Tax Evasion and Capital Taxation*

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Abstract

Wealth inequality has prompted calls for higher taxes on capital income and wealth, but also concerns that rich households would respond by concealing their assets offshore. We use a general equilibrium model to study how taxing capital more heavily would affect offshore tax evasion and how this would affect the broader economy. Without evasion, tax revenue could be increased dramatically, inequality could be reduced, and widespread welfare gains could be achieved. After accounting for evasion, however, tax revenue would rise marginally or even fall, inequality would increase, and widespread welfare losses would result.

JEL Classification: E21; E22; E62; H21; H26

Keywords: tax evasion; wealth tax; capital income tax; wealth inequality; Laffer curve; optimal policy

1 Introduction

Rising inequality has evoked calls to tax rich households more heavily. These calls have been echoed by concerns that these households would evade higher taxes by concealing more of their wealth in offshore tax havens. How much tax evasion would occur if capital income taxes rise or taxes on wealth are introduced? How would this evasion affect public finances and inequality? How would it affect investment, output, and wages in equilibrium? In this paper, we build a dynamic general equilibrium model of offshore tax evasion to answer these questions.

Offshore tax evasion is already a pressing concern under the current U.S. tax code. Zucman (2015) estimates that 4% of U.S. households' wealth is hidden in tax havens like Switzerland and the Cayman Islands, reducing aggregate tax revenues by about $35 billion per year. Ultra-wealthy households are responsible for virtually all of this evasion, and they are rarely caught by government auditors even though they often conceal large portions of their wealth and income (Guyton et al., 2020; Alstadsæter et al., 2019; Londoño-Vélez and Ávila Mahecha, 2021). Motivated by these facts, we build a model in which households can conceal their wealth in tax shelters to reduce their reported tax liabilities. Doing so is costly, however, and risks a substantial fine if detected by the government, and so only the richest households choose to evade in equilibrium. Raising taxes on capital income or wealth increases the benefits of evasion, but evading more is riskier and more expensive. Thus, our model allows us to study how offshore tax evasion would respond endogenously to tax reforms in addition to accounting for this behavior as it stands today.

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To connect offshore tax evasion to the broader economy, we embed our model into a quantitative general equilibrium setting. Our quantitative framework features overlapping generations of households that work in the labor market until retirement and operate businesses if they have entrepreneurial opportunities. They save to smooth consumption over their life cycles, insure against idiosyncratic income shocks, and build collateral to finance entrepreneurial capital. Higher-ability entrepreneurs earn greater returns on their wealth as in Cagetti and De Nardi (2006, 2009), generating a realistic level of wealth concentration, but also a meaningful distinction between capital income taxes and wealth taxes (Guvenen et al., 2023). We calibrate the model under the current tax code to match facts about inequality, entrepreneurship, and, most importantly, offshore tax evasion. To measure the implications of evasion for other outcomes, we also calibrate a counterfactual version of the model in which households cannot conceal wealth offshore.

We first use our model to study the long-run effects of raising taxes on capital income and wealth. Both reforms would expand offshore tax evasion dramatically, which would have significant consequences for public finances and inequality. The revenue-maximizing capital income tax rate would raise ten times more revenue in the no-evasion counterfactual than in the baseline model, while the revenue-maximizing wealth tax would raise four times more revenue. Both of these reforms would reduce the share of reported wealth held by the top 0.1% of households, but would actually increase these households' true wealth share after accounting for their concealed wealth. On the other hand, evasion would actually mitigate these reforms' adverse macroeconomic consequences. Higher taxes on capital income or wealth would reduce households' incentives to save in both versions of our model, and in equilibrium this would reduce investment, output, and wages. This effect would be smaller in the baseline model, however, because rich households can use tax shelters to save without paying higher taxes. Nevertheless, these reforms would almost always lead to larger welfare losses in the baseline model than in the no-evasion counterfactual, and these losses would be more concentrated among households at the bottom of the wealth distribution.

