Corporate Deductibility Provisions and Managerial Incentives*

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Abstract
Using an agency model of firm behavior, the paper analyzes whether the normal return on investment should be tax exempt. The findings suggest that, when managers engage in wasteful capital expenditures, welfare reduces if the corporate tax system exempts the normal return on investment from taxation. The optimal system may use the full return on investment as a tax base. When managers also provide productive effort, the finding is strengthened (weakened) provided effort and capital investment are substitutes (complements) in production. The results are informative as to when tax systems such as an Allowance for Corporate Equity or a cash-flow tax do have the familiar efficiency-enhancing effects known from neoclassical models of firm behavior.

JEL-Classification: H25, D21

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

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1 Introduction

The effects of corporate taxation on investment have been extensively discussed within the neoclassical model of firm behavior.\textsuperscript{1} The neoclassical framework treats the firm as a “black box”, operating so as to maximize the firm value. It thereby disregards tensions between the interests of executives and those of shareholders that are central to the corporate governance literature (see Tirole, 2006). In this paper, we set up an agency model of firm behavior in which we analyze the fundamental question in corporate taxation of whether the normal return on investment should be exempted from taxation and, hence, only rents should be taxed. The issue sparks a huge literature in public economics which analyzes the role of immediate write-off provisions for investment expenses (cash-flow tax) or a tax deductibility of the cost of finance (Allowance for Corporate Equity) in exempting the normal return on investment (see, e.g., Auerbach, 2002, and Auerbach et al., 2010, for a review of the literature).\textsuperscript{2} All such policies effectively involve a tax on the marginal return on investment and a subsidy on the marginal cost of investment in equal proportions, thereby taxing only extraordinary returns on investments (rents) and leaving investment choices undistorted. A full deductibility of either investment expenses or the cost of finance is efficient, absent agency problems. The paper shows that the conclusion may not hold in an agency model.

The agency model used in the paper builds on the non-verifiability of manager behavior and of some of the costs and benefits associated with it. In the model we consider two types of managerial decisions. First, managers and shareholders have diverging perceptions on the desirability of investment projects. Specifically, a manager has the opportunity to invest either in productive investment that yields a pecuniary return, capitalizing in the firm value, or in unproductive investments (pet-projects) that lead to a non-pecuniary return for the manager. The two different investment types are non-verifiable and thereby cannot be distinguished by the shareholders and the government. Thus, 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 abstain from wasteful capital expenditures. As a consequence, managers pay too little dividends compared with a situation where no agency problem exists between shareholders

\textsuperscript{1}See, for instance, King (1974), Auerbach (1979), Bradford (1981), Sinn (1991a) and, for a review of the literature, Auerbach (2002) and Auerbach et al. (2010).

\textsuperscript{2}The ACE was first proposed by the Institute of Fiscal Studies (IFS, 1991, and Devereux and Feeman, 1991) and is related to the work by Boadway and Bruce (1984). A refined treatment can be found in, for example, Bond and Devereux (1995).
and managers (Jensen and Meckling, 1976). The prediction is in line with empirical findings, showing that over-investment of free cash flow is a systematic phenomenon.\(^3\)

Second, managers provide output-enhancing effort. The effort choice is costly to managers. The amount of effort provision and its private cost is non-verifiable. The agency problem inherent to the choice of productive effort is central to the literature on incentive contracting (Bolton and Dewatripont, 2005; Tirole, 2006). Therein, the effort choice may be treated as a substitute or as a complement to other inputs. For instance, managers may generate output by either exerting effort or by using more physical resources (or, alternatively, by being more competent). The agency problem is thereby rooted in the substitutability between both inputs since own effort can be reduced at the expense of using more physical resources or competence can be hidden by reduced effort choices. Differently, effort may also increase the probability of project success in which case effort and, for instance, investments tend to become complements ex-ante.

We show that corporate deductibility provisions have ambiguous welfare implications. In particular, the welfare effects are sensitive to whether dividend distributions are made at the investment stage, i.e. whether the firm is cash constrained. With no cash distributions at the investment stage, deductibility provisions related to investment expenses or the cost of finance do not affect welfare. The provisions turn into a lump-sum subsidy with no capacity to improve efficiency.

Differently, with cash distributions at the investment stage the choice of the deductibility provision influences welfare. The welfare effects depend on the relative importance of the two managerial choice problems. Taking the choice of managerial perks in isolation, a less generous deductibility provisions increases welfare, possibly implemented as part of a tax-cut cum base-broadening policy reform. Intuitively, a lower deductibility rate lowers perk investment which positively influences tax revenues. As a counteracting effect, productive investment may drop as well which negatively affects public revenues. Provided the latter response is not too strong, it is optimal not to allow for a deductibility provision. Otherwise, a reduction in the deductibility rate in combination with a lower corporate tax rate, which is set so as to leave productive investment constant, unambiguously raises welfare. The reason is that the two adjustments in

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3Among others, Richardson (2006) finds that for firms with positive free cash flow managers over-invest 20 per cent of it. Harford (1999) suggests that cash-rich firms are more likely to make acquisitions that subsequently experience abnormal declines in operating performance. Dittmar and Mahrt-Smith (2007) provide similar evidence and relate the agency conflict to the quality of governance. They show that firms with poor corporate governance dissipate excess cash reserves more quickly on less profitable investments than with good corporate governance.
fiscal parameters reinforce each other in reducing managerial incentives to spend on perks. The absence of a deductibility provision promotes welfare.

The welfare effects become more diverse in the presence of output-enhancing effort choices by the manager. The precise welfare implications depend on how effort and productive investment interact in production. Provided both inputs are substitutes, the drop in productive investment following the reduction in the deductibility rate increases managerial effort provision. The rise in output positively affects tax revenues and thus welfare. The finding reinforces the welfare implications which already apply with perk investments. Conversely, provided both inputs are complements, incentives to exert effort are diluted when the deductibility provision becomes less generous. As a consequence, scope for a lower deductibility rate to enhance welfare becomes less pronounced, keeping the level of the corporate tax constant. Finally, we find that, when corporate taxes discourage productive investment, a tax-cut cum base-broadening reform promotes welfare for two reasons. In the extended model, the policy reform not only reduces perks, but also raises effort provision.

