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Distortions for Nothing
Optimal Taxation of (Un)Distributed Profits*

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Abstract

We study the optimal taxation of corporate and dividend income when entrepreneurs can use retained earnings to reduce their tax burden. We show that eliminating dividend taxes while increasing the corporate income tax (CIT) to keep investment unchanged raises total tax revenue. Our simulations suggest net revenue gains of 0.1-0.4% of GDP. In an infinite-horizon model, the optimal policy sets dividend taxes to zero in every period. As the discount factor approaches one and when the planner values only workers' welfare, the optimal steady-state CIT converges to a standard inverse-elasticity rule.

Keywords: Corporate Tax, Dividend Tax, Optimal Taxation, Capital Taxation

JEL Code: H21, H24, H25, H26, H32

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I Introduction

In 2023, the corporate income tax (CIT) accounted for 12 percent of total tax revenue on average across OECD countries (OECD, 2025). From a redistributive perspective, the CIT represents almost half of the total tax liability of the richest Americans (Balkir et al., 2025) and constitutes virtually the only significant tax paid by their European counterparts (Bach et al., 2025; Bruil et al., 2025).[1] Both the revenue importance and the redistributive role of the CIT hinge on its capacity to tax undistributed profits.[2] While some of these profits are eventually distributed to shareholders, retained earnings can also be used to avoid personal income taxation.[3] Although governments can limit some of these strategies,[4] such avoidance opportunities are likely to persist. In this paper, we revisit the debate on the optimal combination of corporate and dividend taxation when retained earnings are used to fund investment but also to escape personal income taxation. We show that the mere existence of such avoidance is sufficient to call into question the use of dividend taxation, i.e taxes levied solely on distributed profits, as a tool for maximizing social welfare.

We begin our analysis with a simple model, where an entrepreneur owns a representative firm employing hand-to-mouth workers with inelastic labor supply. The government sets linear corporate and dividend taxes to maximize the disposable income of workers. After paying the CIT, the entrepreneur can consume remaining profits either by distributing dividends and paying the dividend tax, or by using tax shelters to avoid the dividend tax, albeit at some utility cost. Although labor supply is fixed, we assume a constant returns to scale production function, implying that wages are endogenous. Hence this simple model captures the trade-off between raising tax revenue for redistribution to workers and limiting distortions to investment that would otherwise reduce wages.

We first use this simple model to derive conditions for the desirability of corporate and dividend taxation, expressed in terms of empirically meaningful sufficient statistics. The strong sensitivity of dividends to their tax rates, documented by Chetty and Saez (2005), Jacob and Michaely (2017), Bach et al. (2024) or Bilicka et al. (2025), is sufficient for the model to favor positive corporate income taxation. By contrast, the weaker response of investment to dividend taxation, obtained by Yagan (2015), Alstadsæter et al. (2017) or Bach et al. (2024), is not sufficient to justify dividend taxation. Once avoidance is taken into account, the elasticity of investment with respect to dividend taxation must be weighted by the share of profits distributed as taxable dividends when compared to its corporate income tax counterpart. At

[1] Bach et al. (2025) documents the near absence of other taxes for France, while Bruil et al. (2025) does so for the Netherlands. The prevalence of S corporations largely explains why the CIT accounts for only 46% of total tax liability at the very top in the US (Balkir et al., 2025).

[2] At the top, retained earnings represent more than 95% of comprehensive income in both France (Bach et al., 2025) and the Netherlands (Bruil et al., 2025).

[3] Holding companies, capital gains deferral or stepped-up basis at inheritance are typical mechanisms used to avoid personal taxes on undistributed profits.

[4] Bach et al. (2025) and Bruil et al. (2025) argue that stricter regulation of holding companies in the United States helps explain why billionaires there pay personal income taxes, unlike in Europe.

the optimum, dividends should be taxed or subsidized depending on whether this weighted elasticity is lower or higher than the elasticity of investment with respect to corporate income taxation.

Second, we show that minimal structural assumptions on entrepreneurs' preferences are sufficient to unambiguously pin down the optimal policy mix, thereby resolving the ambiguity highlighted by the sufficient-statistics analysis. In particular, when preferences over legal and sheltered consumption are homothetic and separable from preferences for capital, dividend taxation should be eliminated at the optimum. Under these assumptions, differences in the responses of capital supply to dividend and corporate income taxation arise solely from avoidance behavior. As a result, dividend taxes are as distortive as the CIT on the portion of profits that actually bears the tax, while additionally distorting the choice between legal and sheltered consumption.Eliminating this additional distortion allows the government to raise the CIT while keeping investment unchanged, thereby generating a net revenue gain that can be redistributed to workers.[5] In a numerical exercise calibrated to the current tax systems of France and the US, we show that this gain can be substantial, amounting to 0.1–0.4% of GDP, depending on the elasticity of dividend payouts with respect to the dividend net-of-tax rate.

In the remainder of the paper, we develop an infinite-horizon model to assess the robustness of our findings when retained earnings not only generate avoidance but also finance future investment. Workers optimize labor supply given their productivity, as in Mirrlees (1971), but do not save, as in Judd (1985). In addition to linear corporate and dividend taxes, the government can use a nonlinear labor income tax to maximize a weighted utilitarian social welfare function. To prevent capital supply from becoming infinitely inelastic in the long run, we assume that capital enters directly into the entrepreneur's instantaneous utility. We remain agnostic about whether utility is increasing in the capital stock, as in wealth-in-the-utility models (Piketty and Saez, 2013; Saez and Stantcheva, 2018), or decreasing, reflecting the costs of managing large investments. As long as preferences over capital are separable from preferences over legal and sheltered consumption, we show that dividend taxation should be eliminated in every period. Even when retained earnings finance future investment, dividend taxation continues to distort the choice between legal and sheltered consumption in each period. Echoing Atkinson and Stiglitz (1972), such distortions waste resources needed to deliver a given level of individual utility for both workers and entrepreneurs.

While our main result concerns the undesirability of dividend taxation, we also characterize the optimal CIT. In the simple model, we show that the optimal CIT follows a standard inverse elasticity rule (Ramsey, 1927). In particular, it does not depend on parameters of the production function, in line with the production efficiency theorem (Diamond and Mirrlees, 1971). In the infinite-horizon model, we recover this inverse elasticity rule in the steady state when the planner disregards the entrepreneur's

[5] The intuition is analogous to the arguments in Laroque (2005) and Kaplow (2006) for uniform commodity taxation (Atkinson and Stiglitz, 1972, 1976).

utility and the discount factor converges to one. Using numerical simulations, we show that the presence of consumption smoothing justifies a steady-state CIT above the level implied by the inverse elasticity rule. We also show that the transition to the steady state is smooth, as the optimal CIT rapidly converges to its long-run level.

Related literature. We contribute primarily to the literature comparing the merits of corporate and dividend taxation. As noted by Poterba and Summers (1984), this debate is moot in a neoclassical framework in which both taxes are equivalent ways of taxing the return on equity. For the question we study to be meaningful, the literature has therefore developed several arguments challenging this "old view."

A first argument is grounded in empirical evidence on firms' responses to dividend and corporate income tax reforms. There is direct evidence that CIT reforms affect not only investment (Hassett and Hubbard, 2002; Chodorow-Reich et al., 2024), but also wages (Suárez Serrato and Zidar, 2016; Fuest et al., 2018) and employment (Giroud and Rauh, 2019; Garrett et al., 2020). By contrast, dividend tax reforms appear to primarily affect payout decisions, with limited effects on investment (Yagan, 2015; Alstadsæter et al., 2017; Bach et al., 2024). "New view" models (King, 1977; Auerbach, 1979; Bradford, 1981) have been used to explain this discrepancy, as dividend taxes become nondistortionary when investment is financed out of retained earnings. Exploiting the contrast between cash-rich "new view" firms and cash-poor "old view" firms, Orihuela and Cubillos (2025) documents an elasticity of profits with respect to dividend taxation that is three times smaller than its CIT counterpart. However, as emphasized by Poterba and Summers (1984), the new view relies on the assumption of "trapped equity", under which dividend taxation can be postponed but not avoided. While suitable for describing some mature firms, this framework neglects the role of initial equity issuance. Once this initial capital supply decision is taken into account, dividend taxation becomes distortionary even if subsequent investment is financed out of retained earnings (Korinek and Stiglitz, 2009). Assuming, as we do, that profits are subject to the CIT before any distribution occurs, we recover the neoclassical prediction that both the CIT and dividend taxes distort investment. However, in the presence of avoidance, dividend taxation creates an additional distortion in the choice of how to consume profits, making the CIT strictly preferable.

A second strand of the literature emphasizes allocative efficiency considerations. In an agency framework, Chetty and Saez (2010) argue that dividend taxation, unlike the CIT, discourages unproductive investment, implying that revenue should be raised through the CIT while dividends should be subsidized to better align managers' and shareholders' objectives. Focusing instead on financial market imperfections, Dávila and Hébert (2023) argue against corporate income taxation, as it exacerbates financial constraints faced by cash-poor firms. Empirically, Alstadsæter et al. (2017) document substantial investment reallocation following dividend tax reforms. We complement this literature by ruling out market frictions and instead allowing for an untaxed form of consumption for entrepreneurs through avoidance. We also go beyond the purely efficiency-based arguments in this strand of the literature by motivating a redistributive objective for capital income taxation within a general equilibrium framework, in the tradition of Judd (1985).

A third argument relates to open economy considerations. Berg (2025) emphasizes that, unlike the CIT, dividend taxes apply only to domestic shareholders. As with avoidance, this broader tax base is an advantage of the CIT, and in this sense our contribution is complementary. However, in Berg (2025), the broader base is not sufficient to offset the distortionary effects of the CIT, which leads to a quantitative case in favor of dividend taxation. We provide a theoretical argument against this logic, showing that the weaker investment response to dividend taxation can arise from avoidance. Moreover, our structural assumptions allow us to determine the optimal policy mix at a fixed level of investment, thereby muting the wage channel that plays a key quantitative role in Berg (2025).[6]

Finally, we contribute to the literature on optimal capital income taxation. First, we show that when capital directly enters capitalists' utility, strictly positive capital income taxation can be optimal in the two-class economy of Judd (1985). Unlike Saez and Stantcheva (2018), we do not require utility to be increasing in the capital stock to overturn the zero capital tax result of Judd (1985) and Chamley (1986). Instead we introduce a disutility from managing capital as an alternative microfoundation that keeps the long-run elasticity of capital supply finite.[7] Second, we explicitly distinguish between corporate and dividend taxation in infinite-horizon models and show that the undesirability of dividend taxation holds in every period, rather than only in the steady state, as is standard in this literature (Judd, 1985; Chamley, 1986; Piketty and Saez, 2013; Saez and Stantcheva, 2018).[8]

Outline. We present the simple model in Section II and the infinite-horizon framework in Section III. Section IV concludes. Formal proofs are relegated to the Appendix.

II A Simple Model

In this section, we provide a simple model to understand how avoidance can affect the optimal combination between corporate and dividend taxation. The economy consists of an entrepreneur, a unit mass of workers, and the government. To keep this first model the simplest possible, the government's ob-

[6]Under perfect competition, general equilibrium effects can always be offset by adjusting capital and labor income taxes (Diamond and Mirrlees, 1971; Jacquet and Lehmann, 2025). Our argument is more general, as separability allows reasoning at a fixed capital supply and therefore applies to any market structure in which wages are unchanged when investment does not vary.

[7]Whether utility is strictly increasing or decreasing in capital, we analytically obtain a strictly positive long-run CIT when the economy instantaneously converges to its steady state, as in the "simple model" of Saez and Stantcheva (2018). With consumption smoothing, we focus on the case with management costs and numerically show that the optimal economy features strictly positive capital income taxation.

[8]Notable exceptions are Chari and Kehoe (1999) and Werning (2007), who obtain zero capital income taxation in every period.

jective is solely concerned with the well-being of workers whose labor supply is assumed inelastic and untaxed. We relax these assumptions in Section III.

The entrepreneur invests k units of capital and hires L units of labor, payed at wage w, to produce $\mathcal{F}(k, L)$ units of goods. This yields before tax profits $\mathcal{F}(k, L) - w\ L$. The production function $(k, L) \mapsto \mathcal{F}(k, L)$ is increasing and concave in each argument and exhibits constant returns to scale. Profit maximization therefore implies a before-tax rate of return r verifying:

$$r \stackrel{\text{def}}{\equiv} \max_{\frac{L}{k}} \quad \mathcal{F}\left(1, \frac{L}{k}\right) - w\ \frac{L}{k}$$

The government can tax profits $\Pi = r\ k$ at rate τ_π. We can define the after-CIT return of capital ρ as:

$$\rho \stackrel{\text{def}}{\equiv} (1 - \tau_\pi) \left\{ \max_{\frac{L}{k}} \quad \mathcal{F}\left(1, \frac{L}{k}\right) - w\ \frac{L}{k} \right\} = (1 - \tau_\pi) r$$

The entrepreneur can consume out of after-CIT-profits $\rho\ k$ by paying out dividends D, taxed at rate τ^d, hence enjoying "legal" consumption $c = (1 - \tau^d)\ D$. But in practice, dividend taxes can be avoided through tax planning strategies such as deferring capital gains or reallocating capital income to holdings, pass-through entities, or controlled private corporations. This can also be done through tax evasion. We capture these alternative ways of consuming out of after-CIT-profits by introducing "sheltered" consumption z in the entrepreneur's preferences. Both legal and sheltered consumption generate utility. However, they are imperfect substitutes due to the cost of utility associated with sheltered consumption compared to legal consumption. All profits are consumed, either legally or through avoidance, so that $\rho\ k = D + z$. Denoting $(c, z, k) \mapsto \mathscr{U}(c, z, k)$ the entrepreneur's utility function, the representative entrepreneur solves:

$$\max_{D,k} \quad \mathscr{U}\left((1 - \tau_d) D, \rho\ k - D, k\right) \tag{1}$$

The drivers of capital supply k are embedded in the entrepreneur's utility function $\mathscr{U}(.)$. A straightforward micro-foundation is to assume an initial period during which the entrepreneur is endowed with $\overline{A}$, consumes $\overline{A} - k$ and enjoys utility $u\left(\overline{A} - k\right)$ during the initial period, leading to $\mathscr{U}_k < 0$. In the second period, the entrepreneur would then enjoy utility $v(c, z)$ from legal and sheltered consumption. We nevertheless remain agnostic about the micro-foundation for the entrepreneur's preferences, provided that the utility function $(c, z, k) \mapsto \mathscr{U}(c, z, k)$ is concave, twice continuously differentiable and verifies $\mathscr{U}_c, \mathscr{U}_z > 0 > \mathscr{U}_k$. The entrepreneur's program (1) admits a single solution which we denote $k = \mathcal{K}(\rho, 1 - \tau_d)$ and $D = \mathcal{D}(\rho, 1 - \tau_d)$.

The government wishes to maximizes workers' total income, which equals labor earnings $w\ L$ plus tax revenue from corporate and dividend taxes. Hence the social welfare function (SWF) is given by:

$$SWF = w\ L + \tau_\pi\ r\ k + \tau^d\ D \tag{2}$$

taking into account not only the capitalist behaviors though the reduced-forms $k = \mathcal{K}(\rho, 1-\tau_d)$ and $D = \mathcal{D}(\rho, 1-\tau_d)$, but also the endogeneity of the w wage and of the before-tax return of capital r. For any endogenous variable X, we denote $\zeta_\rho^X \overset{\text{def}}{\equiv} (\rho/X)(\partial X/\partial \rho)$ the elasticity of X with respect to the net-of-corporate-tax rate of return ρ. Similarly, we denote $\zeta_d^X \overset{\text{def}}{\equiv} -((1-\tau_d)/X)(\partial X/\partial \tau_d)$ the elasticity of X with respect to the net-of-dividend tax rate $1-\tau_d$. We define these elasticities at the partial equilibrium, i.e. holding the wage w and the before-tax return on capital r fixed. Hence ζ_ρ^X also represents the partial equilibrium elasticity of X with respect to the net-of-corporate profit tax $1-\tau_\pi$. Finally, we denote $\Delta \overset{\text{def}}{\equiv} D/(\rho\, k)$ the share of dividends D in after-corporate-tax profits $(1-\tau_\pi)\Pi = \rho\, k$, so that $D = \Delta\, \rho\, k$. In Appendix A.1, we show the following proposition.

Proposition 1. *Suppose direct and cross-elasticities of capital and dividend verify*

$$\zeta_\rho^D\, \zeta_d^k < \left(1 + \zeta_d^D\right) \zeta_\rho^k \tag{3a}$$

Then the optimal policy implies:

i) $0 \gtreqless \tau_d$ *if and only if*

$$\zeta_d^k \gtreqless \Delta\, \zeta_\rho^k \tag{3b}$$

ii) $0 \gtreqless \tau_\pi$ *if and only if*

$$\Delta\, \zeta_\rho^D \gtreqless 1 + \zeta_d^D \tag{3c}$$

Part *i*) of Proposition 1 provides a simple condition, in terms of empirically meaningful statistics, for determining whether the optimal dividend tax is positive, negative or zero. The optimal dividend tax is positive (negative) if the elasticity ζ_d^k of capital with respect to the net-of-dividend tax is below (above) a threshold displayed in the right-hand side of (3b). Importantly, this threshold differs from the elasticity ζ_ρ^k of capital with respect to net-of-corporate tax. Instead, the threshold equals the product of ζ_ρ^k to the share Δ of dividends D in after-CIT profits $\rho\, k$.

