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EXTERNALITIES AND THE TAXATION OF TOP EARNERS

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ABSTRACT

This paper characterizes the optimal taxation of top earners in a world with externalities. It takes a reduced-form approach that spans a broad class of models where top earners create externalities on the economy. The model allows for a flexible relationship between top earnings and the distribution of earnings capacities in the population, including positive externalities (such as innovation) and negative externalities (such as rent-extraction). The model allows for simple optimal tax formulas that clarify the role of different externality patterns. In general, externalities that run from top earners to bottom earners have much stronger tax implications than externalities within the top group. The results are expressed in terms of estimable sufficient statistics and linked to recent evidence on the externalities of top entrepreneurs. A calibration to the US economy suggests that the optimal top tax rate, while lower than the Mirrleesian optimum, remains higher than the current top tax rate.

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1 Introduction

One of the most central tax policy questions is how to tax the rich (Slemrod 2000; Saez and Zucman 2019; Scheuer and Slemrod 2020). The classic Mirrleesian approach gives an extremely simple answer. The optimal tax rate on top earners is determined by only two parameters: the Pareto parameter of the income distribution and the elasticity of top earnings with respect to the tax rate (Diamond 1998; Saez 2001). The Pareto parameter is directly observable and the earnings elasticity can be estimated using tax reforms. Although the exact magnitude of the earnings elasticity is subject to disagreement, a large empirical literature has narrowed down the plausible range of this parameter (Saez *et al.* 2012). From this perspective, it would appear that the optimal tax treatment of top earners is essentially a settled question. Yet, the public debate remains contentious, with an enormous disparity in views on what the best policy is.

What explains this lack of consensus? A key reason may be that the standard approach leaves out the most central dispute in the public debate: are top earners good or bad for the economy? Are they good or bad for the poor and middle classes? Some argue that top earners create positive externalities through job creation, productivity spillovers, and innovation, leading to trickle-down effects on workers with lower incomes. Others argue that top earners create negative externalities through rent-extraction, political influence, and rat race effects.[1] Lockwood *et al.* (2017) provide a review of the empirical literature studying externalities from top earners, highlighting that the existing estimates are highly uncertain. Recent papers by Risch (2024) and Jakobsen *et al.* (2025) develop quasi-experimental approaches for estimating the externalities created by top entrepreneurs. We will show how such evidence can be used to inform the optimal taxation of top earners.

On the theoretical side, a number of papers have developed extensions of the Mirrleesian framework that allow for externalities. Most of these papers focus on different forms of rent-seeking. Piketty *et al.* (2014) consider a model in which top earnings reflect a combination of real effort, tax avoidance, and zero-sum wage bargaining, characterizing the optimal top tax rate in terms of elasticities that capture each of these three channels of behavior. Rothschild and Scheuer (2016) develop a model with a rent-seeking sector and a traditional sector, solving for the sector-blind optimal income tax schedule. Rothschild and Scheuer (2014) generalize the analysis to allow

[1] See for example Stiglitz (2012) and Mankiw (2013) for strongly opposing views on the externalities from top earners.

for multiple sectors with an arbitrary pattern of externalities across sectors. Lockwood *et al.* (2017) present a model where workers choose between different professions, each generating different externalities. If higher-paying professions generate worse externalities, progressive taxation ensures a better allocation of talent across professions. Støstad and Cowell (2024) consider a framework where consumption inequality creates additively separable externalities in utility. Using data on elicited inequality aversion, their model implies much higher taxes on top earners than in standard Mirrleesian models. While most papers focus on Pigouvian arguments for taxing the rich more, Jones (2021) focuses on an argument for taxing them less. In his model, innovation drives economic growth and the reward for innovating is a top income, implying that lower top taxes stimulate innovation activity to the benefit of all.[2]

These papers provide many interesting insights, but they suffer from an important limitation: they rely on specific models of externalities in a situation with tremendous model uncertainty. It is conceivable that all of the aforementioned externalities (and many more) co-exist and interact. To address this issue, we take a reduced-form approach that is both simpler and more general than typical approaches. The model allows for a flexible relationship between top earnings and the distribution of earnings *capacities* in the population. Externalities may be positive or negative, and they may vary arbitrarily across workers in different parts of the distribution. We derive simple formulas for optimal taxation that do not rely on any specific type of externality, but apply to a broad class of externality models.[3] This follows the spirit of the sufficient statistics approach to welfare analysis (Chetty 2009; Kleven 2021).

Whenever top earners create externalities on each other, changing the top tax rate gives rise to fiscal multiplier effects. The initial effect on top earnings changes earnings capacities within the top group, leading to further changes in top earnings and further externalities. The multiplier process amplifies the initial effect when externalities are positive and dampens it when externalities are negative. We characterize the condition under which this process converges. Given convergence, the total effect is governed by a macro elasticity of top earnings. The macro elasticity is equal to the standard micro elasticity scaled by an estimable externality parameter. It will be larger or smaller

[2] Regardless of any externalities created by top earners, they may also affect bottom earners through general equilibrium wage incidence. A literature has studied optimal taxation in the presence of such incidence effects (Stiglitz 1982; Rothschild and Scheuer 2013; Sachs *et al.* 2020), emphasizing the implications of trickle-down that run through equilibrium wages without any gap between private and social returns.

[3] By "broad class" of models, we mean any model where externalities run from top earnings to earnings capacities (wages). The analysis does not capture externalities that affect things other than earnings capacities (such as the additively separable utility externalities in Støstad and Cowell 2024), although such effects could easily be incorporated into the framework.

than the micro elasticity depending on whether the *net* externality is positive or negative. The multiplier process created by earnings externalities is conceptually similar to the multiplier process created by general equilibrium wage incidence, as studied by Sachs *et al.* (2020). The relationship between our externality approach and the wage incidence literature is discussed below.

The paper provides a general formula for the optimal top tax rate and considers a number of special cases.[4] It is useful to highlight two special cases here. The first case is where externalities occur only *within* the top group, for example positive externalities from productivity spillovers or negative externalities from rent-extraction or tournament-style compensation among top earners. In this case, the optimal top tax rate corresponds to the Laffer rate — exactly as in standard models — but this rate is governed by the aforementioned macro elasticity rather than the micro elasticity. The Laffer rate will be smaller or larger than the standard Laffer rate depending on whether the *net* externality is positive or negative. It may seem surprising that the government should tax top earners at the revenue-maximizing level in a situation where they generate externalities. The reason is that the social marginal welfare weight converges to zero at the top of the distribution, implying that externalities only matter through their fiscal effects.

The second case is where externalities occur only *between* the top and bottom groups, including positive externalities from innovation that benefit bottom earners and negative externalities from rent-extraction and political influence that hurt them.[5] In this case, the top tax rate deviates from the Laffer rate, with an externality correction that depends on the elasticity of aggregate earnings at the bottom with respect to aggregate earnings at the top. The tax rate is smaller or larger than the Laffer rate depending on the sign of this externality parameter. As we shall see, externalities that run from top earners to bottom earners have much stronger tax implications than those within the top group. There are two reasons for this: an effect of the social marginal welfare weight being

[4]The analysis relies on two high-level assumptions worth noting. First, we consider a static framework where top earnings reflect labor income, not capital income. While this speaks to an enormous literature on optimal labor income taxation in the Mirrleesian tradition (e.g., Mirrlees 1971; Diamond 1998; Saez 2001; Kleven *et al.* 2009), the tax treatment of capital income is in practice a key consideration for top earners. Hellwig and Werquin (2025) characterize the optimal taxation of top earners in a dynamic setting with both labor and capital income taxes, linking the analyses of Saez (2001) and Atkinson and Stiglitz (1976). They show that, whenever capital income should be taxed, it is optimal to simultaneously reduce the labor income tax below the level prescribed by Saez (2001). For simplicity of exposition, we sidestep such trade-offs between labor and capital taxes. Second, the analysis is based on the premise that the externality-generating activities cannot be directly targeted by Pigouvian instruments. This seems like a reasonable assumption: it would be extremely difficult for policymakers to identify and isolate the underlying activities responsible for externalities. Consider for example the "ideas" of Amazon, Facebook, and OpenAI (innovation externalities) or the situation where top compensation reflects a combination of real effort and zero-sum wage bargaining (rent-seeking externalities).

[5]Throughout the paper, "bottom earners" refers to everyone below the externality-generating segment of the distribution. If externalities come from the top 1%, these are workers in the bottom 99%.

larger at the bottom than at the top, and a magnification effect related to the top income share. The latter effect turns out to be particularly powerful.[6]

To quantify the optimal top tax rate, we show how the quasi-experimental evidence in Risch (2024) and Jakobsen *et al.* (2025) can be used to back out the elasticity of bottom earnings with respect to top earnings.[7] The elasticity implied by these papers is around 0.1, suggesting that top earners have positive externalities on net. This estimate does not impose any assumptions on the specific types of externalities at play. A calibration to the US economy suggests that the optimal top tax rate ($\approx 50\%$), while lower than the Mirrleesian solution, remains higher than the current top tax rate ($= 44.4\%$).[8]

To conclude, this paper shows how we can make progress, theoretically and empirically, on evaluating the taxation of top earners in a world with externalities. The calibration analysis is based on quasi-experimental estimates of the key externality parameter highlighted by the theory, but more empirical evidence is needed to reduce the uncertainty about this parameter. We argue that this should be a central focus of future research in public economics.

While our focus is on externalities, the paper speaks to two other literatures that consider non-externality effects. First, there is the literature on optimal taxation with general equilibrium wage incidence coming from nonlinear, concave production technologies (Stiglitz 1982; Rothschild and Scheuer 2013; Sachs *et al.* 2020). In such models, higher labor supply among top earners affects top wages negatively through concavity and bottom wages positively (negatively) through skill complementarity (substitutability). This resembles the within- and between-effects discussed above. But our formulation does not subsume existing models with nonlinear technology, nor do existing models subsume the formulation developed here. The reason is that, with a general nonlinear technology, the labor supply at any given skill level affects the wages at any other skill level. For example, if higher labor supply among top earners leads to higher wages among bottom earners, the resulting labor supply increases at the bottom create a feedback loop back to the top. Such a feedback loop is not present in our baseline model, simplifying the optimal tax

[6] We also show that the case of zero-sum compensation bargaining analyzed by Piketty *et al.* (2014) is subsumed within this special case by imposing a specific structure on the externalities from top earners to bottom earners.

[7] Jakobsen *et al.* (2025) estimate spillovers from top to bottom earners using international out-migration by business owners induced by a major wealth tax reform in Sweden. Risch (2024) estimates spillovers from business owners to employees in pass-through businesses, using the 2013 increase in the top marginal tax rate in the US. Related, Zidar (2019) and Kindsgrab (2022) rely on US income tax reforms and geographical exposure designs to estimate trickle-down effects at the state or local level.

[8] The details of the calculation of the current top tax rate are provided in the paper. The tax rate of 44.4% applies to labor income and it accounts for the differential tax treatment of employees and business owners. It includes all federal and state income taxes in the average state.

formulas. We develop a generalization that allows for both externalities and GE wage incidence, characterizing the optimal top tax rate in terms of estimable macro elasticities.

Second, we contribute to a large body of work studying the difference between micro and macro elasticities of labor supply. This work has focused on the role of extensive margin responses and unemployment (Chetty *et al.* 2013; Kroft *et al.* 2020), optimization frictions (Chetty *et al.* 2011; Chetty 2012), human capital accumulation (Keane 2011; Keane and Rogerson 2015), and dynamic compensation (Kleven *et al.* 2025). This paper highlights externalities as another mechanism that drives a wedge between micro and macro elasticities, and it demonstrates how the welfare-relevant macro elasticity can be estimated empirically. In contrast to the conventional view, the macro elasticity is not necessarily larger than the micro elasticity in a world with externalities. For example, in a scenario with negative externalities from rent-seeking or political influence, the macro elasticity is the smaller of the two.