Next, we analyze progressive wealth taxes that specifically target ultra-wealthy households, using the proposals of Senators Elizabeth Warren and Bernie Sanders as case studies. The Warren proposal would tax wealth between $50 million–$1 billion at a rate of 2% and wealth above $1 billion at a rate of 3%. The Sanders proposal would feature 8 brackets, ranging from a 1% tax on wealth between $32–$50 million to an 8% tax on wealth above $10 billion. These proposals would apply to fewer than 0.1% of households but would have significant aggregate consequences, both because these households hold a large share of total wealth but also because they are responsible for virtually all offshore tax evasion. Output and wages would fall by almost 1%, lost tax revenues would double, overall tax revenues would remain essentially unchanged, and there would be widespread welfare losses. Inequality would fall slightly even after taking the increase in evasion into account, but inequality in reported wealth would fall substantially more. In other words, most of the apparent reduction in inequality would be illusory. Like our first set of experiments, these proposals would have sharply different effects in the absence of evasion. In our no-evasion counterfactual, they would raise at least 5 times more revenue than in our baseline model, achieve larger reductions in wealth inequality, and, most importantly, increase welfare for all households except those at the very top of the wealth distribution. In addition to these case studies, we conduct a global search for the optimal wealth tax structure. In our baseline model, we find that no welfare-improving wealth tax, flat or progressive, exists at all. In the no-evasion counterfactual, on the other hand, the optimal policy—a tax of 3.25% on wealth above $4.8 million—is substantially more aggressive than either Senator's proposed policy.

Last, we analyze transition dynamics. Offshore tax evasion would have even more significant implications after accounting for transitions. In all of our experiments, the differences in welfare outcomes between the baseline model and no-evasion counterfactual would be larger in the short run than in the long run. In the no-evasion counterfactual, raising capital income taxes or taxing wealth would increase welfare dramatically in the short run and these gains would still remain more than a decade later. In the baseline model, on the other hand, welfare would increase slightly or even fall in the short run, and would begin to fall sharply after only a few periods. The primary reason that accounting for transitions would magnify the welfare consequences of offshore tax evasion is that while the macroeconomic effects of these reforms would occur gradually, evasion would jump immediately and continue to increase rapidly. As a result, revenues in the baseline model would be lower in the short run and fall more swiftly than in the no-evasion counterfactual. In addition to analyzing the transition dynamics that would follow permanent tax reforms, we also analyze the effects of a one-time progressive wealth tax in the spirit of the policy introduced in Argentina in 2021 to finance stimulus spending during the COVID-19 pandemic. Here, we find that the effects of offshore tax evasion would actually be negligible. This policy would raise almost exactly the same revenues in the baseline model as in the no-evasion counterfactual, and there would be little difference in overall transition dynamics between the two versions of the model. This analysis, which indicates that the incentive to evade temporary taxes would be smaller than the incentive to evade permanent ones, provides an important contrast to our other findings.

2 Related literature

We draw on several strands of the empirical literature on tax evasion in our analysis. Our calibrated model matches micro- and macroeconomic facts about the extent of offshore tax evasion under the current U.S. tax code documented by Zucman (2015), Saez and Zucman (2019), Guyton et al. (2020), and Alstadsæter et al. (2019). Our predictions about the effects of changes to this tax code are consistent with several estimates from the literature of the responses of reported taxable income and wealth to tax reforms. Our model's elasticity of reported capital income is similar to the estimates of Dowd et al. (2012) and Agersnap and Zidar (2021) for capital gains, as well as the estimates of Heim (2010), Choi (2014), and Sillamaa and Veall (2001) for self-employment income. Our model's elasticity of reported wealth is in the middle of the range of values reported by Seim (2017), Jakobsen et al. (2018), Londoño-Vélez and Ávila Mahecha (2020), Zoutman (2018), Durán-Cabré et al. (2019), Brulhart et al. (2016), and others. Our approach to computing these elasticities using a dynamic general equilibrium model highlights several new insights. First, these elasticities are lower in the no-evasion counterfactual than in the baseline model, which suggests that tax evasion is a primary driver of the responses identified in the empirical literature. Second, wealth tax elasticities are higher in the long run than in the short run, which indicates that conventional short-run estimates overstate the revenues that these taxes could raise. Third, reported wealth responds more to highly progressive wealth taxes that target the ultra-rich than flat taxes. This indicates that the experiences of other countries that have implemented relatively flat wealth taxes may be poor predictors of the effects of taxes that exempt tens of millions of dollars, like those proposed by Elizabeth Warren and Bernie Sanders.