To build intuition for Condition (3b), consider the effect of changing the mix between the dividend tax τ_d and the corporate tax τ_π, while holding the capital supply k fixed, i.e imposing:

$$\left.\frac{\partial \tau_\pi}{\partial \tau_d}\right|_k = -\frac{1-\tau_\pi}{1-\tau_d}\, \frac{\zeta_d^k}{\zeta_\rho^k} \tag{4}$$

Such a reform does not affect capital k, thereby impacts neither the wage level w nor the before tax profits $r\ k$. Consequently, according to (2), it affects the government's objective solely through mechanical effects on the corporate and dividend tax bases, and through behavioral effects on the dividend tax base:

$$\left.\frac{\partial SWF}{\partial \tau_d}\right|_k = \underbrace{D}_{\substack{\text{Mechanical effect}\\ \text{on dividends}}} + \underbrace{\left.\frac{\partial \tau_\pi}{\partial \tau_d}\right|_k r\ k}_{\substack{\text{Mechanical effect}\\ \text{on the CIT}}} + \underbrace{\tau_d\, \left.\frac{\partial D}{\partial \tau_d}\right|_k}_{\substack{\text{Behavioral effects}\\ \text{on dividends}}}$$

Examining the impact of a change in the tax mix starting from a zero dividend tax (i.e., when $\tau_d = 0$) eliminates the behavioral effects on the dividend tax base. Consequently, a tax shift toward positive dividend taxation improves (or worsens) workers' welfare if and only if the mechanical effect on the dividend tax dominates (or is dominated by) the mechanical effect on corporate income tax. Combining with (4) leads to Condition (3b).

The optimal dividend tax is more likely to be positive when the ratio of the two elasticities of capital with respect to dividend and corporate taxation is low. A lower ratio means that the corporate tax rate needs to decrease less to keep the capital supply unchanged when the dividend tax rises. Consequently, using (4), the mechanical effect on the corporate tax base is smaller relative to that on the dividend tax base. Moreover, a larger share Δ of dividends in after-corporate-tax profits amplifies the mechanical effect on the dividend tax base relative to the corporate tax base, making a positive optimal dividend tax more likely. The empirical literature document moderate but significant responses of investment to corporate income tax reforms (Hassett and Hubbard (2002), Chodorow-Reich et al. (2024)) which cannot be detected for dividend tax reforms (Yagan (2015), Alstadsæter et al. (2017) and Bach et al. (2024)). Hence the ratio ζ_d^k/ζ_ρ^k is likely below 1. In particular, Orihuela and Cubillos (2025) directly compares responses of taxable profits to dividend taxation and CIT in Canada and find a ratio $\zeta_d^k/\zeta_\rho^k = 0.296$. As detailed in Appendix A.3, we obtain a baseline Δ of 18% in France and 32% in the US using fiscal data on taxable corporate and dividend income. Whether ζ_d^k/ζ_ρ^k is above (below) Δ, in which case a positive (negative) dividend tax is optimal, is therefore empirically ambiguous.

Part *i*) of Proposition 1 do not depend on general equilibrium effects. As one can see from (4), our optimality condition for τ_d is obtained by keeping capital supply constant. Under perfect competition, this is enough to keep the before-tax return on capital r and the wage level w unchanged. But this reasoning could be extend to situations with market failure, provided that a fixed capital supply k is enough to guarantee a fixed wage w and a fixed return r. Conversely, to derive part *ii*) of Proposition 1, one cannot avoid considering the general equilibrium effects of tax reforms on the wage w and on the before-tax return r. However, assuming perfect competition and following Diamond and Mirrlees (1971), we show in Appendix A.1 that for a given dividend tax τ_d, there exists a one-to-one decreasing relationship between the corporate income tax rate τ_π and the after-CIT return of capital $\rho = (1 - \tau_\pi)r$. After an increase in the corporate tax rate τ_π, the rise in r needed for capital demand to decrease as much as capital supply is not sufficient to offset the fall in $1 - \tau_\pi$. Using the definition of ρ and exploiting the assumption of constant return to scale of the production function, so that $F(k, L) = w\, L + r\, k$, we can therefore rewrite the government's program as maximizing as:

$$SWF(\rho, 1 - \tau_d) = \mathcal{F}\left(\mathcal{K}(\rho, 1 - \tau_d), L\right) - \rho\, \mathcal{K}(\rho, 1 - \tau_d) + \tau_d\, \mathcal{D}(\rho, 1 - \tau_d) \tag{5}$$

Increasing the corporate income tax rate τ_π (i.e. decreasing the after-CIT return of capital ρ) is socially beneficial if and only if $\partial SWF/\partial\rho < 0$ where:

$$\frac{\partial SWF}{\partial\rho} = k\left\{\frac{\tau_\pi}{1-\tau_\pi}\,\zeta_\rho^k - 1 + \tau_d\,\Delta\,\zeta_\rho^D\right\} \tag{6}$$

In the absence of a dividend tax, the optimal corporate tax rate would verify the usual $1/(1+e)$ tax rule where $e = \zeta_\rho^k$ is the capital supply elasticity with respect to the net-of-CIT rate of return ρ. However, when $\tau_d \neq 0$, a change in the corporate tax rate induces a cross-base effect on the dividend tax base captured by the elasticity ζ_ρ^D. Evaluating (6) at $\tau_\pi = 0$ and at the optimal dividend tax (i.e. with $\tau_d = 1/(1+\zeta_d^D)$) leads to:

$$\frac{\partial SWF}{\partial\rho} = -k\left\{1 - \frac{\Delta\,\zeta_\rho^D}{1+\zeta_d^D}\right\}$$

Therefore, starting from an optimal dividend tax, introducing a positive (negative) corporate income tax is socially beneficial (detrimental) depending on Condition (3c) in Part *ii*) of Proposition 1. This condition expresses whether the optimal corporate tax should be positive depending on empirically meaningful sufficient statistics: the elasticities of the dividend tax base with respect to the two types of tax reforms and the share of dividends in the after CIT profits.

Since $D = \Delta\,\rho\,k$, it follows that $\zeta_\rho^D = 1 + \zeta_\rho^k + \zeta_\rho^\Delta$. Building on the literature estimating the direct response of dividends to dividend tax reforms, we expect ζ_d^D to be significant and potentially large.[9] Therefore, if the effect of the CIT on the allocation of profits between legal and sheltered consumption is small, so that ζ_ρ^Δ is negligible, we should expect $1 + \zeta_d^D$ to be at least of the same order of magnitude as ζ_ρ^D. Consequently, $\Delta\,\zeta_\rho^D$ is very likely to be smaller than $1 + \zeta_d^D$, ensuring that the optimal corporate tax rate is positive.

As detailed in Appendix A.1, Condition (3a) ensures that the first-order conditions (3b) and (3c) correspond to a maximum. When $1 + \zeta_d^D \geq \zeta_\rho^D$, the relatively weak response of investment, $\zeta_d^k < \zeta_\rho^k$, makes (3a) likely to hold.

Combining Proposition 1 with existing empirical evidence on how profits and dividends respond to taxation provides a rationale for positive corporate income taxation. Conversely, the empirical literature remains too imprecise to draw clear conclusions on the sign of the optimal dividend tax. Besides, even if we were able to precisely measure ζ_d^k, ζ_ρ^k and Δ, these sufficient statistics are not policy invariant and might take different values when estimated in the current economy compared to the optimal one. To lift such ambiguity on the sign of $\zeta_d^k - \Delta\,\zeta_\rho^k$, hence on the sign of optimal dividend taxation, we impose more structure on our modeling of capital supply. We note that the first-order condition with respect to D in program (1) yields:

[9] In the United States, Chetty and Saez (2005) document a direct elasticity of dividends of about 0.5, which is in the same range as the estimate of ζ_ρ^k reported by Chodorow-Reich et al. (2024). In contrast, Bach et al. (2024) find substantially stronger reactions, with ζ_d^D exceeding 2.

$$\frac{\mathscr{U}_z(c,z,k)}{\mathscr{U}_c(c,z,k)} = 1-\tau_d$$

Hence, if that the marginal rate of substitution between c and z depends only on c/z, the share Δ of profits distributed as dividends depends only dividend tax rate τ_d. To ensure this property, we impose the following preference structure.

Assumption 1. *The entrepreneur's preferences are represented by a weakly separable utility function: $c,z,k \mapsto \mathcal{U}\left(\Omega(c,z),k\right)$ where $\mathcal{U}(\cdot,\cdot)$ is concave and increasing in the first argument and where the sub-utility function $\Omega(\cdot,\cdot)$ is increasing and concave in both arguments and exhibits constant returns to scale.*

Under Assumption 1 we can rewrite the entrepreneur's program (1) as:

$$\max_k \quad \mathcal{U}\left(\rho\, k \left\{\max_\Delta \quad \Omega\left((1-\tau_d)\Delta\,,(1-\Delta)\right)\right\}\right)$$

Hence the entrepreneur faces a subprogram that allocates after-CIT profits $\rho\, k$ between dividends and sheltered consumption independently of the CIT rate τ^π. The choice of capital then solves:

$$\max_k \quad \mathcal{U}\left(\rho\, k\, \omega^\star(1-\tau_d),k\right)$$

with:

$$\omega^\star(1-\tau_d) \stackrel{\text{def}}{\equiv} \max_\Delta \quad \Omega\left((1-\tau_d)\Delta\,,(1-\Delta)\right) \tag{7}$$

So under Assumption 1 investment is solely driven by $\rho\,\omega^\star(1-\tau_d)$. This implies that the response of capital supply $\mathcal{K}(\rho,1-\tau_d) = \mathscr{K}\left(\rho\,\omega(1-\tau_d)\right)$ to dividend and CIT reforms are linked through $\partial\mathscr{K}/\partial(1-\tau_d) = \rho\,\omega' \;(\partial\mathscr{K}/\partial\rho)$. Applying the envelope theorem to (7), this relationship can be rewritten in elasticity terms as:

$$\zeta_d^k = \Delta\,\zeta_\rho^k \tag{8}$$

Compared to the benchmark without avoidance, where investment only depends on $\widehat{\tau} = \tau_\pi + \tau_d(1-\tau_\pi)$, our model does predict a larger response of capital to corporate income tax reforms than to dividend tax reforms. But under Assumption 1, this simply reflects that a share $1-\Delta$ of profits have not been subject to dividend taxation. Hence, the apparently weaker distortions from dividend taxation simply stem from avoidance responses.

Proposition 2. *When the entrepreneur's preferences verify Assumption 1:*

i) The optimal dividend tax is nil: $\tau_d = 0$.

ii) The optimal corporate income tax verifies an inverse elasticity rule: $\tau^\pi = \frac{1}{1+\zeta_\rho^k}$

As shown in Appendix, Condition (3a) is verified under Assumption 1 as long as the elasticity of the payout ratio Δ to the net-of-dividend tax is positive. Combining (8) with part *i*) of Proposition 1, Assumption 1 therefore implies no dividend taxation at the optimum. To better understand the intuition underlying the undesirability of dividend taxation, it is useful to rewrite the objective of the government (2) as:

$$SWF = \mathcal{F}(k, L) - c - z \tag{9}$$

where we used the budget constraint of the capitalist $c + z = \rho\, k - \tau_d\, D$. By reducing the amount of production $F(k, L)$ available for workers, the capitalist's consumption reduces welfare. Hence the planner should tax differently legal and sheltered consumption only if c and z affect investment differently. But under Assumption 1, the capitalist's program depend on c and z only through the subutility $\Omega(c, z)$. The government should therefore minimize $c + z$ while keeping $\Omega(c, z)$ constant, which implies no distortion between c and z. As one can see from the subprogram (7), whether we impose a dividend tax $\tau_d > 0$, hence favoring avoided consumption, or a subsidy $\tau_d < 0$, we distort the capitalist's choice over these two commodities c and z and create resource losses. Echoing Atkinson and Stiglitz (1972), the first part of Proposition 2 discards dividend taxation because it discards differential commodity taxation.

As it applies the same tax rate on undistributed and distributed profits, i.e legal and sheltered consumption, the corporate income tax does not violate uniform commodity taxation. In this case, the second part of Proposition 2 implies that the optimal CIT should verify a standard inverse elasticity rule since zero dividend taxation implies no cross-base effects of the CIT on dividend tax revenue.

The first part of Proposition 2 implies that, as long as some avoidance margins exist, tax policies using dividend taxation are dominated. The severity of avoidance however determines the quantitative gain we can expect from implementing the optimal policy. This follows from the fact that, under Assumption 1, investment depends only on $\rho\, \Omega(c, z)$. By decreasing dividend taxation, we lower the price of legal consumption c. Hence the higher the elasticity of the payout ratio ζ_d^{Δ}, the more we can increase the CIT while leaving $\rho\, \Omega(c, z)$, hence investment, constant. In the left part of Figure 1, we simulate this increase in CIT allowed by erasing dividend taxation in the French and US context.

Details of the calibration are provided in Appendix A.3. For both countries, we consider a unit elasticity of investment to its after-tax rate of return ρ, i.e $\zeta_\rho^k = 1$.[10] The difference between France and the US arises from two sources. First, we consider a baseline CIT rate (dividend tax rate) of 25% (30%) for France against 21% (25%) in the US. As detailed in Appendix, dividend tax rates are based on the flat French tax and on a approximation of the average federal dividend tax rate in the US. Second, we combine our baseline rates with revenue data on taxable corporate income and dividends to recover a

[10] We assess the sensitivity of our results when $\zeta_\rho^k = 0.5$ in Appendix A.4.

baseline Δ of 18% in France and 32% in the US. In the Appendix we consider alternative measures of Δ based on national accounts. There exist an important literature on the response of dividends to their net of tax rate. Estimates from Chetty and Saez (2005) and Yagan (2015) based on the US 2003 dividend tax cut report an elasticity close to 0.5. In the French context, Bach et al. (2024) reports higher elasticities, around 2.5 for the 2018 tax cuts and even larger for the 2013 dividend tax hike. Using 0.5 and 2.5 as a reasonable interval for ζ_d^D, our simulations indicate that erasing dividend taxation can allow France to raise its CIT rates from 25% to 30-32% and the US from 21% to 28-29% without affecting investment. The gains in tax revenue are depicted in the right part of Figure 1. For low dividend elasticities, revenue gains are close to 0.1% of GDP in both countries, while it is slightly higher, exceeding 0.3% in the US for high dividend elasticities. As shown in Appendix A.4, we find a similar range of 0.1-0.4% of GDP revenue gains for both countries in our robustness exercises, despite different calibrations for ζ_ρ^k and Δ.

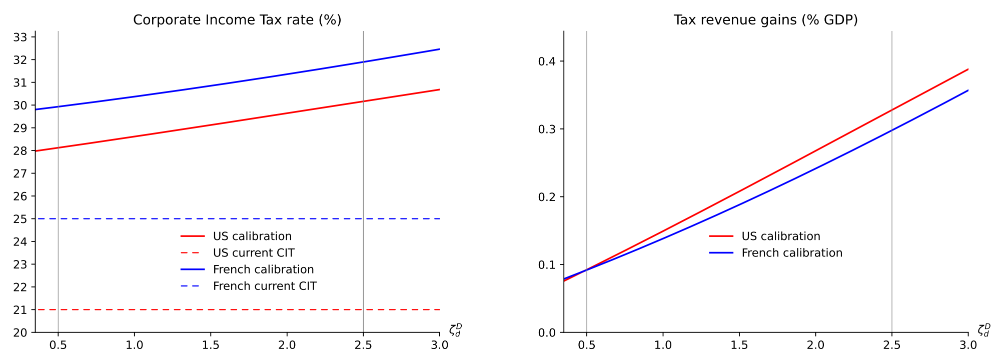

Figure 1: Corporate income tax (left) and associated tax-revenue gain (right) obtained after eliminating dividend taxation and raising the CIT to keep investment fixed, shown as a function of the direct dividend elasticity ζ_d^D, with $\zeta_\rho^k = 1$. Vertical bars at $\zeta_d^D = 0.5$ and $\zeta_d^D = 2.5$ correspond to the estimates of Chetty and Saez (2005) and Bach et al. (2024).

Our simple model predicts substantial revenue gain from shifting the burden of profit taxation fully to the corporate income tax. To prove the inefficiency of dividend taxation, we only needed to impose Assumption 1 which will typically be verified in a framework with time-separable preferences and investment funded by equity issuance. We however do not consider the possibility of funding investment out of retained earnings, as in "new view" models (King (1977), Auerbach (1979), Bradford (1981)). In the next section we assess the robustness of Proposition 2 when retained earnings can be used to both consume without paying dividend taxation but also to fund future investment. To avoid terminal dates mechanisms where ultimately everything is consumed, legally or not, we consider an infinite-horizon model.

III An Infinite Horizon Model

While highlighting the core mechanism of our paper, the simple model of Section II has five limitations that we aim to lift in this section. First, we allow for endogeneous response of labor supply. Second, we introduce skill heterogeneity between workers. Third, we now allow the government to tax workers, through a nonlinear labor income tax. We however keep the two-class structure by preventing workers from saving and capitalists from supplying labor. Fourth, we consider a proper welfare function, that can take into account the well-being of the entrepreneur. Finally, we move from the static framework and consider an infinite horizon model to avoid terminal dates effects on the dynamic determination of capital taxes. So doing, we allow the entrepreneur to use undistributed profits to finance investment. To summarize, workers behave as in the static framework of Mirrlees (1971), while the entrepreneur solves an intertemporal maximization problem as in Judd (1985), augmented to include corporate and dividend taxation.

We first present in III.1 the entrepreneur's behavior before turning to workers in III.2. We then present the government's social objective and budget constraint in III.3 before defining the competitive equilibrium in III.4. Finally, the optimal allocation and policies are characterized in III.5. All proofs are provided in Appendix B. In Appendix C, we generalize our main result to nonlinear capital income taxation in presence of heterogeneous entrepreneurs.

III.1 The Entrepreneur

The entrepreneur enters period t with wealth a_t. She chooses how to allocate her wealth between bonds b_t and investment in capital k_t:

$$a_t = b_t + k_t \tag{10}$$

One unit of goods invested in bonds at the beginning of period t yields $1 + r_t^b$ units of goods at the end of period t.

