Corporate Taxation and Corporate Governance*

Marko Koethenbuerger
University of Copenhagen§
and CESifo

Michael Stimmelmayr
University of Munich**
and CESifo

Please do not circulate.

Abstract

The effects of corporate taxation on firm behavior have been extensively discussed and analyzed in the neoclassical framework of the firm, abstracting from agency problems. Differently, as emphasized by the corporate governance literature, corporate investment behavior is crucially influenced by agency problems due to diverging interests between shareholders and managers. In this paper we analyze the impact of different corporate tax systems, including an Allowance for Corporate Equity (ACE) and a Comprehensive Business Income Tax (CBIT), on the agency problem between shareholders and managers. Our findings suggest that the divergence of objectives is intensified if the corporate tax system provides an ACE, i.e. when the opportunity cost of equity capital is deductible from corporate taxation.

JEL-Classification: H25, D21

Keywords: corporate taxation, corporate governance, allowance for corporate equity, comprehensive business income tax

*We are grateful to seminar participants in Munich, Maastricht (IIPF 2008 conference) and Vienna (WU) for helpful comments.

§Department of Economics, Studiestraede 6, DK 1455 Copenhagen, Phone: +45 35324417, Fax: +45 35323000 , Email: marko.koethenbuerger@econ.ku.dk.

**Center for Economic Studies, Schackstr. 4, 80539 Munich, Email: Stimmelmayr@lmu.de

1 Introduction

The effects of corporate taxation, and related to it, of capital income taxation, have been extensively discussed in the literature. Within the neoclassical view of firm behavior, which abstains form any agency problems, the literature analyzes the effects of corporate taxation on the investment incentives[1] and the effects of deductibility provisions on investment and financing decisions of firms.[2] The neoclassical framework, however, treats the firm as a "black box", operating so as to maximize the firm value. Thereby it disregards the tension between executives' and shareholders' interests which is central to the modern corporate finance literature. The literature rests on the premise that the interests of shareholders and the management are not aligned and analyzes the role of, e.g., incentive pay and the corporate capital structure choices in limiting the divergence of interests; see Tirole (2006).

In this paper we try to bridge the gap between these two strands of literature. In particular, we develop an agency model of corporate behavior and analyze the impact of different corporate income tax provisions - such as the Allowance for Corporate Equity (ACE) and the Comprehensive Business Income Tax (CBIT) - on investment decisions of firms. Central to our model, managers and shareholders have diverging objectives which emanate from the existence of so-called "pet-projects". More concisely, a manager has the opportunity to invest either in productive investments which yield a pecuniary return and capitalizes in the firm value, or in unproductive investments (pet-projects) which solely lead to a non-pecuniary return for the manager. The two different investment types cannot be distinguished by the shareholders or the government. So, neither an incentive contract between the shareholders and the manager nor the tax system can perfectly control the manager's incentive and, thereby, induce him to invest resources so as to maximize the firm value. As a consequence of the managers' taste for perks, managers pay too little dividends compared to the first best where no agency problem between shareholders and managers exists – in line with the free-cash flow view by Jensen and Meckling (1976).

We analyze whether particular corporate tax provisions such as the ACE or the CBIT intensify or annihilate the corporate governance problems. Both forms of corporate taxation differ w.r.t. the tax treatment of financing costs. While the ACE provides an allowance for corporate equity (along with an allowance for the cost of debt financing), the CBIT does not include any allowances. The ACE is of particular importance in our setting since we assume a

[1] A focal issue in the literature is whether investments are financed by equity issues or retrained earnings at the margin. The former is referred to as the Old View of dividend taxation, while the latter is referred to as the New View of dividend taxation. The New View was first published by King (1974, 1977), Auerbach (1979) and Bradford (1981). See e.g. Sinn (1991a) for an illustration of the two views.

[2] See, e.g., Boadway and Bruce (1984) and Sinn (1991a) on the effects of immediate write-offs of investment expenses on firm behavior and Bond (2000) on how the symmetric tax treatment of financing costs ensures financial neutrality of taxes.

mature firm that earns sufficient free cash flows (retained earnings) in excess of its investment expenses. Therefore, investments are internally financed through retained earnings at the margin (according to the New View of dividend taxation) and the deductibility of corporate equity substantially enhance investment incentives under the ACE.