The paper is organized as follows. Section 2 sets out the model with externalities. Section 3 characterizes the optimal taxation of top earners. Section 4 provides a generalization with GE wage incidence effects. Section 5 presents evidence on the theoretically relevant externality parameter and provides a calibration analysis. Section 6 concludes.

2 Model

2.1 Workers

There is a continuum of mass 1 of workers with heterogeneous skill ω and earnings z. Consumption is given by $c = z - T(z)$, where $T(z)$ is a tax schedule. Preferences over consumption c and effort z/ω are characterized by a quasi-linear utility function:

$$u = z - T(z) - \frac{\omega}{1 + 1/\varepsilon} \left(\frac{z}{\omega}\right)^{1+1/\varepsilon}. \tag{1}$$

The assumption of quasi-linearity avoids income effects on effort and is common in the optimal tax literature (e.g., Diamond 1998; Kleven *et al.* 2009). The parameterization of the second term — disutility of effort — has two implications worth highlighting: the disutility term is iso-elastic, and the term is scaled by the skill level ω. As we shall see, the scaling implies that skill, rather than being an hourly wage rate, represents a measure of earnings capacity. The ω-scaling used in equation (1) has been used in a number of prior papers (e.g., Kleven *et al.* 2009; Saez 2010; Kleven *et al.* 2025). The assumptions on preferences are useful for interpretation, but they are easy to generalize and do not change any of the fundamental insights presented below.

The maximization of utility gives the following earnings supply function

$$z = \omega \left(1 - \tau\left(z\right)\right)^{\varepsilon}, \tag{2}$$

where $\tau(z) \equiv T'(z)$ is the marginal tax rate and ε is the elasticity of earnings with respect to the marginal net-of-tax rate $1 - \tau$. Equation (2) implies that, at a marginal tax rate of zero, workers choose $z = \omega$. Hence, the skill parameter can be interpreted as laissez-faire earnings or "earnings capacity." The imposition of positive marginal tax rates depresses actual earnings z below earnings capacity ω according to the elasticity parameter ε.

2.2 Externalities and Equilibrium Convergence

The key feature of the model is to allow for the possibility that top earners generate externalities on the distribution of earnings capacities in the population. Specifically, suppose earnings capacity ω is governed by the following relationship

$$\omega = \omega\left(\omega_0, Z^*\right), \tag{3}$$

where ω_0 denotes earnings capacity at baseline (worker type) and Z^* denotes aggregate earnings at the top of the distribution (above some threshold). Apart from assuming that the relationship is differentiable, the specification is general and flexible: the external effects of Z^* may be positive or negative, and they may vary arbitrarily through the distribution of types. The specification is deliberately reduced-form to encompass a wide range of situations where the private and social returns to top earnings differ.[9] This includes positive externalities from productivity spillovers and innovation, or negative externalities from rent-seeking, rat race, and political influence.[10]

The distribution of worker types is given by the cdf $F_0(\omega_0)$ and pdf $f_0(\omega_0)$. Using equations

[9] To be clear about the level of generality, equation (3) can capture all externalities that run from top earnings Z^* to the earnings capacities ω (and thus earnings choices z) of other agents. It cannot capture externalities that do not come from top earnings (but from other characteristics or actions of top earners) or externalities that affect things other than earnings capacities. Importantly, externalities unrelated to earnings choices are not very interesting for the study of optimal income taxation, because income taxes cannot be used to correct such externalities.

[10] To clarify the terminology, equation (3) represents an "externality" because it implies that the private and social marginal benefits of top earnings differ. The reason is that top earners do not internalize the effect of their earnings choices on the earnings capacities of other agents. The paper sometimes refers to "spillovers," which is a broader concept than externalities. Spillovers include both externalities (where private and social marginal returns are misaligned) and general equilibrium spillovers (where private and social marginal returns are aligned).

(2)-(3), aggregate earnings at the top can be written as

$$Z^* = \int_{\bar{\omega}_0}^{\infty} \omega\left(\omega_0, Z^*\right)\left(1-\tau^*\right)^{\varepsilon} dF_0\left(\omega_0\right), \tag{4}$$

where workers with $\omega_0 \geq \bar{\omega}_0$ are classified as "top earners" and τ^* is the top marginal tax rate. The threshold $\bar{\omega}_0$ will be context-specific and should be guided by empirical evidence on externalities: $1 - F_0\left(\bar{\omega}_0\right)$ is the share of top earners who generate externalities on the rest of the economy.

Suppose the government changes the top marginal tax rate by $d\tau^*$. Taking the total derivative of equation (4), the effect on top earnings Z^* can be written as

$$dZ^* = -\frac{\varepsilon}{1-\eta^*} \cdot \frac{d\tau^*}{1-\tau^*} \cdot Z^*, \tag{5}$$

where η^* denotes the average earnings-weighted elasticity of top skill ω with respect to top earnings Z^*, i.e.

$$\eta^* \equiv \int_{\bar{\omega}_0}^{\infty} \frac{z}{Z^*} \frac{Z^*}{\omega} \frac{\partial \omega}{\partial Z^*} dF_0\left(\omega_0\right). \tag{6}$$

The elasticity η^* will be positive or negative depending on whether top earners generate positive or negative externalities on *each other*. The ratio $\varepsilon / \left(1-\eta^*\right)$ represents the macro elasticity of top earnings with respect to $1-\tau^*$. It will be smaller or larger than the micro elasticity ε depending on the sign of the net-externality parameter η^*.

Importantly, for equation (5) to describe an equilibrium, we must restrict η^* to be less than one in absolute value. Otherwise the economy will either explode ($\eta^* \geq 1$) or implode ($\eta^* \leq -1$) in response to a change in the top tax rate. To see this, note that the presence of skill externalities introduces fiscal multiplier effects into the model. Taking skills as given, the initial effect of changing the top tax rate on top earnings equals $dZ_1^* = -\varepsilon \cdot \frac{d\tau^*}{1-\tau^*} \cdot Z^*$. This first-round effect changes skills and creates a second-round effect on top earnings equal to $dZ_2^* = dZ_1^* \cdot \eta^*$. The process continues indefinitely with an nth-round effect equal to $dZ_n^* = dZ_1^* \cdot \left(\eta^*\right)^{n-1}$. Hence, the total effect on top earnings can be written as an infinite geometric series, $dZ^* = dZ_1^* \cdot \left(1 + \eta^* + \left(\eta^*\right)^2 + \left(\eta^*\right)^3 + ...\right)$. This series converges to $dZ^* = dZ_1^* / \left(1-\eta^*\right)$ if and only if $\left|\eta^*\right| < 1$. The total effect is proportional to the macro elasticity $\varepsilon / \left(1-\eta^*\right)$, while the initial effect is proportional to the micro elasticity ε.

The process described above is akin to the fiscal multiplier process in Keynesian macro models, although the economic mechanism is different. Figure 1 provides an illustration of the multiplier process for positive externalities (Panel A) and negative externalities (Panel B). The figure plots top earnings supply $Z_s^*(Z^*, \tau^*)$ — the right-hand side of equation (4) — against actual top earnings Z^*. This relationship is depicted by the red curves, which are positively (negatively) sloped under positive (negative) externalities.[11] In equilibrium, we must have $Z_s^* = Z^*$ as depicted by the 45-degree line. When the top tax rate is reduced, there is an upward shift in the supply curve. With positive externalities, the initial effect is amplified through a multiplier process, making the total effect larger than the initial effect by a factor of $1/(1-\eta^*)$. Conversely, with negative externalities, the initial effect is dampened and the total effect is smaller than the initial effect.

The trick to the simplicity of this model is to build the externality of top earnings directly into the earnings capacity parameter ω. As discussed in the introduction, this gives rise to effects that are conceptually similar — but not equivalent — to those studied in the literature on GE wage incidence. To capture incidence effects of nonlinear production technology, our formulation would have to be enriched to allow for own- and cross-wage effects of effort in all labor markets. We consider a generalization with unrestricted externality and incidence effects of top and bottom earners in Section 4.

2.3 Government

The government's preferences can be described by a social welfare function specified as

$$W = \int_0^\infty \Psi\left[u\left(z\left(\omega\right), \omega\right)\right] dF_\omega\left(\omega\right), \tag{7}$$

where $\Psi[.]$ is an increasing and concave transformation of individual utilities, and $F_\omega(\omega)$ denotes the distribution of (endogenous) skills. The government sets the tax schedule $T(z)$ to maximize social welfare (7) subject to incentive compatibility (2), skill externalities (3), and a government budget constraint given by

$$\int_0^\infty T\left(z\left(\omega\right)\right) dF_\omega\left(\omega\right) \geq R, \tag{8}$$

where R is an exogenous revenue requirement.

Denoting the Lagrange multiplier on the government budget constraint by μ, we may define social marginal welfare weights as $g(\omega) \equiv \frac{\Psi'[u(z(\omega),\omega)]}{\mu}$. The welfare weight $g(\omega)$ captures the social marginal value of giving income to type ω ($\Psi'[.]$) in terms of the marginal value of public funds (μ). We assume that $g(\omega)$ converges to g^* at the top of the distribution. With a standard concave social welfare function, we have $g^* \approx 0$.

[11] To simplify, the figure depicts these curves as linear, but the model makes no such functional-form assumption.

3 Optimal Top Tax Rate

3.1 General Formula

Suppose the government sets a constant marginal tax rate above an earnings threshold $\bar{z}$, with associated skill thresholds $\bar{\omega}_0$ and $\bar{\omega}$.[12] We may solve for the optimal top marginal tax rate using a perturbation approach (Saez 2001). This approach is based on the idea that, at the optimum, small changes in the tax schedule have no first-order effects on social welfare. We therefore characterize the different effects of changing the top tax rate on social welfare and solve for the value that makes the total effect equal to zero. In this model, there are three welfare effects of changing the top tax rate: a mechanical effect taking earnings as given (dM), a direct behavioral effect from earnings responses to the tax change (dB_{dir}), and an indirect behavioral effect from the externalities created by top earnings changes (dB_{ext}).

The mechanical effect of changing the top marginal tax rate by $d\tau^*$ can be written as

$$dM = (1 - g^*) \cdot (Z^* - \bar{Z}) \cdot d\tau^*, \tag{9}$$

where $\bar{Z} = \bar{z} \cdot (1 - F_\omega(\bar{\omega}))$ denotes the top bracket threshold in aggregate terms. The expression in equation (9) is simply the mechanical revenue effect of increasing τ^* net of the welfare-weighted income loss for top earners. As mentioned above, the welfare weight converges to zero at the top of the distribution such that $g^* \approx 0$.

The direct behavioral effect is given by

$$dB_{dir} = -\frac{\tau^*}{1 - \tau^*} \cdot \varepsilon \cdot Z^* \cdot d\tau^*. \tag{10}$$

This is the behavioral revenue effect — or fiscal externality — associated with earnings responses to a higher τ^*, ignoring any externalities on the distribution of skill. We do not need to include any direct utility effects of earnings changes due to the envelope theorem.

Finally, there is the indirect behavioral effect from the externalities of top earnings — the feature that makes this model different from standard optimal tax models. This effect can be written as

$$dB_{ext} = -\frac{\varepsilon}{1 - \eta^*} \cdot \frac{d\tau^*}{1 - \tau^*} \cdot Z^* \cdot \int_0^\infty \left(g(\omega) \frac{du}{d\omega} + \tau(z) \frac{dz}{d\omega} \right) \frac{\partial \omega}{\partial Z^*} dF_\omega(\omega), \tag{11}$$

[12] The mapping between the earnings threshold $\bar{z}$ and the skill thresholds $\bar{\omega}_0, \bar{\omega}$ is governed by equations (2)-(3). These thresholds correspond to the threshold in the definition of aggregate top earnings Z^* in equation (4). In other words, we are considering a top tax bracket that corresponds to the externality-generating segment of the population.

where $\frac{du}{d\omega} = \frac{(1-\tau(z))^{1+\varepsilon}}{1+\varepsilon}$ is the marginal willingness to pay for higher skill and $\frac{dz}{d\omega} = (1-\tau(z))^{\varepsilon}$ is the marginal effect of higher skill on earnings. The externality effect in (11) has two components: a welfare-weighted utility effect of skill changes and a fiscal externality of skill changes.