Investing k_t units of capital and hiring L_t units of labor produces $\mathcal{F}(k_t, L_t; t)$ units of goods where the production function $(k, L) \mapsto \mathcal{F}(k_t, L_t; t)$ of period t is increasing and concave in both arguments, is strictly quasi-concave and exhibits constant returns to scale. We allow technical progress so the production function can be time-varying. Denoting $\delta \in [0, 1]$ the depreciation rate, and w_t the wage rate at date t, the before tax gross profits is $\mathcal{F}(k_t, L_t; t) - w_t\, L_t + (1 - \delta)k_t$. The corporate income tax τ_t^π applies to net operating surplus $\mathcal{F}(k_t, L_t; t) - w_t\, L_t - \delta\, k_t$.[11] Therefore k_t units of investment yields $(1 - \tau_t^\pi)\,(\mathcal{F}(k_t, L_t; t) - w_t\, L_t - \delta\, k_t) + k_t$ units of goods at the period t. At the end of period t, the

[11] In practice, tax deductions for capital depreciation apply only to tangible assets. Moreover, the life cycle of firms can prevent the full realization of depreciation plans when a firm exits the market. In Appendix B, we show that our results are robust to limiting eligible depreciation to a fraction $0 \leq \widehat{\delta} \leq \delta$ of capital k_t.

entrepreneur's wealth is given by:

$$D_t + z_t + a_{t+1} = (1 + r_t^b) b_t + (1 - \tau_t^\pi) \left(\mathcal{F}(k_t, L_t; t) - w_t \, L_t - \delta k_t \right) + k_t \tag{11}$$

A part of this wealth is distributed as dividends D_t which are taxed at rate τ_t^d to give legal consumption $c_t = (1 - \tau_t^d) D_t$. Another part finances sheltered consumption z_t and the rest constitutes next period wealth a_{t+1}. Combining Equations (10) and (11), the entrepreneur's budget constraint is:

$$a_{t+1} = (1 + r_t^b) a_t + (1 - \tau_t^\pi) \left(\mathcal{F}(k_t, L_t; t) - w_t \, L_t - \delta \, k_t \right) - r_t^b \, k_t - \frac{c_t}{1 - \tau_t^d} - z_t \tag{12}$$

The entrepreneur derives utility from both forms of consumption c and z. If capital supply is solely driven by a saving motive, it becomes infinitely elastic at the steady state, hence preventing capital income taxation (Judd, 1985).[12] We circumvent this issue by imposing that capital directly enters the instantaneous utility of the entrepreneur.

Assumption 2. *The entrepreneur preferences are represented by a weakly separable utility function:* $(c, z, k) \mapsto \mathscr{U}(\Omega(c, z), k, t)$*, where* $\mathscr{U}(\cdot, \cdot, t)$ *is strictly concave and increasing in the first argument and where the subutility function* $\Omega(\cdot, \cdot)$ *is increasing and concave in both arguments and exhibits constant returns to scales.*

A first microfoundation for capital directly entering the utility function is wealth-in-the-utility (Piketty and Saez (2013), Saez and Stantcheva (2018)), which implies $\mathscr{U}_k > 0 > \mathscr{U}_{kk}$. An alternative is to consider convex management costs such that $\mathscr{U}_k < 0 < \mathscr{U}_{kk}$. This captures the idea that transforming savings into productive capital requires the entrepreneur to exert effort, and that the required effort increases with the scale of investment k. We remain agnostic between these two microfoundations, as long as preferences over capital are weakly separable from preferences over consumption and utility function is concave in capital. In addition, as in Assumption 1, we impose that preferences over c and z are homothetic.[13]

Note that Assumption 2 allows the entrepreneur's preferences to vary over time. The entrepreneur's program writes:

$$V_t(a_t) \overset{\text{def}}{\equiv} \max_{c_t, z_t, k_t, L_t, a_{t+1}} \quad \mathscr{U}(\Omega(c_t, z_t), k_t, t) + \beta \, V(a_{t+1}) \qquad s.t.: \quad (12) \tag{13}$$

Since the budget constraints (12) are linear in c_t, z_t and the production function is strictly quasi-concave, the first-order conditions of (13), which are derived in Appendix B.1 are also sufficient. The first-order condition with respect to labor provides the labor demand equation:

$$w_t = \frac{\partial \mathcal{F}(k_t, L_t; t)}{\partial L_t} \qquad \Leftrightarrow \qquad \frac{\partial \mathcal{F}(k_t, L_t; t)}{\partial k_t} = \frac{\mathcal{F}(k_t, L_t; t) - w_t \, L_t}{k_t} \tag{14a}$$

[12] In Chamley (1986), the discount factor can vary such that the elasticity of capital supply can become finite. But in this case, the absence of capital taxation either implies convergence to a first-best with also zero labor income taxation or to a steady-state with no capital (See Proposition 6 of Straub and Werning (2020)).

[13] In Appendix C, we allow for non-homothetic preferences over c and z in the presence of heterogeneous entrepreneurs, provided that their preferences over legal and sheltered consumption remain weakly separable from preferences over capital.

where the second equality holds because the production function exhibits constant returns to scale. Combining the first-order conditions with respect to legal and sheltered consumption leads to:

$$(1 - \tau_t^d)\, \Omega_c(c_t, z_t) = \Omega_z(c_t, z_t) \tag{14b}$$

The Euler equation with respect to bonds is:

$$\Omega_z(c_t, z_t)\, \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t) = \beta(1 + r_{t+1}^b)\, \Omega_z(c_{t+1}, z_{t+1})\, \mathscr{U}_\Omega(\Omega(c_{t+1}, z_{t+1}), k_{t+1}, t+1) \tag{14c}$$

Let

$$\rho_t \overset{\text{def}}{\equiv} (1 - \tau_t^\pi) \left(\frac{\partial \mathcal{F}(k_t, L_t)}{\partial k_t} - \delta \right) \tag{14d}$$

denote the after-CIT return of capital. The Euler Equation with respect to capital is:

$$\begin{aligned} &\Omega_z(c_t, z_t)\, \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t) = \beta\, \mathscr{U}_k(\Omega(c_{t+1}, z_{t+1}), k_{t+1}, t+1) \\ + \quad &\beta(1 + \rho_{t+1})\, \Omega_z(c_{t+1}, z_{t+1})\, \mathscr{U}_\Omega(\Omega(c_{t+1}, z_{t+1}), k_{t+1}, t+1) \end{aligned} \tag{14e}$$

Finally, the transversality condition is:

$$\lim_{t \mapsto \infty} \qquad \beta^t\, V_t'(a_t)\, a_t = 0 \tag{14f}$$

Combining (14c) with (14e), we note that the after-CIT return of capital ρ_{t+1} is higher (lower) than the return on bonds r_{t+1}^b if the marginal utility from capital $\mathscr{U}_k$ is negative (positive). While at this stage we remain agnostic on the sign of $\mathscr{U}_k$, we will privilege a microfoundation based on management costs, hence $\mathscr{U}_k < 0$, in our numerical exercise of Section III.6, in order to replicate the realistic scenario where $\rho_t > r_t^b$.

III.2 Workers

Workers are endowed with different types denoted θ distributed over $[\underline{\theta}, \overline{\theta}]$, where $0 \leq \underline{\theta} < \overline{\theta} \leq \infty$, through the cumulative distribution function $\Phi(\cdot)$ and the density $\varphi(\cdot) \overset{\text{def}}{\equiv} \Phi'(\cdot)$. Following Judd (1985), we assume workers are hand-to-mouth and do neither save nor borrow. Moreover, following a long tradition in the optimal income tax literature (Atkinson, 1990; Diamond, 1998) or in macroeconomics (Greenwood et al., 1988), we assume away income effects on labor supply. Finally, we assume workers desire to smooth their consumption over time and discount the future at the same rate β as the entrepreneur. We therefore assume that the per-period preference of a type$-\theta$ worker over consumption y and labor supply are given by $v(y - h(\ell; \theta, t))$, where $v'(\cdot) > 0 \geq v''(\cdot)$ and the utility cost of working function $h(\cdot; \cdot)$ is increasing and convex in labor supply, decreasing in type (providing a given amount of labor supply is easier for a higher type) and verifies the single-crossing condition according to which the marginal cost of supplying a marginal unit of supply is easier for a higher type. We allow for these preferences over labor to vary over time. To summarize, we assume $h_\ell(\cdot;\cdot,t), h_{\ell,\ell}(\cdot,\cdot,t) > 0 > h_\theta(\cdot;\cdot,t), h_{\ell,\theta}(\cdot,\cdot,t)$. Let $T_t(\cdot)$ denote the nonlinear labor income tax schedule in period t. A type$-\theta$ worker solves in period t:

$$U_t(\theta) \stackrel{\text{def}}{\equiv} \max_{\ell} \qquad w_t\,\ell - T_t\,(w_t\,\ell) - h(\ell;\theta,t) \tag{15}$$

Let $\ell_t(\theta)$ denote the solution to this program and $y_t(\theta) \stackrel{\text{def}}{\equiv} w_t\,\ell(\theta) - T_t(w_t\,\ell(\theta))$, so that $U_t(\theta) = y_t(\theta) - h(\ell_t(\theta);\theta,t)$. A type-$\theta$ worker enjoys at period t utility $\upsilon(U_t(\theta))$ and consumes $y_t(\theta) = U_t(\theta) + h(\ell_t(\theta);\theta,t)$. The first-order condition of (15) is:

$$1 - T_t'(w_t\,\ell_t(\theta)) = \frac{h_\ell(\ell_t(\theta);\theta,t)}{w_t} \tag{16}$$

According to the Taxation Principle (Hammond, 1979), and as shown in Appendix B.2, it is equivalent for the government, in period t, to design an income tax function $y \mapsto T_t(y)$, taking into account workers' labor supply decisions in (15), or to directly select an incentive-compatible allocation. $\theta \mapsto (\ell_t(\theta), U_t(\theta), y_t(\theta))$ where $\ell_t(\cdot)$ is non-decreasing and:

$$U_t(\theta) = U_t(\underline{\theta}) - \int_{\underline{\theta}}^{\theta} h_\theta(\ell_t(x);x,t)\,\mathrm{d}x \qquad \text{and} \qquad y_t(\theta) = U_t(\theta) + h(\ell_t(\theta);\theta,t) \tag{17}$$

III.3 The Government

The government's objective is weighted utilitarianism. Let $\Psi(\cdot)$ denote the cumulative distribution of the weights on type$-\theta$ workers and let $\kappa \geq 0$ be the weight on the entrepreneur. The social welfare function is given by:

$$SWF = \sum_{t=0}^{\infty} \beta^t \left\{ \int_{\underline{\theta}}^{\overline{\theta}} \upsilon\left(U_t(\theta)\right) \mathrm{d}\Psi(\theta) + \kappa\, \mathscr{U}\left(\Omega(c_t,z_t),k_t,t\right) \right\} \tag{18}$$

During period t, the government reimburses debt b_t plus interest $r_t^b\,b_t$ by issuing new debt b_{t+1} and taxing profits, dividends and labor income:

$$(1+r_t^b)b_t = b_{t+1} + \tau_t^\pi\left(\mathcal{F}(k_t,L_t;t) - w_t\,L_t - \delta\,k_t\right) + \tau_t^d\,D_t + \int_{\underline{\theta}}^{\overline{\theta}} T_t\left(w_t\,\ell_t(\theta)\right)\,\mathrm{d}\Phi(\theta) \tag{19}$$

Combining the entrepreneur's budget constraints (10) and (11) with government's budget constraint (19) leads to the period$-t$ resources constraint (See Appendix B.3):

$$\underbrace{\int_{\underline{\theta}}^{\overline{\theta}} y_t(\theta)\,\mathrm{d}\Phi(\theta)}_{\text{Workers' consumption}} + \underbrace{c_t + z_t}_{\substack{\text{Entrepreneur's}\\ \text{consumption}}} + \underbrace{k_{t+1}}_{\substack{\text{Next period}\\ \text{capital}}} = \underbrace{\mathcal{F}(k_t,L_t;t)}_{\text{Production}} + \underbrace{(1-\delta)k_t}_{\substack{\text{undepreciated}\\ \text{capital}}} \tag{20}$$

Hence production $\mathcal{F}(k_t,L_t;t)$ plus undepreciated capital $(1-\delta)k_t$ on the right-hand side of (20) are used either for workers' consumption $\int_{\underline{\theta}}^{\overline{\theta}} y_t(\theta)\,\mathrm{d}\Phi(\theta)$, for the entrepreneur's legal c_t and sheltered z_t

consumption or for next period capital k_{t+1} in the left-hand side of (20). Using the first-order incentive constraint (17), the period$-t$ resources constraint can be rewritten as (See Appendix B.3):

$$\begin{aligned} & U_t(\underline{\theta}) + \int_{\underline{\theta}}^{\overline{\theta}} \left[h\left(\ell_t(\theta);\theta,t\right) - \frac{1-\Phi(\theta)}{\varphi(\theta)}\, h_\theta\left(\ell_t(\theta);\theta,t\right) \right] \mathrm{d}\Phi(\theta) + c_t + z_t + k_{t+1} \\ = \quad & \mathcal{F}(k_t, L_t; t) + (1-\delta)k_t \end{aligned} \tag{21}$$

III.4 The Competitive Equilibrium

Definition 1. *Given a sequence of corporate income tax rates $\{\tau_t^\pi\}_{t\in\mathbb{N}}$, of dividend tax rates $\{\tau_t^d\}_{t\in\mathbb{N}}$, of labor income tax schedules $\{T_t(\cdot)\}_{t\in\mathbb{N}}$, and of public debt $\{b_t\}_{t\in\mathbb{N}}$ and for a given level of entrepreneur's initial wealth a_0, a competitive equilibrium is a sequence of legal consumption $\{c_t\}_{t\in\mathbb{N}}$, of sheltered consumption $\{z_t\}_{t\in\mathbb{N}}$, of capital $\{k_t\}_{t\in\mathbb{N}}$, of labor demand $\{L_t\}_{t\in\mathbb{N}}$, of labor supplies $\{\theta \mapsto \ell_t(\theta)\}_{t\in\mathbb{N}}$, of workers' consumption $\{\theta \mapsto y_t(\theta)\}_{t\in\mathbb{N}}$, of workers utility $\{U_t(\theta)\}_{t\in\mathbb{N}}$, of wages $\{w_t\}_{t\in\mathbb{N}}$ and of interest rates on bonds $\{r_t^b\}_{t\in\mathbb{N}}$, such that:*

1. *$\{c_t, z_t, k_t, L_t, b_t\}_{t\in\mathbb{N}}$ solves the entrepreneur's program (13), taking wages $\{w_t\}_{t\in\mathbb{N}}$ and interest rates of bonds $\{r_t^b\}_{t\in\mathbb{N}}$ as given, where assets $\{a_t\}_{t\in\mathbb{N}}$ verifies (10).*

2. *At each period $t \in \mathbb{N}$ and for each type $\theta \in \left[\underline{\theta}, \overline{\theta}\right]$, labor supply $\ell_t(\theta)$ solves the workers' program (15) taking the wage w_t as given and $y_t(\theta) \overset{def}{\equiv} w_t\, \ell_t(\theta) - T_t\left(w_t\, \ell_t(\theta)\right)$.*

3. *Market clears, labor demand is equal to aggregate labor supply:*

$$\int_{\underline{\theta}}^{\overline{\theta}} \ell_t(\theta)\, \mathrm{d}\Phi(\theta) = L_t \tag{22}$$

and, by the Walras law, the resources constraint (20) is satisfied.

As described in Appendix B.4, we characterize a competitive equilibrium as a sequence of allocations $\{c_t, z_t, k_{t+1}, U_t(\underline{\theta}), \theta \mapsto \ell_t(\theta)\}$ that verifies the implementability constraint:

$$\sum_{t=0}^{\infty} \beta^t \left[\mathscr{U}_\Omega(\Omega(c_t,z_t),k_t,t)\,\Omega(c_t,z_t) + \mathscr{U}_k(\Omega(c_t,z_t),k_t,t)\,k_t\right] = V_0'(a_0)\,a_0, \tag{23}$$

the resources constraint (21) at each period t and where $\theta \mapsto \ell_t(\theta)$ is non decreasing.