We find that the divergence of objectives is intensified if the corporate tax system provides an ACE, i.e. when the opportunity costs of equity capital are deductible from corporate taxation. The intuition for this result is straight forward: Under the ACE both types of investments, the productive one and the pet projects, are tax privileged such that the manager has an incentive to increases the amount of resources invested in both projects. Shareholders may not welcome such a deductibility provision since the provision aggravates the agency problem. They prefer less perks and higher dividend pay-outs. We find that a government which is interested in correcting the divergence of interest will indeed not opt for such a provision. Also, we find that a government, which faces a revenue requirement, may prefer to fully eliminate the deductibility of corporate equity and, in order to balance the budget, to lower the statutory corporate tax rate. The rationale for this result follows from the reduced tax provision for investments. Such a reduction lowers the level of both productive and unproductive investments. When the policy measure is accompanied by a cut in the statutory tax rate, the returns of productive investment receive a lower tax treatment while the return of pet-projects remains unaffected. Hence, productive investments become more attractive relative to pet projects from the managers' perspective.

Our paper distinguishes itself from the current work in this field, since we do not focus on the neoclassical theory of the firm in analyzing similar corporate tax provisions; see , e.g., Bond (2000) and Auerbach and Hines (2002) for a review. Chetty and Saez (2007) abstain from corporate tax provisions and focus solely on dividend taxation, but introduce an agency relationship between managers and shareholders into the neoclassical framework of firm behavior. Guided by an illustrative calibration, they show that in the presence of the agency problems the efficiency cost of dividend taxation can be close to the amount of revenue collected by the tax. Korinek and Stiglitz (2006) analyze a firm's behavior over its life-cycles when agency problems exist and only dividends are taxed. The trade-off central to their analysis is that distributing funds via dividend pay-outs is costly to shareholders (as distributions are taxed), but leaving funds within the firm is costly too, since a larger amount of working capital intensifies the agency problem between managers and shareholders. Unlike these two contributions, our paper focuses on the effects of corporate tax provisions on firm's investment behavior.

2 Model Setup

The two-period model developed in this section rests on the neoclassical framework of the firm, but accounts for the diverging interests between managers and shareholders. Similar to Chetty and Saez (2007), the agency problem takes the form of so-called "pet-projects" which generate some positive utility for managers, but not for shareholders. In detail, we consider a mature firm with excessive cash holdings, X_0. These free cash flows can either be paid out as dividends, D_0, used for productive investment activities, I_0, or for pet-projects, J_0.[3] While productive investments yield a pecuniary net of corporate tax return of size $(1-\tau)f(I_0)$ in the next period, pet projects generate solely a private benefit of $g(J_0)$ for the manager.[4] As we assume free cash flows to be excessive, both types of investments are financed internally via retained earnings at the margin.[5] The firm has a level of corporate debt B_0 which finance inframarginal investment projects. The firms flow of funds identity in period 0 reads

$$X_0 + B_0 = D_0 + I_0 + J_0. \tag{1}$$

At the end of period 1, the firm is liquidated and all liquidation proceeds net of taxes and debt liabilities, D_1, are distributed to the shareholders

$$D_1 = (1-\tau)f(I_0) + \tau r(z_1 B_0 + z_2 K_0) + \tau K_0 - (1+r)B_0 - c(B_0). \tag{2}$$

The first term in (2) denotes the net of tax return to productive investments, I_0, carried out in period 0. The variables z_1, $z_2 \in [0,1]$ are tax parameters indicating the degree of tax deductibility for debt interest and the opportunity cost of equity capital. In case both tax parameters equal one, debt interest and the opportunity cost of equity are fully tax deductible as is the case under the Allowance for Corporate Equity (ACE) tax system. If neither of the two cost components are tax deductible, implying $z_1 = z_2 = 0$, the tax systems resembles the Comprehensive Business Income Tax (CBIT).[6] Capital is assumed to fully depreciate after use in production. The third term in (2) represents the tax savings due to capital depreciation.

[3] According to the life-cycle theory, we step in at phase two of the firm's life-cycle when the entrepreneurial decision has already been made.

[4] Both functions $f(I_0)$ and $g(J_0)$ are increasing and concave.

[5] Beside retained earnings, the mature corporation can in principle raise additional funds by issuing equity capital, E_0, or borrowing debt capital, B_0. In the presence of dividend taxation, a mature firm with free cash flows, however, never issues equity and distributes dividends simultaneously - see e.g. Sinn (1987, 1991b) or Chetty and Saez (2007). The intuition behind this finding is simple: A corporation which raises 1 Euro of equity capital and simultaneously pays out 1 Euro as dividends, lowers shareholders' wealth. Shareholders have to pay 1 Euro of new equity, but receive only a net income of $(1-\tau^D)$ Euro when 1 Euro is distributed as dividends by the firm.