Based on these derivations, it is straightforward to characterize the optimal top tax rate. We obtain the following result:

Proposition 1 (General Formula). *Assuming that the social marginal welfare weight converges to zero at the top of the distribution ($g^* = 0$), the optimal top marginal tax rate τ^* is given by*

$$\tau^* = \frac{1}{1+\alpha\varepsilon} - \frac{\alpha\varepsilon/\left(1-\eta^*\right)}{1+\alpha\varepsilon} \cdot E_{Z^*}, \tag{12}$$

where $\alpha = \frac{Z^*}{Z^*-\bar{Z}}$ is the Pareto parameter, ε is the elasticity of top earnings with respect to $1-\tau^*$, η^* is the average earnings-weighted elasticity of top skill with respect to top earnings, and $E_{Z^*} = \int_0^\infty \left(g\left(\omega\right)\frac{du}{d\omega} + \tau\left(z\right)\frac{dz}{d\omega}\right)\frac{\partial\omega}{\partial Z^*}dF_{\omega}\left(\omega\right)$ is the marginal externality effect of top earnings.

Proof. This result follows from the fact that, at the social optimum, we have $dM + dB_{dir} + dB_{ext} = 0$, where each of the three terms have been characterized in equations (9)-(11). □

The optimal tax formula has two components: the standard formula (first term) and an externality correction (second term). The standard formula depends simply on the Pareto parameter α and the earnings elasticity ε, as shown by Diamond (1998) and Saez (2001). However, in standard models without externalities, this corresponds to the Laffer rate on top earners. This is not true in the more general model, where the externality correction includes additional fiscal externalities due to the impact of top earnings on the distribution of earnings capacities in the population.

The externality term shows the additional parameters that have to be estimated to evaluate the optimal taxation of top earners. First, we need an estimate of the skill elasticity at the top of the distribution, η^*. This parameter determines the degree to which the initial impact of the top tax rate on top earnings is either magnified through positive externalities ($\eta^* > 0$) or dampened through negative externalities ($\eta^* < 0$), as illustrated in Figure 1. To put it differently, the top skill elasticity is necessary for quantifying the *macro* elasticity of top earnings, $\frac{\varepsilon}{1-\eta^*}$. Second, we need an estimate of the marginal externality effect of top earnings, E_{Z^*}. This term represents the weighted impact of top earnings on realized skills across all workers. The weighted impact depends on the *distribution* of skill externalities for two reasons: one is that different workers have different welfare weights (creating variation in the social marginal value of skill) and the other is that different workers have different marginal tax rates (creating variation in fiscal externalities). The first aspect implies that, all else equal, we should be more concerned about externalities from the top to the bottom (such as trickle-down) than about externalities within the group of top earners (such as rent-seeking or rat race effects within the top group).

Heterogeneous Elasticities: To simplify the exposition, we have assumed that the earnings elasticity ε is homogeneous in the population. Specifically, top earners have the same elasticity as workers further down the distribution.[13] It is straightforward to relax this assumption. Consider an extension where $\varepsilon = \varepsilon(\omega_0)$ is allowed to vary arbitrarily across worker types and converges to ε^* at the top. In this case, the three key welfare terms dM, dB_{dir}, and dB_{ext} take the exact same form as in equations (9)-(11), except that the homogeneous elasticity ε is replaced by the top elasticity ε^*. Hence, the optimal top marginal tax rate is still characterized by equation (12), again replacing ε by ε^*. Inside the expression for E_{Z^*}, we have $\frac{du}{d\omega} = \frac{(1-\tau(z))^{1+\varepsilon(\omega_0)}}{1+\varepsilon(\omega_0)}$ and $\frac{dz}{d\omega} = (1-\tau(z))^{\varepsilon(\omega_0)}$. Allowing for heterogeneity in elasticities will in general affect the size of the optimal top tax rate, but it does not conceptually change any of the results or insights in the paper.

3.2 Special Case 1: Externalities Only Within Top Group

The following sections consider special cases. These are meant to provide additional economic intuition and highlight the empirical targets (sufficient statistics) in specific externality scenarios. We start by analyzing the case where top earners generate externalities on each other, with no externalities further down the distribution. In this scenario, the optimal top tax rate takes a particularly simple form:

Proposition 2 (Externalities Only Within Top Group). *When externalities are contained within the group of top earners, the optimal top marginal tax rate τ^* is given by*

$$\tau^* = \frac{1}{1+\alpha\varepsilon/\left(1-\eta^*\right)}, \tag{13}$$

where α is the Pareto parameter, ε is the micro elasticity of top earnings with respect to $1-\tau^*$, η^* is the average earnings-weighted elasticity of top skill with respect to top earnings, and $\varepsilon/\left(1-\eta^*\right)$ is the macro elasticity of top earnings with respect to $1-\tau^*$.

[13] Empirically, we do not have strong evidence on elasticity heterogeneity across the income distribution. The elasticity of *taxable income* tends to be larger at the top due to avoidance responses (Saez *et al.* 2012). But our model focuses on real earnings responses, where it is not clear if elasticities are larger at the top than at the bottom.

Proof. This result follows from the fact that, when $\partial\omega/\partial Z^* = 0$ for $\omega < \bar{\omega}$, we obtain $E_{Z^*} = \tau^*\eta^*$. The derivation uses $g^* = 0$, $\frac{dz}{d\omega} = \frac{z}{\omega}$ from equation (2), and the definition of η^* from equation (6). Inserting $E_{Z^*} = \tau^*\eta^*$ into equation (1) and rearranging terms gives the optimal tax rule in equation (13). □

The optimal top tax rate in equation (13) corresponds to the Laffer rate. While this is similar to standard optimal tax results (Diamond 1998; Saez 2001), it is important to note that the Laffer rate is different in this model due to the presence of externalities. It is governed by the macro elasticity $\varepsilon/\left(1-\eta^*\right)$ rather than the micro elasticity ε. The macro elasticity will be larger than the micro elasticity — and the optimal tax rate therefore smaller — when externalities are positive. Examples include spillovers from innovation or agglomeration. Conversely, when externalities are negative, the macro elasticity will be smaller than the micro elasticity and the optimal tax rate therefore larger. Examples include spillovers from rent-seeking or rat race.

It may seem surprising that the government should set the top tax rate equal to the Laffer rate in a situation where top earners generate externalities. Typically, a Pigouvian correction would make the optimal tax rate deviate from its revenue-maximizing level. The reason for the result is that the social marginal welfare weight converges to zero at the top of the distribution. Hence, the direct utility implications of skill externalities within the top group are irrelevant to the planner, only the fiscal implications of skill externalities matter. This insight reflects an important, broader point: the policy implications of externalities depend crucially on who is affected by them, not just on their overall magnitude.[14] All else equal, externalities within the group of top earners are less important than externalities on workers at the bottom.

The result in Proposition 2 is the one that comes closest to results from structural models with GE wage incidence effects, in particular those in Sachs *et al.* (2020). Assuming a CES technology, they generalize the Diamond-Saez formula to incorporate the elasticity of substitution between workers at different skill levels, denoted by σ, and retain the standard formula as a special case where $\sigma \to \infty$. Similarly, we generalize the Diamond-Saez formula based on a single parameter — the average earnings-weighted elasticity of top skill with respect to top earnings η^* — and retain the standard formula as a special case where $\eta^* = 0$. Important differences remain, however. The formula in Sachs *et al.* (2020) is more involved and has different policy implications: their top tax rate is always lower than the Diamond-Saez rate, whereas our top tax rate may be either higher or lower.

[14] Rothschild and Scheuer (2016) make a similar point.

3.3 Special Case 2: Externalities Only From Top to Bottom

We now turn to the special case where top earners generate externalities on workers at the bottom, but not on their peer workers at the top. That is, we consider a case where the skill externality $\partial\omega/\partial Z^*$ is zero for $\omega \geq \bar{\omega}$ and non-zero elsewhere. To simplify further, we assume that the tax rate is constant below the top bracket (denoted by τ_L) and that the social welfare weight is also constant below the top bracket (denoted by g_L). These additional assumptions make the optimal tax rule simpler, highlighting the intuition more clearly. We obtain the following result:

Proposition 3 (Externalities Only From Top to Bottom). *When externalities run from top earners to bottom earners, with no externalities within the top group, the optimal top marginal tax rate τ^* can be expressed as*

$$\tau^* = \frac{1}{1+\alpha\varepsilon} - \frac{\alpha\varepsilon}{1+\alpha\varepsilon} \cdot \eta_L \cdot \frac{1-s_z}{s_z} \cdot \left(\frac{g_L\left(1-\tau_L\right)}{1+\varepsilon} + \tau_L \right), \tag{14}$$

where α is the Pareto parameter, ε is the earnings elasticity, η_L is the average earnings-weighted elasticity of bottom skill with respect to top earnings, $s_z = Z^*/\left(Z_L + Z^*\right)$ is the top income share, τ_L is the marginal tax rate on bottom earners, and g_L is the social marginal welfare weight on bottom earners.

Proof. From equations (1)-(2), we have that $\frac{du}{d\omega} = \frac{(1-\tau(z))^{1+\varepsilon}}{1+\varepsilon}$ and $\frac{dz}{d\omega} = \frac{z}{\omega}$. Hence, given $\partial\omega/\partial Z^* = 0$ for $\omega \geq \bar{\omega}$, the marginal externality effect of top earnings equals $E_{Z^*} = \eta_L \frac{1-s_z}{s_z}\left(\frac{g_L(1-\tau_L)}{1+\varepsilon} + \tau_L\right)$, where we use the definitions $\eta_L = \int_0^{\bar{\omega}} \frac{z}{Z_L}\frac{Z^*}{\omega}\frac{\partial\omega}{\partial Z^*} dF_\omega\left(\omega\right)$, $Z_L = \int_0^{\bar{\omega}} z\left(\omega\right) dF_\omega\left(\omega\right)$, and $s_z = \frac{Z^*}{Z_L + Z^*}$. Inserting E_{Z^*} into equation (12) gives the result in equation (14), noting that $\eta^* = 0$ in the case considered here. □

In this case, the optimal top tax rate deviates from the Laffer rate due to the positive welfare weight g_L on the low-income workers affected by externalities. The tax rate may be smaller or larger than the Laffer rate depending on the sign of η_L. The externality correction is increasing in the magnitude of η_L and decreasing in the top income share s_z. The intuition for the effect of the top income share is the following. If the top income share is small, this means that a small part of the economy is generating externalities on a large part of the economy. Hence, in the case of positive externalities, lowering the top tax rate creates large externality gains at a small revenue cost. The top income share may be "small" either because the society is relatively equal or because the externality-generating segment of the population includes only superstars in the extreme tail. In general, the top income share term $\left(1-s_z\right)/s_z$ is much greater than one, thus magnifying the effect of η_L.[15]

Importantly, equation (14) does not provide a closed-form solution for the optimal top tax rate because the top income share is endogenous to the choice of tax rate. To solve for the optimal policy, we need to derive the top income share as a function of the tax rate. Consider an iso-elastic version of equation (3) such that, at the bottom of the distribution, the realized skill of worker type ω_0 is given by $\omega = \omega_0 (Z^*)^{\eta_L}$.[16] With this specification, we show in Appendix B.1.1 that the top income share is given by

$$s_z = \frac{1}{1 + (1-\tau_L)^{\varepsilon} (1-s_p) \left[(1-\tau^*)^{\varepsilon} s_p \omega_0^*\right]^{\eta_L - 1}}, \tag{16}$$

where $s_p \equiv 1 - F_0 (\bar{\omega}_0)$ denotes the top population share and ω_0^* denotes average baseline skill at the top. The system of equations (14) and (16) provides a full characterization of τ^* and s_z for given values of α, ε, η_L, g_L, τ_L, s_p, and ω_0^*. While most of these parameters are directly observable or estimable, the value of ω_0^* can be calibrated to ensure that s_z corresponds to the actual top income share at the actual tax system.