III.5 Optimal Policies

We are now in position to consider the optimal policy with commitment which consists in choosing the policy sequence $\{\tau_t^\pi, \tau_t^d, T_t(\cdot), b_t\}_{t\in\mathbb{N}}$ such that the associated competitive equilibrium maximizes the social objective (18). This amounts to choosing the best sequence of allocations $\{c_t, z_t, k_{t+1}, U_t(\underline{\theta}), \theta \mapsto \ell_t(\theta)\}$ that verifies the implementability constraint (23), the resources constraint (21) at each period and the monotonicity constraints that $\theta \mapsto \ell_t(\theta)$ are non-decreasing, i.e.:

$$\begin{aligned}
\max_{c_t, z_t, k_{t+1}, U_t(\underline{\theta}), \ell_t(\cdot)} \quad & \sum_{t=0}^{\infty} \beta^t \left\{ \int_{\underline{\theta}}^{\overline{\theta}} v\left(U_t(\underline{\theta}) - \int_{\underline{\theta}}^{\theta} h_\theta(\ell_t(x); x, t)\, \mathrm{d}x \right) \mathrm{d}\Psi(\theta) + \kappa\, \mathscr{U}\left(\Omega(c_t, z_t), k_t, t\right) \right\} \\
s.t: \quad & \sum_{t=0}^{\infty} \beta^t \left[\mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t)\, \Omega(c_t, z_t) + \mathscr{U}_k(\Omega(c_t, z_t), k_t, t)\, k_t \right] = V_0'(a_0)\, a_0 \\
\forall t \geq 0: \quad & U_t(\underline{\theta}) + \int_{\underline{\theta}}^{\overline{\theta}} \left[h\left(\ell_t(\theta); \theta, t\right) - \frac{1 - \Phi(\theta)}{\varphi(\theta)}\, h_\theta\left(\ell_t(\theta); \theta, t\right) \right] \mathrm{d}\Phi(\theta) + c_t + z_t + k_{t+1} \\
= \quad & \mathcal{F}(k_t, L_t; t) + (1 - \delta) k_t \qquad (24) \\
\forall t \geq 0: \quad & \ell_t(\cdot) \text{ is non-decreasing}
\end{aligned}$$

In the model of Judd (1985) which does not distinguish between corporate and dividend taxation, Straub and Werning (2020) explains that the optimal economy may not converge to a steady state with positive capital if the intertemporal elasticity of substitution is too low (if wealth effects are too high). To avoid this difficulty, we assume that at each period, the Lagrange multiplier associated to the implementability constraint (23), denoted μ, verifies:

$$(\kappa + \mu)\mathscr{U}_\Omega(t) + \mu \left[\mathscr{U}_{\Omega,\Omega}(t)\, \Omega(t) + \mathscr{U}_{\Omega,k}(t)\, k_t \right] > 0 \qquad (25)$$

To better understand the constraint imposed by this condition, consider the case where preferences for capital are additively separable from preferences for consumption and determined by an isoelastic management cost. Denoting by Γ the scale parameter and by ϵ the Frisch-elasticity of this effort, the entrepreneur's utility function takes the form:

$$\begin{aligned}
\mathscr{U}(\Omega, k) &= \frac{\Omega^{1-\gamma}}{1-\gamma} - \frac{\Gamma\, \varepsilon}{1+\varepsilon}\, k^{1+\frac{1}{\varepsilon}} && \text{if}: \quad \gamma \neq 1 \qquad (26) \\
&= \log(\Omega) - \frac{\Gamma\, \varepsilon}{1+\varepsilon}\, k^{1+\frac{1}{\varepsilon}} && \text{if}: \quad \gamma = 1
\end{aligned}$$

where $\gamma \geq 0$ and $\varepsilon > 0$. In this case, condition (25) reduces to:

$$\kappa + \mu(1 - \gamma) > 0. \qquad (27)$$

such that our convergence condition depends on policy-invariant primitives and amounts to impose a lower bound on the intertemporal elasticity of substitution $1/\gamma$. We prove in Appendix B.5 the following result:

Proposition 3. *Suppose the entrepreneur's preferences verify Assumption 2 and that the multiplier μ of the implementability constraint verifies (25). Then, the optimal dividend tax is nil at each period:*

$$\forall t \geq 1: \qquad \tau_t^d = 0.$$

As for part *i*) of Proposition 2, we can recover Proposition 3 by directly comparing environments with and without dividend taxation. The difference with the static model is that the government must adapt to the absence of dividend taxation not only by adjusting the corporate income tax but also the sequence of public debt. Proposition 3 therefore implies that for each sequence of policies with dividend taxation $\{\tau_t^\pi, \tau_t^d, b_t\}_{t\in\mathbb{N}}$, there exists another sequence of policies without dividend tax denoted $\{\widehat{\tau}_t^\pi, \widehat{\tau}_t^d = 0, \widehat{b}_t\}_{t\in\mathbb{N}}$ that increases welfare. To understand the mechanism underlying Proposition 3, we can characterize this alternative sequence of corporate income tax $\widehat{\tau}_t^\pi$ and public debt $\widehat{b}_t$.

Using (7), we first note that to obtain at each period a given subutility $\Omega_t = \Omega(c_t, z_t)$ from legal c_t and sheltered z_t consumption, the entrepreneur needs consumption expenditures:

$$\frac{c_t}{1-\tau_t^d} + z_t = \frac{\Omega_t}{\omega^\star(1-\tau_t^d)}$$

Using this relation as well as (14a) and (14d), the entrepreneur's program (13) becomes:

$$V_t(a_t) \stackrel{\text{def}}{\equiv} \max_{\Omega_t, k_t} \quad \mathscr{U}\left(\Omega_t, k_t\right) + \beta\, V_{t+1}\left((1+r_{t+1}^b)a_t + \left(\rho_t - r_t^b\right)k_t - \frac{\Omega_t}{\omega^\star(1-\tau_t^d)}\right) \tag{28}$$

Therefore, given the sequence of policies $\{\tau_t^\pi, \tau_t^d, b_t\}_{t\in\mathbb{N}}$, and the endogenous sequence of interest rates $\{r_t^b\}_{t\in\mathbb{N}}$, the entrepreneur's choices lead to a sequence of subutility and capital $\{\Omega_t, k_t\}_{t\in\mathbb{N}}$ where the budget constraints (10) and (12) can be rewritten as:

$$b_{t+1} + k_{t+1} = (1+r_t^b)(b_t + k_t) + \left(\rho_t - r_t^b\right)k_t - \frac{\Omega_t}{\omega^\star(1-\tau_t^d)}, \tag{29a}$$

while the Euler equation on bonds (14c) is rewritten as:

$$\omega^\star(1-\tau_t^d)\, \mathscr{U}_\Omega(\Omega_t, k_t) = \beta\, \left(1+r_{t+1}^b\right)\, \omega^\star(1-\tau_{t+1}^d)\, \mathscr{U}_\Omega(\Omega_{t+1}, k_{t+1}) \tag{29b}$$

and the optimal condition on capital (14e) as:

$$-\mathscr{U}_k(\Omega_t, k_t) = \mathscr{U}_\Omega(\Omega_t, k_t)\, \omega^\star(1-\tau_t^d)\, \left(\rho_t - r_t^b\right) \tag{29c}$$

According to (29b), to yield the same subutility $\{\Omega_t, k_t\}_{t\in\mathbb{N}}$ without dividend taxation, the alternative sequence of bonds must verify:

$$\widehat{r}_0^b = r_0^b \qquad \text{and :} \qquad \forall t\in\mathbb{N}: \qquad 1+\widehat{r}_{t+1}^b = \frac{\omega^\star(1-\tau_{t+1}^d)}{\omega^\star(1-\tau_t^d)}\, \left(1+r_{t+1}^b\right). \tag{30a}$$

Combining (14d) and (29c), the alternative corporate tax rate $\widehat{\tau}_t^\pi$ is defined from the after-corporate-tax return on capital $\widehat{\rho}_t$ through:

$$\forall t\in\mathbb{N}: \qquad \widehat{\rho}_t = \widehat{r}_t^b + \frac{\omega^\star(1-\tau_t^d)}{\omega^\star(1)}\left(\rho_t - r_t^b\right) \tag{30b}$$

Finally, according to (29a), the alternative sequence of public debt verifies the recursive equation:

$$\begin{aligned} \widehat{b}_{t+1} \quad &= \quad \left(1+\widehat{r}_t^b\right)\widehat{b}_t + \frac{\omega^\star(1-\tau_t^d)}{\omega^\star(1)}\left(b_{t+1} - \left(1+r_t^b\right)b_t\right) \\ &+ \quad \left(\frac{\omega^\star(1-\tau_t^d)}{\omega^\star(1)} - 1\right)k_{t+1} - \left(\frac{\omega^\star(1-\tau_t^d)}{\omega^\star(1)}(1+r_t^b) - \left(1+\widehat{r}_t^b\right)\right)k_t \end{aligned} \tag{30c}$$

Therefore, the sequence $\{\Omega_t, k_t\}_{t\in\mathbb{N}}$ verifies the necessary conditions (30a), (30b) and (30c) of the entrepreneur's program (28) under the two environments $\{\tau_t^\pi, \tau_t^d = 0, b_t, r_t^b\}_{t\in\mathbb{N}}$ and $\{\widehat{\tau}_t^\pi, \widehat{\tau}_t^d = 0, \widehat{b}_t, \widehat{r}_t^b\}_{t\in\mathbb{N}}$. Since capital is the same, the two environments lead also to the same sequence of wages, labor demands and labor supplies under the same labor income tax $T_t(\cdot)$ and the same level of utility at each period for the entrepreneur $\mathscr{U}(\Omega_t, k_t)$. However, the two environments differ only by the amount of resources $c_t + z_t$ to be extracted at each period by the entrepreneur to get the same sub-utility level $\Omega_t = \Omega(c_t, z_t)$ at each period, which are minimized under no dividend policy at each period.

Proposition 3 implies that the undesirability of dividend taxation is independent of the redistributive tastes of the planner. There are two reasons for that. First, because workers are hand-to-mouth, the choice of capital income taxation instruments can only have indirect impacts on workers' well-being, through investment. Hence any combination of corporate and dividend taxation that leaves investment unchanged leaves the welfare of workers unchanged. Second, because of Assumption 2, there always exists a sequence of policies without dividend taxation that induces the same sequence of investment decisions, hence the same sequence of utility for workers, as well as the same sequence of utility from legal and sheltered consumption, hence the same sequence of utility for the entrepreneur, as an arbitrary sequence of policies with non-zero dividend taxation. Since utility of workers and the entrepreneurs is unaffected, the choice of using dividend taxation solely depends on efficiency concerns. And we know from Atkinson and Stiglitz (1972) that under Assumption 2[14], dividend taxation, i.e a different tax treatment of legal and sheltered consumption, is Pareto-dominated, as any differential commodity tax.

It follows from Proposition 3 that the undesirability of dividend taxation established in Proposition 2 continues to hold in a dynamic setting in which undistributed profits finance not only avoidance but also future investment. Contrary to "new view" models, however, we impose that any investment $\{k_t\}_{t\in\mathbb{N}}$ must be subject to the corporate income tax before being either distributed or retained, as can be seen from the entrepreneur's budget constraint (12). Hence, there is no initial cash held by the firm that could be distributed and incur dividend taxation without first being subject to corporate income taxation. Otherwise, the corporate income tax would distort investment by discouraging the reinvestment of initial cash, while the dividend tax would be neutral, since initial cash would ultimately be subject to dividend taxation (Auerbach, 1979). Ruling out such "trapped equity" (Poterba and Summers (1984)), allowing for profits to be reinvested does not prevent capital supply to respond to both dividend and corporate taxation.[15]

Finally, it is worth noting that the undesirability of dividend taxation continue to hold in an economy

[14]As shown in Appendix C, we can relax Assumption 2 by allowing non-homothetic preferences in presence of heterogeneous entrepreneurs. In this case, the choice of dividend taxation remains independent of equity issues, provided that preferences remain weakly separable and that the government has access to nonlinear capital income taxes, echoing Atkinson and Stiglitz (1976).

[15]Even with initial cash holdings trapped in the firm, dividend taxation would still be distortionary if additional equity is needed, as in the cash-poor case of Chetty and Saez (2010) or the young firm of Korinek and Stiglitz (2009).

with technical progress when the production function and workers and entrepreneurs are time varying, provide that the convergence condition (25) continue to hold.

Erasing dividend taxation allows for Pareto-improvement under Assumption 2. The tax burden that should however be imposed on different types of workers and on the entrepreneur involves equity considerations. To obtain a clear-cut result on the corporate income tax, i.e the only tax levied on the entrepreneur at the optimum, we assume that the government is only concern with the well-being of workers, as in Judd (1985).

Proposition 4. *Suppose that the planner does not value the utility of the entrepreneur, i.e $\kappa = 0$, and that the discount factor β tends to 1. Then, when Assumption 2 and the convergence condition (25) hold, the optimal steady-state corporate income tax verifies:*

$$\tau^\pi = \frac{1}{1 + \zeta_\rho^k}$$

with ζ_ρ^k the elasticity of steady state capital supply with respect to after-corporate-tax returns ρ.

The proof is given in Appendix B.5. While part *i*) of Proposition 2 is valid at each period of an infinite-horizon model, part *ii*) only constitutes a limit case of an economy that directly jumps to its steady-state. In Section III.6, we explore the shape of corporate income taxation in more realistic settings with consumption smoothing. The analytical solution for the corporate income tax described in Proposition 4 is however worth-mentioning for two reasons.

First, Proposition 4 shows that the absence of dividend taxation, established in Proposition 3, does not trivially follow from the undesirability of capital taxation in infinite-horizon models (Judd, 1985; Chamley, 1986; Chari and Kehoe, 1999). To see this, consider the case with isoelastic preferences (26) with a discount factor $\beta \mapsto 1$. In this case, as shown in Appendix B.5, the steady-state elasticity of capital supply verifies $1 + \zeta_\rho^k = (1 + \epsilon)/(1 + \gamma\, \epsilon)$, which is strictly positive and finite. Combining Proposition 3 and 4 implies that dividend taxation should be eliminated in an economy that however requires strictly positive capital income taxation, through the CIT, at the optimum.

Second, Proposition 4 provides an example where the optimal long run corporate income tax does not depend on its incidence on factor prices. Compared to the simple model developed in Section II, the introduction of nonlinear labor income taxation prevents a straightforward application of the production efficiency theorem which was proved under linear taxation (Diamond and Mirrlees, 1971). But Jacquet and Lehmann (2025) showed that the validity of the production efficiency theorem does not hinge on the nonlinearity of the tax instruments but on the ability of the tax system to target each production factor's income. A separate tax schedule for labor income and capital income, as assumed here, is therefore enough to apply their production efficiency theorem in a competitive economy. Hence the optimal linear corporate income tax, and, as shown in Appendix B.6, the optimal nonlinear labor income tax do not depend on parameters of the production function.

Although providing a knife-edge example where corporate income taxation follows a simple inverse elasticity logic in an infinite-horizon model, the assumption of a discount rate tending to one, which implies the absence of transitional dynamic, is unrealistic. We therefore numerically explore optimal corporate income taxation in presence of consumption smoothing in the next Subsection.

III.6 Optimal Corporate Income Tax: The Isoelastic Case

To explore the shape of the optimal corporate income taxation along the transition dynamics when the discount factor is below one, we numerically solve a special case of the economy described in Section III.

We first assume that the entrepreneur's preferences can be represented by an isoelastic cost of managing capital, additively separable from preferences for consumption. We attach no welfare weight to the entrepreneur, i.e $\kappa = 0$. To enforce the convergence condition to non degenerate steady-states (25), we assume that the entrepreneur's utility is given by (26) with the intertemporal elasticity of substitution satisfying $1/\gamma > 1$, i.e $0 < \gamma < 1$.

Second, we assume that workers' preferences are also isoelastic with

$$h(\ell;\theta) = \frac{\xi}{1+\xi}\,\ell^{1+\frac{1}{\xi}}\,\theta^{-\frac{1}{\xi}} \qquad \text{with :} \qquad \xi > 0 \tag{31}$$

Moreover, we assume that workers have the same intertemporal preferences than entrepreneurs so their utility level $v(U_t)$ is given by:

$$v(U_t(\theta)) = \max_{\ell} \qquad \frac{\left(w_t\,\ell - T_t\left(w_t\,\ell - \frac{\xi}{1+\xi}\,\ell^{1+\frac{1}{\xi}}\,\theta^{-\frac{1}{\xi}}\right)\right)^{1-\gamma}}{1-\gamma} \qquad \gamma \in (0,1) \tag{32}$$

Third assume a maximin objective among workers such that the cumulative distribution of the weights on type-θ boils down to $\Psi(\theta) = 1$ for all $\theta \in (\underline{\theta}, \overline{\theta}]$.

Eventually, to recover the dynamics of the optimal economy, we need to specify the production function, which we assume to be Cobb-Douglas with:

$$\mathcal{F}(k, L) = A\,k^{\alpha}\,L^{1-\alpha} \qquad \alpha \in (0,1) \tag{33}$$

In Appendix B.6, we solve for the government's program (24) under this specific set of structural assumptions. Parameter choices are described in Table 2. In particular, we set the coefficients γ and ϵ of the entrepreneur's program (26) so that the steady-state capital supply elasticity $\zeta^k_\rho \mapsto 1$ when the discount factor $\beta \mapsto 1$. In this extreme case with zero discounting, Proposition 4 implies a steady-state optimal corporate income tax rate of 50%. In Figure 2, we describe how the optimal corporate income tax rate deviates from this closed-form inverse elasticity rule when $\beta < 1$.

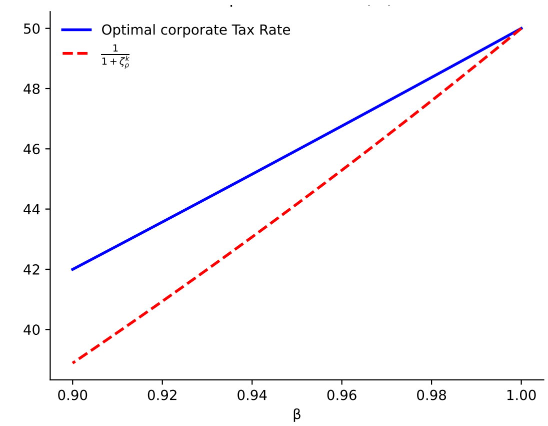

Figure 2: Optimal steady-state corporate income tax rate (%) versus $1/(1+\zeta_\rho^k)$ tax rule, depending on the discount factor β.

Introducing discounting reduces the optimal steady-state corporate income tax. However, in presence of discounting, the optimal corporate income tax (in blue) should be higher than the one predicted by a naive inverse elasticity rule (in red). To get an intuition, recall that not only the entrepreneur but also workers discount the future at rate β. Hence when $\beta < 1$, workers, so the government, are willing to sacrifice some future consumption to maximize their present utility. When $\gamma > 0$ such that capital does not jump to its steady-state level instantaneously, this transfer from future to present consumption can be done by setting the steady-state corporate income tax above its steady-state revenue maximizing level $1/1+\zeta_\rho^k$. Hence, the optimal capital stock converges to a steady-state level that is lower than the one implied by the $1/(1+\zeta_\rho^k)$ rule. This mirrors the optimal growth economy, in which the steady-state capital stock converges to a "modified" golden rule level that is below the one implied by the golden rule (Blanchard and Fischer, 1989).

