxable base for IRAP.
8 5% of 27.5%.
9 Combined tax rate, aggregate of national tax (30%), inhabitant tax and enterprise tax.
10 39% for short term gains.
11 Dividends from UK companies carry a 10% tax credit. The nominal tax rate is 42.5 %.
12 Special rate of 10% on the first GBP 1 million of capital gains. This threshold is a “lifetime” limit per individual.
13 Without state taxes.
14 The tax rate depends on the application of sec. 246A IRC.
15 Source: Deloitte: International Tax and Business Guides, Mennel and Förster (2009), European Commission (2009), Devereux et al (2009).

	investor's residence country								
	DE	ES	FR	IT	JP	PL	RU	UK	US
DE	29.43%	29.43%	29.43%	-	-	63.29%	31.46%	74.31%	-
ES	66.97%	66.97%	66.97%	-	-	-	69.86%	-	-
FR	100.00%	100.00%	100.00%	-	-	-	-	-	-
IT	47.49%	47.49%	47.49%	-	-	84.46%	50.13%	93.88%	-
JP	75.00%	75.00%	75.00%	-	-	-	77.57%	-	-
PL	100.00%	100.00%	100.00%	-	-	-	-	-	-
RU	72.50%	72.50%	72.50%	-	-	-	79.84%	-	-
UK	50.00%	50.00%	50.00%	-	-	98.35%	53.14%	-	-
US[16]	65.00%	65.00%	65.00%	-	-	-	67.90%	-	-
Unrealistically high or low values are not listed in this table. They are replaced by "-".									

Table 2: Critical percentages of debt funding a stock portfolio

[16] No application of sec. 246A IRC.

	investor's residence country								
	DE	ES	FR	IT	JP	PL	RU	UK	US
DE	5.70%	5.70%	5.70%	-	-	12.25%	6.09%	14.38%	40.96%
ES	41.97%	41.97%	41.97%	-	-	63.95%	43.78%	68.59%	93.94%
FR	4.94%	4.94%	4.94%	-	16.09%	7.76%	5.16%	8.38%	11.93%
IT	4.52%	4.52%	4.52%	-	27.14%	8.04%	4.77%	8.94%	15.30%
JP	52.44%	52.44%	52.44%	-	-	72.34%	54.23%	76.06%	94.11%
PL	50.00%	50.00%	50.00%	-	-	-	55.43%	-	-
RU	72.50%	72.50%	72.50%	-	-	-	79.84%	-	-
UK	50.00%	50.00%	50.00%	-	-	98.35%	53.14%	-	-
US	50.00%	50.00%	50.00%	-	-	77.52%	52.23%	83.45%	-

Unrealistically high or low values are not listed in this table. They are replaced by "-".

Table 3: Critical percentages of debt funding a qualified stock investment

The value of ρ^{crit} is determined by the tax rates figured in Table 1. However, if the investor's residence country and the country of the corporation are not the same, tax rates of two countries have to be combined. Table 2 shows the value of ρ^{crit} for all possible combinations. For the US, I abandon to show results for the case Sec. 246A IRC is applicable, because even if not the critical values are very high or not realistic. Negative results would mean that the analyzed strategy cannot yield a benefit. Also, results exceeding 100% are not realistic, so I also abandon to show these results. Particularly for German corporations, the critical percentage of new debt which is used to fund the portfolio investment is relative low, 29.43%, and could be easily reached. It is an interesting result, that corporate tax rates on capital gains often exceeds the corresponding tax rates on dividends received by corporations. This can be seen as an argument to explain why corporation do pay dividends at all. With some constraints the analysis can be transferred to the decision about investing in qualified stocks (Table 3). In this case the critical values are notably lower, which can explain M&A activities (cf. Auerbach, 2001, pp. 49-50).

Notice that in hypothetical tax systems which do not tax stock returns received by corporations ($\tau^{C,PF} = 0\%$) the critical value ρ^{crit} is equal to zero as long as corporations can derive a tax benefit from debt financing. Including stock returns in the corporate income tax base can therefore be interpreted as a protection against this strategy which is necessary for tax systems discriminating between debt and equity. Without discriminating tax rules for corporate portfolio investments it is hardly possible to discriminate between debt and equity.