From equation (16), it is worth noting that the relationship between the top income share and the top marginal tax rate is governed by the elasticity $\varepsilon (\eta_L - 1)$. For a given top earnings elasticity ε, positive externalities weaken the relationship between the top income share and the top tax rate. The reason is that, if top earnings increase in response to a lower tax rate, bottom earnings increase due to trickle-down. In the extreme, as $\eta_L \to 1$, the top income share is completely independent of the top tax rate. This reasoning suggests that externalities could be estimated by combining evidence on ε with evidence on the impact of taxes on top income shares. For example, if the data suggest that ε is large while the impact of top taxes on top income shares is small, this would imply strong positive externalities.[17]

[15] Consider the generalization with heterogeneous elasticities, $\varepsilon = \varepsilon(\omega_0)$, laid out in Section 3.1. Assuming that the elasticity equals ε^* at the top and ε_L at the bottom, the optimal tax formula (14) is modified as follows:

$$\tau^* = \frac{1}{1+\alpha\varepsilon^*} - \frac{\alpha\varepsilon^*}{1+\alpha\varepsilon^*} \cdot \eta_L \cdot \frac{1-s_z}{s_z} \cdot \left(\frac{g_L (1-\tau_L)}{1+\varepsilon_L} + \tau_L \right). \tag{15}$$

Hence, a smaller bottom elasticity ε_L makes the externality correction larger, all else equal.

[16] In the special case considered here, because externalities run only from the top to the bottom, we have $\omega = \omega_0$ at the top of the distribution.

[17] Such an approach requires that the earnings elasticity ε and the top income share effect can be separately estimated, in contrast to the empirical strategy proposed by Saez *et al.* (2012) in which ε is estimated directly from variation in the top income share.

3.4 Special Case 3: Zero-Sum Wage Bargaining

Piketty *et al.* (2014) analyze the optimal top tax rate in a model where a fraction of top earnings reflects zero-sum compensation bargaining. They assume that the negative externality from such bargaining is uniform across workers and lump sum. In this section, we show how their model and results relate to the approach developed here. As we shall see, their main result can be obtained as a special case.

We first derive the Piketty-Saez-Stantcheva formula directly from their assumptions. The fraction of bargained earnings at the top is denoted by λ.[18] Crucially, because bargaining externalities are uniform and lump sum, the government can compensate each worker for the external effects by adjusting the demogrant of the tax system, $T(0)$. The demogrant adjustment needed to neutralize externalities equals $-\lambda Z^*$. Then, assuming that the social marginal welfare weight converges to zero at the top, the government's problem can be formulated as a revenue-maximization problem. The government sets τ^* to maximize top tax revenue net of demogrant spending, $\tau^* \cdot (Z^* - \bar{Z}) - \lambda Z^*$.[19] Taking the total derivative of this expression and setting it equal to zero gives

$$\tau^* = \frac{1 + \alpha\lambda\varepsilon}{1 + \alpha\varepsilon}, \tag{17}$$

where $\lambda\varepsilon \equiv \varepsilon_b$ is the elasticity of bargained earnings with respect to the net-of-tax rate. Equation (17) is identical to the main result of Piketty *et al.* (2014).

Two points are worth highlighting. First, the assumption that bargaining spillovers are uniform and lump sum implies that they correspond to an additively separable public goods externality, similar to the type of externalities analyzed by Støstad and Cowell (2024).[20] Second, the notion of bargaining is largely a matter of terminology; the model does not explicitly characterize bargaining between top earners and other workers. We could alternatively label λ as "innovation" and assume $\lambda < 0$, corresponding to positive externalities.

[18] To simplify the exposition, we will treat λ as a fixed parameter, but this is straightforward to generalize. If λ is endogenous to bargaining effort (as in Piketty *et al.* 2014), then, in the formulas below, we simply need to reinterpret λ as the *marginal* fraction of bargained earnings at the top.

[19] To be clear, it is not assumed that the government actually compensates each worker by adjusting the demogrant. Rather, given the (strong) assumptions on bargaining externalities, we can express the optimization problem as if they did.

[20] In an appendix, Piketty *et al.* (2014) relax the assumption of uniform bargaining externalities within the context of a discrete labor supply model. To obtain equation (17) with non-uniform externalities, the authors assume that the government, when changing the top tax rate τ^*, can flexibly adjust the rest of the tax schedule to keep consumption, labor supply, and utility constant for each worker affected by the externalities. In this case, the government's problem can again be formulated as a revenue-maximization problem, accounting for the revenue effects of both the top tax rate and the associated tax-schedule adjustments needed to neutralize externalities throughout the distribution.

Let us consider zero-sum compensation bargaining in the context of the model developed here. In this model, externalities operate through earnings capacities ω as specified in equation (3). Suppose this equation takes the form $\omega = \omega(\omega_0, \lambda Z^*)$ where bargained top earnings, λZ^*, have negative effects on workers below the top bracket, but not on peer workers within the top bracket. Hence, we stay within the special case analyzed in the previous section, where $\eta^* = 0$ and there are no multiplier effects of top earnings (as in Piketty *et al.* 2014). We make no assumptions on the specific distribution of bargaining externalities, only that bargaining is zero-sum in the aggregate. That is, we have

$$\lambda \cdot dZ^* = -dZ_L \quad \Leftrightarrow \quad \lambda = -\eta_L \cdot \frac{1 - s_z}{s_z}, \tag{18}$$

where we use the definitions of the elasticity of bottom earnings with respect to top earnings (η_L) and the top income share (s_z). This allows us to characterize the optimal top tax rate as follows:

Proposition 4 (Zero-Sum Wage Bargaining). *With zero-sum bargaining externalities of top earners on bottom earners, the optimal top marginal tax rate τ^* can be expressed as*

$$\tau^* = \frac{1}{1+\alpha\varepsilon} + \frac{\alpha\lambda\varepsilon}{1+\alpha\varepsilon} \cdot \left(\frac{g_L(1-\tau_L)}{1+\varepsilon} + \tau_L \right), \tag{19}$$

where λ is the fraction of bargained earnings at the top and $\lambda\varepsilon \equiv \varepsilon_b$ is the elasticity of bargained earnings with respect to the net-of-tax rate.

Proof. This follows from Proposition 3 and equation (18). □

This result corresponds to the Piketty-Saez-Stantcheva formula, except for the last term in parenthesis. This term reflects that, in this model, bargaining externalities operate through earnings capacities ω rather than being lump sum. We may simplify this term by noting that, if the demogrant $T(0)$ is optimized, then the average welfare weight in the population equals one.[21] In that case, given top earners represent a small share of the population, we have $g_L \approx 1$. Hence, the last term can be approximated as $(1+\varepsilon\tau_L)/(1+\varepsilon)$. Considering the generalization with heterogeneous elasticities in equation (15), this term becomes $(1+\varepsilon_L\tau_L)/(1+\varepsilon_L)$ where ε_L is the earnings elasticity at the bottom. Then, as $\varepsilon_L \to 0$, our top tax formula (19) converges to the Piketty-Saez-Stantcheva formula (17). Our formula is more general by not relying on assumptions

[21] Assuming that the demogrant $T(0)$ is optimized is conceptually different from the assumption in Piketty *et al.* (2014) that the government can compensate each worker for any external effects by adjusting $T(0)$. In our model, bottom workers are not compensated for the bargaining externalities of top workers.

about the distribution of bargaining externalities across bottom workers. The only assumption is that wage bargaining is zero-sum in the aggregate.

3.5 Special Case 4: Rawlsian Social Preferences

As a final special case, we consider a government with Rawlsian social preferences. In this case, the social marginal welfare weight equals zero for all individuals except those at the very bottom: $g(\omega) = 0$ for all $\omega > 0$. These are the strongest possible preferences for equality, conditional on respecting the Pareto criterion. We make no restrictions on the pattern of externalities apart from assuming that $\partial\omega/\partial Z^* = 0$ at the lower bound of $\omega = 0$. This is a realistic benchmark because, in any economy, there will be a mass point of low-skilled individuals who are unable to work under any policy configuration (such as severely disabled individuals). The optimal top tax rate can be characterized as follows:

Proposition 5 (Rawlsian Social Preferences). *Assuming Rawlsian social preferences ($g(\omega) = 0$ for $\omega > 0$), the optimal top marginal tax rate τ^* is given by*

$$\tau^* = \frac{1}{1 + \alpha\varepsilon/(1-\eta^*)} - \frac{\alpha\varepsilon/(1-\eta^*)}{1 + \alpha\varepsilon/(1-\eta^*)} \cdot \tau_L \cdot \eta_L \cdot \frac{1-s_z}{s_z}, \tag{20}$$

where α is the Pareto parameter, ε is the micro elasticity of top earnings with respect to $1-\tau^*$, η^* and η_L are average earnings-weighted elasticities of top and bottom skill, respectively, with respect to top earnings, $\varepsilon/(1-\eta^*)$ is the macro elasticity of top earnings with respect to $1-\tau^*$, $s_z = Z^*/(Z_L + Z^*)$ is the top income share, and τ_L is the marginal tax rate on bottom earners.

Proof. Under the assumptions of $g(\omega) = 0$ for $\omega > 0$ and $\partial\omega/\partial Z^* = 0$ for $\omega = 0$, we obtain $E_{Z^*} = \tau_L\eta_L\frac{1-s_z}{s_z} + \tau^*\eta^*$, where $\eta_L = \int_0^{\bar{\omega}} \frac{z}{Z_L}\frac{Z^*}{\omega}\frac{\partial\omega}{\partial Z^*}dF_\omega(\omega)$, $\eta^* = \int_{\bar{\omega}}^{\infty} \frac{z}{Z^*}\frac{Z^*}{\omega}\frac{\partial\omega}{\partial Z^*}dF_\omega(\omega)$, and $s_z = \frac{Z^*}{Z_L+Z^*}$. Inserting E_{Z^*} into equation (12) and rearranging terms gives the result in equation (20). □

This result combines elements of the results in Propositions 2-3. The reason is that, in this special case, we allow for externalities both within the top group and between the top and bottom groups. Because of the former, the optimal top tax rate depends on the macro elasticity of top earnings, $\varepsilon/(1-\eta^*)$. Because of the latter, the optimal top tax rate includes a Pigouvian correction for the externalities of top earnings on bottom earnings.