[6] We abstain from introducing an immediate write-off for investment expenses. Such a provision can be considered by subtracting the term $z_3(I_0 + J_0)$ from the firm's tax liability. If $z_3 = 1$, the tax system offers a full immediate write-off. Such a provision, however, would not qualitatively change the results of our analysis.

We assume that an increased indebtedness, as measured by B_0, rises the risk of liquidation which reduces firm value. The discount on firm value is represented by the function $c(B_0)$ in (2). It is assumed to be increasing and convex, i.e. $c'(B_0) > 0$ and $c''(B_0) > 0$, and satisfies $c(0) = 0$.

The value of a firm is determined by the present value of all future net of tax dividend payments less equity injections. Since a mature firm with excessive free cash flows never issues equity, the firm value of a mature firm is given by

$$V_0 = D_0 + \frac{D_1}{1+r}, \tag{3}$$

with the definition of D_0 and D_1 as in the above equations (1) and (2), respectively. Note, that the dividend tax is left out of (3) since it is neutral w.r.t. the firm's investment decision under the New View, but it simply reduces the firm's distributions in a lump-sum fashion. Moreover, since the managers and shareholders are identically affected by the dividend tax, the results of our paper equally hold in the presence of dividend taxation as long as corporate taxes cannot be fully credited against the shareholder's personal income tax.[7]

The agency problem occurs since it is neither for the shareholder nor for the government possible to verify whether investments are productive or perks. Therefore, shareholders cannot contract managers to abstain from pet-projects. But the contract may specify that the manager gets a stake α in the firm and earns a fixed wage S, which w.l.o.g. is set to zero in the sequel.[8] The remaining shares are owned by the external shareholders. These shareholders would like to induce the manager to invest so as to maximize their wealth

$$V^S = (1-\alpha)\left[D_0 + \frac{D_1}{1+r}\right]. \tag{4}$$

Noting (1) and (2), the wealth of the shareholders is maximized if managers do not engage in pet-projects, $J_0 = 0$, and if they select an investment level which satisfies

$$f'(I_0) = \frac{1+r-(1+z_2 r)\tau}{1-\tau}. \tag{5}$$

Note, the investment plan of the firm is still distorted away from the efficient level as long as the tax system does not provide a full deductibility of equity cost of finance. If it does ($z_2 = 1$), as is the case under an ACE tax system, the investment rule reduces to $f'(I_0) = 1+r$.

The investment decisions are delegated to the managers which choose productive investments, I_0 and pet-projects J_0 (and thereby D_0 and D_1)) so as to maximize

$$V^M = \alpha\left[D_0 + \frac{D_1}{1+r}\right] + (1-p(B_0))\frac{g(J_0)}{1+r}, \tag{6}$$

[7] Tax systems which entail a partial effective taxation of dividend income at the shareholder level is implemented in a variety of countries, including Germany, the US, and the UK.

[8] We abstract from determining the optimal fraction α of company shares assigned to managers. Additionally, we abstract from monitoring on the part of the shareholder.

with dividend payments given by (1) and (2). $p(B_0)$ is the probability with which the manager is fired and does not reap the private benefits of the perk investment. The probability is increasing in the level of firm debt B_0. The idea is that banks have a superior capacity to judge whether investments are of a productive type.[9] The bank's incentives to monitor the manager's behavior are stronger the more stakes the bank has in the firm. The investment behavior is not verifiable which precludes the possibility of bringing the case to court. But a mutually agreed termination of the contract is still possible and, indeed, observed in practice. Thus, managers loose access to the perks, but still own a share of the company's stocks as we assume here. Throughout the interest rate r is constant as is, e.g., the case in a small open economy. The timing of events is as follows: In period 0 the board hires a manager and chooses the level of corporate debt B_0 at stage 1. At stage 2 the management chooses the level of investments I_0 and J_0. In period 1 the bank monitors the manager's behavior which, with probability $p(B_0)$, leads to a termination of the contract at stage 3. Finally, at stage 4 production takes place and taxes are collected. Shareholders receive dividend payments D_1 and the manager additionally receives utility $g(J_0)$, conditional on being in office. We apply backward induction to solve for a subgame-perfect equilibrium.