3.2.3 Maximal reachable benefit

So far, it has been shown that the critical percentage of debt used to fund the corporate portfolio investment could be reached and even notably exceeded in some constellations. In these cases, the formal analysis yields the extreme result that corporations should invest infinite capital in the stock portfolio to maximize the firm's value. But, the imperfect loss offset included in most tax laws restricts this strategy.

The analyzed strategy contains a rise in tax-deductible interest expenditures whilst only a smaller rise in taxable earnings must be suffered, since some of the earnings are tax-exempted or taxed at a lower rate. As a result, the analyzed strategy is at least limited by the fact that the corporate tax base declines in extension of the portfolio investment and, finally, gets negative. Notice that these effects reduce only the tax base not the book profit. Until now, the model assumes complete loss offset, which means that a negative tax base causes immediate tax refunds. In the case of durable negative tax bases, however, this assumption is unrealistic. Therefore, the maximal benefit of the strategy could be calculated by the use of the maximal amount of portfolio investments, which still guarantees a positive tax base.

As this maximal amount of portfolio investment depends on the (risky) profitability of the whole company and the temporal apportionment of the taxable profits, it can be hardly formulated in a general way, which is valid for all firms. In order to attain an easy calculation, I assume that the total assets reduced by the portfolio investment must be higher or equal to the total debt. Of course, the maximal advantage only occurs if they are equal. Because corporate assets equal the sum of equity and debt, the assumption also ensures the identity of equity and the portfolio investment as well as the identity of debts and normal-taxed assets.

$$A = D^{II} \tag{21}$$

$$PF_C^{II} = E^{II} \tag{22}$$

This assumption causes positive taxable profits if the return rate of the normal-taxed assets exceeds the interest rate of corporate debts. This result even holds if the returns of the portfolio investment are completely exempted from tax base, which yield the lowest tax base. In the case that the returns are not fully exempted or interest expenditures are only incompletely tax-deductible or the rate of return considerably exceeds the interest rate, the maximal portfolio investment could be even higher without causing negative tax bases. Nevertheless, the used assumption gives a very good hint, how high the tax advantage is which is finally reachable by the analyzed strategy. Inserting (7) into (22) yields

$$\begin{aligned} PF_C^{II} &= E^I + (1-\rho)\cdot PF_C^{II} \\ \Leftrightarrow \quad PF_C^{II} &= \frac{E^I}{\rho} \end{aligned} \tag{23}$$

Since the equity of opportunity I is defined by π, equation (23) can be formulated as follows

$$PF_C^{II} = \frac{(1-\pi)\cdot A}{\rho} \tag{24}$$

By inserting equation (24) in equation (19) it is possible to calculate the maximal net-of-tax advantage, which depends only on the value of the normal-taxed assets:

$$\begin{aligned} \tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} &= \frac{(1-\pi)\cdot A}{\rho}\cdot i\cdot\left[\rho\cdot\left(\left(1-\tau^{S,i}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right)-\left(1-\tau^{S,i}\right)\cdot\tau^{C,PF}\right] \\ &= (1-\pi)\cdot A\cdot i\cdot\left[\left(1-\tau^{S,i}\right)\cdot\left(1-\frac{\tau^{C,PF}}{\rho}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right] \end{aligned} \tag{25}$$

Considering the double taxation of corporate profits, it could be calculated how much the rate of return of the normal-taxed investment could be lower, if it is financed corresponding to the analyzed strategy ($\Delta\tilde{r}_A$). This exactly defines the reduction in the cost of capital, which is caused by the strategy:

$$\begin{aligned} &\Delta\tilde{r}_A\cdot A\cdot\left(1-\tau^{C}\right)\cdot\left(1-\tau^{S,PF}\right) = \tilde{r}_\tau^{II}-\tilde{r}_\tau^{I} \\ \Leftrightarrow\ &\Delta\tilde{r}_A = \frac{(1-\pi)\cdot i}{\left(1-\tau^{C}\right)\cdot\left(1-\tau^{S,PF}\right)}\cdot\left[\left(1-\tau^{S,i}\right)\cdot\left(1-\frac{\tau^{C,PF}}{\rho}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right] \end{aligned} \tag{26}$$