As in Section 3.3, the policy rule in equation (20) does not provide a closed-form solution due to the endogeneity of the top income share s_z to the top tax rate τ^*. The relationship between s_z

and τ^* is different in this case because the pattern of externalities is more general. The top income share in equilibrium is characterized in Appendix B.1.2.[22]

4 General Equilibrium Wage Incidence

Our model allows for top earners to have unrestricted externalities on the distribution of earnings capacities ω. As discussed, this does not include general equilibrium wage incidence effects due to nonlinear production technology. The reason is that, in standard incidence models, equilibrium wages are affected by aggregate labor supply in all labor markets, not just the top labor market. If top earnings affect bottom earnings through an incidence channel, there will be a feedback loop from the bottom back to the top. Here we consider a generalization that incorporates such effects, connecting the paper more closely to the literature on optimal income taxation with GE wage incidence (Stiglitz 1982; Rothschild and Scheuer 2013; Sachs *et al.* 2020). To keep things simple, we consider a setting with two labor markets — top workers with aggregate earnings Z^* and bottom workers with aggregate earnings Z_L — assuming perfect substitutability across skill levels within the two groups. This is similar to the two-sector model of Rothschild and Scheuer (2013). Earnings capacity ω is governed by the following relationship

$$\omega = \omega \left(\omega_0, Z_L, Z^* \right). \tag{21}$$

This specification allows for arbitrary externality and incidence effects within and between the top and bottom groups. While it is theoretically feasible to develop a sufficient statistics approach with more than two labor markets, it becomes empirically intractable due to the large number of own- and cross-elasticities that have to be estimated.[23]

All other aspects of the model are unchanged. The technical details of the derivations are provided in Appendix B.2. Similar to how we defined the average elasticities of top and bottom skills with respect to *top* earnings, η^* and η_L, we define average elasticities of top and bottom skills with respect to *bottom* earnings, σ^* and σ_L. The optimal marginal tax rate on top earners can be characterized as follows:

[22] It is given by equation (28) in the appendix. Equations (20) and (28) fully characterize the optimum.

[23] In a general case with N labor markets and unrestricted externality/incidence effects, we would have $\omega = \omega \left(\omega_0, Z_1, ..., Z_N \right)$. When N is large, the sufficient statistics include a large number of own- and cross-effects. As discussed by Kleven (2021), when the dimensionality of sufficient statistics approaches is very high, structural approaches are generally preferred as they reduce the dimensionality to a few structural primitives.

Proposition 6 (Externalities & GE Wage Incidence). *Given the specification of earnings capacities in equation (21), and assuming that the social marginal welfare weight converges to zero at the top ($g^* = 0$), the optimal top marginal tax rate τ^* is given by*

$$\tau^* = \frac{1}{1+\alpha\varepsilon} - \frac{\alpha\zeta^*}{1+\alpha\varepsilon} \cdot E_{Z^*} - \frac{\alpha\zeta_L}{1+\alpha\varepsilon} \cdot \frac{1-s_z}{s_z} \cdot E_{Z_L}, \tag{22}$$

where α is the Pareto parameter, ε is the micro elasticity of top earnings with respect to $1-\tau^*$, $\zeta^* = \frac{\varepsilon}{1-\eta^*-\frac{\sigma^*}{1-\sigma_L}\eta_L}$ is the macro elasticity of top earnings with respect to $1-\tau^*$, $\zeta_L = \frac{\eta_L}{1-\sigma_L}\zeta^*$ is the macro elasticity of bottom earnings with respect to $1-\tau^*$, $E_{Z^*} = \int_0^\infty \left(g(\omega)\frac{du}{d\omega} + \tau(z)\frac{dz}{d\omega}\right)\frac{\partial\omega}{\partial Z^*}dF_\omega(\omega)$ is the marginal externality/GE effect of top earnings, and $E_{Z_L} = \int_0^\infty \left(g(\omega)\frac{du}{d\omega} + \tau(z)\frac{dz}{d\omega}\right)\frac{\partial\omega}{\partial Z_L}dF_\omega(\omega)$ is the marginal externality/GE effect of bottom earnings.

Proof. See Appendix B.2. □

This generalized formula retains Proposition 1 as a special case where $\sigma^* = \sigma_L = 0$, in which case we have $\zeta^* = \frac{\varepsilon}{1-\eta^*}$ and $E_{Z_L} = 0$.[24] It maintains a transparent link to the classic Diamond-Saez formula (first term), and it is more general than existing GE formulas by allowing for externalities and not relying on any specific functional forms.[25] While the formula is simple and intuitive, it would be challenging to causally estimate all the parameters on which it relies. The evidence and calibration presented below restrict attention to the simpler externality model, which is the main focus of this paper.

[24] The formula carries over to the extension with heterogeneous elasticities, $\varepsilon = \varepsilon(\omega_0)$, laid out in Section 3.1. Assuming that the elasticity converges to ε^* at the top, we simply replace ε by ε^* in Proposition 6. The expressions for E_{Z^*} and E_{Z_L} are unchanged as they are written, but note that we have $\frac{du}{d\omega} = \frac{(1-\tau(z))^{1+\varepsilon(\omega_0)}}{1+\varepsilon(\omega_0)}$ and $\frac{dz}{d\omega} = (1-\tau(z))^{\varepsilon(\omega_0)}$ in the extension with elasticity heterogeneity.

[25] A well-known result from the GE wage incidence literature is that, in a two-type model, the optimal marginal tax rate on high-skill workers is negative (Stiglitz 1982). This reflects the classic "no-distortion-at-the-top" result (which holds at any finite upper bound, absent incidence effects) combined with trickle-down forces from wage incidence. To link Proposition 6 to the Stiglitz result, note that our model relies on two *labor markets*, not on two types. We allow for a continuum of workers with an infinite Pareto tail. To obtain the Stiglitz result, we would need to consider the limit case of $\alpha \to \infty$, corresponding to its value when setting the marginal tax rate at the income level of the top person in the economy. In this case, the Diamond-Saez term $1/(1+\alpha\varepsilon)$ goes to zero (no-distortion-at-the-top) and the limit of the remaining terms can be calculated using L'Hôpital's Rule (Bernoulli's Rule). Furthermore, we would need to impose a specific structure on the reduced-form parameters — i.e, on $\omega(\omega_0, Z_L, Z^*)$ — so as to capture Stiglitz's production technology (without any externalities). Importantly, the negative top tax result of Stiglitz (1982) is not practically relevant because it relies on the no-distortion-at-the-top baseline (setting τ^* at the income level of a finite top type) rather than the Diamond-Saez baseline (setting τ^* in the top bracket of a distribution with a Pareto tail).

5 Evidence and Policy Implications

5.1 Evidence on the Externalities of Top Earners

A reason why top earners may generate positive externalities is that many of them are active business owners, thereby creating jobs and making investments of potential benefit to the rest of the economy (Smith *et al.* 2020). Top earners may also generate negative externalities through rent-extraction and other effects (Piketty *et al.* 2014; Rothschild and Scheuer 2016; Lockwood *et al.* 2017). Our model allows for positive and negative externalities to co-exist: what matters for optimal policy is the distribution of *net* externalities from top earnings. Unfortunately, causal evidence on the magnitude of these externalities is scarce due to the empirical challenges of estimating them.[26] The main issue is that causal evidence on earnings responses — such as evidence from tax reforms — generally does not allow for estimating general equilibrium effects as these are present in both treatment and control groups. We consider two recent papers that develop quasi-experimental approaches to estimate spillovers or externalities from top earners (Risch 2024; Jakobsen *et al.* 2025). The estimates provided in these papers can be translated into the key sufficient statistic highlighted above: the elasticity of earnings capacity at the bottom with respect to aggregate earnings at the top, η_L.

Consider first Jakobsen *et al.* (2025). This paper estimates externalities using international out-migration by people at the top of the distribution induced by wealth tax reform.[27] The estimated migration effects are combined with event studies of out-migration, tracing the implications for individual-level, firm-level, and market-level outcomes. The analysis leverages administrative data from Sweden, including detailed information on the firms owned by migrants, linked to the employees of those firms. Jakobsen *et al.* (2025) find that migration responses to a 1pp increase in the top wealth tax rate reduce the stock of wealthy taxpayers by 1.77%, leading to reductions of 0.02% in aggregate employment, 0.07% in aggregate investment, and 0.10% in aggregate value-added.

To relate these estimates to our model, we note the following. First, because of the strong correlation between wealth and income, we can interpret the effects as coming from top earners.

[26] Lockwood *et al.* (2017) provide a review of the literature estimating economy-wide externalities from top professions such as engineering, finance, law, management, and medicine. They emphasize that the existing estimates are highly uncertain.

[27] To clarify, they focus on estimating the externalities from top *wealth* owners, as opposed to top *income* earners. However, given the strong correlation between wealth and income, their estimates are informative for the calibration exercise in this paper.

Second, assuming that the migrants are representative of other top earners in terms of income level, the migration-induced reduction in aggregate top earnings equals $dZ^*/Z^* = \gamma \cdot dN^*/N^*$, where N^* denotes the number of top earners and γ denotes the fraction of migrant income lost to the origin country. The value of γ is less than one because some out-migrants continue to have earnings in their origin country, for example by retaining control over the firms they own rather than shutting them down. Third, the aggregate economic effects are driven primarily by firm closures among migrant entrepreneurs. Hence, they are most naturally interpreted as effects on workers *outside* the top group, for example due to layoffs following firm closures. We will therefore interpret the effect on aggregate value-added as an effect on aggregate earnings below the top group, Z_L. Finally, given the earnings supply function (2), our key parameter of interest η_L — the average earnings-weighted elasticity of bottom skill with respect to top earnings — is equivalent to the elasticity of Z_L with respect to Z^*.

Given these points, we can provide an estimate of the sufficient statistic for capturing the externalities of top earnings on workers further down the distribution. We obtain

$$\eta_L = \frac{dZ_L/Z_L}{dZ^*/Z^*} = \frac{dZ_L/Z_L}{\gamma \times dN^*/N^*} = \frac{0.10\%}{0.678 \times 1.77\%} = 0.083. \tag{23}$$

This estimate represents the reduced-form *net* externality of top earners. The underlying empirical design makes no assumptions on the specific form of externalities — as in our theoretical model — and may include offsetting effects from positive externalities (trickle-down) and negative externalities (rent-extraction).

An alternative estimate of η_L can be obtained from Risch (2024). This paper estimates spillovers from business owners to employees in pass-through businesses. The analysis exploits the increase in the top marginal tax rate introduced by the American Taxpayer Relief Act of 2012 (ATRA).[28] The results show that, for business owners exposed to the top tax rate increase, the earnings of their employees were negatively affected. The earnings effect on employees in firms with exposed owners was -2.58% and these employees constituted about 21% of all workers. This implies an average spillover effect in the population of $-0.0258 \cdot 0.21 = -0.0054$, which translates into an elasticity of bottom earnings with respect to the top net-of-tax rate equal to 0.05.[29] Risch (2024)

[28]This reform raised the top marginal tax rate on labor income by 6.7pp (Saez 2017).

[29]This elasticity calculation uses a percentage change in the top net-of-tax rate equal to $\frac{-d\tau^*}{1-\tau^*} = \frac{-0.067}{0.586} = 0.11$, where 0.067 is the reform-induced increase in the top marginal tax rate and 0.586 is the pre-reform net-of-tax rate at the top (see Saez 2017). These are tax rates pertaining to labor income, including all federal and state income taxes in the average state.

does not provide estimates of the direct effect of the top tax rate on the exposed business owners themselves, but we can use an elasticity estimate from the literature. At a top earnings elasticity of 0.4 — taken from the study by Kleven *et al.* (2025) — we have $\eta_L = 0.05/0.4 = 0.125$. Interestingly, this estimate is roughly similar to the one obtained from Jakobsen *et al.* (2025), even though the estimates are based on very different settings and empirical approaches.

5.2 Calibration and Policy Implications

In this section, we quantify the optimal top tax rate under different externality patterns. We focus on two of the special cases considered above: the case where externalities occur only *within* top earners, and the case where externalities occur only *between* top and bottom earners.

Calibration: The case where externalities occur within the group of top earners is characterized by equation (13). The optimal top tax rate τ^* depends on three sufficient statistics: the Pareto parameter α, the top earnings elasticity ε, and the externality parameter η^*. The Pareto parameter of the US income distribution is about 1.5 (Diamond and Saez 2011). The top earnings elasticity is set equal to 0.4 based on recent evidence on long-run responses in Kleven *et al.* (2025). Using these parameter values, we will trace out the relationship between the optimal top tax rate and the externality parameter η^*. As shown above, while η^* may be either negative or positive, it must be less than one in absolute value for an equilibrium to exist. Otherwise economies would either explode or implode in response to small tax perturbations.