In sum, the paper allows for a more informed prediction as to when deductibility provisions have the familiar efficiency-enhancing effects known from neoclassical models of firm behavior. We should emphasize that the findings do not depend on superior instruments the government has relative to shareholders in controlling manager behavior. The results are due to fiscal externalities, i.e. the effects of firm choices on public revenues. Controlling fiscal externalities is arguably beyond the interest of shareholders and, thus, this type of externality will not be internalized by managerial incentive schemes which shareholders implement.

The results of the paper have implications for tax policy. Various countries have opted for or consider augmenting the deductibility of the cost of debt finance by a similar provision for the cost of equity finance. This partly reflects the view that, since a significant fraction of new investments is equity financed through retained earnings, the additional deductibility of the cost of equity finance promotes aggregate investment and welfare (see, e.g., Devereux and De Mooij, 2009, Auerbach et al., 2010, and Griffith et al., 2010). This paper’s findings suggest that the move to an ACE system will increase aggregate investment which, however, may reduce welfare.

1.1 Literature Review

As mentioned above, our paper differs from the large body of public finance literature which typically abstracts from corporate agency problems (Auerbach, 2002; Hasset and Hubbard, 2002).
An early exception is found in Kannaiainen and Södersten (1994) who analyze the impact of bank monitoring on the response of firms to corporate taxes. They take the view that monitoring perfectly solves any conflict between shareholders and the management; hence, agency problems that result in diverging investment incentives are effectively absent in their analysis.

Only recently have agency problems made an explicit appearance in tax policy analysis. Desai et al. (2007) show that, when managers can divert resources, corporate taxes interact with the level of investment and rent diversion. Corporate taxes may amplify the agency problem.\(^4\) Chetty and Saez (2010) consider the efficiency effects of dividend and corporate taxes in an agency model of free cash flow. Both contributions do not consider a deductibility provision for investment expenses or the cost of finance.\(^5\) Schjelderup and Schindler (2008) analyze the effects of corporate taxes on tax avoidance behavior when there is a conflict of interest among shareholders. The work does not analyze the efficiency effects of deductibility provisions. Also, our analysis builds on externalities firms exert on the public budget rather than on externalities between shareholders. In line with conventional wisdom, Keuschnigg and Ribi (2009) show that for cash-constrained firms a cash-flow tax and an ACE tax welfare dominate a tax system that allows only for limited or no deductibility provisions. Finally, Hauller and Schjelderup (2000) show that a cash-flow tax and an ACE system\(^6\) lower welfare once firms are able to shift profits outside the jurisdiction. The finding relies on inefficiencies associated with decentralized tax choices rather than on corporate agency problems.

This paper proceeds as follows. In Section 2 we set up an agency model of firm behavior with perk investment. In Section 3 we characterize firm investment behavior and in Section 4 we analyze the welfare implications of deductibility provisions. In Section 5 we extend the analysis to allow for imperfections in corporate governance. We introduce output-enhancing effort choices into the model in Section 6. Finally, we provide a summary of the results and offer some conclusions in Section 7.

\(^4\)In their model the agency problem takes the form of managerial theft. Hence, resources leave the firm instead of staying within the firm as in our model (with empire-building investments). From that perspective, the work of Desai et al. (2007) is more targeted to economies with poor corporate governance systems. Besides corporate taxes, Desai et al. also consider tax enforcement policies. See also Desai and Dharmapala (2006) andCrocker and Slemrod (2005) on tax enforcement policies when managers and shareholders have misaligned interests.

\(^5\)Related contributions on dividend taxation include Gordon and Dietz (2009) and Korinek and Stiglitz (2009).

\(^6\)Haufler and Schjelderup explicitly consider a cash-flow tax which is equivalent to an ACE system in their setting.
2 Model Set-Up

Consider a two-period model of corporate investment in which managers can make two types of investments: productive investments $I$ and unproductive investments (pet-projects) $J$. Initially, the firm has cash holdings $X$ and possibly a positive amount of debt $B$ that can either be paid out as dividends, $D_1$, or used for productive investment or for pet-projects. Thus, the firm’s flow of dividends in period 1, $D_1$, is

$$D_1 = X + B - I - J.$$  \hspace{1cm} (1)

In period 2, the firm produces output using the technology $f(I)$ which is strictly increasing and concave in the amount of productive investment. At the end of period 2, the firm is liquidated and all liquidation proceeds net of taxes and liabilities are paid to shareholders. Hence, dividend payments in the second period depend on the firm’s net-of-tax profits minus principal and interest on debt:

$$D_2 = (1 - \tau)f(I) + \tau(r(z_1B + z_2(K - B))) + \tau K - (1 + r)B,$$  \hspace{1cm} (2)

where $K = I + J$ denotes the aggregate amount of investment and $K - B > 0$ is the equity base of the firm (after first-period dividends are paid out). The first term in (2) denotes the net-of-tax return on productive investments $I$. The second term gives the tax savings due to a deductibility of the cost of finance. The variables $z_1, z_2 \in [0, 1]$ indicate the extent to which debt interest and the opportunity cost of equity capital are deductible from the corporate tax base. When both tax parameters equal one, debt interest and the opportunity cost of equity are fully tax deductible as in the case under the Allowance for Corporate Equity (ACE) 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).\footnote{The CBIT was advocated by the US Treasury (1992).} Most existing tax systems include elements of both polar systems by deducting only the cost of debt finance, i.e. $z_1 = 1$ and $z_2 = 0$. An alternative way of considering a deductibility provision is to allow for an immediate write-off of investment expenses (R-based cash flow tax).\footnote{Such a provision can be considered by subtracting the term $z_3 K (1 + \tau)$ from the firm’s tax base in period 2 and eliminating the depreciation term $\tau K$ in (2). If $z_3 = 1$, the tax system offers a full immediate write-off.} An immediate expensing of investment has equivalent effects on investment and welfare as a deductibility of the cost of investment finance. Thus, the subsequent results can be interchangeably expressed in terms of the deductibility of the cost of finance or of investment expenses. Capital is assumed to fully depreciate after use in
production. The third term in (2) represents the tax savings due to capital depreciation.\(^9\)

We consider a mature firm that uses retained earnings to finance both types of investments at the margin. The value of a firm is determined by the present value of all future dividend payments less equity injections. Since a mature firm with excessive cash flow will not issue new equity, the firm value is\(^{10}\)

\[
D_1 + \frac{D_2}{1 + r},
\]

where \(D_1\) and \(D_2\) are given by (1) and (2), respectively. We do not formally introduce a dividend tax in (3). The results of our paper, however, equally hold in the presence of dividend taxation as long as corporate taxes cannot be fully credited against the shareholder’s personal income tax. Tax systems that entail an incomplete offset of corporate taxes at the shareholder level are implemented in a number of countries, including Germany, the US, and the UK.