3 Firm Behavior

3.1 Stage 2: Investment Behavior

The first order conditions for the optimal choice of investments, I_0, and pet-projects, J_0, are given by

$$\begin{array}{lll} \text{(a)} \quad \frac{\partial V^M}{\partial I_0}: & \alpha\left[-1+\frac{1}{1+r}\left((1-\tau)f'(I_0)+z_2\tau r+\tau\right)\right] & =0. \\ \text{(b)} \quad \frac{\partial V^M}{\partial J_0}: & \alpha\left[-1+\frac{1}{1+r}\left(z_2\tau^C r+\tau\right)\right]+\frac{1-p(B_0)}{1+r}g'(J_0) & =0. \end{array} \tag{7}$$

According to (7a), the optimal investment behavior requires that the marginal benefit form a productive investment equals the loss in dividend payments in period 0. In detail, an additional productive investment yields an increased dividend payout in period 1 consisting of the net of tax return on the productive investment and the additional tax advantage resulting form the deductibility of the equity cost. The manager values the discounted dividend income according to the fraction α, the amount of shares he is holding. Given that the benefits and costs of productive investments fully capitalize in dividend payments, the investment incentive of the manager and owners are perfectly aligned, and the investment level I_0 coincides with the level prescribed by (5).

As we learn from (7b), the manager invests in pet-projects up to the point where the

[9] See, e.g., Aghion and Bolton (1992) and Bolton Scharfstein (1996) on the incentive effects of corporate debt.

reduction in dividend payments in period 0 – stemming from the rise in capital outlays – equals the gain in the manager's future pay-off. In the presence of pet-projects the manager's future pay-offs are augmented, since (equity-financed) pet-project boost the tax advantage accompanying the deductability of equity capital, on the one hand. On the other hand and even more importantly, the pet-project by itself generates some positive utility for the manger thereby augmenting his future pay-off. As perks do not capitalize in the firm value, unproductive pet-projects create a wedge between the manager's investment incentives and the ones of the shareholders. Consequently, the manager pays out too little dividends in order to finance his own projects – a finding which is in line with the free-cash hypothesis by Jensen and Meckling (1976).

Differentiation of (7a) and (7b) w.r.t. the corporate tax rate τ yields

$$\begin{array}{lll} \text{(a)} & \frac{dI_0}{d\tau} = & \frac{f'(I_0)-rz_2-1}{(1-\tau)f''(I_0)} \\ \text{(b)} & \frac{dJ_0}{d\tau} = & \frac{-\alpha(1+rz_2)}{(1-p(B_0))g''(J_0)} \quad > 0. \end{array} \tag{8}$$

A change in the tax rate increases the value of the deductibility provision, while lowering the net-of-tax return on productive investments. Following (7a), the latter effect dominates for $z_2 \in [0,1)$.[10] When $z_2 = 1$ the level of productive investment is undistorted in which case tax rate changes have not influence on productive investment. A tax rate increase has an unambiguously positive effect on pet-projects since the value of the equity cost deductibility as well as depreciation provision rises. We can thus summarize that a higher tax undermines incentives to invest productively while encouraging the management to invest in pet-projects.

Differentiating (7a) and (7b) w.r.t. the deductibility rate z_2 gives

$$\begin{array}{lll} \text{(a)} & \frac{dI_0}{dz_2} = & -\frac{\tau r}{(1-\tau)f''(I_0)} \quad > 0, \\ \text{(b)} & \frac{dJ_0}{dz_2} = & -\frac{\alpha\tau r}{(1-p(B_0))g''(J_0)} \quad > 0. \end{array} \tag{9}$$

Accordingly, a rise in the deductibility rate, z_2, promotes spending for both types of investment projects. As to the perturbations in the deductibility rate z_1 we find

$$\frac{dI_0}{dz_1} = \frac{dJ_0}{dz_1} = 0. \tag{10}$$

The intuition is that, given a level of corporate debt B_0, the higher tax savings following a higher z_1 leave investment incentives (being financed by equity at the margin) unaffected; thereby only capitalizing in the firm value.

The effect of corporate borrowing on investment behavior is as follows:

$$\begin{array}{lll} \text{(a)} & \frac{dI_0}{dB_0} = & 0 \\ \text{(b)} & \frac{dJ_0}{dB_0} = & \frac{p'(B_0)}{1-p(B_0)}\frac{g'(J_0)}{g''(J_0)} < 0 \end{array} \tag{11}$$

[10] Formally, using (7a) we find sign$\{dI_0/d\tau\}$=-sign$\{1-z_2\}$.

A higher exposure to debt repayment incentives the bank to monitor the investment behavior more intensively. This leaves productive investments unaffected, but, through the higher probability of contract termination, reduces the expected benefit and thereby the level of pet-projects.