The case where externalities occur between top and bottom earners is characterized by equations (14) and (16). These equations determine the optimal top tax rate τ^* and the top income share s_z given values of the Pareto parameter α, the earnings elasticity ε, the externality parameter η_L, the welfare weight on bottom earners g_L, the marginal tax rate on bottom earners τ_L, the population share of top earners s_p, and the average earnings capacity of top earners ω_0^*. As in the previous case, we set $\alpha = 1.5$ and $\varepsilon = 0.4$ based on empirical evidence. To set the remaining parameters, we rely on a combination of empirical evidence and calibration.

The earnings capacity of top earners ω_0^* is calibrated to ensure that the model produces the actual top income share at the actual income tax system. Defining top earners as the top 1% of the population, the top income share in the US is currently about 20%, excluding capital gains (Piketty and Saez 2003, updated series).[30] To calculate the top marginal tax rate, we need to account for

[30] The updated series of top income shares is available on Saez's website: https://eml.berkeley.edu/~saez.

the differential tax treatment of employees and business owners. The top tax rate on employees is currently equal to 46.1%, including all federal and state income taxes in the average state.[31] Using data from Kennedy *et al.* (2024), the top tax rate on private business owners can be calculated as 42.0%.[32] Based on the updated series of Piketty and Saez (2003), the share of entrepreneurial income in top labor income equals 0.41. Hence, the average top marginal tax rate across employees and business owners can be calculated as $\tau^* = 0.59 \cdot 46.1\% + 0.41 \cdot 42.0\% = 44.4\%$.

The rest of the parameters are set at follows. The marginal tax rate on bottom earners (τ_L) is set equal to 31.5% based on OECD *Taxing Wages* (OECD 2023).[33] The average welfare weight on bottom earners (g_L) is set equal to one. This is based on the argument in Section 3.4 that, if the demogrant of the tax schedule is optimized, then the average welfare weight in the population equals one. In that case, given bottom earners are defined as the bottom 99%, we have $g_L \approx 1$ at the optimum. Based on these parameters and an assumed value of the externality parameter η_L, average top skill ω_0^* can be backed out from equation (16). Having quantified all parameters of the model, we are able to solve for the optimal tax rate. By varying the size of the externality parameter η_L, recalibrating the model each time, we will trace out the relationship between the optimal tax rate and η_L. We are particularly interested in the top tax rates implied by our quasi-experimental estimates of η_L from Risch (2024) and Jakobsen *et al.* (2025), but it is useful to consider alternative values given the empirical uncertainty about this parameter.

Policy Implications: The results of the calibration analysis are presented in Figure 2. Panel A considers the case where externalities occur only within the top group, while Panel B considers the case where externalities occur only between the top and bottom groups. In each panel, the red curve depicts the optimal top tax rate as a function of the relevant externality parameter, the elasticities η^* and η_L, respectively. The blue line depicts the Mirrleesian solution, an optimal top tax

[31] This is the top marginal tax rate on labor income after the 2018 Tax Cuts and Jobs Act (TCJA) and before the 2025 One Big Beautiful Bill Act (OBBBA). It is calculated as follows. At the federal level, the top marginal tax rate equals 37%, the Medicare tax rate equals 1.45% on both employers and employees, and the Obamacare surtax equals 0.9%. At the state level, we use an average top marginal tax rate of 6%. With these parameters, the total top marginal tax rate can be calculated as $\tau^* = 1 - (1 - 0.37 - 0.0145 - 0.009 - 0.06) / 1.0145 = 0.461$.

[32] This is the top marginal tax rate on the labor income of S-corporation owners after the 2018 Tax Cuts and Jobs Act (TCJA) and before the 2025 One Big Beautiful Bill Act (OBBBA). The top federal tax rate is lower on business owners than on employees (32.8% vs 37%), mainly due to the implications of the Qualified Business Income (QBI) deduction. Accounting for Medicare taxes, the Obamacare surtax, and state taxes, the total top marginal tax rate on business owners can be calculated as $\tau^* = 1 - (1 - 0.328 - 0.0145 - 0.009 - 0.06) / 1.0145 = 0.420$. We do not include the Net Investment Income Tax (NIIT) of 3.8% because this tax applies only to passive investment income (i.e., where the business owner is not actively involved in the business operations), not to earned labor income.

[33] This is the marginal tax rate for a married couple with two children, where the earnings of one spouse equal average economy-wide earnings and the earnings of the other spouse equal two-thirds of average economy-wide earnings.

rate of 0.625 in the calibration considered here. The pink-shaded area represents the discrepancy between the Mirrleesian model and the externality model.[34]

The following points are worth highlighting. First, the optimal tax rate is much more sensitive to externalities that run from top earners to bottom earners than to externalities within the top group. As explained above, there are two reasons for this: an effect of the social marginal welfare weight being larger at the bottom than at the top, and an amplification effect related to the top income share.[35] Second, in Panel B, the solid vertical line marks our empirical estimate of $\eta_L = 0.083$, deduced from the evidence in Jakobsen *et al.* (2025). At this estimate, the optimal top tax rate equals 0.519, in between the Mirrleesian top tax rate (0.625) and the actual top tax rate (0.444).[36] Third, as η_L becomes increasingly negative, the top tax rate increases quickly towards one, restricting how negative η_L can credibly be. The reason is that, as η_L falls and τ^* rises, the top income share becomes smaller (see Appendix Figure A.1) and this magnifies the externality correction as discussed above. Finally, we may take an inverse-optimum perspective by asking: what would the magnitude of externalities have to be to make the current US tax system optimal? In the case where externalities run from the top to the bottom, the implied externality parameter η_L is roughly 0.15. In other words, the current tax system is based on more positive beliefs about the benefits of top earners to society than implied by our estimate of $\eta_L = 0.083$.

Table 1 compares the actual values of the top tax rate and the top income share in the US to their socially optimal values in specific externality scenarios. The table shows that externalities within top earners — including productivity spillovers and agglomeration — cannot justify lowering the top tax rate from its current level. Even at an extreme value of $\eta^* = 0.5$, the optimal top tax rate (0.455) remains higher than the current top tax rate (0.444). Externalities from top to bottom earners are much more critical for policy design. A negative externality of $\eta_L = -0.1$ implies a top tax rate of 0.816 and a top income share of 0.137, while a positive externality of $\eta_L = 0.3$ implies a top tax rate of 0.287 and a top income share of 0.211. At the empirical estimates we have presented, $\eta_L = 0.083$ and $\eta_L = 0.125$, the optimal top tax rate is higher than the current rate.

This calibration analysis is meant to illustrate how the theoretical model developed here can be combined with empirical evidence to obtain research-based conclusions regarding the taxation of

[34] Appendix Figure A.1 shows the top 1% income share at the optimal top tax rates in Figure 2.

[35] The latter effect comes from the term $(1 - s_z) / s_z \gg 1$ in equation (14).

[36] Note that, in general, the simulations imply sizable differences in marginal tax rates above and below the top tax threshold. The model therefore predicts bunching by taxpayers at the threshold, as studied in a large literature on bunching (see e.g., Saez 2010; Kleven 2016). In general, because bunching responses are very local, they have only second-order effects on aggregate welfare. We may therefore ignore bunching when studying the optimal top tax rate, as we have done throughout the analysis.

top earners. It is intended more as a proof of concept than a policy recommendation. The estimates of the main externality parameter η_L are based on just two empirical studies and involve a great deal of uncertainty. More evidence is needed to put our policy recommendations on a stronger footing.

6 Conclusion

This paper revisits a classic, yet unsettled question in public finance: how to tax top earners? It argues that the lack of consensus originates from the fact that the standard Mirrleesian approach leaves out the most central point of contention in the public debate: are top earners good or bad for the economy? Are they good or bad for the poor and middle classes? To characterize the optimal top tax rate in a world with externalities, the paper takes a reduced-form approach that is both simpler and more general than typical approaches. The model allows for a flexible relationship between top earnings and the distribution of earnings capacities in the population, including positive externalities (such as job creation, knowledge spillovers, and innovation) and negative externalities (such as rent-extraction, political influence, and rat race). The model allows for simple and intuitive tax formulas that depend on estimable parameters in the spirit of the sufficient statistics approach (Chetty 2009; Kleven 2021).

To quantify the optimal top tax rate, the paper shows how recent evidence in Risch (2024) and Jakobsen *et al.* (2025) can be used to back out the key externality parameter highlighted by the theory. A calibration to the US economy suggests that the optimal top tax rate, while lower than the Mirrleesian optimum, remains higher than the current top tax rate. In terms of the big picture, the paper calls for a new direction in empirical tax policy research: providing better evidence on the externalities of top earners on workers further down the distribution. The returns to a better understanding of the externalities created by top earners are much greater than the returns to more studies of their earnings responses to taxes. While Jakobsen *et al.* (2025) propose using out-migration to estimate externalities, an alternative strategy would be to use premature death or retirement, building on the approaches in Smith *et al.* (2020) and Jäger and Heining (2022). Developing causal research designs for studying externalities and general-equilibrium spillovers is an important agenda for future research.

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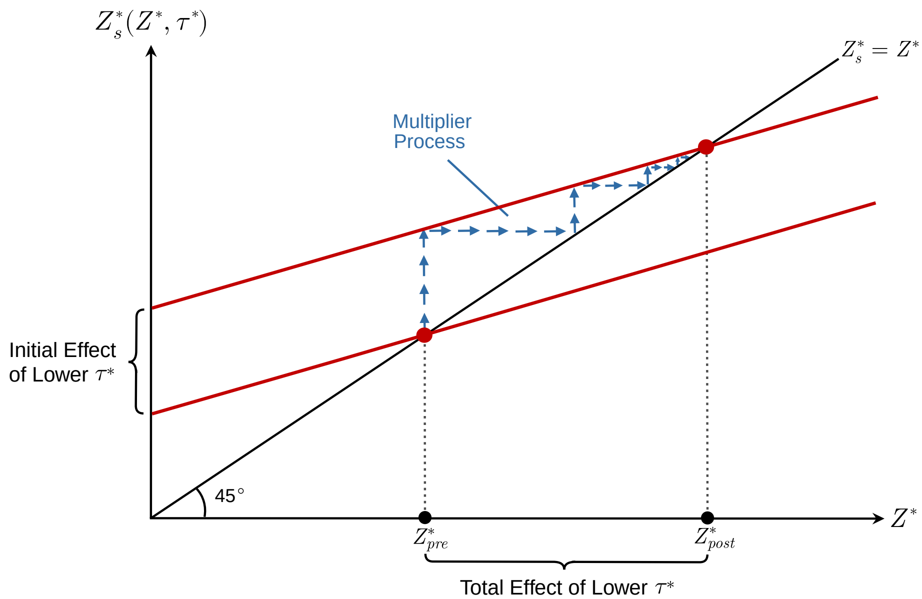
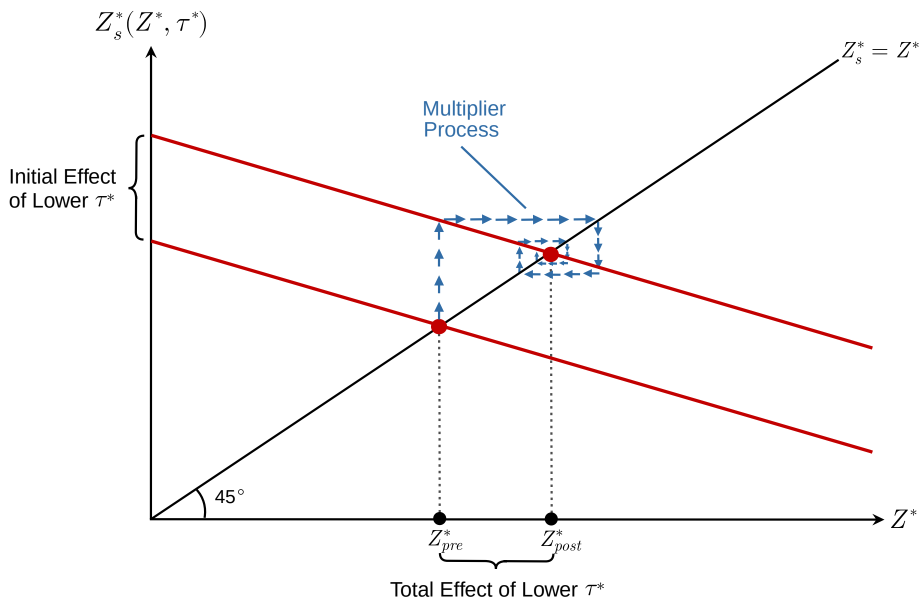
Figure 1: The Effect of the Top Tax Rate on Top Earnings