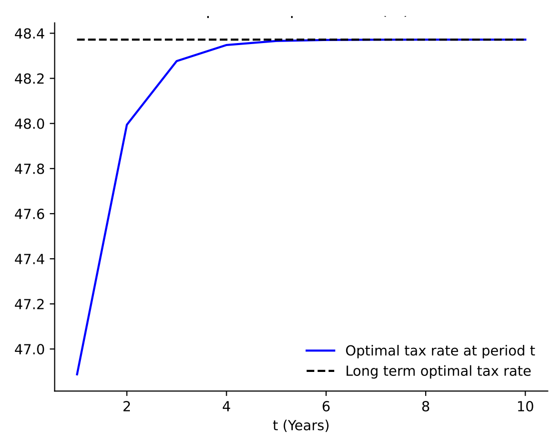

Figure 3: Convergence to the optimal steady-state corporate income tax rate (%) starting from a capital stock 10% below the steady-state, with $\beta = 0.98$.

To go beyond steady-state analysis, we depict in Figure 3 the convergence of the corporate income tax when capital is 10% below its steady-state level. The adjustment is smooth, with the tax rate rising from 47% to its 48.4% steady-state level over six years, indicating that the response of the optimal CIT along the transitional dynamics are very small compared to the initial deviation of capital stock.

IV Conclusion

We asked whether profits should be taxed directly through a corporate income tax or, once distributed, via a dividend tax in a two-class economy with workers and capitalists. Introducing shareholder-level avoidance makes dividend taxation undesirable at the optimum. Hence, the government should rely on an enhanced corporate income tax rather than the current combination of the two instruments used in most OECD countries.

We first employed a stylized model with simplified dynamics and welfare preferences to establish our core result. It showed that dividend taxation raises the resource cost required for capitalists to undertake investment and therefore should be eliminated. In the second part of the paper, we demonstrated that this intuition holds in an infinite-horizon model with a full-fledged utilitarian welfare function: dividend taxation should be set to zero in every period. In the long run, the optimal corporate income tax is strictly positive. In the limiting case where the economy immediately reaches its steady state, the optimal corporate income tax follows the standard inverse-elasticity rule.

To establish the undesirability of dividend taxation, we focused on a closed economy, abstracting from issues such as profit shifting. However, our logic can extend to an open economy as long as profits shifted abroad are not ultimately repatriated to shareholders as taxable dividends. Whether shifted profits escape both corporate and dividend taxation remains an empirical question for future research.

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A Appendix to the Toy model

A.1 Proof of Proposition 1

Let $\eta > 0$ denote the capital demand elasticity so that differentiating the capital demand equation leads to:

$$\frac{\mathrm{d}k}{k} = -\eta\,\frac{\mathrm{d}r}{r}$$

Differentiating the capital supply equation yields

$$\frac{\mathrm{d}k}{k} = \zeta^k_\rho\,\frac{\mathrm{d}\rho}{\rho} = \zeta^k_\rho\,\left[\frac{\mathrm{d}r}{r} - \frac{\mathrm{d}\tau_\pi}{1-\tau_\pi}\right]$$

Combining the two yields:

$$\begin{aligned}
(\eta+\zeta^k_\rho)\frac{\mathrm{d}r}{r} &= \zeta^k_\rho\,\frac{\mathrm{d}\tau_\pi}{1-\tau_\pi} \\
\frac{1-\tau_\pi}{r}\,\frac{\partial r}{\partial(1-\tau_\pi)}\bigg|^{GE}_{\tau_d} &= -\frac{\zeta^k_\rho}{\eta+\zeta^k_\rho} \\
\frac{1-\tau_\pi}{\rho}\,\frac{\partial \rho}{\partial(1-\tau_\pi)}\bigg|^{GE}_{\tau_d} = 1 + \frac{1-\tau_\pi}{r}\,\frac{\partial r}{\partial(1-\tau_\pi)}\bigg|^{GE}_{\tau_d} &= \frac{\eta}{\eta+\zeta^k_\rho} > 0 \qquad \text{(A.1)}
\end{aligned}$$

so that decreasing τ^π does increase ρ and the government problem can be rewritten as (5). Differentiating (5) with respect to ρ and τ^d yields:

$$\begin{aligned}
\frac{\partial SWF}{\partial \rho} &= -k + (r-\rho)\frac{\partial \mathcal{K}}{\partial \rho} + \tau_d\,\frac{\partial \mathcal{D}}{\partial \rho} \\
&= -\left[1 - \frac{r-\rho}{\rho}\,\frac{\rho}{k}\frac{\partial \mathcal{K}}{\partial \rho}\right] k + \frac{\tau_d}{\rho}\frac{\rho}{D}\frac{\partial \mathcal{D}}{\partial \rho} D \\
&= -\left[1 - \frac{\tau_\pi}{1-\tau_\pi}\,\zeta^k_\rho\right] k + \tau_d\,\zeta^D_\rho\,\frac{\mathcal{D}}{\rho} \\
&= -k\left\{1 - \frac{\tau_\pi}{1-\tau_\pi}\,\zeta^k_\rho - \tau_d\,\Delta\,\zeta^D_\rho\right\} \qquad \text{(A.2a)}
\end{aligned}$$

$$\begin{aligned}
\frac{\partial SWF}{\partial \tau_d} &= D - \tau_d\,\frac{\partial \mathcal{D}}{\partial(1-\tau_d)} - (r-\rho)\frac{\partial \mathcal{K}}{\partial(1-\tau_d)} \\
&= \left[1 - \frac{\tau_d}{1-\tau_d}\,\zeta^D_d\right] D - \tau_\pi\, r\,\frac{k}{1-\tau_d}\zeta^k_d \\
&= \left[1 - \frac{\tau_d}{1-\tau_d}\,\zeta^D_d\right] D - \frac{\tau_\pi}{1-\tau_\pi}\,\zeta^k_d\frac{\rho\, k}{1-\tau_d} \\
&= \frac{D}{1-\tau_d}\left\{1 - (1+\zeta^D_d)\tau_d - \frac{\tau_\pi}{1-\tau_\pi}\,\frac{\zeta^k_d}{\Delta}\right\} \qquad \text{(A.2b)}
\end{aligned}$$

Multiplying (A.2a) by (4) and using (A.2b), the impact of increasing τ^d while adjusting ρ to keep k fixed is given by:

$$
\begin{aligned}
\left.\frac{\partial SWF}{\partial \tau_d}\right|_k &= \frac{\rho}{1-\tau_d}\,\frac{\zeta_d^k}{\zeta_\rho^k}\,\frac{\partial SWF}{\partial \rho} + \frac{\partial SWF}{\partial \tau_d} \\
&= \frac{\rho\, k}{1-\tau_d}\,\frac{\zeta_d^k}{\zeta_\rho^k}\left\{-1 + \frac{\tau_\pi}{1-\tau_\pi}\,\zeta_\rho^k + \tau_d\,\Delta\,\zeta_\rho^D\right\} \\
&+ \frac{D}{1-\tau_d}\left[1-\tau_d(1+\zeta_d^D)\right] - \frac{\tau_\pi}{1-\tau_\pi}\,\zeta_d^k\,\frac{\rho\, k}{1-\tau_d} \\
&= \frac{D}{1-\tau_d}\left\{-\frac{1}{\Delta}\frac{\zeta_d^k}{\zeta_\rho^k} + \tau_d\,\zeta_\rho^D\frac{\zeta_d^k}{\zeta_\rho^k} + 1 - \tau_d(1+\zeta_d^D)\right\} \\
&= \frac{D}{1-\tau_d}\left\{1 - \frac{1}{\Delta}\frac{\zeta_d^k}{\zeta_\rho^k} + \tau_d\left[\zeta_\rho^D\frac{\zeta_d^k}{\zeta_\rho^k} - 1 - \zeta_d^D\right]\right\} \qquad \text{(A.3)}
\end{aligned}
$$

Evaluating this first-order condition at $\tau_d = 0$ yields the first part of Proposition 1. This condition is sufficient for identifying a maximum if and only if:

$$
\zeta_\rho^D\frac{\zeta_d^k}{\zeta_\rho^k} - 1 - \zeta_d^D < 0 \qquad \Leftrightarrow \qquad \zeta_\rho^D\,\zeta_d^k < \left(1+\zeta_d^D\right)\zeta_\rho^k \qquad \text{(A.4)}
$$

At the optimal dividend tax, on gets from (A.2b):

$$
\begin{aligned}
0 &= \frac{\partial SWF}{\partial \tau_d} \\
(1+\zeta_d^D)\tau_d &= 1 - \frac{\tau_\pi}{1-\tau_\pi}\frac{\zeta_d^k}{\Delta} \\
\tau_d\,\Delta\,\zeta_\rho^D &= \frac{\Delta\,\zeta_\rho^D}{1+\zeta_d^D} - \frac{\zeta_\rho^D\,\zeta_d^k}{1+\zeta_d^D}\,\frac{\tau_\pi}{1-\tau_\pi}
\end{aligned}
$$

Inserting the latter equality into (A.2a) yields:

$$
\frac{\partial SWF}{\partial \rho} = k\left\{-1 + \frac{\Delta\,\zeta_\rho^D}{1+\zeta_d^D} + \left[\zeta_\rho^k - \frac{\zeta_\rho^D\,\zeta_d^k}{1+\zeta_d^D}\right]\frac{\tau_\pi}{1-\tau_\pi}\right\}
$$

Evaluating this condition at $\tau_\pi = 0$ yields the second part of Proposition 1. Whenever condition (A.4) is verified, one gets[16] $\zeta_\rho^k > \frac{\zeta_\rho^D\,\zeta_d^k}{1+\zeta_d^D}$. Therefore $\partial SWF/\partial\rho$ is increasing in τ_π, i.e. is decreasing in ρ and $\partial SWF/\partial\rho = 0$ corresponds to a maximum.

A.2 Proof of Proposition 2

Since $D = \Delta\,\rho\,k$ and Δ does not depend on ρ under Assumption 1, we get:

$$
\zeta_\rho^D = 1 + \zeta_\rho^k \quad \text{and} \quad \zeta_d^D = \zeta_d^k + \zeta_d^\Delta.
$$

Applying the envelope theorem to (7) yields:

$$
\begin{aligned}
\frac{\partial \omega^\star(1-\tau_d)}{\partial(1-\tau_d)} &= \Delta\,\Omega_c \\
(1-\tau_d)\frac{\partial \omega^\star(1-\tau_d)}{\partial(1-\tau_d)} &= (1-\tau_d)\Delta\,\Omega_c \\
\frac{(1-\tau_d)}{\omega^\star(1-\tau_d)}\,\frac{\partial \omega^\star(1-\tau_d)}{\partial(1-\tau_d)} &= \frac{(1-\tau_d)\Delta\,\Omega_c}{(1-\tau_d)\Delta\,\Omega_c + (1-\Delta)\,\Omega_z} \\
&= \Delta
\end{aligned}
$$

[16] if $\zeta_d^D > -1$.

where the third equality holds because $\Omega(\cdot,\cdot)$ exhibits constant return to scale while the last equality uses the entrepreneur's first-order condition with respect to z $\Omega_z = (1-\tau_d)\Omega_c$. Since capital supply depends on ρ and τ_d solely through $\rho\,\omega^\star(1-\tau_d)$, we thus get

$$\zeta_d^k = \Delta\,\zeta_\rho^k$$

To summarize Assumption 1 implies:

$$\boxed{\zeta_d^k = \Delta\,\zeta_\rho^k \quad , \quad \zeta_\rho^D = 1+\zeta_\rho^k \quad \text{and} \quad \zeta_d^D = \zeta_d^k + \zeta_d^\Delta} \tag{A.5}$$

Using (A.5), the second-order condition (A.4) under Assumption 1 boils down to $\Delta < 1+\zeta_d^\Delta$ which is always verified since $\Delta \leq 1$ by definition. Plugging (A.5) in (A.3) proves the first part of Proposition 2. Plugging $\tau_d = 0$ into (A.2a) yields the second part of Proposition 2.

A.3 Calibration

Let specify the subutility function $\Omega(\cdot,\cdot)$ by the CES:

$$\Omega(c,z) = \left[c^{1-\frac{1}{\gamma}} + \alpha\, z^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}. \tag{A.6}$$

Program (7) implies:

$$\max_{\Delta} \qquad (1-\tau_d)^{\frac{\gamma-1}{\gamma}}\Delta^{1-\frac{1}{\gamma}} + \alpha\,(1-\Delta)^{1-\frac{1}{\gamma}}$$

The first-order condition implies:

$$\begin{aligned}
\cancel{\left(1-\frac{1}{\gamma}\right)}(1-\tau_d)^{\frac{\gamma-1}{\gamma}}\Delta^{-\frac{1}{\gamma}} &= \cancel{\left(1-\frac{1}{\gamma}\right)}\alpha\,(1-\Delta)^{-\frac{1}{\gamma}} \\
\left(\frac{1-\Delta}{\Delta}\right)^{\frac{1}{\gamma}} &= \alpha\,(1-\tau_d)^{\frac{1-\gamma}{\gamma}} \\
\frac{1-\Delta}{\Delta} &= \alpha^\gamma\,(1-\tau_d)^{1-\gamma} \\
1-\Delta &= \alpha^\gamma\,(1-\tau_d)^{1-\gamma}\,\Delta \\
1 &= \left(1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}\right)\Delta
\end{aligned}$$

and eventually:

$$\boxed{\Delta(1-\tau_d) \overset{\text{def}}{\equiv} \frac{1}{1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}}} \tag{A.7}$$

We want to set parameters γ and α to reproduce empirical values for Δ and ζ_d^Δ. Differntiating (A.7) yields:

$$\begin{aligned}
\frac{\partial\Delta}{\partial(1-\tau_d)} &= \frac{-(1-\gamma)\,\alpha^\gamma(1-\tau_d)^{-\gamma}}{[1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}]^2} \\
(1-\tau_d)\frac{\partial\Delta}{\partial(1-\tau_d)} &= (\gamma-1)\,\frac{\alpha^\gamma(1-\tau_d)^{1-\gamma}}{[1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}]^2} \\
&= (\gamma-1)\frac{1}{1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}}\;\frac{\alpha^\gamma(1-\tau_d)^{1-\gamma}}{1+\alpha^\gamma\,(1-\tau_d)^{1-\gamma}} \\
&= (\gamma-1)\,\Delta\,(1-\Delta)
\end{aligned}$$

Consequently:

$$\boxed{\zeta_d^\Delta = (\gamma-1)(1-\Delta(1-\tau_d))} \tag{A.8}$$

So for a given value of ζ^{Δ_d} and of Δ, we can retrieve γ. Plugging this calibrated value of γ with a baseline value for Δ and for τ_d into (A.7) we can retrieve α through:

$$\begin{aligned}
\frac{1}{\Delta} &= 1+\alpha^{\gamma}\left(1-\tau_d\right)^{1-\gamma} \\
\frac{1-\Delta}{\Delta} &= \alpha^{\gamma}\left(1-\tau_d\right)^{1-\gamma} \\
\frac{1-\Delta}{\Delta}\left(1-\tau_d\right)^{\gamma-1} &= \alpha^{\gamma} \\
\left(\frac{1-\Delta}{\Delta}\right)^{\frac{1}{\gamma}}\left(1-\tau_d\right)^{\frac{\gamma-1}{\gamma}} &= \alpha
\end{aligned}$$

In France, we use the 2022 flat-tax rate on dividend to set $\tau_d = 0.3$. Using tax data for 2022 from DGFIP, we estimate $D \approx 36,7$ billion euros and $r\ k \approx 277,5$. Setting $\tau_\pi = 0.25$ based on the corporate income tax rate, this yields $\Delta \approx 18\%$.

In the US, dividends are part of the nonlinear personal income tax. Using the IRS data, we retrieve a distribution of ordinary and qualified dividends based on adjusted gross income. Using the 2022 tax schedule for ordinary and qualified dividend, we approximate taxable dividend and corresponding tax rates by levels of AGI as described in Table 1. This yields $D \approx 717.6$ billion dollars . We use the IRS Corporate Income Tax Report to retrieve $r\ k \approx 2879,1$ billion dollars. Setting $\tau_\pi = 0.21$, this yields $\Delta \approx 32\%$. We round up or implicit average dividend tax rate to $\tau_d = 0.25$.[17]

Approximating $r\ k$ by net operating surplus, we obtain $\Delta \approx 44\%$ in France and $\Delta \approx 52\%$ in the US using national accounts data instead of tax data.

AGI Bin	Ordinary (bn)	Qualified (bn)	Ordinary Rate	Qualified Rate
Under $1	3,572,443	2,332,836	10%	0%
$1–$10,000	2,524,930	1,567,951	10%	0%
$10,000–$25,000	5,663,804	3,510,019	12%	0%
$25,000–$50,000	10,829,069	7,015,253	12%	15%
$50,000–$75,000	14,304,823	9,597,796	22%	15%
$75,000–$100,000	16,250,082	11,244,723	22%	15%
$100,000–$200,000	59,404,894	43,356,086	24%	15%
$200,000–$500,000	81,364,750	62,176,807	32%	18.8%
$500,000–$1,000,000	46,707,610	36,106,096	37%	23.8%
$1,000,000 or more	167,640,201	132,448,172	37%	23.8%

Table 1: Ordinary and Qualified Dividend Amounts and Tax Rates by AGI Bin - US - 2022

A.4 Alternative Calibration

[17] France: DGFiP (income tax data and business tax statistics), U.S: IRS (dividend statistics and Corporate Income Tax Report).