As indicated above, shareholders and the manager have non-congruent investment incentives. In particular, managers either invest productively or unproductively. While productive investments \(I\) yield a pecuniary net-of-tax return of \((1 - \tau)f(I)\), which capitalizes in firm value, pet projects \(J\) solely generate a private benefit \(g(J)\) for the manager, where manager utility \(g(J)\) is strictly increasing and concave.\(^{11}\) One may view \(J\) as empire-building investments or investments that imply a quiet life for managers.\(^{12}\) In either case, capital \(J\) remains inside the firm and is part of the firm’s balance sheet.\(^{13}\)

Shareholders would like to induce the manager to invest so as to maximize their wealth (3). Noting (1) and (2), the wealth of the shareholders is maximized if managers do not engage in pet projects, \(J\), and if they select an investment level \(I\) which satisfies

\[
f'(I) = \frac{1 + r - (1 + 2r)\tau}{1 - \tau}.
\]

\(^9\)Alternatively, we could allow capital not to depreciate or \(I\) and \(J\) to depreciate at different rates.

\(^{10}\)Strictly speaking, it is only in the presence of dividend taxation that a mature firm with sufficient cash flows never issues equity and distributes dividends simultaneously (see, e.g., Sinn, 1987, 1991b). Intuitively, 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 \(1 - \tau D\) Euros when 1 Euro is distributed as dividends by the firm (with \(\tau D\) denoting the dividend tax). The reasoning applies in a neoclassical investment model and in the agency model adopted here.

\(^{11}\)The sharp distinction between the two investment types is made for simplicity. The paper’s results equally hold when pet-projects \(J\) are also productive, but sufficiently less productive than investments \(I\). Also, to exclude hurdle rates related to the rate of return on investment to solve the agency problem, we could additionally allow both returns to be stochastic.

\(^{12}\)It may require less effort by the manager to handle the investment \(J\), giving the manager a quite life. In this case, \(g(J)\) is the gain in utility which results from less effort provision.

\(^{13}\)Note, we do not view \(J\) as resources that are directly diverted by the manager. We thereby implicitly assume “mature” corporate governance structures to be in place which preclude theft on the part of the manager. See, for instance, Desai et al. (2007) on managers’ incentives to divert resources in low-quality governance economies.
The investment level of the firm is still below the undistorted level as long as the tax system does not provide full deductibility of the cost of equity finance. If it does \( z_2 = 1 \), as is the case under an ACE tax system, the investment rule reduces to \( f'(I) = 1 + r \).

Agency problems arise when investment decisions are delegated to a manager and both investments, \( I \) and \( J \), are non-verifiable, i.e. neither shareholders nor the government is able to verify (at reasonable costs) whether the investments are productive or perks.\(^{14}\) This has two implications. First, the tax system cannot distinguish between the two investment types. The deductibility of the cost of finance as well as depreciation applies to both types; see (2). Secondly, shareholders cannot design incentive schemes which are conditioned on the level of \( J \), ensuring \( J = 0 \).\(^{15}\) Still, shareholders may use, for instance, incentive contracts or may exert effort in monitoring managers to align the incentive of managers and shareholders. We assume that shareholders have a sufficiently rich set of instruments available to induce the manager to fully take the consequences of his behavior on shareholder wealth (3) into account, at least at the margin. The assumption serves to clarify that the results do not rely on imperfections in corporate governance to address externalities between shareholders and the manager. Later on, we will show that the paper’s findings are robust to the inclusion of imperfections in corporate governance in which case the government has an advantage over shareholders in controlling the shareholder-manager relationship.

The manager thus chooses productive investments \( I \) and pet projects \( J \) (and thereby \( D_1 \) and \( D_2 \)) so as to maximize

\[
D_1 + \frac{D_2}{1 + r} + \frac{g(J)}{1 + r},
\]

where dividend payments follow from (1) and (2).

The timing of events is as follows: In period 1, the management chooses the level of investments \( I \) and pet projects \( J \). In period 2, production takes place, taxes are collected, shareholders receive dividend payments \( D_2 \), and the manager receives utility \( g(J) \). We apply backward induction to solve for a subgame-perfect equilibrium.

\(^{14}\)This implies that the input-output relation prescribed by \( y = f(I) \) is not verifiable such that the inverse \( f^{-1}(y) \) cannot be used to contract on \( I \).

\(^{15}\)Corporate debt may ameliorate agency problems. Debt effectively mortgages the normal return on investment that must be paid out to debt claimants, thereby reducing the free cash flow available for perks (Jensen, 1986, 1993; Grossman and Hart, 1982). The threat of firm liquidation inherent to debt finance provides similar incentives for perk spending (Aghion and Bolton, 1992; Bolton and Scharfstein, 1996). In our setting, the incentive device is only partly effective. For any amount of cash left in the firm (i.e. after debt payment), the manager will invest some funds in unproductive investments. The disciplining effect of corporate debt will not perfectly curb empire-building tendencies.
3 Firm Behavior

The manager maximizes (5) subject to (1) and (2). Investment policy critically depends on whether first-period dividend payments are positive, i.e., whether finance-constraints exist.\footnote{See, e.g., Fazzari et al. (1988) and Kaplan and Zingales (1997) on the empirics of finance constraints. Finance constraints prove useful in reconciling the extensive margin of firm dividend responses to the 2003 dividend tax cut in the U.S., see Chetty and Saez (2010).} Provided $D_1$ is zero, the first-order condition for $I$ is

$$
(1 - \tau)f'(I) = g'(X + B - I),
$$

(6)

where $J = X + B - I$ is residually determined. The level of $D_1$ is zero if $(1 - \tau)f'(I) + z_2\tau r + \tau > 1 + r$ holds at the optimum prescribed by (6).\footnote{Productive capital, hence, earns an excess return which is a common feature of constrained investment models. See, e.g., Holmstrom and Tirole (1997).} Combining (6) with the inequality, the absence of first-period distributions is more likely the lower initial cash holdings $X + B$.\footnote{External financing due to, for example, new share issue is associated with significant transaction costs which prohibits firms to use new share issue as a regular means to overcome a lack of sufficient internal funds as we assume here. In Koethenbuerger and Stimmelmayr (2009), we extend the analysis to allow firms to issue new shares as well as to use debt finance at no transaction costs.} Following (6), the manager weights the additional second-period dividend payments when investing productively against the loss in private utility from perks. Since the subsidy $z_2$ is granted to both investment types, the relative attractiveness of productive and perk investment is not affected by $z_2$. Hence, the subsidy leaves investment incentives unchanged and, along with the subsidy $z_1$, proportionally capitalizes in firm value.