Multiplier Effects of Externalities

A. Positive Externalities



B. Negative Externalities

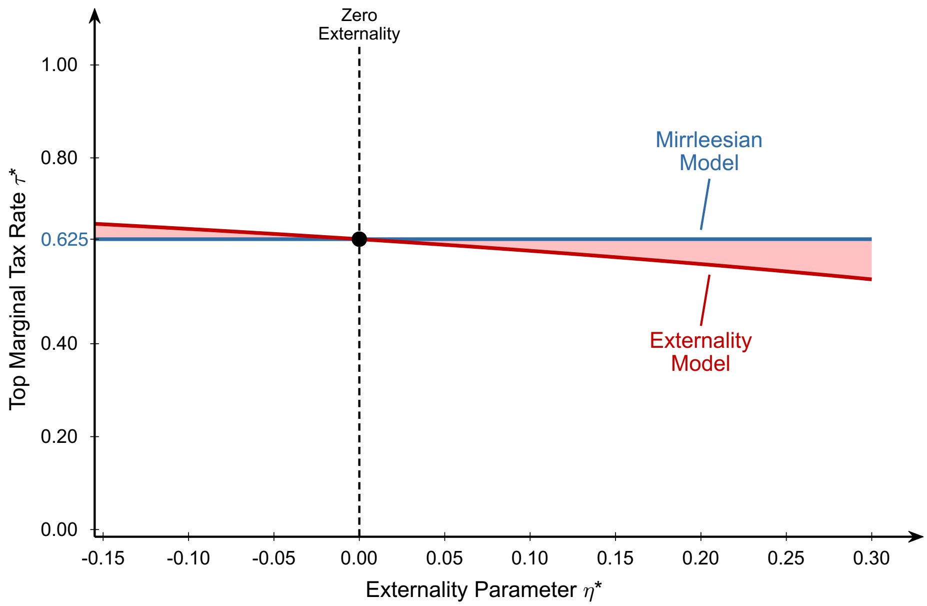


Notes: This figure illustrates the effect of the top tax rate τ^* on top earnings Z^* in a world with positive externalities (Panel A) and negative externalities (Panel B). The red curves depict the relationship between top earnings supply $Z_s^*(Z^*, \tau^*)$ and actual top earnings Z^*, and the 45-degree line depicts points where $Z_s^* = Z^*$. The equilibrium is determined by the intersection between the two. As shown, when top earnings create externalities on the earnings capacities of other top earners, changing the tax rate gives rise to a multiplier process akin to the fiscal multiplier in Keynesian macro models. With positive externalities, the initial effect of a lower tax rate is amplified through this multiplier process, making the total effect larger than the initial effect. With negative externalities, the initial effect is dampened and the total effect is smaller than the initial effect.

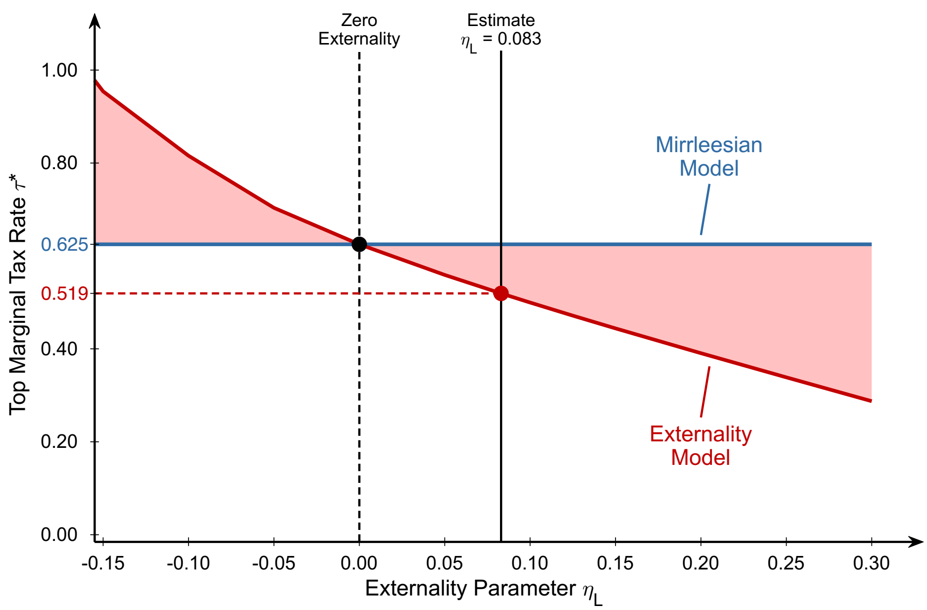
FIGURE 2: CALIBRATION ANALYSIS OF THE OPTIMAL TOP TAX RATE

VARYING THE PATTERN AND STRENGTH OF EXTERNALITIES

A. Externalities Within the Top 1%



B. Externalities From the Top 1% to the Bottom 99%



Notes: This figure presents a calibration analysis of the optimal top tax rate under different assumptions about the pattern and strength of externalities. Panel A considers the case where externalities occur only within the top group, varying the externality parameter η^*. Panel B considers the case where externalities occur only between the top and bottom groups, varying the externality parameter η_L. In each panel, the optimal top tax rate is depicted by the red curve, while the Mirrleesian top tax rate without externalities is depicted by the blue line. As shown, the optimal tax rate is much more sensitive to externalities that run from top earners to bottom earners than to externalities within the top group. In Panel B, the vertical solid line marks the externality estimate implied by Jakobsen *et al.* (2025). At this estimate, the optimal top tax rate equals 0.519, lower than the Mirrleesian top tax rate of 0.625.

TABLE 1: ACTUAL VS OPTIMAL TAX SYSTEM IN THE US

TOP MTRS AND TOP INCOME SHARES FOR DIFFERENT EXTERNALITY PARAMETERS

	Top MTR	Top Income Share
A. Actual Tax System		
Observed values in the US	0.444	0.200
B. Optimal Tax System		
Externalities Within Top		
$\eta^* = -0.5$	0.714	0.173
$\eta^* = -0.1$	0.647	0.175
$\eta^* = 0.1$	0.600	0.178
$\eta^* = 0.5$	0.455	0.198
Externalities From Top to Bottom		
$\eta_L = -0.1$	0.816	0.137
$\eta_L = 0.083$ [1]	0.519	0.192
$\eta_L = 0.125$ [2]	0.471	0.197
$\eta_L = 0.3$	0.287	0.211

[1] Author's calculations based on Jakobsen *et al.* (2025)

[2] Author's calculations based on Risch (2024)

Notes: This table shows the actual values of the top marginal tax rate and the top 1% income share in the US (Panel A) compared to their socially optimal values in specific externality scenarios (Panel B). The actual top marginal tax rate of 0.444 represents the average rate on labor income across employees and pass-through business owners after the 2018 Tax Cuts and Jobs Act (TCJA), but before the 2025 One Big Beautiful Bill Act (OBBBA). The actual top 1% income share of 0.200 excludes capital gains and is taken from the most recent update to the Piketty and Saez (2003) series. The table shows that externalities within top earners (the η^* parameter) cannot justify lowering the top tax rate from its current level. The table also shows that externalities from top to bottom earners (the η_L parameter) have potentially dramatic effects on optimal policy design. The optimal top tax rate may be much higher or much lower than the current rate, depending on the empirical strength of these effects. At the empirical estimates of η_L presented in this paper — based on the evidence in Risch (2024) and Jakobsen *et al.* (2025) — the optimal top tax rate is higher than the current rate.

APPENDIX:

"Externalities and the Taxation of Top Earners"

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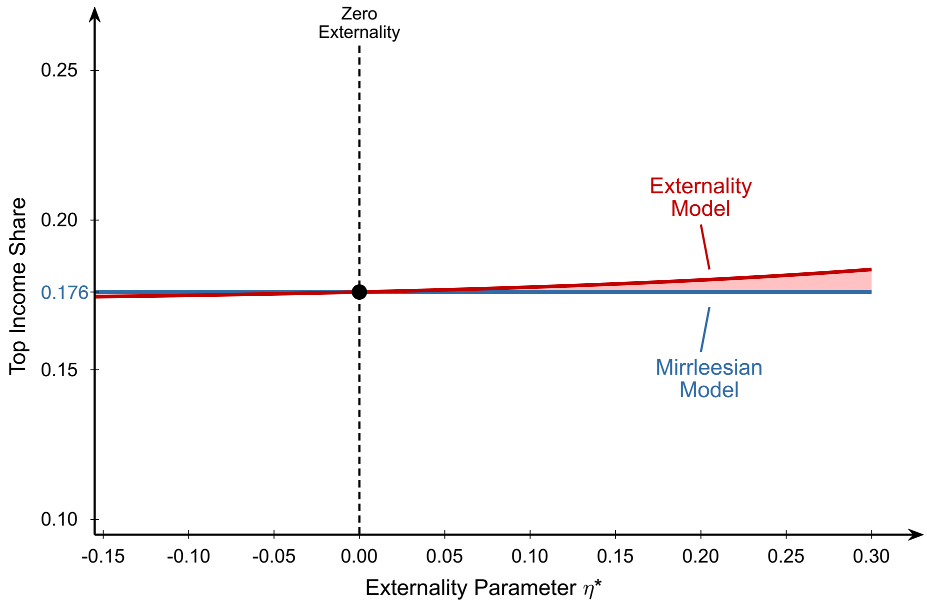
January 2026

A Supplementary Graphs

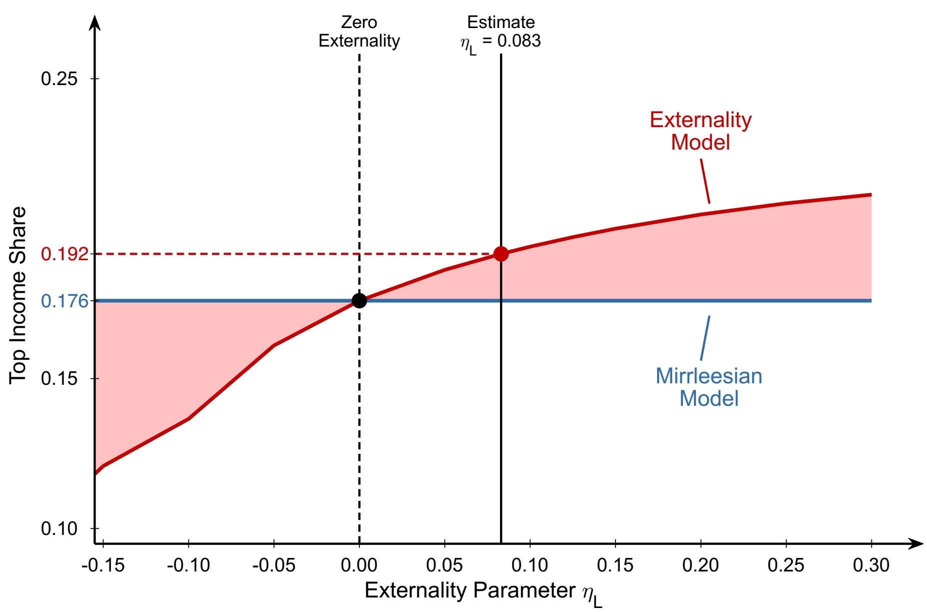
FIGURE A.1: THE TOP 1% INCOME SHARE AT THE OPTIMAL TAX SYSTEM

VARYING THE PATTERN AND STRENGTH OF EXTERNALITIES

A. Externalities Within the Top 1%



B. Externalities From the Top 1% to the Bottom 99%



Notes: This figure depicts the top 1% income share implied by the optimal tax system (as shown in Figure 2) under different assumptions about the pattern and strength of externalities. Panel A considers the case where externalities occur only within the top group, varying the externality parameter η^*. Panel B considers the case where externalities occur only between the top and bottom groups, varying the externality parameter η_L. In each panel, the top income share for the externality model is depicted by the red curve, while the top income share for the Mirrleesian model is depicted by the blue line. As shown, the top income share is much more sensitive to externalities that run from top earners to bottom earners than to externalities within the top group.