Our results offer several substantive contributions to the macro public finance literature. Numerous studies have used calibrated general equilibrium models to analyze capital taxation (see, e.g., Cagetti and De Nardi, 2009; Conesa et al., 2009; Trabandt and Uhlig, 2011, 2012; Guvenen et al., 2023; Dyrda and Pedroni, 2022; Boar and Midrigan, 2020; Rotberg, 2022), but all of them have abstracted from tax evasion. Positive analyses of the public-finance implications of capital income tax reform like Trabandt and Uhlig (2011, 2012) typically find that doubling or even tripling capital income tax rates would raise tax revenues substantially. Our analysis confirms that this would be true in the absence of offshore tax evasion, but we find that raising capital income taxes would have virtually no effect on revenues at all after accounting for evasion. Normative studies of optimal wealth taxes like Guvenen et al. (2023) find that using wealth taxes to reduce distortionary labor income taxes would significantly increase welfare, but we find that this would actually reduce welfare after accounting for evasion. Our findings highlight a range of other consequences of offshore tax evasion that should interest policymakers as well as academic researchers.

Finally, our model itself represents a methodological contribution. Previous theories of tax evasion have restricted attention to static, partial equilibrium, and representative-agent settings (Saez et al., 2012; Piketty, 2013; Piketty et al., 2014), or limited-enforcement environments in which evasion does not occur in equilibrium (Shourideh, 2013; Boar and Knowles, 2020). Our model is the first dynamic general equilibrium framework in which households can evade taxes by concealing their wealth in tax shelters. The closest model to ours is that of Di Nola et al. (2021), who study an environment in which business owners can conceal a portion of their income at the risk of detection by the government. Their model is static in the sense that agents cannot accumulate concealed wealth, precluding an analysis of wealth taxes. Moreover, the poorest, lowest-income business owners evade the most in their model, while evasion increases with wealth and income in the data. Our model provides a micro-founded account of offshore tax evasion by rich households, predicts how this behavior will respond to tax reforms, and connects these responses to investment, wages, and other macroeconomic outcomes. It could be used to address many issues outside the scope of this paper, from cross-country studies of the consequences of tax evasion to the optimal design of estate taxes.

3 Model

The model economy features overlapping generations of households, competitive firms, and a government. Households in each cohort differ in labor productivity, entrepreneurial productivity, and wealth. They save in order to smooth consumption over their life cycles, insure against idiosyncratic shocks, and finance entrepreneurial capital. Firms produce final goods using capital, labor, and intermediate inputs purchased from entrepreneurs. The government purchases public goods, provides social security benefits to retired households, and makes lump-sum transfers to all households. It finances these expenditures using taxes on income, consumption, and wealth. These features are similar to those found in many other models in the quantitative public finance literature, most notably Guvenen et al. (2023) and Boar and Midrigan (2020).

Our modeling innovation is a theory of offshore tax evasion. Households in our model can evade taxes on capital income and wealth by concealing their wealth in tax shelters. Maintaining a tax shelter requires a fixed administrative cost, which makes offshore tax evasion uneconomical for all but the richest households. Transferring wealth into a shelter requires a proportional transaction cost and, if detected by tax authorities, triggers a financial penalty. In section 4, we discipline these features of our model using estimates from the literature on the aggregate amount of wealth concealed offshore, the micro-level extensive and intensive margins of this behavior, the average probability of detection, and the penalties the government assesses when detection occurs. To quantify the consequences of tax evasion, we also consider a version of our model in which wealth cannot be concealed, which we refer to as the no-evasion counterfactual.