When dividend payments are positive in the first period, the first-order conditions for the optimal choice of investments, $I$, and pet projects, $J$, are

\begin{align*}
\text{(a)} & \quad -1 + \frac{1}{1+r} ((1 - \tau)f'(I) + z_2\tau r + \tau) = 0 \\
\text{(b)} & \quad -1 + \frac{1}{1+r} (z_2\tau r + \tau) + \frac{g'(J)}{1+r} = 0.
\end{align*}

(7)

Productive investment yields an increase in dividend payout in period 2 consisting of the net-of-tax return on the productive investment and the tax advantage resulting from the deductibility of the cost of equity finance. At the optimum, the marginal benefit equals the loss in dividend payments in period 1, as shown by the first-order condition (7a). Since the benefits and costs of productive investments fully capitalize in dividend payments, the investment incentive of the manager and shareholders are perfectly aligned. The amount of $I$ coincides with the level preferred by shareholders; c.f. (4).
The manager invests in pet projects up to the point where the reduction in dividend payments equals the marginal utility of pet projects, see (7b). The reduction in dividend payment equals the rise in unproductive investment net of tax savings due to the deductibility of the cost of equity finance and the depreciation allowance. As the benefit of perks does not capitalize in the firm value, pet projects create a wedge between the manager’s investment incentives and the shareholders’ interest. Consequently, the manager pays out too little dividends in order to finance his own projects – a finding that is in line with the free cash flow hypothesis of Jensen and Meckling (1976).

Differentiation of (7a) and (7b) with respect to the corporate tax rate $\tau$ yields

$$\frac{dI}{d\tau} = \frac{f'(I) - rz_2}{(1 - \tau)^2 f(I)} - rz_2 > 0.$$  \hfill (8)

A rise in the tax rate increases the value of the deductibility provision, while it lowers the net-of-tax return on productive investments. Using (7a) and (8a), the latter effect dominates for $z_2 \in [0,1)$ which signs the investment response negative.\(^{19}\) When $z_2 = 1$, both effects cancel out and the tax rate has no distorting effect on the level of productive investment (c.f. Boadway and Bruce, 1984; Devereux and Freeman, 1991). A higher tax rate has an unambiguously positive effect on pet projects because the value of the cost deductibility as well as depreciation provision rises.\(^{20}\)

Differentiating (7a) and (7b) with respect to the deductibility rate $z_2$ gives

$$\frac{dI}{dz_2} = -\frac{\tau r}{(1 - \tau)^2 f(I)} > 0,$$

$$\frac{dJ}{dz_2} = -\frac{\tau r g''(J)}{g'(J)} > 0.$$  \hfill (9)

A rise in the deductibility rate, $z_2$, promotes spending for both productive investments and pet projects which reflects the higher subsidy on investment outlays. As to perturbations in the deductibility rate $z_1$, we find no effect on investment:

$$\frac{dI}{dz_1} = \frac{dJ}{dz_1} = 0.$$  \hfill (10)

Intuitively, both investment types are equity financed at the margin, such that a more generous deductibility rate for interest payments leaves investment incentives unaffected, and so only capitalize in the firm value.

\(^{19}\)Formally, using (7a) we find $\text{sign}(dI/d\tau) = -\text{sign}(1 - z_2)$.

\(^{20}\)Fiscal depreciation is not necessary for the result to hold. Even when perks do not fiscally depreciate we cannot avoid the conclusion in our model.
4 Welfare Implications

Subsequently, we will analyze the welfare implications of the choice of the corporate tax base. To focus on the efficiency costs of tax policy we assume that tax revenues are rebated to taxpayers as a lump sum. The government sets \( z_2 \) so as to maximize the sum of private welfare (comprising firm value and utility from perks) and discounted tax revenues, anticipating how investment choices respond to the tax system.\(^{21}\) Formally, using (1) and (2) the government solves\(^{22}\)

\[
\max_{z_2 \in [0,1]} W = X + B - I - J + \frac{f(I) - (1 + r)B - T}{1 + r} + \frac{g(J)}{1 + r} + \frac{T}{1 + r},
\]

where

\[
T = \tau (f(I) - (z_1 r B + z_2 r (K - B)) - K)
\]

and investment responses follow from (6) or (7).

4.1 No First-Period Dividend Payments

We first turn to the case in which first-period dividend payments are zero, effectively assuming that \( X + B \) is not too large.

Following (6), investment behavior is unaffected by the deductibility rate \( z_2 \). The total amount of investment is constant (\( dI + dJ = 0 \)) and, since the deductibility provision is granted to both investments, \( z_2 \) does not influence the structure of investment. As such, changes in \( z_2 \) only exert mechanical tax revenue effects, and so the deductibility provision is effectively a lump-sum subsidy. We can immediately conclude:

**Proposition 1:** Assume the firm does not pay dividends in the first period. Then, for any level of the corporate tax rate \( \tau \in (0,1) \), a full or partial deductibility of the cost of finance, \( z_2 \in (0,1] \), yields the same level of welfare as no deductibility provision, \( z_2 = 0 \).

Proposition 1 states an equivalence result: Provided all internal funds are used for investments, a tax system that exempts the normal return on investment (such as an ACE or cash-flow

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\(^{21}\)We abstain from a formal representation of the welfare effect of \( z_1 \). Since corporate debt is exogenous and investment levels do not respond to \( z_1 \) the deductibility rate \( z_1 \) is effectively a lump-sum subsidy; entailing no efficiency cost or benefit.