3.2 Stage 1: Choice of Corporate Debt

The board (i.e., the external shareholders) chooses the level of corporate debt B_0. It maximizes (4) subject to (1) and (2), anticipating how managers will decide on the profile of dividend payments by selecting I_0 and J_0 - see (7a) and (7b). Invoking the envelope theorem, the first-order condition reads:

$$\left(-1+\frac{(1+rz_2)\tau}{1+r}\right)\frac{dJ_0}{dB_0}+\frac{(1+rz_1)\tau}{1+r}-\frac{c'(B_0)}{1+r}=0. \tag{12}$$

A higher level of corporate debt increases distributions because managers divert less resources and debt cost are tax-deductible. The board uses debt financing up to the point where the increase in firm value is equal to the higher cost of debt finance. Differentiating the first-order condition w.r.t. the tax rate and deductibility rate z_1, respectively, yields:

$$\begin{array}{lll} \text{(a)} & \frac{dB_0}{d\tau} = & -\frac{1}{\Delta}\left(\frac{1+rz_1}{1+r}+\frac{1+rz_2}{1+r}\frac{dJ_0}{dB_0}\right) \\ \text{(b)} & \frac{dB_0}{dz_1} = & -\frac{r\tau}{(1+r)\Delta}>0 \end{array} \tag{13}$$

where $\Delta<0$ denotes the second-order condition for the choice of debt which is negative at the optimum. Higher taxes have countervailing effects on the use of debt. On the one hand they lower the cost of debt finance (by increasing the tax savings through the deductibility of the cost of debt finance). On the other hand, the reduction in perk-investments leads to higher tax payments. Differently, a more generous deductibility provision for debt z_1 lowers the perceived cost of debt finance and the board will unambiguously choose a higher level of indebtedness in response. As to the effect of z_2, differentiating (12) and noting (11) yields

$$\frac{dB_0}{dz_2}=-\frac{1}{\Delta}\left[\frac{r\tau}{1+r}\frac{dJ_0}{dB_0}+\left(-1+\frac{(1+rz_2)\tau}{1+r}\right)\frac{p'(B_0)}{(1-p(B_0))}\left(\frac{g'(J_0)}{g''(J_0)}\right)'\frac{dJ_0}{dz_2}\right], \tag{14}$$

where the last expression is given by (9b). The expression $(\cdot)'$ denotes the first derivative of the term in brackets w.r.t. J_0. To simplify the exposition of the analysis and, in particular, to avoid signing third derivatives we assume $(\cdot)'$ to be non-positive. A wide variety of utility functions satisfy this requirement including Cobb-Douglas utility, iso-elastic utility, and exponential utility. Taken together, a higher z_2 has two effects on corporate debt: First, it incentivices the manager to increase pet-projects. To counteract the diversion of resources, the board generically allows for a higher level of debt so as to deter the manager from unproductive investment through a higher detection probability. Second, tax savings of equity-financed investments increase which undermines the benefit of less perk-investment.

4 Comparing Tax Systems: ACE vs. CBIT

As shown above, a change in each of the tax instruments has generically different implications for each type of investment and corporate debt levels. The finding raises the question of how a tax system should be designed in order to ameliorate the agency problem. In analyzing this issue, we start out with the basic question of whether the tax system can be assigned a Pigouvian role, i.e we first assume that the government has a purely corrective concern. Considering perk-investment to be wasteful from a social perspective, the government sets τ, z_1, and z_2 so as to increase firm value and rebates tax revenues in a lump-sum fashion. Such a strategy implies that the government maximizes the sum of firm value and discounted tax revenues (i.e. before tax firm value), anticipating how investment and corporate debt choices respond to the tax system. Using (1) and (2) the government's objective becomes

$$\max \quad X_0 + B_0 - I_0 - J_0 + \frac{f(I_0) - (1+r)B_0 - c(B_0) - T}{1+r} + \frac{T}{1+r}, \tag{15}$$

where

$$T = \tau \left(f(I_0) - r \left(z_1 B_0 + z_2 K_0 \right) - K_0 \right). \tag{16}$$

Differentiating the above equation we get

$$-\frac{dI_0}{d\tau} - \frac{dJ_0}{d\tau} + \frac{f'(I_0)}{1+r}\frac{dI_0}{d\tau} - \frac{c'(B_0)}{1+r}\frac{dB_0}{d\tau}. \tag{17}$$

If we evaluated equation (17) subject to the constraint $(\tau, z_1, z_2) \in [0,1]^3$, we find that the government has an incentive to set $\tau = 0$. The reduced spending on productive investments increases dividend payments in period 0, but lowers dividend payments in the subsequent period. As we learn from (7a), a non-negative tax rate implies $f'(I_0) \geq 1 + r$, indicating that the firm value drops on net. Taken together with the fact that spending on perks as well as corporate debt rises with a higher tax rate, the government cannot do better than setting a zero tax rate. Hence,

Proposition 1: *The corporate tax rate which maximizes firm value is* $\tau = 0$.