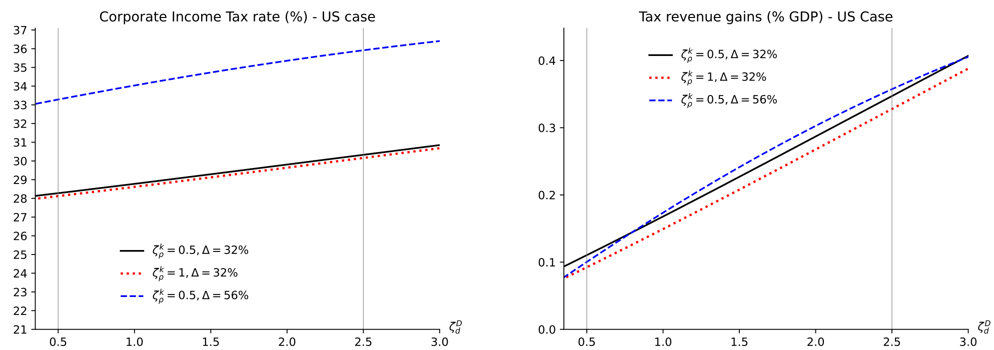

Figure 4: Corporate income tax (left) and associated tax-revenue gain (right) for the US with alternative values for Δ and ζ_ρ^k

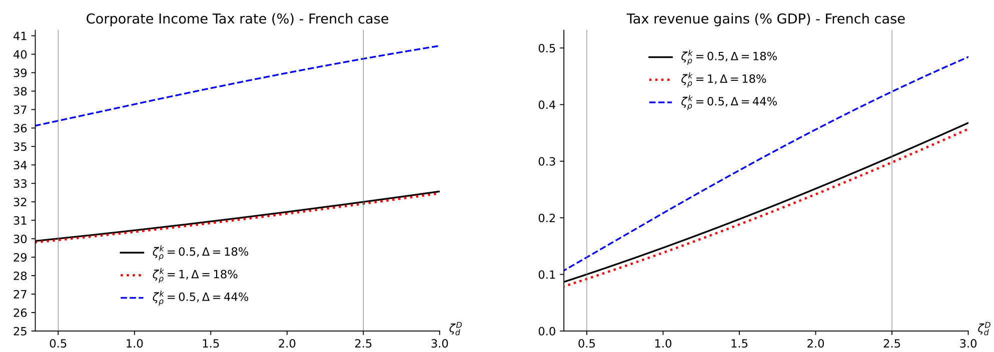

Figure 5: Corporate income tax (left) and associated tax-revenue gain (right) for France with alternative values for Δ and ζ_ρ^k

B Appendix of the Infinite Horizon Model

Throughout this section, we allow for a discrepancy between total depreciation $\delta\ k_t$ and depreciation eligible for tax deduction $\widehat{\delta}\ k_t$, with $0 \leq \widehat{\delta} \leq \delta$. Therefore k_t units of investment yields $(1-\tau_t^\pi)\left(\mathcal{F}(k_t, L_t; t) - w_t\ L_t - \widehat{\delta}\ k_t\right) + (1-\delta+\widehat{\delta})\ k_t$ units of goods at the period t.

B.1 Entrepreneur's program

The first-order condition with respect to employment L_t is Equation (14a). The envelope and first-order conditions with respect to c_t, z_t and k_t associated to the entrepreneur's program (13) are:

$$
\begin{aligned}
V_t'(a_t) &= \beta(1+r_t^b)\ V_{t+1}'(a_{t+1}) && \text{(B.1a)}\\
\Omega_c(c_t, z_t)\ \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t) &= \frac{\beta\ V_{t+1}'(a_{t+1})}{1-\tau_t^d} && \text{(B.1b)}\\
\Omega_z(c_t, z_t)\ \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t) &= \beta\ V_{t+1}'(a_{t+1}) && \text{(B.1c)}\\
-\mathscr{U}_k(\Omega(c_t, z_t), k_t, t) &= \beta\ V_{t+1}'(a_{t+1})(\rho_t - r_t^b). && \text{(B.1d)}
\end{aligned}
$$

where we used (14d) to derive (B.1d). Combining (B.1b) and (B.1c) leads to (14b). Combining (B.1a) at period $t+1$ with (B.1c) leads to (14c). Combining (B.1a) and (B.1d) leads to:

$$
V_t'(a_t) = \mathscr{U}_k(\Omega(c_t, z_t), k_t, t) + \beta(1+\rho_t)\ V_{t+1}'(a_{t+1})
$$

and so:

$$\beta\, V'_{t+1}(a_{t+1}) = \beta\left[\mathscr{U}_k(\Omega(c_{t+1}, z_{t+1}), k_{t+1}, t+1) + \beta(1+\rho_{t+1})\, \beta\, V'_{t+2}(a_{t+2})\right]$$

Using (B.1c) leads to (14e).

B.2 Workers

We first reproduce the proof by Hammond (1979) of the Taxation principle whish establishes the equivalence between designing an income tax schedule taking (15) into account and designing an allocation $\theta \mapsto (\ell_t(\theta), y_t(\theta))$ that verifies an incentive constraint. Since $\ell_t(\theta)$ solves (15) and $y_t(\theta) = w_t\, \ell_t(\theta) - T_t(w_t\, \ell_t(\theta))$, one gets that:

$$\forall t, \theta, \ell' : \qquad y_t(\theta) - h(\ell_t(\theta); \theta, t) \geq w_t\, \ell' - T_t(w_t\, \ell') - h(\ell'; \theta, t).$$

Taking $\ell' = \ell_t(\theta')$ in the last inequality and noting that $y_t(\theta') = w_t\, \ell_t(\theta') - T_t(w_t\, \ell_t(\theta'))$ leads to incentive (equivalently self-selection) constraint:

$$\forall t, \theta, \theta' : \qquad y_t(\theta) - h(\ell_t(\theta); \theta, t) \geq y_t(\theta') - h(\ell_t(\theta'); \theta, t) \tag{B.2}$$

We now consider an allocation $\theta \mapsto (\ell_t(\theta), y_t(\theta))$ that verifies the incentive constraint (B.2) and build an income tax schedule that decentralizes it (i.e. such that $\ell_t(\theta)$ solves (15) and $y_t(\theta) = w_t\, \ell_t(\theta) - T_t(w_t\, \ell_t(\theta))$). Let $\mathcal{X} = \{x \mid \exists \theta \in [\underline{\theta}, \overline{\theta}] \text{ s.t } x = w_t \cdot \ell_t(\theta)\}$ denote the income range.

- If $x \notin \mathcal{X}$, set
$$T_t(x) = +\infty.$$
- Otherwise, if $x \in \mathcal{X}$ and there exists $\theta_1 \neq \theta_2 \in [\underline{\theta}, \overline{\theta}]$ such that $x = w_t\, \ell_t(\theta_1) = w_t\, \ell_t(\theta_2)$, then (B.2) implies $y_t(\theta_1) \geq y_t(\theta_2)$ and $y_t(\theta_2) \geq y_t(\theta_1)$, so one must have $y_t(\theta_1) = y_t(\theta_2)$. We then unambiguously define
$$T_t(x) = x - y_t(\theta_1) = x - y_t(\theta_2).$$

Given this tax schedule, a taxpayer never opt for pretax labor income $w_t\, \ell$ outside the income range and program (15) amounts to solve:

$$\max_{\theta'} \qquad y_t(\theta') - h(\ell_t(\theta'); \theta, t)$$

whose solution is $\theta' = \theta$ according to (B.2).

The next step is to show that any allocation $\theta \mapsto (\ell_t(\theta), y_t(\theta))$ verifies the incentive constraint (B.2) if and only if it verifies (17) and $\theta \mapsto \ell_t(\theta)$ is non decreasing. Using $U_t(\theta) = y_t(\theta) - h(\ell_t(\theta); \theta, t)$, we first rewrite (B.2) as

$$\forall t, \theta, \theta' : \qquad U_t(\theta) \geq U_t(\theta') + h(\ell_t(\theta'); \theta', t) - h(\ell_t(\theta'); \theta, t) \tag{B.3}$$

Let $\theta_1 < \theta_2 \in \left[\underline{\theta}, \overline{\theta}\right]$. Apply (B.3) to $\theta = \theta_2$ and $\theta' = \theta_1$ and vice versa leads to:

$$h(\ell_t(\theta_1); \theta_1, t) - h(\ell_t(\theta_1); \theta_2, t) \leq U_t(\theta_2) - U_t(\theta_1) \leq h(\ell_t(\theta_2); \theta_1, t) - h(\ell_t(\theta_2); \theta_2, t)$$
$$-\int_{\theta_1}^{\theta_2} h_\theta(\ell_t(\theta_1); x, t)\, \mathrm{d}x \leq U_t(\theta_2) - U_t(\theta_1) \leq -\int_{\theta_1}^{\theta_2} h_\theta(\ell_t(\theta_2); x, t)\, \mathrm{d}x \tag{B.4}$$

Since $h_{\ell,\theta}(\cdot, \cdot; t) < 0$ and $\theta_1 < \theta_2$, Equation (B.4) imposes $\ell_t(\theta_1) \leq \ell_t(\theta_2)$, i.e. that $\ell_t(\cdot)$ is non decreasing. Moreover, for any $\theta \in \left[\underline{\theta}, \overline{\theta}\right]$, divide the $[\underline{\theta}, \theta]$ interval into n sub-intervals and apply (B.4) on each of these sub-intervals. Sum these n inequalities. As n tends to infinity, the left-hand side and the right-hand sides converges to the right-hand side of:

$$U_t(\theta) = U_t(\underline{\theta}) - \int_{\underline{\theta}}^{\theta} h_\theta(\ell_t(x); x, t)\, \mathrm{d}x \tag{B.5}$$

in Equation (17).

Conversely, assume $\ell_t(\cdot)$ is non decreasing and define $U_t(\theta)$ and $y_t(\theta)$ using (17). Since $U_t(\cdot)$ verifies (B.5), $\ell(\cdot)$ is non decreasing and $h_{\ell,\theta}(\cdot,\cdot;t) < 0$, one gets (B.4) for any $\theta_1 < \theta_2$, thereby (B.3) and (B.2) for any $\theta \neq \theta'$.

B.3 The Government

Using (10) and (11), we get:

$$(1+r_t^b)b_t - b_{t+1} \;=\; D_t + z_t + k_{t+1} - (1-\tau_t^\pi)\left(\mathcal{F}(k_t, L_t; t) - w_t\, L_t - \widehat{\delta}\, k_t\right) - (1-\delta+\widehat{\delta})k_t$$

Combining the latter equation with $c_t = (1-\tau_t^d)D_t$ and (19) leads to:

$$\begin{aligned} c_t + z_t + k_{t+1} &= \mathcal{F}(k_t, L_t; t) - w_t\, L_t - \widehat{\delta}\, k_t + (1-\delta+\widehat{\delta})k_t + \int_{\underline{\theta}}^{\overline{\theta}} T_t\left(w_t\, \ell_t(\theta)\right)\, \mathrm{d}\Phi(\theta) \\ &= \mathcal{F}(k_t, L_t; t) - w_t\, L_t + (1-\delta)k_t + \int_{\underline{\theta}}^{\overline{\theta}} \left(w_t\, \ell_t(\theta) - y_t(\theta)\right)\, \mathrm{d}\Phi(\theta) \\ &= \mathcal{F}(k_t, L_t; t) + (1-\delta)k_t - \int_{\underline{\theta}}^{\overline{\theta}} y_t(\theta)\, \mathrm{d}\Phi(\theta) \end{aligned}$$

where we used $y_t(\theta) \overset{\text{def}}{\equiv} w_t\, \ell_t(\theta) - T_t(w_t\, \ell_t(\theta))$ in the second equality and the labor market clearing condition $L_t = \int_{\underline{\theta}}^{\overline{\theta}} \ell_t(\theta)\, \mathrm{d}\Phi(\theta)$ in the third equality, to finally obtain (20).

According to (17) workers' consumption are given by:

$$\begin{aligned} \int_{\underline{\theta}}^{\overline{\theta}} y_t(\theta)\, \mathrm{d}\Phi(\theta) &= \int_{\underline{\theta}}^{\overline{\theta}} U_t(\theta)\, \mathrm{d}\Phi(\theta) + \int_{\underline{\theta}}^{\overline{\theta}} h\left(\ell_t(\theta); \theta, t\right)\, \mathrm{d}\Phi(\theta) \\ &= U_t(\underline{\theta}) - \iint_{\underline{\theta} \le x \le \theta \le \overline{\theta}} h_\theta\left(\ell_t(x); x, t\right)\, \mathrm{d}\Phi(\theta)\mathrm{d}x + \int_{\underline{\theta}}^{\overline{\theta}} h\left(\ell_t(\theta); \theta, t\right)\, \mathrm{d}\Phi(\theta) \\ &= U_t(\underline{\theta}) - \int_{\underline{\theta}}^{\overline{\theta}} h_\theta\left(\ell_t(x); x, t\right)\, \left(1 - \Phi(x)\right)\mathrm{d}x + \int_{\underline{\theta}}^{\overline{\theta}} h\left(\ell_t(\theta); \theta, t\right)\, \mathrm{d}\Phi(\theta) \\ &= U_t(\underline{\theta}) + \int_{\underline{\theta}}^{\overline{\theta}} \left[h\left(\ell_t(\theta); \theta, t\right) - \frac{1-\Phi(\theta)}{\varphi(\theta)}\, h_\theta\left(\ell_t(\theta); \theta, t\right)\right] \mathrm{d}\Phi(\theta) \end{aligned}$$

Plugging the latter result into (20) leads to (21).

B.4 Implementability condition

Using (14a) and (14d), the entrepreneur's budget constraint (12) can be rewritten as:

$$\begin{aligned} a_{t+1} &= (1+r_t^b)a_t + (\rho_t - r_t^b)k_t - \frac{c_t}{1-\tau_t^d} - z_t \\ \beta\, V'_{t+1}(a_{t+1})\, a_{t+1} &= \beta(1+r_t^b)\, V'_{t+1}(a_{t+1})\, a_t + \beta\, V'_{t+1}(a_{t+1})(\rho_t - r_t)\, k_t \\ &- \beta\, V'_{t+1}(a_{t+1})\, \frac{c_t}{1-\tau_t^d} - \beta\, V'_{t+1}(a_{t+1})\, z_t \\ \beta\, V'_{t+1}(a_{t+1})\, a_{t+1} &= V'_t(a_t)\, a_t - \mathscr{U}_k(\Omega(c_t, z_t), k_t, t)\, k_t \\ &- \Omega_c(c_t, z_t)\, \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t)\, c_t - \Omega_z(c_t, z_t)\, \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t)\, z_t \\ \beta\, V'_{t+1}(a_{t+1})\, a_{t+1} &= V'_t(a_t)\, a_t - \mathscr{U}_k(\Omega(c_t, z_t), k_t, t)\, k_t - \mathscr{U}_\Omega(\Omega(c_t, z_t), k_t, t)\, \Omega(c_t, z_t) \end{aligned}$$

where we multiplied the first equation by $\beta\ V'_{t+1}(a_{t+1})$ to get the second equation, we used (B.1a), (B.1b), (B.1c) and (B.1d) to get the third equation and where we used the assumption that $\Omega(\cdot,\cdot)$ exhibits constant returns to scales, so $c_t\ \Omega_c(c_t,z_t)+z_t\ \Omega_z(c_t,z_t)=\Omega(c_t,z_t)$, to get the last equation. The sum of the last equation times β^t, together with the transversality condition (14f) leads to the implementability constraint (23).

Symmetrically, for each sequence of allocations $\{c_t, z_t, k_{t+1}, U_t(\underline{\theta}), \theta \mapsto \ell_t(\theta)\}_{t\in\mathbb{N}}$ that verifies the implementability constraint (23), the resources constraint (21) at each period t and where $\theta \mapsto \ell_t(\theta)$ is non decreasing, we now show the existence and uniqueness of a sequence of fiscal policies $\{\tau_t^\pi, \tau_t^d, T_t(\cdot), b_t\}$ such that that there exists a unique competitive equilibrium that corresponds to that sequence of allocations. We show this as follows.

- There exists a unique sequence of labor demand $\{L_t\}_{t\in\mathbb{N}}$ that clear the labor market at each period according to (22).
- There exists a unique sequence of wages $\{w_t\}_{t\in\mathbb{N}}$ that satisfies the labor demand conditions (14a) at each period.
- There exists a unique sequence of interest rates on bonds $\{r_t^b\}_{t\in\mathbb{N}}$ that verifies the entrepreneur's Euler equation with respect to bonds (14c) at each period.
- There exists a unique sequence of corporate income tax rates $\{\tau_t^\pi\}_{t\in\mathbb{N}}$ that verifies the entrepreneur's Euler equation with respect to capital (14e) at each period using the definition of after-corporate-tax returns of capital ρ_t in (14d).
- There exists a unique sequence of dividend tax rates $\{\tau_t^d\}_{t\in\mathbb{N}}$ that verifies the entrepreneur's optimality condition with respect to sheltered consumption (14b) at each period.
- Given the entrepreneur's initial wealth a_0, one can recover the sequence of entrepreneur's wealth a_t using (12), thereby the sequence of bonds b_t using (10).

Note that since the allocation $\{c_t, z_t, k_t\}_{t\in\mathbb{N}}$ verifies the implementability constraint (23), $\{c_t, z_t, k_t, L_t, b_t\}_{t\in\mathbb{N}}$ verifies for a given sequence of wage, interest rates on bonds, corporate tax rates and dividend tax rates $\{w_t, r_t^b, \tau_t^\pi, \tau_t^d\}_{t\in\mathbb{N}}$ the transversality condition (14f), the entrepreneur's necessary conditions (14a)-(14f) and budgetary constraint (12). It thus solves the entrepreneur's program (13) at each period.

- At each period and for each type $\theta \in \left[\underline{\theta}, \overline{\theta}\right]$ of worker, there exists a unique sequence of type$-\theta$ worker' consumption $y_t(\theta)$ and utility level $U_t(\theta)$ verifying (17).

As discussed in B.2, since $\ell_t(\cdot)$ is a at each period non-decreasing, the resulting mechanism $t \mapsto (\ell_t(\theta), y_t(\theta))$ verifies the incentive constraint (B.2). Therefore, following the Taxation principle of Hammond (1979), there exists an income tax schedule that decentralizes it, i.e. $\ell_t(\theta)$ solves the worker$-\theta$ type program (15).