\(^{22}\)We restrict the choice of \( z_2 \) to the unit interval which is the relevant range for implementing an ACE or CBIT system as polar cases. We may thus pick constrained optimal solutions. The characterization of unconstrained optimal deductibility rates straightforwardly follows from the respective welfare analysis.
tax), and a tax system that taxes the full return on investment (CBIT) are equivalent for a given choice of the corporate tax rate. The finding contrasts previous literature which shows that, when interests between managers and shareholders are aligned, a tax exemption of the normal return on investment \( z_2 = 1 \) increases welfare and, in fact, ensures efficiency of investment choices.

### 4.2 First-Period Dividend Payments

We now consider the case in which first-period dividend payments are positive. Differentiating welfare with respect to the deductibility rate \( z_2 \), we find

\[
\frac{dW}{dz_2} = \frac{1}{1 + r} \left( \tau \left( f'(I) - rz_2 - 1 \right) \frac{dI}{dz_2} - \tau (rz_2 + 1) \frac{dJ}{dz_2} \right).
\] (13)

Productive and unproductive investments do not influence private welfare which follows from an application of the envelope theorem. The two terms in (13) give the fiscal externality which a change in productive and perk investments exert on public revenues. The two revenue effects are of opposite sign. A more generous deductibility provision negatively affects revenues due to the induced rise in perks, but simultaneously tends to expand the tax base through the positive adjustment in productive investment. To see the latter, note that, following (7a), the term \( f'(I) - rz_2 - 1 \) is positive for \( z_2 \in [0, 1) \) and vanishes only for \( z_2 = 1 \). Taken together, the overall welfare effect of perturbations in \( z_2 \) is ambiguous in sign.

At this point it might be instructive to characterize the optimal choice of \( z_2 \) in the absence of an agency problem, i.e. in the absence of verifiability problems. When \( J \equiv 0 \), the welfare term (13) only comprises the fiscal externality due to the change in productive investment. Following (7), the externality is positive for \( z_2 < 1 \) and zero at \( z_2 = 1 \). Thus, setting \( z_2 = 1 \), fiscal externalities do not exist for any choice of \( \tau \). Intuitively, allowing for a full deductibility of the equity cost of finance insulates the return on investment from the tax rate which leaves investment incentives undistorted, i.e. \( f'(I) = 1 + r \) (Boadway and Bruce, 1984; Devereux and Freeman, 1991). The effects on the public budget thereby vanish. Moreover, the efficiency cost of the corporate tax \( \tau \) vanishes as well, and the tax rate can be set at any feasible level to collect revenues on rents.\(^{23}\)

\(^{23}\)To see more formally why the corporate tax rate is turned into a lump-sum tax, differentiate welfare with respect to \( \tau \), while accounting for \( J \equiv 0 \):

\[
\frac{dW}{d\tau} = \frac{1}{1 + r} \tau (f'(I) - rz_2 - 1) \frac{dI}{d\tau}.
\]
In the presence of an agency conflict a higher $z_2$ exerts counteracting effects on welfare, c.f. (13). Evaluated at $z_2 = 1$, the positive tax base effect due to changes in productive investments is zero since, following (7a), $f'(I) - rz_2 - 1 = 0$ at $z_2 = 1$. This precludes $z_2 = 1$ to be the optimal choice of the deductibility rate. Intuitively, at $z_2 = 1$ the return and cost of productive investment are fully included in the tax base, and so a marginal downward deviation of $z_2$ exerts no behavioral revenue effect through productive investment. The remaining welfare effects in (13) work through the adjustment in perk investments which are negative in sign. In sum,

**Proposition 2:** When $D_1 > 0$ and managers have a taste for perk investments, a corporate tax system which allows for a full deductibility of the cost of equity finance ($z_2 = 1$) is welfare-dominated by a tax system which entails a marginally lower deductibility rate $z_2$. The result holds for any level of the corporate tax rate $\tau \in (0, 1)$.

Proposition 2 shows that an ACE system (and a cash-flow tax) is not welfare enhancing in the presence of an agency problem. A less generous deductibility provision limits the negative implications that perk investments have for tax revenues; c.f. the second part of the Harberger term in (13).

Proposition 2 is less informative as to the extent to which $z_2$ can be lowered. For $z_2 < 1$, a lower $z_2$ continues to have the efficiency benefit of lower perk investment which, however, must now be weighted against the Harberger deadweight loss due to lower productive investment. Provided the productive investment response is not too strong compared with the response in perks, it will be optimal to set $z_2 = 0$. This applies when, for example, the curvature of $f(I)$ is sufficiently pronounced relative to the curvature of $g(J)$.\(^{24}\) Otherwise, the optimal choice of the deductibility rate is interior $z_2 \in (0, 1)$, balancing the welfare effects of the two investment types.

**Proposition 3:** Consider $D_1 > 0$. For any level of the corporate tax rate $\tau \in (0, 1)$, the optimal deductibility rate is $z_2 = 0$ provided the reduction in productive investment is not too strong relative to the reduction in perks. Otherwise, the optimal deductibility rate satisfies $z_2 \in (0, 1)$.

Fixing $\tau$, the optimal deductibility rate $z_2$ may be positive since a lower $z_2$ undermines

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\(^{24}\)Note from (9), $f''(I)$ and $g''(J)$ influence the investment responses.
incentives to invest productively. A straightforward question is whether the adverse consequence can be addressed by adjustments in the second policy instrument \( \tau \). To show that this is possible consider a simultaneous reduction in \( z_2 \) and \( \tau \) so as to keep the marginal cost of investing productively (4) constant. The reform leaves incentives to invest productively unaffected, and so only singles out welfare effects that result from perk investments. Following (7), (8) and (9), the policy requires perturbations in \( z_2 \) and \( \tau \) to obey \( d\tau = \left[ \tau(1 - \tau)/(1 - z_2) \right] dz_2 \). The associated welfare change is

\[
\frac{dW}{d\tau} \bigg|_{dI=0} = \frac{d\tau}{dz_2} \bigg|_{dI=0} + \frac{dW}{dz_2} \bigg|_{dI=0}.
\]