The following tables show the reductions in the cost of capital which result by assuming different values for ρ – which, once again, represents the (maximal) percentage of debt used for funding the new stock investment – and π – which represent the (maximal) percentage of debt used for funding the normal-taxed assets. In order to figure an interesting constellation which is related with a low ρ^{crit}, German tax rates are assumed for the corporation and for the investor (Table 4). To give an illustrative reference of the benefit's magnitude, the maximal benefit of debt financing – the benefit of the common tax shield (TS) – is listed in the last column in each table (see appendix for details). This means the tables could be interpreted as follows: The cost of capital of an investment which is financed with new contributed capital can be reduced twice. In a first step, using debt declines the cost of capital by the amount in the right column depending from π. If the corporation additionally invests in a debt-financed stock portfolio, the costs of capital are reduced a second time. The magnitude of this reduction depends from ρ and π. Furthermore, an interest rate of 8% is supposed.

π \ ρ	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	max. TS
0%	-5.8%	-1.4%	0.1%	0.8%	1.2%	1.5%	1.7%	1.9%	2.0%	2.1%	0.0%
10%	-5.3%	-1.3%	0.1%	0.7%	1.1%	1.4%	1.6%	1.7%	1.8%	1.9%	0.3%
20%	-4.7%	-1.1%	0.0%	0.6%	1.0%	1.2%	1.4%	1.5%	1.6%	1.7%	0.6%
30%	-4.1%	-1.0%	0.0%	0.6%	0.9%	1.1%	1.2%	1.3%	1.4%	1.5%	0.9%
40%	-3.5%	-0.8%	0.0%	0.5%	0.7%	0.9%	1.0%	1.1%	1.2%	1.3%	1.2%
50%	-2.9%	-0.7%	0.0%	0.4%	0.6%	0.8%	0.9%	0.9%	1.0%	1.1%	1.5%
60%	-2.3%	-0.6%	0.0%	0.3%	0.5%	0.6%	0.7%	0.8%	0.8%	0.8%	1.8%
70%	-1.8%	-0.4%	0.0%	0.2%	0.4%	0.5%	0.5%	0.6%	0.6%	0.6%	2.1%
80%	-1.2%	-0.3%	0.0%	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.4%	2.4%
90%	-0.6%	-0.1%	0.0%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	2.7%
100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%

Table 4: Reduction in the cost of capital achievable by the strategy (German investor and German corporation)

When comparing the benefit of the strategy with the benefit of financial leverage, notice that the calculation does not consider the costs of possible financial distress. So, the benefit of financial leverage can be much smaller. Therefore, the analyzed strategy can cause a reduction in the cost of capital which can be nearly as high as the benefit of the tax shield. However, a notable benefit only emerges if the value of ρ exceeds the critical value ρ^{crit} significantly.

Depending on exogenous parameters, the additional contribution of capital needed to fund the portfolio investment could differ considerably. In some constellations, it is imaginable that the corporate stock portfolio exceeds the value of the normal-taxed asset several times. This means a huge extension of the balance sheet total. Because this can be regarded as an unrealistic constellation, another benefit measure is introduced in the following by figuring the reduction in the cost of capital depending on the ratio of corporate portfolio to the normal-taxed asset. Again, the German tax rates are supposed.

$\frac{PF_C^{II}}{A}$ \ ρ	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10%	-0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%
20%	-0.1%	-0.1%	0.0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.4%	0.4%
30%	-0.2%	-0.1%	0.0%	0.1%	0.2%	0.3%	0.4%	0.5%	0.5%	0.6%
40%	-0.2%	-0.1%	0.0%	0.1%	0.2%	0.4%	0.5%	0.6%	0.7%	0.8%
50%	-0.3%	-0.1%	0.0%	0.2%	0.3%	0.5%	0.6%	0.8%	0.9%	1.1%
60%	-0.4%	-0.2%	0.0%	0.2%	0.4%	0.6%	0.7%	0.9%	1.1%	1.3%
70%	-0.4%	-0.2%	0.0%	0.2%	0.4%	0.6%	0.9%	1.1%	1.3%	1.5%
80%	-0.5%	-0.2%	0.0%	0.3%	0.5%	0.7%	1.0%	1.2%	1.5%	1.7%
90%	-0.5%	-0.3%	0.0%	0.3%	0.6%	0.8%	1.1%	1.4%	1.6%	1.9%
100%	-0.6%	-0.3%	0.0%	0.3%	0.6%	0.9%	1.2%	1.5%	1.8%	2.1%
110%	-0.6%	-0.3%	0.0%	0.3%	0.7%	1.0%	1.3%	1.7%	2.0%	2.3%
120%	-0.7%	-0.3%	0.0%	0.4%	0.7%	1.1%	1.5%	1.8%	2.2%	2.5%
130%	-0.8%	-0.4%	0.0%	0.4%	0.8%	1.2%	1.6%	2.0%	2.4%	2.8%
140%	-0.8%	-0.4%	0.0%	0.4%	0.9%	1.3%	1.7%	2.1%	2.5%	3.0%
150%	-0.9%	-0.4%	0.0%	0.5%	0.9%	1.4%	1.8%	2.3%	2.7%	3.2%