Following Proposition 1 the tax value of the deductibility provision vanishes (as $\tau = 0$), and the choice of z_1 and z_2 becomes immaterial. Positive taxes hence have no corrective role in this setting since the distortions in both investment margins are aggravated: productive investments are discouraged while investments in pet-projects are encouraged. The latter effect causes the board to rely more on external monitoring (via a higher corporate debt level) which causes firm value to drop further.

A more constrained approach would be to ask how the deductibility provisions should be

chosen for a given tax rate $\tau \in (0,1)$, i.e. whether z_1 and z_2 have a corrective role in itself. Differentiating (3) subject to (1) and (2) w.r.t. z_1 and invoking the envelope theorem yields

$$\left(-1+\frac{(1+rz_2)\tau}{1+r}\right)\frac{dJ_0}{dz_1}+\frac{\tau r B_0}{1+r} \tag{18}$$

The first term vanishes since perk-investment is sensitive to z_1 - see (10). The second term represent the tax advantage associated with a higher deductibility rate which is immaterial for corrective policy. Thus, the optimal deductibility rate is undetermined. Turning to the deductibility of the cost of equity we likewise find

$$\left(-1+\frac{(1+rz_2)\tau}{1+r}\right)\frac{dJ_0}{dz_2}+\frac{\tau r K_0}{1+r}. \tag{19}$$

Again, the second term is immaterial for corrective policy. Thus, since a more favorable deductibility rate raises the amount of perk-investment, the optimal rate is $z_2 = 0$. Hence, fixing the tax rate at some positive level $\in (0,1)$, it is not optimal to allow for a deductibility of the cost of equity finance. The conclusion is that a government interest in correcting the agency conflict will not opt for an ACE. Rather, it will be interested in implementing a CBIT. Hence,

Proposition 2: *For any $\tau \in (0,1)$ it is optimal to set $z_2 = 0$. Thus, an ACE system is not optimal.*

The implicit assumption underlying the Pigouvian approach is that the government has access to lump-sum taxes. A different approach is that the government is not solely concerned about efficiency, but any change in the tax system may require revenue neutrality; that is, the government chooses τ, z_1, and z_2 in order to keep the budget balanced. For a constant amount of tax revenues (16), the corporate tax rate and deductibility rates are related as follows

$$\left.\frac{di}{dj}\right|_{dT=0} = -\frac{\partial T/\partial j}{\partial T/\partial i} > 0 \quad i,j \in \{\tau, z_1, z_2\}, \quad i \neq j. \tag{20}$$

We assume that the economy is on the upward sloping part of the Laffer-curve w.r.t. both the tax rate, $\partial T/\partial \tau > 0$, and the deductibility rates, $\partial T/\partial z_1 < 0$ and $\partial T/\partial z_2 < 0$. The government cannot grant both a lower tax rate and a more favorable deductibility provision to firms, thus facing a fiscal trade-off in its choice of fiscal parameters.

To see whether there is some scope for z_2 to be positive we simplify the model by assuming $B_0 \equiv 0$. Thus, changes in z_1 have no incentive effects for managers through changes in corporate debt levels. We next compute the change in the firm value resulting from a revenue-neutral change in the tax system, i.e. due to a revenue-neutral increase in the deductibility provision, z_2 and the tax rate, τ. To this end, we compute the associated dividend responses in period 0 and period 1. From (1) and (2) we get

$$\left.\frac{dD_0}{dz_2}\right|_{dT=0} = -\frac{dI_0}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} - \frac{dI_0}{dz_2} - \frac{dJ_0}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} - \frac{dJ_0}{dz_2}, \tag{21}$$

and

$$\left.\frac{dD_1}{dz_2}\right|_{dT=0} = f'\left(\frac{dI_0}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} + \frac{dI_0}{dz_2}\right) - \frac{dT}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} - \frac{dT}{dz_2}. \tag{22}$$