3.1 Demographics and preferences

Households are born at age $j = 0$ and live for a maximum of J years, but may die earlier due to mortality risk. The probability that a household of age $j < J$ survives to reach age $j + 1$ is ϕ_j. We assume without loss of generality that there is a measure one of newborn households each period, so that the measure of age-j households is $\Pi_{k=0}^{j-1}\phi_k$. When a household dies, it is replaced by a newborn household, which we refer to as the former's child or offspring. Households retire from the labor force at age $j = R$, after which they receive social security payments from the government, which we describe in more detail below.

Households' preferences are described by the flow utility function,

$$u(c, \ell) = \frac{\left[c^{\mu}(1-\ell)^{1-\mu}\right]^{1-\sigma}}{1-\sigma}, \tag{1}$$

where c denotes consumption and ℓ denotes the fraction of time spent working in the labor market. The parameter μ represents the share of consumption in utility, and σ governs risk aversion as well as the elasticity of intertemporal substitution. Households do not value their children's utility.

3.2 Heterogeneity

Households are heterogeneous in labor productivity, entrepreneurial productivity, and wealth. Each of these primary characteristics has two components.

A household's labor productivity consists of a deterministic life-cycle profile, ζ_j, and an idiosyncratic shock, $e \in \mathcal{E} = \mathbb{R}_{++}$. A household of age j that works ℓ hours supplies $\zeta_j e \ell$ units of labor. During a household's working life, its labor productivity shock follows an AR(1) process $F(e', e)$ with persistence ρ_e and variance σ_e^2. After retirement, its labor productivity shock remains constant until death. Upon death, its labor productivity shock is transmitted stochastically to its child according to a different AR(1) process $\tilde{F}(e', e)$ with persistence $\tilde{\rho}_e$ and variance $\tilde{\sigma}_e^2$.

A household's entrepreneurial productivity is determined by its entrepreneurial ability, $z \in \mathcal{Z} = \mathbb{R}_{++}$, and whether it has an entrepreneurial opportunity, $\iota \in \mathcal{I} = \{0, 1\}$. We refer to households with entrepreneurial opportunities ($\iota = 1$) as entrepreneurs, and those without opportunities ($\iota = 0$) as workers. Entrepreneurial ability is fixed throughout a household's life. Entrepreneurial opportunity evolves stochastically over time according to a Markov process with transition matrix,

$$\Pi = \begin{bmatrix} 1 - p_1 & p_1 \\ p_2 & 1 - p_2 \end{bmatrix}, \tag{2}$$

where p_1 is the probability of losing an opportunity and p_2 is the probability of regaining one. At birth, households inherit their entrepreneurial abilities stochastically from their parents according to an AR(1) process $\tilde{G}(z', z)$ with persistence $\tilde{\rho}_z$ and variance $\tilde{\sigma}_z^2$ and receive entrepreneurial opportunities with probability p_0.[1]

In addition to the exogenous characteristics described above, households are also heterogeneous in wealth, which is endogenous. There are two forms of wealth in our model: reported wealth, $a_r \in \mathcal{A}_r = \mathbb{R}_+$, and hidden wealth, $a_h \in \mathcal{A}_h = \mathbb{R}_+$. We discuss the costs of concealing wealth, the likelihood and consequences of detection, and the optimal choices of saving and concealment in sections 3.5 and 3.6 below. Newborn households inherit their parents' wealth, but these bequests are entirely accidental because parents do not value their children's utility; bequests only occur when households die before reaching the maximum age.[2]

The household's state space is $\mathcal{S} = \mathcal{E} \times \mathcal{Z} \times \mathcal{I} \times \mathcal{A}_r \times \mathcal{A}_h$. We use $\Psi_{j,t}(s)$ to denote the measure of age-j households with state $s \in \mathcal{S}$ in period t. Households of the same age in the same state make the same decisions, and thus we index households by their ages and state variables throughout the remainder of the paper.

[1] Guvenen et al. (2023) assume that all newborn households have entrepreneurial opportunities, which implies that the entrepreneurship rate declines with age. Boar and Midrigan (2020) assume that entrepreneurial opportunities are assigned randomly at birth and are then fixed over the life cycle. Our approach allows us to capture the fact that entrepreneurship displays a hump shape over the life cycle: the entrepreneurship rate first increases with age and then decreases.