The last term is given by (13), evaluated at \( dI = 0 \). It is negative in sign. The welfare change due to the tax rate adjustment follows from differentiating (11), while accounting for \( dI = 0 \), which gives

\[
\frac{dW}{d\tau} = -\frac{\tau (r z_2 + 1)}{1 + r} \frac{dJ}{d\tau} < 0.
\]

The welfare term (15) reflects the negative fiscal externality higher perk investments exert on the public budget. As a consequence, welfare strictly increases in response to the tax-cut cum base-broadening reform. The less favorable deductibility rate lowers the amount of perk investments, an effect that is reinforced by the drop in the corporate tax rate which reduces the tax value of the deductibility provision. Hence,

**Proposition 4:** Consider \( D_1 > 0 \) and a tax system \((\tau, z_2) \in (0, 1)^2\). When the manager has a taste for perk investment, there always exists a tax-cut cum base-broadening reform (marginally lowering \( z_2 \) and \( \tau \) so as to keep productive investment constant) which increases welfare.

Proposition 4 predicts that a marginally lower \( z_2 \) with an appropriate adjustment in \( \tau \) increases welfare. By a continuity argument, the tax-cut cum base-broadening reform can be continued until the deductibility provision related to equity finance and, trivially also related to debt finance, is abolished.\(^{25}\) Thus, summarizing Propositions 2 to 4:

\(^{25}\) The required post-reform corporate tax rate does not violate the non-negativity constraint. Comparing the effective tax rate on productive investment (4) for \( z_2 \in (0, 1) \) and for \( z_2 = 0 \), the post-reform tax rate \( \bar{\tau} \) which keeps the effective tax rate constant when eliminating \( z_2 \in (0, 1) \) is

\[
\bar{\tau} = \frac{(1 + r)(1 - \tau) - (1 + r - \tau(r z_2 + 1))}{(1 - \tau) - (1 + r - \tau(r z_2 + 1))},
\]

where \( \tau \) is the pre-reform tax rate. Note, we have \( \bar{\tau} \in (0, 1) \) when \( \tau \in (0, 1) \) and \( \bar{\tau} = 0 \) only when \( \tau = 0 \).
**Corollary:** When managers distribute part of the retained earnings to shareholders and spend some of the remaining amount on perks, then a tax system which fully or partially exempts the normal return on investment from corporate taxation is welfare-dominated by a tax system which taxes the full return \(z_1 = z_2 = 0\), possibly at an adjusted corporate tax rate.

Unlike the case when internal funds are only used for investment, in which taxing the normal return is welfare neutral, the Corollary ranks a CBIT \(z_1 = z_2 = 0\) over an ACE \(z_1 = z_2 = 1\) (and a cash-flow tax) in terms of welfare.

### 4.3 Revenue Implications

A natural question is whether the implications for tax policy outlined in Propositions 1 to 4 do not undermine the fiscal viability of the public sector by reducing tax revenues. When internal funds are only used for investments, a tax reform that broadens the tax base to include the normal return on investment increases tax revenues, while leaving welfare constant as stipulated by Proposition 1.

When distributions are made in all periods, tax revenues may still increase following a tax base broadening. As to the reform described in Proposition 2, a small reduction in \(z_2\) (starting at \(z_2 = 1\)) broadens the tax base and strictly increases tax revenues, although \(I\) and, hence, output decreases.\(^{26}\) Further, larger welfare-increasing reductions in \(z_2\), as implied by Proposition 3, exert behavioral tax revenue effects. To the extent that these are dominated by the mechanical effect of tax base broadening (as predominantly assumed in the literature) tax revenues rise in response.

The reform suggested in Proposition 4 may not necessarily increase tax revenues. The revenue effects depend on the relative importance of the tax cut and the base broadening. We should note that a welfare-increasing tax-cut cum base-broadening reform does not necessitate the tax rate and deductibility rate changes to satisfy \(d\tau = \frac{\tau(1 - \tau)}{(1 - z_2)} dz_2\) as assumed above. The tax rate may also be lowered to a smaller extent such that productive investment is slightly reduced. Appealing to a continuity-type argument, welfare still increases in response to a reform that entails a less drastic reduction in \(\tau\) than the reduction which is necessary to keep the marginal cost of productive investments constant. The alternative tax reform limits

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\(^{26}\)Precisely, differentiating (12) with respect to \(z_2\), inserting (4), and evaluating terms at \(z_2 = 1\) (which eliminates the effect of \(dI/dz_2\) on tax revenues) shows that a marginal drop in \(z_2\) away from \(z_2 = 1\) always generates higher tax revenues.
potential revenue shortfalls or may imply tax revenue increases following a policy of tax-cut cum base-broadening.

5 Imperfect Corporate Governance

So far, we have assumed a perfect corporate governance scheme to be in place; inducing the manager to fully internalizes the consequences the investment behavior has for shareholder wealth. The purpose of this section is to analyze whether imperfections in corporate governance invalidate the results of the previous section.

One source of inefficiency in corporate governance is related to the role of diffuse corporate ownership in controlling managers. Provided that not all shares are owned by a single investor or that shareholders cannot coordinate interests, it is likely that corporate governance decisions only reflect the interest of a fraction of shareholders (subsequently referred to as active shareholders). Most notably, active shareholders may decide on monitoring activities which reduce the extent of moral hazard, i.e. in the context of our model, reduce the manager’s incentive to spend on perks. Monitoring activities have a public good character since passive shareholders also benefit from firm value improvements associated with monitoring. Thus, the level of monitoring tends to be inefficiently low, a tendency which becomes more pronounced the smaller the stake active shareholders have in the firm (e.g., Shleifer and Vishny, 1986). As a consequence, the value managers place on perks (and, reciprocally, on firm value) will be higher (lower) compared with the monitoring choice by a single shareholder or by shareholders which perfectly coordinate interests.