By construction, the change in the firm's tax liability is constant and the last two terms in (22) vanish. Taken together, the response in the firm value states

$$\begin{aligned}\left(\frac{dD_0}{dz_2} + \frac{1}{1+r}\frac{dD_1}{dz_2}\right)\Bigg|_{dT=0} \quad = \quad & \left[\left(-1 + \frac{f'}{1+r}\right)\left(\frac{dI_0}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} + \frac{dI_0}{dz_2}\right)\right] \\ & -\frac{dJ_0}{d\tau}\left.\frac{d\tau}{dz_2}\right|_{dT=0} - \frac{dJ_0}{dz_2}.\end{aligned} \tag{23}$$

As long as $\tau > 0$ (which is a necessary condition for $T > 0$), the marginal productivity of capital exceeds unity, $f' > 1 + r$. Since the level of pet-projects unambiguously increase due to the revenue-neutral change in the tax system the response in the firm value critically depends on the response of productive investments – as captured by the first term in brackets on the r.h.s. of (23).

The change in productive investments depends, for instance, on the initially prevailing tax system, but also on the conflict of interest between the manager and the shareholders. The latter may be surprising since incentives to spend on productive investments are not affected by the conflict of interests as captured by $g'(J_0)$ in (7b). However, the level of pet-projects carried out, depends on the extent an increase in z_2 is tracked by a rise in the corporate tax rate. In detail, the more pronounced the conflict of interest between shareholders and managers, $g'(J_0)$, the higher the level of pet-projects and, thus, the revenue shortfall due to a more generous deductibility provision, z_2. Accordingly, the increase in the corporate tax rate must be sufficiently high to keep tax revenues constant, $d\tau/dz_2|_{dT=0} \gg 0$, what in turn reduces productive investments. The monotonicity finding implies that whenever such a revenue-neutral tax reform causes productive investments to fall (and therewith the firm value) in the absence of an agency conflict, productive investments will also fall in the presence of such a conflict, independently of its magnitude.

Proposition 3: *Assume $d\tau/dz_2|_{dT=0} > 0$. Given that a revenue neutral tax-cut-cum-base-broadening tax reform (lower z_2 and lower τ) raises the firm value in absence of an agency conflict, it also does so in the presence of such a conflict, independently of its severeness.*

Appealing to a continuity argument, if a revenue-neutral rise in z_2 increases productive investments in the absence of agency problems, productive investments will also be increased for a sufficiently low divergence of interest between shareholders and the management. However, if the agency conflict is sufficiently severe the firm value will unambiguously fall. To illustrate this finding we apply the following functional forms for the investment function, $f(I_0)$, and the manager's utility function $g(J_0)$ and perform a simulation analysis

$$f(I_0) = aI_0^{\gamma}, \quad a, \gamma > 0, \qquad \text{and} \qquad g(J_0) = \omega \ln J_0, \quad \omega > 0. \tag{24}$$

The parameter ω measures the conflict of interest between shareholders and the manager. Given a parameter combination of $a = 10, \alpha = 0.1, \gamma = 0.2, r = 0.05, \tau = 0.2$ and $z_2 = 0$, we compute the response of productive investments due to revenue-neutral change in the tax system. In doing so, we evaluate

$$\frac{dI_0}{d\tau} \left. \frac{d\tau}{dz_2} \right|_{dT=0} + \frac{dI_0}{dz_2} \tag{25}$$

subject to the above mentioned parameter constellation. Our results show that the response of productive investments is positive for $\omega \in (0, 0.6)$. So, if the conflict of interest between shareholders and managers is sufficiently small, a revenue neutral increase in the deductibility provision will rise productive investments. Note, $\left. \frac{d\tau}{dz_2} \right|_{dT=0}$ is positive e.g. for all values of $\omega \in (0, 100)$ and the firm value increases over the range $\omega \in (0, 0.0065)$ and drops thereafter. Thus, if the divergence of interests between managers and shareholders is sufficiently strong, e.g. if $\omega > 0.0065$, a revenue-neutral increase in deductability provision z_2 unambiguously causes a decline in the firms value.

To verify under which conditions the introduction of a revenue-neutral deductability provision for the cost of equity finance lowers the firm value independently of the magnitude of the agency conflict, we use the same parameter combinations as above except of the corporate tax rate. The level of the latter at which the amount of productive investments reacts negatively for any value of ω is $\tau \approx 0.8$. Hence, independently of the severeness of the agency conflict, the level of corporate taxes, and hence the distortion in productive investment, must be sufficiently high such that the introduction of the allowance for corporate equity reduces firm value straight away.