Table 5: Reduction of the cost of capital depending on the ratio of corporate portfolio to the value of the investment (German investor and German corporation)

Another two tables are presented in the appendix. They illustrate the impact of the tax rate on corporate stock returns ($\tau^{C,PF}$) on the benefit. By assuming this tax rate to be zero, the reduction in the cost of capital can easily attain two percentage points and more.

Note that these reductions in the cost of capital also occur if an investment is financed by retained earnings. Typically, the costs of capital are lower in the case of financing with retained earnings instead of financing with contributed capital (Sinn, 1991; Stiglitz, 1973). Therefore, the overall cost of capital can fall below the cost of capital of all three sources of financing, namely contributed capital, retained earnings, and debt. In this case, the tax-induced discrimination of contributed capital is overcompensated by the tax benefit of investing in debt-financed stock portfolio. This is a surprising result as investment decisions are commonly evaluated by using the weighted average of the cost of capital (WACC) which cannot fall below the costs of one of its components.

4 Conclusions

In this paper, I analyzed the strategy of deriving a tax benefit for a corporation from investing in a partially debt-financed stock portfolio. In particular German corporations can derive a notable benefit by adopting this strategy. Concerning investments in qualified stocks most countries` tax laws offer notable tax benefits which can explain M&A activities.

Integrating assumptions about the character of restricted financial structures, it is possible to link this tax benefit to a new investment in normal-taxed assets. This allows calculating the reduction in an investment's cost of capital if the investment is simultaneously realized with an investment in a widespread stock portfolio. In realistic constellations, this reduction can even exceed one percentage point. These results have a considerable impact on investment decisions and the valuation of firms. Typically, the discount rate used to estimate an investment is a weighted average of the cost of capital (WACC). Integrating the effects of taxation analyzed in this paper, the Net Present Value (NPV) of an investment project can increase notably.

Although a single corporation does not necessarily extend its leverage ratio by adopting the analyzed strategy, the corporate sector as a whole tends to be more levered and thus more vulnerable to economic crises. The current tax rules, therefore, foster systemic risk of the corporate sector. It is up to further empirical research to corroborate these effects.

All in all, the discussed effects are not efficient. The distortions caused can be avoided by, first, implementing a tax system which is neutral to corporations' debt-equity decisions and, second, by exempting the complete returns of stock investments from the corporate tax base. Blueprints for fundamental tax reforms which can be used to reach this have already been discussed in the literature (Sørensen, 2005a, 2005b; German Council of Economic Experts et al., 2006). The findings in this paper could be interpreted as an additional example for tax planning opportunities raised by unsystematically distorting tax systems and therefore underline the relevance of implementing such a reform.

Appendix

Deriving of equation (19)

$$\begin{aligned}
\tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} &= \left(1-\tau^{S,i}\right)\cdot i\cdot\left(B^{II}-B^{I}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot i\cdot\left(D^{II}-D^{I}\right)\\
&= \left(1-\tau^{S,i}\right)\cdot i\cdot\left(\left(\rho-\tau^{C,PF}\right)\cdot PF_C^{II}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot i\cdot\left(\rho\cdot PF_C^{II}\right)\\
&= PF_C^{II}\cdot i\cdot\left[\left(1-\tau^{S,i}\right)\cdot\left(\rho-\tau^{C,PF}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot\rho\right]\\
&= PF_C^{II}\cdot i\cdot\left[\left(1-\tau^{S,i}\right)\cdot\rho-\left(1-\tau^{S,i}\right)\cdot\tau^{C,PF}-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\cdot\rho\right]\\
&= PF_C^{II}\cdot i\cdot\left[\rho\cdot\left(\left(1-\tau^{S,i}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right)-\left(1-\tau^{S,i}\right)\cdot\tau^{C,PF}\right]
\end{aligned} \tag{27}$$