Let’s denote the fraction of shares owned by active shareholders by $\alpha^* < 1$. Then, the manager chooses investment levels $I$ and $J$ so as to maximize

$$\alpha^* \left( D_1 + \frac{D_2}{1 + r} \right) + \frac{g(J)}{1 + r},$$

where, for simplicity, we assume that the lower weight the manager attaches to profits is equal to the fraction of shares owned by active shareholders. When no distributions are made in the first period, the response of investments to corporate taxation are qualitatively the same as in the previous section. The two investment types equally benefit from the deductibility provision and, hence, welfare is not affected by changes in $z_2$, as found before. The welfare implications are different when distributions are made in the first period. Productive investments still follow
from (7a), while unproductive investments deduce from

$$\alpha^* \left( -1 + \frac{1}{1+r} \left( z_2 \tau r + \tau \right) \right) + \frac{g'(J)}{1+r} = 0.$$  \hspace{1cm} (17)$$

The manager only accounts for the fraction $\alpha^*$ of the drop in shareholder wealth when investing in perks. Taking investment responses into account, the welfare effect of a higher $z_2$ is

$$\frac{dW}{dz_2} = -(1-\alpha^*) \frac{dJ}{dz_2} + \frac{1}{1+r} \left( \tau \left( f'(I) - rz_2 - 1 \right) \frac{dI}{dz_2} - \tau \left( rz_2 + 1 \right) \frac{dJ}{dz_2} \right).$$ \hspace{1cm} (18)$$

The first term is new. It captures the first-order welfare effect a higher deductibility rate has on passive shareholders. By investing in perks, the manager exerts a negative externality on passive shareholders who bear a fraction $1-\alpha^*$ of the induced drop in first-period dividend income. A higher deductibility rate $z_2$ amplifies incentives to invest in perks and, thereby, the externality. The shareholder externality reinforces the negative fiscal externality of perk investment. As a consequence, the results derived in the previous section continue to apply.\(^{27}\)

A similar conclusion holds when all shareholders coordinate their interests, but the incentive scheme used to align interest between shareholders and the manager is restricted. The incentive scheme is restricted when shareholders do not condition the incentive scheme on the same variables on which the state conditions the tax payment. If the set of instruments available to shareholders includes the set of instruments available to the government, then the state has no advantage in influencing shareholder wealth and, by an application of the envelope theorem, the welfare effect of changes in $z_2$ comprises the standard fiscal externality characterized in Section 4, see Chetty and Saez (2007, 2010). Differently, given the set of tax instruments in the model, the incentive scheme is restricted if shareholders only use equity-based incentive pay to align interest between the manager and shareholders. The incentive contract may specify that the manager gets a stake $\alpha \in (0,1)$ in the firm in addition to a fixed wage $a$, which without loss of generality is set to zero. Such an incentive scheme is widely considered in agency models (Tirole, 2006). In this case, the manager’s objective function is (16), with $\alpha$ replacing $\alpha^*$. Given that the objective functions has not changed relative to the situation with diffuse ownership, the welfare effects of the deductibility provision coincide as well, for a given choice of $\alpha$.\(^{28}\) The economic

\(^{27}\)The behavior of active shareholders is not formally described. We should emphasize that the negative first-order welfare effect in (18) equally exists when the monitoring choices by active shareholders are explicitly modeled. The extended analysis is available upon request.

\(^{28}\)With an endogenous sharing parameter $\alpha$, the adjustment in $\alpha$ in response to a hike in $z_2$ does not nullify the welfare effects of the deductibility provision; see Koetenburger and Stimmelmayr (2008). In fact, shareholders may well reduce the fraction of payoffs in the optimal contract that they allocate to managers; an adjustment which magnifies the welfare gain from reducing $z_2$.\(^{17}\)
interpretation of the first term in (18), however, differs. It now represents the externality the manager exerts on all shareholders (other than the manager) when investing in \( J \).

6 Output-Enhancing Effort Provision

The previous analysis shows that wasteful managerial expenditures render a deductibility of the cost of finance welfare reducing. In this section, we point to the boundaries of the finding. We show that the conclusion may not necessarily hold if other types of agency problems are considered as well. Precisely, we extend the model in Section 4 by assuming that, in addition to the level of investment, the manager also decides on the level of output-increasing effort, \( e \). The production function now reads \( f(I, e) \) where \( f_i > 0 > f_{ii}, i = I, e \). At this point, we leave it unspecified how investment and effort interact in production, i.e. whether the two inputs are complements or substitutes.

The manager’s cost of effort provision is \( \psi(e) \) with \( \psi'(e) > 0 \) and \( \psi''(e) > 0 \). The effort level and the cost of the manager are non-verifiable. Thereby, the cost is not deductible from the tax base. The level of effort is chosen simultaneously with the level of investment. Assuming perfect corporate governance, the manager chooses investment and effort so as to maximize

\[
D_1 + \frac{D_2}{1+r} + \frac{g(J)}{1+r} - \frac{\psi(e)}{1+r},
\]

where dividends follow from (1) and (2). The first-order condition for the effort level is

\[
(1 - \tau)f_e - \psi'(e) = 0.
\]

The manager exerts effort up to the point where the net-of-tax increase in output is equated to the marginal cost of effort provision. The welfare measure is

\[
W = D_1 + \frac{D_2}{1+r} + \frac{g(J)}{1+r} - \frac{\psi(e)}{1+r} + \frac{T}{1+r},
\]

where tax revenues, \( T \), are given by (12).

When \( D_1 = 0 \), the level of (un)productive investment follows from (6). Note, conditions (6) and (20) do not depend on the deductibility rate \( z_2 \). It thus becomes apparent that changes in \( z_2 \) do not affect welfare. Thus,

**Proposition 5:** When the manager has a taste for perk investment and exerts output-enhancing effort, the deductibility rate \( z_2 \) is welfare neutral in the absence of first-period dividend
With cash distributions in the first period, the first-order conditions for the investment levels are given by (7), adjusted to the new production function. Totally differentiating (7) and (20) with respect to $z_2$ gives

$$\frac{dI}{dz_2} = -\frac{\tau r}{(1 - \tau)(f_{II} + \gamma(f_{eI})^2)} > 0 \quad \text{and} \quad \frac{de}{dz_2} = \gamma f_{eI} \frac{dI}{dz_2},$$

(22)

where $\gamma = -(1 - \tau)/(1 - \tau) (f_{ee} - \psi'') > 0$. The denominator of $dI/dz_2$ is negative, given the second-order conditions. Productive investment increases with $z_2$. Managerial effort in turn may increase or decrease depending on whether productive investment raises or lowers the marginal productivity of effort, i.e. whether $f_{eI} > 0$ or $f_{eI} < 0$. The first-order condition for perk investment (7b) is not affected by managerial effort provision. Hence, $dJ/dz_2 > 0$, as given by (9b).