5 Conclusion

This paper analyzes the effects of different corporate tax provisions on the firm's investment behavior. Unlike the neoclassical view of the firm, we incorporate an agency conflict in the relation between shareholders and the management as investment may take two forms: investment are either productive and, thereby, enhance the firm value or investments are purely

dissipative from the shareholders' perspective, but utility-enhancing from the manager's perspective. In particular, we analyze the impact of an Allowance for Corporate Equity (ACE), i.e. the tax deductibility of the corporate cost of finance, on the firm's the investment pattern and its firm value. The main result of our analysis is that the deductibility provision for the cost of corporate equity finance may not be similarly welcome as under the neoclassical view of the firm. A government which is interested in correcting the agency conflict will generically not opt for an ACE. Moreover, a revenue-neutral tax-cut-bum-base-broadening reform of the corporate tax system enhances the firm value unless the agency conflict is severe and/or the statutory corporate tax rate is high. The result is informative for the general discussion on the tax treatment of the cost of capital (both equity and corporate debt). Among the two polar systems (ACE and CBIT) the results provide an underpinning for the CBIT.

A straightforward question is whether endogenously chosen incentive contracts may not alter the basic finding of our paper. The main insights of the model have been derived for any given value of $\alpha \in (0, 1)$. Thus, we expect an endogenous choice of α, e.g. at stage 1 of the game, not to affect the basic notion that making the cost of equity finance to be tax-deductible has undesirable effects on corporate agency conflicts and thus firm value. The paper is silent on how the results change if the marginal source of investment finance is debt rather than retained earnings. Arguably, corporate debt will most likely not be the source of finance for mature firms. However, start-ups rely heavily on external financing, possible taking the form of corporate debt; see Schmidt (2003). We leave a thorough analysis of this issue to future research.

References

Aghion, P. and P. Bolton (1992), An Incomplete Contract Approach to Financial Contracting, Review of Economic Studies, 59, 473-494.

Auerbach, A. J. (1979), "Wealth Maximization and the Cost of Capital", Quarterly Journal of Economics, 93/3, 433-446.

Auerbach, A. J. and J. Hines (2002), "Taxation and Economic Efficiency", in Auerbach, A. J. and M. Feldstein (eds.), Handbook of Public Economics, Vol. 3, Amsterdam: North-Holland.

Bolton, P. and D. Scharfstein (1996), Optimal Debt Structure and the Number of Creditors, Journal of Political Economy, 104, 1-25.

Bond, S. R. (2000), "Levelling Up or Levelling Down? Some Reflections on the ACE and CBIT Proposals, and the Future of the Corporate Tax Base", in S. Cnossen (ed.)

Taxing Capital Income in the European Union, Oxford: Oxford University Press.

Bradford, D. F. (1981), "The Incidence and Allocation Effects of a Tax on Corporate Distributions", Journal of Public Economics, 15(1), 1-22.

Boadway, R. and N. Bruce (1984), A general proposition on the design of a neutral business tax, Journal of Public Economics, 24, 231-239.

Chetty, R. and E. Saez (2007), An Agency Theory of Dividend Taxation, NBER Working Paper 13538, Boston.

Jensen, M.C. and W.H. Meckling (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure", Journal of Financial Economics, 3(4), 305-360.

King, M. (1974), Dividend Behaviour and the Theory of the Firm, Economica, 41(1), 25-34.

King, M. (1977), Public Policy and the Corporation, London: Chapman and Hall.

Korinek, A. and J. E. Stiglitz (2006), Dividend Taxation and Intertemporal Tax Arbitrage, NBER Working Paper 13858, Boston.

Mas-Colell, M., M.D. Whinston and J.R. Green (1995), Microeconomic Theory, Oxford University Press, Oxford.

Schmidt, K. (2003), Convertible Securities and Venture Capital Finance, Journal of Finance, 58, 1139-1166.

Sinn, H.-W. (1987), Capital income taxation and resource allocation, Amsterdam: North-Holland.

Sinn, H.-W. (1991a), Taxation and the Cost of Capital: The 'Old' View, the 'New' View, and Another View", in D. Bradford, ed., Tax Policy and the Economy 5, NBER, 25-54;

Sinn, H.-W. (1991b), The Vanishing Harberger Triangle, Journal of Public Economics, 45 (3), 271-300.

Tirole, J. (2006), The Theory of Corporate Finance, Princeton University Press, Princeton.