Finally, since the allocation verifies the resource constraint (21) and the entrepreneur's budget constraint (12) and transversality condition (14f), it also verifies by the Walras Law the government's budget constraint (19) and the no-Ponzi condition preventing public debt from exploding.

B.5 Optimal Policy

Let μ denote the Lagrange multiplier with respect to the implementability constraint (23) and let $\beta^t\ \lambda_t$ denote the Lagrange multiplier with respect to period$-t$ resource constraint (21). Taking (17) into account, the Lagrangian of government's problem (24) is:

$$\begin{aligned}\mathcal{L} &= \sum_{t=0}^{\infty}\beta^t\left\{\int_{\underline{\theta}}^{\overline{\theta}} \upsilon\left(U_t(\underline{\theta}) - \int_{\underline{\theta}}^{\theta} h_\theta\left(\ell_t(x);x,t\right)\mathrm{d}x\right)\mathrm{d}\Psi(\theta) + \kappa\,\mathscr{U}\left(\Omega(c_t,z_t),k_t,t\right)\right.\\ &+ \mu\left[\mathscr{U}_\Omega(\Omega(c_t,z_t),k_t,t)\;\Omega(c_t,z_t) + \mathscr{U}_k(\Omega(c_t,z_t),k_t,t)\;k_t\right]\\ &+ \lambda_t\left[\mathcal{F}\left(k_t,\int_{\underline{\theta}}^{\overline{\theta}}\ell_t(\theta)\mathrm{d}\Phi(\theta);t\right) + (1-\delta)k_t - k_{t+1} - c_t - z_t - U_t(\underline{\theta})\right.\\ &- \left.\left.\int_{\underline{\theta}}^{\overline{\theta}}\left[h\left(\ell_t(\theta);\theta,t\right) - \frac{1-\Phi(\theta)}{\varphi(\theta)}\,h_\theta\left(\ell_t(\theta);\theta,t\right)\right]\mathrm{d}\Phi(\theta)\right]\right\} - \mu\,V_0'(a_0)\,a_0\end{aligned}$$

Using the shorted notation (t) to indicate that functions are evaluated along the optimal allocation at period t, the first-order conditions are:[18]

$$c_t: \quad \lambda_t = \Omega_c(t)\;\left((\kappa+\mu)\mathscr{U}_\Omega\,(t) + \mu\left[\mathscr{U}_{\Omega,\Omega}(t)\;\Omega(t) + \mathscr{U}_{\Omega,k}(t)\;k_t\right]\right) \tag{B.6a}$$

$$z_t: \quad \lambda_t = \Omega_z(t)\;\left((\kappa+\mu)\mathscr{U}_\Omega\,(t) + \mu\left[\mathscr{U}_{\Omega,\Omega}(t)\;\Omega(t) + \mathscr{U}_{\Omega,k}(t)\;k_t\right]\right) \tag{B.6b}$$

$$\begin{aligned}k_{t+1}: \quad \lambda_t &= \lambda_{t+1}\,\beta\left(\frac{\partial\mathcal{F}(t+1)}{\partial k} + 1 - \delta\right) + \beta(\kappa+\mu)\mathscr{U}_k\,(t+1)\\ &+ \beta\,\mu\left[\mathscr{U}_{\Omega,k}(t+1)\;\Omega(t+1) + \mathscr{U}_{k,k}(t+1)\;k_{t+1}\right]\end{aligned} \tag{B.6c}$$

$$U_t\left(\underline{\theta}\right): \quad \lambda_t = \int_{\underline{\theta}}^{\overline{\theta}} \upsilon'\left(U_t(\theta)\right)\;\mathrm{d}\Psi(\theta) \tag{B.6d}$$

$$\ell_t(\theta): \quad 0 = \frac{\partial\mathcal{F}(t)}{\partial L} - h_\ell\left(\ell_t(\theta);\theta\right) + \frac{1-\Phi(\theta) - \int_\theta^{\overline{\theta}}\frac{\upsilon'(U_t(\theta))}{\lambda_t}\mathrm{d}\Psi(\theta)}{\varphi(\theta)}\;h_{\ell,\theta}\left(\ell_t(\theta);\theta\right) \tag{B.6e}$$

Assuming Condition (25) is verified, one get that $\lambda_t > 0$ according to (B.6a) and (B.6b).

Proof of Proposition 3

Dividing (B.6a) and (B.6b) by $(\kappa+\mu)\mathscr{U}_\Omega\,(t) + \mu\left[\mathscr{U}_{\Omega,\Omega}(t)\;\Omega(t) + \mathscr{U}_{\Omega,k}(t)\;k_t\right]$, which is positive under Condition (25), leads to:

$$\Omega_c(c_t,z_t) = \Omega_z(c_t,z_t) \tag{B.7}$$

which, combined with (14b) proves $\tau_t^d = 0$ for $t \geq 1$.

Proof of Proposition 4

If the optimal allocation converges to a steady state with positive capital, Equations (B.6a) and (B.6b) imply:

$$\lambda = \omega^\star(1)\;\mathscr{U}_\Omega\;\left[\kappa + \mu + \mu\frac{\Omega\;\mathscr{U}_{\Omega,\Omega} + k\;\mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}\right], \tag{B.8a}$$

while Equation (B.6c) implies:

$$\lambda\left(\beta\left(1+r\right) - 1\right) = -\beta\;\mathscr{U}_k\;\left[\kappa + \mu + \mu\frac{\Omega\;\mathscr{U}_{\Omega,k} + k\;\mathscr{U}_{k,k}}{\mathscr{U}_k}\right] \tag{B.8b}$$

where:

$$r \stackrel{\text{def}}{\equiv} \frac{\partial\mathcal{F}(k,L)}{\partial k} - \delta$$

[18]Following the first-order approach, (B.6e) presumes that the monotonicity constraints are not binding, a presumption that has to be verified ex-post.

Combining (B.8a) and (B.8b), the optimal allocation should verify in the long run:

$$\frac{\kappa + \mu + \mu \dfrac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\kappa + \mu + \mu \dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}} \left(\beta\,(1+r) - 1\right) \omega^\star(1)\, \mathscr{U}_\Omega = -\beta\, \mathscr{U}_k \tag{B.9}$$

At a steady state with $\tau^d = 0$, Equation (14e) becomes:

$$\left(\beta\,(1+\rho) - 1\right) \omega^\star(1)\, \mathscr{U}_\Omega = -\beta\, \mathscr{U}_k \tag{B.10}$$

where (14d) implies at the steady state:

$$\rho = (1-\tau^\pi)(r + \delta - \widehat{\delta}) + \widehat{\delta} - \delta = r - \tau^\pi (r + \delta - \widehat{\delta})$$

Let us denote

$$\widehat{\tau}^\pi \stackrel{\text{def}}{\equiv} \tau^\pi\, \frac{r + \delta - \widehat{\delta}}{r} \qquad \Leftrightarrow \qquad \rho = (1 - \widehat{\tau}^\pi) r \tag{B.11}$$

Equating the left-hand sides of Equations (B.9) and (B.10), one obtains that at the steady state of the optimal allocation:

$$\left(1 - \frac{\dfrac{\kappa}{\mu} + 1 + \dfrac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\dfrac{\kappa}{\mu} + 1 + \dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}}\right) \left(\beta\,(1+r) - 1\right) \omega^\star(1)\, \mathscr{U}_\Omega = \beta\, \widehat{\tau}^\pi\, r\, \omega^\star(1)\, \mathscr{U}_\Omega$$

$$\frac{\dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \dfrac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\dfrac{\kappa}{\mu} + 1 + \dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}} \left(\beta\,(1+r) - 1\right) = \beta\, \widehat{\tau}^\pi\, r$$

and so:

$$\widehat{\tau}^\pi = \frac{\dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \dfrac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\dfrac{\kappa}{\mu} + 1 + \dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}} \, \frac{\beta(1+r) - 1}{\beta\, r}$$

When $\beta \mapsto 1$, we get:

$$\widehat{\tau}^\pi = \frac{\dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \dfrac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\dfrac{\kappa}{\mu} + 1 + \dfrac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}} \tag{B.12}$$

which is strictly below 1, whenever (25) holds, whatever κ.

We now compute the microeconomic/partial equilibrium long-run elasticity of capital supply with respect to net-of after-corporate-tax rate of return of capital ρ, in the absence of public debt. This elasticity denoted e is therefore computed from the steady-state of the entrepreneur's program, holding the wage rate w and interest rates r_t^b and r_t as given and when $b = 0$. Differentiating the Euler equation with respect to capital at the steady state (B.10) leads to:[19]

$$\frac{\Omega\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_k} \frac{\mathrm{d}\Omega}{\Omega} + \frac{k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} \frac{\mathrm{d}k}{k} = \frac{\beta\, \rho}{\beta\,(1+\rho) - 1} \frac{\mathrm{d}\rho}{\rho} + \frac{\Omega\, \mathscr{U}_{\Omega,\Omega}}{\mathscr{U}_\Omega} \frac{\mathrm{d}\Omega}{\Omega} + \frac{k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega} \frac{\mathrm{d}k}{k} \tag{B.13}$$

[19] This can be obtained either by log-differentiating (B.10) if $\mathscr{U}_k < 0$ and $\beta(1+\rho) > 1$ or by log-differentiating $\beta\, \mathscr{U}_k(\Omega(c,z), k) = (1 - \beta(1+\rho))\, \mathscr{U}_\Omega(\Omega(c,z), k)$ if $\mathscr{U}_k > 0$ and $\beta(1+\rho) < 1$.

Using Equations (14a) and (14d), Equation (11) becomes at the steady state:

$$0 = r^b\, a + (\rho - r^b)k - \frac{c}{1-\tau^d} - z$$

Using $I = \frac{c}{1-\tau^d} + z$ and (10), one gets in the absence of public debt $b = 0$ that $I = \rho\, k$, thereby that:

$$\Omega = \omega^\star(1)\, \rho\, k. \tag{B.14}$$

Therefore, when τ^d is fixed one has $\mathrm{d}\Omega/\Omega = \mathrm{d}I/I = \mathrm{d}\rho/\rho + \mathrm{d}k/k$, Equation (B.13) becomes:

$$\frac{\Omega\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_k}\frac{\mathrm{d}\rho}{\rho} + \frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}\frac{\mathrm{d}k}{k} \quad = \quad \frac{\beta\, \rho}{\beta\,(1+\rho)-1}\frac{\mathrm{d}\rho}{\rho} + \frac{\Omega\, \mathscr{U}_{\Omega,\Omega}}{\mathscr{U}_\Omega}\frac{\mathrm{d}\rho}{\rho} + \frac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}\frac{\mathrm{d}k}{k}$$

So

$$\left(\frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \frac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}\right)\frac{\mathrm{d}k}{k} = \left(\frac{\beta\, \rho}{\beta\,(1+\rho)-1} + \frac{\Omega\, \mathscr{U}_{\Omega,\Omega}}{\mathscr{U}_\Omega} - \frac{\Omega\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_k}\right)\frac{\mathrm{d}\rho}{\rho} \tag{B.15}$$

and when $\beta \mapsto 1$

$$\zeta^k_\rho = \frac{1 + \frac{\Omega\, \mathscr{U}_{\Omega,\Omega}}{\mathscr{U}_\Omega} - \frac{\Omega\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_k}}{\frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \frac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}} \qquad \Rightarrow \qquad 1 + \zeta^k_\rho = \frac{1 + \frac{k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \frac{k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}{\frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \frac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}}$$

Multiplying both sides of Equation (B.10) by k when $\beta \mapsto 1$ and using (B.14) yields $-\mathscr{U}_k\, k = \Omega\, \mathscr{U}_\Omega$. Therefore we get

$$1 + \zeta^k_\rho = \frac{1 + \frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k}}{\frac{\Omega\, \mathscr{U}_{\Omega,k} + k\, \mathscr{U}_{k,k}}{\mathscr{U}_k} - \frac{\Omega\, \mathscr{U}_{\Omega,\Omega} + k\, \mathscr{U}_{\Omega,k}}{\mathscr{U}_\Omega}} \tag{B.16}$$

Combining with (B.12) ends the proof that when $\beta \mapsto 1$ and $\kappa = 0$, the optimal corporate tax wedge $\widehat{\tau}^\pi = 1/(1+\zeta^k_\rho)$.

Steady-state elasticity with isoelastic preferences

When the entrepreneur's preferences verify (26), we get:

$$\mathscr{U}_k = -\Gamma\, k^{\frac{1}{\varepsilon}} \qquad \text{and :} \qquad \mathscr{U}_\Omega = \Omega^{-\gamma}; \tag{B.17}$$

This implies:

$$k\, \mathscr{U}_{k,k} = \frac{1}{\varepsilon}\, \mathscr{U}_k \qquad \text{and :} \qquad \Omega\, \mathscr{U}_{\Omega,\Omega} = -\gamma \mathscr{U}_\Omega \tag{B.18}$$

Plugging (B.17) and (B.18) in (B.16) and using $\mathscr{U}_{\Omega,k} = 0$ yields:

$$1 + \zeta^k_\rho = \frac{1 + \frac{1}{\varepsilon}}{\frac{1}{\varepsilon} + \gamma} = \frac{1+\varepsilon}{1 + \gamma\, \varepsilon}$$

B.6 Optimal Policy under Maxmin and Isoelastic Preferences

Using (B.17) and (B.18) and $\kappa = 0$, Equations (B.6a)-(B.6c) simplify to:

$$c_t : \qquad \lambda_t = \Omega_c(t)\, \mu(1-\gamma)\, \Omega_t^{-\gamma} \tag{B.19a}$$

$$z_t : \qquad \lambda_t = \Omega_z(t)\, \mu(1-\gamma)\, \Omega_t^{-\gamma} \tag{B.19b}$$

$$k_{t+1} : \qquad \lambda_t = \lambda_{t+1}\, \beta \left(\frac{\partial \mathcal{F}(t+1)}{\partial k} + 1 - \delta \right) - \beta\, \mu \left(1 + \frac{1}{\varepsilon}\right) \Gamma\, k_{t+1}^{\frac{1}{\varepsilon}} \tag{B.19c}$$

Because of the Maximin assumption, Equation (B.6d) simplifies to:

$$\lambda_t = \upsilon' \left(\underline{U}(\theta)\right) = \left(\underline{U}(\theta)\right)^{-\gamma} \tag{B.19d}$$

Because of the iso-elasticity of workers' preferences, we get that

$$h_\theta = -\frac{h(\ell;\theta)}{\xi\, \theta} \qquad \text{and :} \qquad h_{\ell,\theta} = -\frac{h_\ell(\ell;\theta)}{\xi\, \theta},$$

so, under Maximin preferences, Equation (B.6e) becomes:

$$\frac{\partial \mathcal{F}(t)}{\partial L} - h_\ell\left(\ell_t(\theta);\theta\right) = \frac{1-\Phi(\theta)}{\xi\, \theta\, \varphi(\theta)}$$

Using the labor demand condition (14a) and workers' first-order condition (16), the optimal marginal tax rate faced by a type$-\theta$ worker verifies the ABC formula:

$$\frac{T'(w_t\, \ell_t(\theta))}{1 - T'(w_t\, \ell_t(\theta))} = \frac{1}{\xi}\, \frac{1-\Phi(\theta)}{\theta\, \varphi(\theta)} \tag{B.19e}$$

In particular, even if w_t changes over time, thereby changing the earning $w_t\, \ell_t(\theta))$ of each type of worker, the optimal marginal tax of type$-\theta$ worker is constant over time. Moreover we get:

$$\ell_t(\theta) = w_t^\xi\, \theta\, \left[1 + \frac{1}{\xi}\, \frac{1-\Phi(\theta)}{\theta\, \varphi(\theta)}\right]^{-\xi} \quad \Rightarrow \quad L_t = w_t^\xi \int_{\underline{\theta}}^{\overline{\theta}} \theta\, \left[1 + \frac{1}{\xi}\, \frac{1-\Phi(\theta)}{\theta\, \varphi(\theta)}\right]^{-\xi} \mathrm{d}\Phi(\theta) \tag{B.20}$$

Since the production function is Cobb-Douglas, we get

$$w_t = (1-\alpha)\, A\, k_t^\alpha\, L_t^{-\alpha} \qquad \frac{\partial \mathcal{F}(k,L)}{\partial k} = \alpha\, A\, k_t^{\alpha-1}\, L_t^{1-\alpha} \tag{B.21}$$