The welfare effect of perturbations in $z_2$ is

$$\frac{dW}{dz_2} = \frac{1}{1 + r} \left( \tau (f_I - rz_2 - 1) \frac{dI}{dz_2} - \tau (rz_2 + 1) \frac{dJ}{dz_2} + \tau f_e \frac{de}{dz_2} \right).$$

(23)

The last fiscal externality in (23) is new. It captures the effect managerial effort choices exert on the public budget. When productive investments and effort are complements ($f_{eI} > 0$), effort increases with the deductibility rate, c.f. (22), and the last term constitutes a positive fiscal externality. Analogously, the effort externality is negative when productive investments and effort are substitutes in production ($f_{eI} < 0$).

To see how verifiability problems influence the optimal choice of $z_2$, note that, in the absence of verifiability problems, the cost of effort provision can be made tax-deductible. With a full tax deductibility of the cost, the fiscal externality generated by $e$ reads $\tau (f_e - \psi'(e))de/dz_2$. Since the manager’s effort choice will now satisfy $f_e = \psi'(e)$, the fiscal externality vanishes. In this environment, shareholders will require $J \equiv 0$. Hence, a full tax deductibility related not only to the cost of investment but also to the cost of effort is optimal, as found in earlier literature.

With verifiability problems, the welfare implications of the deductibility provision are ambiguous. In particular, compared with Propositions 2 and 3, the welfare gains from lowering $z_2$ are less straightforward when managers engage in output-enhancing effort decisions in addition
to wasteful expenditures. Scope for a reduction in $z_2$ to improve welfare narrows for $f_{eI} > 0$, because managerial effort reduces in response to a lower $z_2$, and widens for $f_{eI} < 0$ because the manager exerts more effort and, thereby, positively affects tax revenues.\footnote{Precisely, at $z_2 = 1$, (7a) reduces to $f_I = 1 + r$ which eliminates the fiscal externality due to an adjustment of productive investment. Lowering $z_2$ below a value of 1 unambiguously increases welfare with substitutes. With complements, the policy change only promotes welfare if the externality of perk investment is sufficiently strong so as to dominate the tax revenue effect of the effort response. For $z_2 < 1$ and thus $f_I > 1 + z_2r$, a less generous deductibility provision turns out to be more desirable with substitutes since now the perk response and the effort response are beneficial. With complements, a less generous deductibility provision turns out to be desirable provided the responses in both productive inputs are not too strong relative to the response in perks.} An important implication is that $z_2 = 1$ may be the optimal deductibility rate when $f_{eI} > 0$.

Finally, we will elaborate on the potential of a tax-cut cum base-broadening reform to implement $z_2 = 0$ as a welfare-enhancing policy. With productive investment reacting negatively to a higher corporate tax, we can appropriately reduce $\tau$ and $z_2$ so as to leave the level of productive investment constant.\footnote{It might be possible that $dI/d\tau > 0$ when investment and effort are sufficiently strong substitutes in production, i.e. $f_{eI} \ll 0$. We omit the possibility of a positive investment response. The characterization of welfare-enhancing policy reforms involving perturbations in $\tau$ and $z_2$ becomes complex in this case. Details are available upon request.} Since the choice of unproductive expenditures $J$ is not affected by $e$, such a reform lowers $J$, as before. From (20), we find

$$\frac{de}{dz_2} \bigg|_{dI=0} = 0 \quad \text{and} \quad \frac{de}{d\tau} \bigg|_{dI=0} = -f_e(1 - \tau)^{-1}\gamma < 0. \quad (24)$$

By construction, productive investment is constant and, as a consequence, the deductibility rate does not influence the manager’s effort choice. The positive response in effort following the reform is only due to the rise in the marginal return to effort which a smaller corporate tax rate induces, c.f. (20). The tax-cut cum base-broadening reform thus lowers $J$ and increases $e$. The two adjustments in managerial behavior enhance welfare through the induced increase in fiscal income. In sum,

**Proposition 6:** Assume $D_1 > 0$ and that the manager decides on the level of output-enhancing effort in addition to perk investment. (i) The effort choice reinforces (counteracts) the welfare implications of the deductibility rate $z_2$ rooted in perk investment provided productive investment and effort are substitutes (complements) in production. (ii) Assume $(\tau, z_2) \in (0, 1)^2$ and $dI/d\tau < 0$. A tax-cut cum base-broadening reform (keeping $I$ constant) lowers perks and increases effort provision. Welfare rises.
7 Discussion and Concluding Remarks

This paper analyzes the question of whether corporate taxes should exempt the normal return on investment from taxation as entailed by, for instance, an ACE system and a cash-flow tax. The issue sparks a huge body of literature which predominantly abstracts from corporate agency problems. We set up an agency model in which managers can choose the level of perks and can exert output-enhancing effort. One of our findings is that an efficient tax system may not fully exempt the normal return from taxation and may tax it at the same rate as above-normal returns. The result has relevance for the tax policy discussion in many countries that have introduced or consider introducing an ACE (see, e.g., Devereux and De Mooij, 2009). The implication of the analysis is that a switch to an ACE system increases investment, but may reduce welfare.

We develop the welfare results in the context of the tax treatment of capital. We should emphasize that the basic insight of the model applies to any kind of inputs into the production process whose choice is subject to agency problems and whose costs (or benefits) cannot be fully included in the tax base due to, e.g., verifiability problems.

Finally, the agency model of firm behavior used in the paper might be particularly descriptive for agency problems in mature firms. Agency problems in young, innovative firms might be more related to moral hazard problems which constraint the firm’s access to external finance (Tirole, 2006).32 Considering a model in which firms are finance constrained when being young and transition to a mature firm with agency problems, as modeled in this paper, allows to characterize the optimal choice of the corporate tax base over the whole life-cycle of firms. We leave a formal analysis of this and other interesting extensions to future research.

References


32See, e.g., Keuschnigg and Ribi (2009) on public policy in such models.


[34] Koethenbuerger, M. and M. Stimmelmayr (2009), Corporate taxation and corporate governance, CESifo WP No. 2881, Munich.