B Theoretical Proofs

B.1 Derivation of Top Income Shares

B.1.1 Special Case 2: Externalities Only From Top to Bottom

To derive the top income share $s_z = Z^*/(Z_L + Z^*)$ in this special case, we consider an iso-elastic version of equation (3) where, at the bottom of the distribution, the realized skill of worker type ω_0 is given by $\omega = \omega_0 (Z^*)^{\eta_L}$. At the top of the distribution, we have $\omega = \omega_0$. Using this specification of skill externalities and the earnings supply function (2), the aggregate incomes Z^* and Z_L can be written as

$$Z^* = (1-\tau^*)^{\varepsilon} (1 - F_0(\bar{\omega}_0)) \mathbb{E}[\omega_0 | \omega_0 \geq \bar{\omega}_0] \tag{24}$$

and

$$Z_L = (1-\tau_L)^{\varepsilon} (Z^*)^{\eta_L} F_0(\bar{\omega}_0) \mathbb{E}[\omega_0 | \omega_0 < \bar{\omega}_0]. \tag{25}$$

We normalize average baseline skill at the bottom as $\mathbb{E}[\omega_0|\omega_0 < \bar{\omega}_0] = 1$, and denote average baseline skill at the top by $\mathbb{E}[\omega_0|\omega_0 \geq \bar{\omega}_0] \equiv \omega_0^*$. Based on equations (24)-(25), the top income share can be characterized as follows

$$s_z = \frac{Z^*}{Z_L + Z^*} = \frac{1}{1 + (1-\tau_L)^{\varepsilon} (1-s_p) \left[(1-\tau^*)^{\varepsilon} s_p \omega_0^*\right]^{\eta_L - 1}},$$

where $s_p \equiv 1 - F_0(\bar{\omega}_0)$ denotes the top population share. This is equation (16) in the main text.

B.1.2 Special Case 4: Rawlsian Social Preferences

In Proposition 5, the externalities of top earnings are unrestricted. To put more structure on the problem, consider iso-elastic externalities whereby $\omega = \omega_0 (Z^*)^{\eta_L}$ at the bottom and $\omega = \omega_0 (Z^*)^{\eta^*}$ at the top. Using the earnings supply function (2) and the same normalization and notation as above, the aggregate incomes Z^* and Z_L can be written as

$$Z^* = \left[(1-\tau^*)^{\varepsilon} s_p \omega_0^*\right]^{\frac{1}{1-\eta^*}} \tag{26}$$

and

$$Z_L = (1-\tau_L)^{\varepsilon} \left[(1-\tau^*)^{\varepsilon} s_p \omega_0^*\right]^{\frac{\eta_L}{1-\eta^*}} (1-s_p). \tag{27}$$

From equations (26)-(27), the equilibrium top income share equals

$$s_z = \frac{Z^*}{Z_L + Z^*} = \frac{1}{1 + (1-\tau_L)^{\varepsilon}(1-s_p)\left[(1-\tau^*)^{\varepsilon} s_p \omega_0^*\right]^{\frac{\eta_L - 1}{1-\eta^*}}}. \tag{28}$$

This expression differs from the previous one (equation 16) only through the exponent on the last term in the denominator.

B.2 General Equilibrium Wage Incidence: Proof of Proposition 6

Based on the earnings supply function (2) and the specification of earnings capacity (21), aggregate earnings at the top and the bottom can be written as

$$Z^* = \int_{\bar{\omega}_0}^{\infty} \omega(\omega_0, Z_L, Z^*)(1-\tau^*)^{\varepsilon} dF_0(\omega_0) \tag{29}$$

$$Z_L = \int_{0}^{\bar{\omega}_0} \omega(\omega_0, Z_L, Z^*)(1-\tau_L)^{\varepsilon} dF_0(\omega_0), \tag{30}$$

where τ^* and τ_L are the marginal tax rates on top and bottom earners, respectively. The top tax rate is constant, while the bottom tax rate τ_L is allowed to vary arbitrarily with earnings z.

We consider a small change in the top tax rate, $d\tau^*$. By totally differentiating equations (29)-(30), we obtain

$$dZ^* = \frac{s_z}{1-s_z}\cdot\frac{\sigma^*}{1-\eta^*}\cdot dZ_L - \frac{\varepsilon}{1-\eta^*}\cdot\frac{d\tau^*}{1-\tau^*}\cdot Z^* \tag{31}$$

$$dZ_L = \frac{1-s_z}{s_z}\cdot\frac{\eta_L}{1-\sigma_L}\cdot dZ^*, \tag{32}$$

where we define the following elasticities

$$\begin{aligned}
\eta^* &= \int_{\bar{\omega}_0}^{\infty} \frac{z}{Z^*}\frac{Z^*}{\omega}\frac{\partial\omega}{\partial Z^*} dF_0(\omega_0) \\
\eta_L &= \int_{0}^{\bar{\omega}_0} \frac{z}{Z_L}\frac{Z^*}{\omega}\frac{\partial\omega}{\partial Z^*} dF_0(\omega_0) \\
\sigma^* &= \int_{\bar{\omega}_0}^{\infty} \frac{z}{Z^*}\frac{Z_L}{\omega}\frac{\partial\omega}{\partial Z_L} dF_0(\omega_0) \\
\sigma_L &= \int_{0}^{\bar{\omega}_0} \frac{z}{Z_L}\frac{Z_L}{\omega}\frac{\partial\omega}{\partial Z_L} dF_0(\omega_0).
\end{aligned}$$

The elasticities of earnings capacities with respect to top earnings, η^* and η_L, are similar to those previously defined for the baseline externality model. The elasticities of earnings capacities with respect to bottom earnings, σ^* and σ_L, are new parameters.

By combining equations (31)-(32) and rearranging terms, we may write the general equilibrium effects on aggregate earnings at the top and the bottom as follows:

$$dZ^* = -\zeta^* \cdot \frac{d\tau^*}{1-\tau^*} \cdot Z^* \tag{33}$$

$$dZ_L = -\zeta_L \cdot \frac{d\tau^*}{1-\tau^*} \cdot Z_L, \tag{34}$$

where $\zeta^* = \frac{\varepsilon}{1-\eta^* - \frac{\sigma^*}{1-\sigma_L}\eta_L}$ denotes the macro elasticity of top earnings Z^* with respect to $1-\tau^*$ and $\zeta_L = \frac{\eta_L}{1-\sigma_L}\zeta^*$ denotes the macro elasticity of bottom earnings Z_L with respect to $1-\tau^*$.

With these preliminaries in hand, we now turn to the characterization of the optimal top tax rate. As before, we consider a small tax perturbation, $d\tau^*$, and derive the implied welfare effects: the mechanical effect (dM), the direct behavioral effect (dB_{dir}), and an indirect behavioral effect operating through earnings capacities ω (dB_ω), caused by externalities and/or GE wage incidence effects. The mechanical and direct behavioral effects are still given by equations (9)-(10), but the indirect behavioral effect from externalities and GE is more involved.

To derive dB_ω, we first note that the effect on earnings capacity for a given type can be written as

$$d\omega = -\left[\zeta_L Z_L \frac{\partial \omega}{\partial Z_L} + \zeta^* Z^* \frac{\partial \omega}{\partial Z^*}\right] \frac{d\tau^*}{1-\tau^*}. \tag{35}$$

The change in earnings capacities has two effects on social welfare: a welfare effect of utility changes $\frac{du}{d\omega}$ and a welfare effect of fiscal externalities due to $\frac{dz}{d\omega}$. Using equation (35), the utility effect can be written as

$$\begin{aligned} dB_\omega^{utility} = & -\frac{d\tau^*}{1-\tau^*}\zeta_L Z_L \int_0^\infty g(\omega) \frac{du}{d\omega}\frac{\partial \omega}{\partial Z_L} dF_\omega(\omega) \\ & -\frac{d\tau^*}{1-\tau^*}\zeta^* Z^* \int_0^\infty g(\omega) \frac{du}{d\omega}\frac{\partial \omega}{\partial Z^*} dF_\omega(\omega), \end{aligned} \tag{36}$$

and the fiscal externality effect as

$$\begin{aligned} dB_\omega^{fiscal} = & -\frac{d\tau^*}{1-\tau^*}\zeta_L Z_L \int_0^\infty \tau(z) \frac{dz}{d\omega}\frac{\partial \omega}{\partial Z_L} dF_\omega(\omega) \\ & -\frac{d\tau^*}{1-\tau^*}\zeta^* Z^* \int_0^\infty \tau(z) \frac{dz}{d\omega}\frac{\partial \omega}{\partial Z^*} dF_\omega(\omega). \end{aligned} \tag{37}$$

At the social optimum, we have $dM + dB_{dir} + dB_\omega = 0$ where $dB_\omega = dB_\omega^{utility} + dB_\omega^{fiscal}$. The different terms are characterized in equations (9)-(10) and (36)-(37). Inserting these equations into the optimality condition and setting $g^* = 0$, we may express the optimal top tax rate τ^* as

$$\tau^* = \frac{1}{1+\alpha\varepsilon} - \frac{\alpha\zeta^*}{1+\alpha\varepsilon} \cdot E_{Z^*} - \frac{\alpha\zeta_L}{1+\alpha\varepsilon} \cdot \frac{1-s_z}{s_z} \cdot E_{Z_L},$$

where α is the Pareto parameter, ε is the micro elasticity of top earnings with respect to $1-\tau^*$, ζ^* is the macro elasticity of top earnings with respect to $1-\tau^*$, ζ_L is the macro elasticity of bottom earnings with respect to $1-\tau^*$, $s_z = Z^* / (Z_L + Z^*)$ is the top income share, $E_{Z^*} = \int_0^\infty \left(g(\omega) \frac{du}{d\omega} + \tau(z) \frac{dz}{d\omega} \right) \frac{\partial \omega}{\partial Z^*} dF_\omega(\omega)$ is the marginal externality/GE effect of top earnings, and $E_{Z_L} = \int_0^\infty \left(g(\omega) \frac{du}{d\omega} + \tau(z) \frac{dz}{d\omega} \right) \frac{\partial \omega}{\partial Z_L} dF_\omega(\omega)$ is the marginal externality/GE effect of bottom earnings.

The preceding optimal tax formula corresponds to equation (22) in Proposition 6. It provides a very general characterization. It can be simplified by considering special cases — for example, Rawlsian social preferences — as we did in the baseline externality model.