Let us denote

$$\overline{L} \overset{\text{def}}{\equiv} \int_{\underline{\theta}}^{\overline{\theta}} \theta\, \left[1 + \frac{1}{\xi}\, \frac{1-\Phi(\theta)}{\theta\, \varphi(\theta)}\right]^{-\xi} \mathrm{d}\Phi(\theta).$$

so that $L_t = w_t^\xi\, \overline{L}$. We get:

$$w_t = L_t^{\frac{1}{\xi}} \overline{L}^{-\frac{1}{\xi}} = (1-\alpha)\, A\, k_t^\alpha\, L_t^{-\alpha}$$

$$L_t^{\frac{1}{\xi}+\alpha} = L_t^{\frac{1+\alpha\,\xi}{\xi}} = (1-\alpha)\, A\, k_t^\alpha\, \overline{L}^{\frac{1}{\xi}}$$

$$L_t = (1-\alpha)^{\frac{\xi}{1+\alpha\,\xi}}\, A^{\frac{\xi}{1+\alpha\,\xi}}\, k_t^{\frac{\alpha\,\xi}{1+\alpha\,\xi}}\, \overline{L}^{\frac{1}{1+\alpha\,\xi}} \tag{B.22a}$$

$$w_t^\xi = \frac{L_t}{\overline{L}} = (1-\alpha)^{\frac{\xi}{1+\alpha\,\xi}}\, A^{\frac{\xi}{1+\alpha\,\xi}}\, k_t^{\frac{\alpha\,\xi}{1+\alpha\,\xi}}\, \overline{L}^{\frac{-\alpha\,\xi}{1+\alpha\,\xi}}$$

$$w_t = (1-\alpha)^{\frac{1}{1+\alpha\,\xi}}\, A^{\frac{1}{1+\alpha\,\xi}}\, k_t^{\frac{\alpha}{1+\alpha\,\xi}}\, \overline{L}^{\frac{-\alpha}{1+\alpha\,\xi}} \tag{B.22b}$$

$$\mathcal{F}(k_t, L_t) = (1-\alpha)^{\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\, A^{1+\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\, k_t^{\alpha+(1-\alpha)\frac{\alpha\,\xi}{1+\alpha\,\xi}}\, \overline{L}^{\frac{1-\alpha}{1+\alpha\,\xi}}$$

$$\mathcal{F}(k_t, L_t) = (1-\alpha)^{\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\, A^{\frac{1+\xi}{1+\alpha\,\xi}}\, k_t^{\frac{\alpha(1+\xi)}{1+\alpha\,\xi}}\, \overline{L}^{\frac{1-\alpha}{1+\alpha\,\xi}} \tag{B.22c}$$

$$\frac{\partial \mathcal{F}(k_t, L_t)}{\partial k_t} = \alpha\, \frac{\mathcal{F}(k_t, L_t)}{k_t}$$

$$\frac{\partial \mathcal{F}(k_t, L_t)}{\partial k_t} = \alpha\, (1-\alpha)^{\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\, A^{\frac{1+\xi}{1+\alpha\,\xi}}\, k_t^{\frac{\alpha-1}{1+\alpha\,\xi}}\, \overline{L}^{\frac{1-\alpha}{1+\alpha\,\xi}} \tag{B.22d}$$

Since

$$h(\ell;\theta) = \frac{\xi}{1+\xi}\,\ell^{1+\frac{1}{\xi}}\,\theta^{-\frac{1}{\xi}} \qquad h_\theta(\ell;\theta) = -\frac{1}{1+\xi}\,\left(\frac{\ell}{\theta}\right)^{1+\frac{1}{\xi}} = -\frac{h(\ell;\theta)}{\xi\,\theta}$$

the resources constraint (21) can be re-expressed as:

$$\begin{aligned}
k_{t+1} &= \mathcal{F}(k_t, L_t) + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) \\
&- \frac{\xi}{1+\xi}\int_{\underline{\theta}}^{\overline{\theta}} (\ell_t(\theta))^{1+\frac{1}{\xi}}\,\theta^{-\frac{1}{\xi}}\left[1 + \frac{1-\Phi(\theta)}{\xi\,\theta\,\varphi(\theta)}\right]\mathrm{d}\Phi(\theta) \\
&= \mathcal{F}(k_t, L_t) + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) \\
&- w_t^{1+\xi}\,\frac{\xi}{1+\xi}\int_{\underline{\theta}}^{\overline{\theta}} \theta\left[1 + \frac{1-\Phi(\theta)}{\xi\,\theta\,\varphi(\theta)}\right]^{-\xi}\mathrm{d}\Phi(\theta) \\
&= \mathcal{F}(k_t, L_t) + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) - w_t\,\frac{\xi}{1+\xi}\,L_t \\
&= \left(1 - (1-\alpha)\,\frac{\xi}{1+\xi}\right)\mathcal{F}(k_t, L_t) + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) \\
&= \frac{1+\alpha\,\xi}{1+\xi}\,\mathcal{F}(k_t, L_t) + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) \\
&= \frac{1+\alpha\,\xi}{1+\xi}\,(1-\alpha)^{\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\,A^{\frac{1+\xi}{1+\alpha\,\xi}}\,k_t^{\frac{\alpha(1+\xi)}{1+\alpha\,\xi}}\,\overline{L}^{\frac{1-\alpha}{1+\alpha\,\xi}} + (1-\delta)k_t - c_t - z_t - U_t(\underline{\theta}) \\
&= \frac{1+\alpha\,\xi}{1+\xi}\,(1-\alpha)^{\frac{\xi(1-\alpha)}{1+\alpha\,\xi}}\,A^{\frac{1+\xi}{1+\alpha\,\xi}}\,k_t^{\frac{\alpha(1+\xi)}{1+\alpha\,\xi}}\,\overline{L}^{\frac{1-\alpha}{1+\alpha\,\xi}} + (1-\delta)k_t - \frac{\Omega_t}{\omega^\star(1)} - U_t(\underline{\theta})
\end{aligned}$$

Combining (B.19a), (B.19b) and (B.19d) implies that

$$\lambda_t = \omega^\star(1)\,\mu(1-\gamma)\,\Omega_t^{-\gamma} = (U(\underline{\theta}))^{-\gamma} \qquad \Rightarrow \qquad U(\underline{\theta}) = \Omega_t\,\left(\omega^\star(1)\,\mu(1-\gamma)\right)^{-\frac{1}{\gamma}}$$

So the resources constraint becomes

$$k_{t+1} = \frac{1+\alpha\,\xi}{1+\xi}\,\mathcal{F}(k_t, L_t) + (1-\delta)k_t - \left(\frac{1}{\omega^\star(1)} + \left(\omega^\star(1)\,\mu(1-\gamma)\right)^{-\frac{1}{\gamma}}\right)\,\Omega_t \tag{B.23}$$

Plugging (B.19b) into (B.19c) yields:

$$\begin{aligned}
\frac{\varepsilon(1-\gamma)}{1+\varepsilon}\,\omega^\star(1)\,\Omega_t^{-\gamma} &= \beta\,(1+r_{t+1})\,\frac{\varepsilon(1-\gamma)}{1+\varepsilon}\,\omega^\star(1)\,\Omega_{t+1}^{-\gamma} - \beta\,\Gamma\,k_{t+1}^{\frac{1}{\varepsilon}} \\
\Omega_t^{-\gamma} + \beta\,\Gamma\,\frac{1+\varepsilon}{\varepsilon(1-\gamma)\,\omega^\star(1)}\,k_{t+1}^{\frac{1}{\varepsilon}} &= \beta(1+r_{t+1})\,\Omega_{t+1}^{-\gamma}
\end{aligned} \tag{B.24}$$

Numerical Solution

Given μ, the system (B.23)-(B.24) expresses (k_{t+1}, Ω_{t+1}) as a function of (k_t, Ω_t). Actually, k_{t+1} is obtained from (k_t, Ω_t) thanks to (B.23). Then, (B.22d) provides r_{t+1} as a function of k_{t+1}, taking into account the adjustment of labor supplies when capital changes. Finally, Ω_{t+1} is obtained thanks to (B.24) as a function of Ω_t, and the obtained k_{t+1} and r_{t+1}.

We numerically solve for this system using the following parameters.

Technology			Workers		Entrepreneurs			Both	
α	A	δ	ξ	$\overline{L}$	ε	Γ	$\omega^\star(1)$	β	γ
0.25	1	8%	1/3	1	2	1	1	0.98	1/2

Table 2: Parameters for the calibration

Linearizing (B.23) and (B.24) around the steady state leads to eigenvalues 0.336, which is inside the unit circle, and 2.722, which is outside the unit circle, so the dynamics is saddle-path. Since k_t is a backward-looking variable and Ω_t is forward-looking, the Blanchard-Kahn conditions are satisfied.

Optimal Steady State Corporate Income Tax

At a steady state, the government's Euler equation (B.24) becomes:

$$\frac{\varepsilon(1-\gamma)}{1+\varepsilon}\,\omega^\star(1)\,\Omega^{-\gamma}\left(\beta\ (1+r)-1\right)=\beta\,\Gamma\,k^{\frac{1}{\varepsilon}} \tag{B.25}$$

while the capitalist's Euler equation (14e) becomes:

$$\frac{\varepsilon(1-\gamma)}{1+\varepsilon}\,\omega^\star(1)\,\Omega^{-\gamma}\left(\beta\ (1+(1-\tau^\pi)\,r)-1\right)=\beta\,\Gamma\,k^{\frac{1}{\varepsilon}}, \tag{B.26}$$

Combining (B.25) with (B.26) yields:

$$\tau^\pi=\frac{1+\gamma\,\varepsilon}{1+\varepsilon}\,\frac{\beta(1+r)-1}{\beta\,r} \tag{B.27}$$

Log differentiating (B.26) yields:

$$-\gamma\,\frac{\mathrm{d}\Omega}{\Omega}+\frac{\beta\,\rho}{\beta\ (1+\rho)-1}\frac{\mathrm{d}\rho}{\rho}=\frac{1}{\varepsilon}\frac{\mathrm{d}k}{k}$$

Using $\mathrm{d}\Omega/\Omega=\mathrm{d}\rho/\rho+\mathrm{d}k/k$, this implies that the steady-state capital supply elasticity verifies:

$$\zeta^k_\rho=\frac{\varepsilon}{1+\gamma\,\varepsilon}\left(\frac{\beta\,\rho}{\beta(1+\rho)-1}-\gamma\right) \tag{B.28}$$

When $\gamma=0$, the optimal corporate income tax formula (B.27) boils down to:

$$\tau^\pi=\frac{1}{1+\varepsilon}-\frac{1}{1+\varepsilon}\,\frac{1-\beta}{\beta\,r} \tag{B.29}$$

and the steady-state elasticity (B.28) verifies:

$$1+\zeta^k_\rho=\frac{\beta\ (1+\rho(1+\varepsilon))-1}{\beta(1+\rho)-1} \tag{B.30}$$

Using $\rho=(1-\tau^\pi)r$, (B.29) implies:

$$\beta\ (1+\rho(1+\varepsilon))-1=\beta\,\varepsilon\,r \tag{B.31a}$$

$$\beta(1+\rho)-1=\frac{\beta\,\varepsilon\,r}{1+\varepsilon}-\frac{(1-\beta)\varepsilon}{1+\varepsilon} \tag{B.31b}$$

Combining (B.30) and (B.31) with (B.29) implies:

$$\frac{1}{1+\zeta^k_\rho}=\frac{1}{1+\varepsilon}-\frac{1-\beta}{\beta(1+\varepsilon)r}=\tau^\pi$$

C Nonlinear tax on profits and dividends

We now assume, on the one hand, that entrepreneurs are endowed with different characteristics[20] denoted χ and, on the other hand, that they pay at each period t a non linear tax on profits Π_t, cash flow F_t and (after-tax) dividends c_t denoted $(\Pi_t,F_t,c_t)\mapsto\mathcal{T}_t(\Pi_t,F_t,c_t)$.

Assumption 3. *The entrepreneur preferences are represented by a weakly separable utility function:* $(c,z,k)\mapsto\mathscr{U}\left(\Omega(c,z),k\right)$, *where* $\mathscr{U}(\cdot,\cdot)$ *is concave and increasing in the first argument and where the subutility function* $\Omega(\cdot,\cdot)$ *is increasing and concave in both arguments.*

[20] χ can be interpreted as an entrepreneurial ability if $\mathscr{U}_k<0$ or as a taste for wealth if $\mathscr{U}_k>0$.

Note that we do no longer assume the subutility $\Omega(\cdot,\cdot)$ to be homogeneous.

The type$-\chi$ entrepreneur's program in period t solves:[21]

$$\begin{aligned} V_t(a_t;\chi) &= \max_{c_t,z_t,k_t,L_t,a_{t+1};\chi} \mathscr{U}\left(\Omega(c_t,z_t),k_t;\chi\right)+\beta\, V_{t+1}(a_{t+1};\chi) && \text{(C.1a)}\\ s.t.: a_{t+1} &= (1+r_t^b)a_t+\Pi_t-r_t^b\,k_t-c_t-z_t-\mathcal{T}_t(\Pi_t,F_t,c_t) && \text{(C.1b)}\\ \Pi_t &= \mathcal{F}(k_t,L_t)-w_t\,L_t-\delta\,k_t && \text{(C.1c)}\\ F_t &= (1+r_t^b)a_t-a_{t+1}+\Pi_t-r_t^b\,k_t && \text{(C.1d)}\end{aligned}$$

The solution to this program are denoted as functions of the type χ of the entrepreneur.[22]

This program includes a labor demand subprogram which is type-independent:

$$\Pi_t(k)=\max_L \qquad \mathcal{F}(k,L)-w_t\,L-\delta\,k \tag{C.2a}$$

with first-order condition:

$$w_t=\frac{\partial\mathcal{F}(k_t(\chi),L_t(\chi))}{\partial L} \tag{C.2b}$$

Assuming the production function is the same for all entrepreneurs and it exhibits constant returns to scale we get:

$$\Pi_t(\chi)=r_t\,k_t(\chi) \qquad \text{where}: \qquad r_t=\frac{\partial\mathcal{F}(k_t(\chi),L_t(\chi))}{\partial k}-\delta \tag{C.2c}$$

and r_t is the same for all entrepreneurs.

Consequently, the type$-\chi$ entrepreneur's program in period t solves:

$$\begin{aligned} V_t(a_t;\chi) &= \max_{c_t,z_t,k_t,a_{t+1}} \mathscr{U}\left(\Omega(c_t,z_t),k_t;\chi\right)+\beta\, V_{t+1}(a_{t+1};\chi)\\ a_{t+1} &= (1+r_t^b)a_t+r_t\,k_t-r_t^b\,k_t-c_t-z_t-\mathcal{T}_t(r_t\,k_t,F_t,c_t)\\ F_t &= (1+r_t^b)a_t-a_{t+1}+r_t\,k_t-r_t^b\,k_t\end{aligned}$$

or

$$\begin{aligned} V_t(a_t;\chi) &= \max_{c_t,z_t,k_t,a_{t+1}} \mathscr{U}\left(\Omega(c_t,z_t),k_t;\chi\right)+\beta\, V_{t+1}(a_{t+1};\chi) && \text{(C.3a)}\\ c_t+z_t &= F_t-\mathcal{T}_t(r_t\,k_t,F_t,c_t) && \text{(C.3b)}\\ F_t &= (1+r_t^b)a_t-a_{t+1}+(r_t-r_t^b)k_t && \text{(C.3c)}\end{aligned}$$

We now show that for each status-quo sequence of tax schedules $(\Pi_t,F_t,c_t)\mapsto\mathcal{T}_t^0(\Pi_t,F_t,c_t)$, there exists an alternative sequence of tax schedules denoted $(\Pi_t,F_t)\mapsto\mathcal{T}_t^*(\Pi_t,F_t)$ that do not tax dividends but only cash flow and profits which induces each type of entrepreneurs to make the same investment and saving decisions and enjoy the same level of utility.

For this purpose, we define the subprogram:

$$\Omega_t^0(k,F)=\max_{c,z} \qquad \Omega(c,z) \qquad s.t: \qquad c+z=F-\mathcal{T}_t^0(r_t\,k,F,c) \tag{C.4}$$

Then, under the status-quo sequence of tax schedules, saving and investment decisions have to solve:

$$V_t(a_t;\chi)=\max_{k_t,a_{t+1}} \quad \mathscr{U}\left(\Omega_t^0\left(k_t,(1+r_t^b)a_t-a_{t+1}+(r_t-r_t^b)k_t\right),k_t;\chi\right)+\beta\, V_t(a_{t+1};\chi) \tag{C.5}$$

Under the alternative sequence of tax schedules, we define:

$$\Omega_t^*(k,F)=\max_{c,z} \qquad \Omega(c,z) \qquad s.t: \qquad c+z=F-\mathcal{T}_t^*(r_t\,k,F) \tag{C.6}$$

[21] We take $\widehat{\delta}=\delta$ to simplify notations

[22] In the absence of public debt, $a_t=k_t$, so $F_t=\Pi_t+k_{t+1}-k_t$, i.e. F_t is before tax profits less investment. With public debt, cash flow F_t is the capitalist before income tax flows $\Pi_t+r_t^b\,b_t=\Pi_t+r_t^b\,a_t-r_t^b\,k_t$ minus investment in wealth $a_{t+1}-a_t$

so that, under the alternative sequence of tax schedules, saving and investment decisions have to solve:

$$V_t(a_t;\chi) = \max_{k_t, a_{t+1}} \quad \mathscr{U}\left(\Omega_t^*\left(k_t, (1+r_t^b)a_t - a_{t+1} + (r_t - r_t^b)k_t\right), k_t;\chi\right) + \beta\, V_t(a_{t+1};\chi) \tag{C.7}$$

Define the expenditure function:

$$\mathscr{E}(\omega) = \min_{c,z} \qquad c + z \qquad s.t: \qquad \Omega(c,z) = \omega \tag{C.8}$$

Note that by duality:

$$\forall t, \forall (F,k): \qquad \mathscr{E}\left(\Omega_t^*\left(F\right)\right) = F - \mathcal{T}_t^*(F) \tag{C.9}$$

Define:

$$\forall t, \forall (F,\Pi): \qquad \mathcal{T}_t^*(\Pi, F) \overset{\text{def}}{\equiv} F - \mathscr{E}\left(\Omega_t^0\left(\frac{\Pi}{r_t}, F\right)\right) \tag{C.10}$$

At each period t, and for each F and k, since $\Pi = r_t\, k$, we get:

$$\begin{aligned}
\mathscr{E}\left(\Omega_t^0(k,F)\right) &= F - \mathcal{T}_t^*(r_t\, k, F) \\
\mathscr{E}\left(\Omega_t^0(k,F)\right) &= \mathscr{E}\left(\Omega_t^*(k,F)\right) \\
\Omega_t^0(k,F) &= \Omega_t^*(k,F)
\end{aligned}$$

Therefore, comparing (C.5) and (C.7), the status quo and the alternative sequence of tax policies induce each type of entrepreneur to take at each period the same saving and investment decisions. As the alternative sequence of tax policies require less resources to each type of entrepreneurs, it Pareto dominates the status quo sequence of tax policies.