Calculating the benefit of financial leverage

The equation for calculating the benefit of debt financing can be derived in nearly the same way as equation (26). Equation (4) yield the absolute benefit of debt financing:

$$\tilde{r}_\tau^{II} - \tilde{r}_\tau^{I} = \left[\left(1-\tau^{S,i}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right]\cdot\left(i\cdot\underbrace{D}_{\pi\cdot A}\right). \tag{4}$$

The amount of debt is given by $\pi\cdot A$ and again the reduction in the cost of capital can be calculated by considering the combined taxation of the asset

$$\begin{aligned}
&\Delta\tilde{r}_A\cdot A\cdot\left(1-\tau^{C}\right)\cdot\left(1-\tau^{S,PF}\right)=\tilde{r}_\tau^{II}-\tilde{r}_\tau^{I}\\
\Leftrightarrow\quad &\Delta\tilde{r}_A=\frac{\pi\cdot i}{\left(1-\tau^{C}\right)\cdot\left(1-\tau^{S,PF}\right)}\cdot\left[\left(1-\tau^{S,i}\right)-\left(1-\tau^{C}+\tau^{C,D}\right)\cdot\left(1-\tau^{S,PF}\right)\right].
\end{aligned} \tag{28}$$

Tables by assuming $\tau^{C,PF}$=0%

π \ ρ	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	max. TS
0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	0.0%
10%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	0.3%
20%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	0.6%
30%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	0.9%
40%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.2%
50%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
60%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.8%
70%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	2.1%
80%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	2.4%
90%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	2.7%
100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%

Table 6: Reduction in the cost of capital achievable by the strategy (German investor and German corporation, $\tau^{C,PF} = 0\%$)

$\frac{PF_C^{II}}{A}$ \ ρ	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10%	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%
20%	0.1%	0.1%	0.2%	0.2%	0.3%	0.4%	0.4%	0.5%	0.5%	0.6%
30%	0.1%	0.2%	0.3%	0.4%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
40%	0.1%	0.2%	0.4%	0.5%	0.6%	0.7%	0.8%	1.0%	1.1%	1.2%
50%	0.2%	0.3%	0.5%	0.6%	0.8%	0.9%	1.1%	1.2%	1.4%	1.5%
60%	0.2%	0.4%	0.5%	0.7%	0.9%	1.1%	1.3%	1.4%	1.6%	1.8%
70%	0.2%	0.4%	0.6%	0.8%	1.1%	1.3%	1.5%	1.7%	1.9%	2.1%
80%	0.2%	0.5%	0.7%	1.0%	1.2%	1.4%	1.7%	1.9%	2.2%	2.4%
90%	0.3%	0.5%	0.8%	1.1%	1.4%	1.6%	1.9%	2.2%	2.4%	2.7%
100%	0.3%	0.6%	0.9%	1.2%	1.5%	1.8%	2.1%	2.4%	2.7%	3.0%
110%	0.3%	0.7%	1.0%	1.3%	1.7%	2.0%	2.3%	2.6%	3.0%	3.3%
120%	0.4%	0.7%	1.1%	1.4%	1.8%	2.2%	2.5%	2.9%	3.2%	3.6%
130%	0.4%	0.8%	1.2%	1.6%	2.0%	2.3%	2.7%	3.1%	3.5%	3.9%
140%	0.4%	0.8%	1.3%	1.7%	2.1%	2.5%	2.9%	3.4%	3.8%	4.2%
150%	0.5%	0.9%	1.4%	1.8%	2.3%	2.7%	3.2%	3.6%	4.1%	4.5%

Table 7: Reduction of the cost of capital depending on the ratio of corporate portfolio to the value of the investment (German investor and German corporation, $\tau^{C,PF} = 0\%$)

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