[2] Nevertheless, our model matches Nishiyama (2000)'s estimate that aggregate bequests are about 1% of aggregate wealth. We leave intentional bequests and the implications of offshore tax evasion for estate taxation for future research.

3.3 Final goods production

A representative firm produces the final good, Y_t, using labor, L_t, corporate capital K_t, and entrepreneurial capital, Q_t, according to the Cobb-Douglas technology,

$$Y_t = K_t^{\gamma} Q_t^{\alpha} L_t^{1-\alpha-\gamma}. \tag{3}$$

Labor and corporate capital are rented directly from households. As in Guvenen et al. (2023), Q_t is a constant-elasticity-of-substitution bundle of differentiated goods purchased from entrepreneurial households:

$$Q_t = \left(\sum_{j=0}^{J} \int_S q_{j,t}(s)^{\nu} \, \mathrm{d}\Psi_{j,t}(s) \right)^{\frac{1}{\nu}}. \tag{4}$$

The parameter ν governs the elasticity of substitution between these goods. We include corporate capital as well as entrepreneurial capital as in Zetlin-Jones and Shourideh (2017) and Boar and Midrigan (2020) to account for the fact that public firms may not face the same financial frictions as privately-run businesses, which implies that tax reforms may have different effects on the allocation of capital among the former as compared to the latter.

Final-goods producers are competitive, choosing factor inputs to maximize profits taking the wage, W_t, the interest rate, r_t, and the price of each intermediate variety, $p_{j,t}$, as given:

$$\max_{L_t, K_t, q_{j,t}(s)} \left\{ Y_t - W_t L_t - (r_t + \delta) K_t - \sum_{j=0}^{J} \int_S p_{j,t}(s) q_{j,t}(s) \, \mathrm{d}\Psi_{j,t} \right\}, \tag{5}$$

where δ is the depreciation rate. The first-order conditions that characterize a final-goods producer's demand for labor, corporate capital, and varieties of entrepreneurial capital are

$$W_t = (1 - \alpha - \gamma) K_t^{\gamma} Q_t^{\alpha} L_t^{-\alpha-\gamma}, \tag{6}$$

$$r_t + \delta = \gamma K_t^{\gamma-1} Q_t^{\alpha} L_t^{1-\alpha-\gamma}, \tag{7}$$

$$p_{j,t}(q) = \alpha K_t^{\gamma} Q_t^{\alpha-\nu} L_t^{1-\alpha-\gamma} q^{\nu-1}. \tag{8}$$

3.4 Entrepreneurship

We follow Guvenen et al. (2023)'s model of entrepreneurship, in which households with entrepreneurial opportunities use capital to produce differentiated goods and sell them to final-goods producers at a profit. A household with an entrepreneurial opportunity ($\iota = 1$), entrepreneurial ability z, and k units of capital produces $q = zk$ goods and sells them at the price $p_{j,t}(q)$ characterized above. Households without entrepreneurial opportunities ($\iota = 0$) produce nothing regardless of their abilities.

Entrepreneurs can self-finance their capital expenditures using reported wealth or obtain external financing at the interest rate, r_t. External financing is limited to a multiple $\lambda(z)$ of a household's wealth:

$$k - a_r \leq \lambda(z)\left(a_h + a_r\right). \tag{9}$$

Hidden and reported wealth can both be used as collateral.[3] We assume that $\lambda'(z) > 0$: higher-ability entrepreneurs can borrow more than low-ability entrepreneurs with the same amount of wealth. Li (2022) shows that this constraint arises from a limited-enforcement problem in which an entrepreneur can pledge a portion of her profits as well as a portion of her wealth. This approach is consistent with the findings of Lian and Ma (2020) that a large fraction of corporate borrowing is secured by cash flows rather than assets. Entrepreneurs who self-finance earn interest on any excess reported wealth.

Conditional on its current state s, a household chooses how much capital to rent to maximize the sum of its entrepreneurial and interest income. A household's onshore capital income is given by

$$\pi_{j,t}(s) = \max_k \left\{ \underbrace{\iota\left[p_{j,t}(zk) \times zk - \delta k - r_t \max\left\{k - a_r, 0\right\}\right]}_{\text{Entrepreneurial income}} + \underbrace{r_t \max\left\{a_r - k, 0\right\}}_{\text{Interest income}} \right\} \tag{10}$$

subject to (9). We use $k_{j,t}(s)$ to denote the optimal choice of capital and $q_{j,t}(s)$ to denote the associated output of intermediate goods. In addition to onshore capital income, households also earn interest on the wealth they have concealed offshore. A household's total capital income is thus equal to $\pi_{j,t}(s) + r_t a_h$, but only the first term is potentially reported to the government and assessed for taxation.

Before moving on, two comments are in order on the role of entrepreneurship in our quantitative environment. First, as in Cagetti and De Nardi (2006, 2009), entrepreneurship is the primary source of wealth inequality in our model: higher-ability entrepreneurs earn greater returns on their wealth than lower-ability entrepreneurs, and thus accumulate more wealth over their lives. In our calibration, we choose the dispersion in entrepreneurial ability to match the share of reported wealth held by the wealthiest 0.1% of households. Second, as shown by Guvenen et al. (2023), this rate-of-return heterogeneity creates a distinction between capital income taxes and wealth taxes. Capital income taxes are borne disproportionately by high-ability entrepreneurs while wealth taxes are borne by low-ability entrepreneurs, so the former create more capital misallocation than the latter. The overlapping-generations structure of our model plays an important role in modulating this effect. As Guvenen et al. (2023) point out, this kind of model does a good job not only of capturing the cross-sectional wealth distribution, but also the fraction of large fortunes that are "self-made" vs. inherited. This, too, affects the amount of capital misallocation in the model; households with low entrepreneurial abilities that inherit large fortunes are "too rich" in the sense that aggregate output would be higher if some of their wealth was transferred to higher-ability entrepreneurs.

[3] We study a version of the model in which hidden wealth cannot be collateralized in the online appendix. All of our main results are robust to this assumption.

3.5 Taxes and tax evasion

The government raises revenue from proportional taxes τ_k, τ_c, and τ_a on capital income, consumption, and wealth, respectively. Labor income is taxed progressively: the labor income tax rate, $\tau_\ell(e)$, depends on a household's labor productivity, with $\tau_\ell(e') > \tau_\ell(e)$ for $e' > e$. The government spends its revenue on public consumption, G, lump-sum transfers, T_t, and social security benefits, $B_t(e)$. Public consumption does not provide any benefit to households; its only purpose is to facilitate calibration under the current tax code as in Guvenen et al. (2023). Social security benefits depend on retirees' individual labor productivity shocks and the average labor income: $B_t(e) = \kappa(e)\bar{y}_{\ell,t}$, where the parameter $\kappa(e)$ captures the extent to which a household's lifetime labor income influences its retirement benefits.

Households can evade taxes on wealth and capital income by concealing their wealth in tax shelters. Wealth tax evasion is determined by a household's stock of hidden wealth at the beginning of the period: a household pays $\tau_a a_r$ in taxes on its reported wealth and evades the taxes $\tau_a a_h$ on its hidden wealth. Capital income tax evasion is determined by the flow of wealth into a tax shelter. A household with onshore capital income π and hidden wealth a'_h at the end of the period pays capital income taxes of $\tau_k \max[\pi - \max(a'_h - a_h, 0), 0]$ and evades the amount $\tau_k \min[\pi, \max(a'_h - a_h, 0)]$.

Maintaining a tax shelter requires a fixed cost, θ, and transferring wealth into or out of a tax shelter requires a proportional transaction cost, η. Additionally, transferring funds may be detected by the government at the end of the period, triggering a financial penalty as in Allingham and Sandmo (1972). The detection probability is given by

$$d(\iota, a_h, a'_h) = \tanh\left(\omega_\iota \max(a'_h - a_h, 0)\right), \tag{11}$$

which is equal to zero when $a'_h \leq a_h$ and converges to one as $a'_h - a_h$ approaches infinity. We allow the detection probability to depend on entrepreneurial opportunity, ι, to capture the possibility that evasion may be harder for entrepreneurs whose wealth is tied up in their businesses than households that passively invest their wealth in the market; in our calibration, we find that this is indeed the case. If detected, all of a household's hidden wealth is revealed and it pays two fines: (i) a fraction χ_a of its offshore account; and (ii) a multiple χ_τ of its unpaid taxes. Thus, when a household is detected by the government, its hidden wealth at the beginning of the next period is zero and its reported wealth is

$$\hat{a}_d(a_h, \pi, a'_r, a'_h) = a'_r + (1 - \chi_a)a'_h - \chi_\tau \tau_a a'_h - \chi_\tau \tau_k \min[\pi, \max(a'_h - a_h, 0)]. \tag{12}$$

3.6 Dynamic program

Each period, households choose how much to consume, how much to work, how much to save, and how much to conceal. The value function of a working-age household is

$$V_{j,t}(s) = \max_{c,\ell,a'_r,a'_h} \Big\{ u(c,\ell) + \beta\phi_j \sum_{\iota'} \Pi(\iota',\iota) \int_{\mathcal{E}} \Big[(1 - d(\iota, a_h, a'_h)) V_{j+1,t+1}(e', z, \iota', a'_r, a'_h) + \\ d(\iota, a_h, a'_h) V_{j+1,t+1}(e', z, \iota', \hat{a}_d(a_h, \pi_{j,t}(s), a'_r, a'_h), 0) \Big] \, \mathrm{d}F(e', e) \Big\} \tag{13}$$

subject to $c \geq 0$, $\ell \in [0,1]$, $a'_r \geq 0$, $a'_h \geq 0$, and the budget constraint

$$(1+\tau_c)c + a'_r + a'_h + \tau_k \max\left[\pi_{j,t}(s) - \max\left(a'_h - a_h, 0\right), 0\right] + \tau_a a_r + \\ \mathbb{1}_{\{a'_h > 0\}}\theta + \eta|a'_h - a_h| = (1 - \tau_\ell(e)) W_t \zeta_j e \ell + \pi_{j,t}(s) + r_t a_h + a_h + a_r + T_t \tag{14}$$

The left-hand side of the budget constraint includes the household's consumption, saving (both reported and concealed), capital income tax payment, wealth tax payment, and evasion costs. The right-hand side includes net labor income, gross capital income, initial wealth, and the lump-sum transfer from the government. The value function of a retiree is similar, except that its labor supply is set to zero, its labor productivity shock, e, remains the same in the next period, and its budget constraint includes social security income, $B_t(e)$, rather than net labor income. We denote the policy functions for consumption, labor supply, reported wealth, and hidden wealth by $c_{j,t}(s)$, $\ell_{j,t}(s)$, $a'_{r,j,t}(s)$, and $a'_{h,j,t}(s)$, respectively. We also use the following shorthand for the detection probability and post-penalty wealth associated with these policies: $d_{j,t}(s) := d(\iota, a_h, a'_{h,j,t}(s))$ and $\hat{a}_{d,j,t}(s) := \hat{a}_d(a_h, \pi_{j,t}(s), a'_{r,j,t}(s), a'_{h,j,t}(s))$.

3.7 Aggregation

There are two factor market clearing conditions:

$$\sum_{j=0}^{R-1} \int_{\mathcal{S}} \ell_{j,t}(s)\, \Psi_{j,t}(s) = L_t, \tag{15}$$

$$\sum_{j=0}^{J} \int_{\mathcal{S}} (a_h + a_r)\, \mathrm{d}\Psi_{j,t}(s) = K_t + \sum_{j=0}^{J} \int_{\mathcal{S}} k_{j,t}(s)\, \mathrm{d}\Psi_{j,t}(s). \tag{16}$$

The labor market clearing condition (15) states that the final-good producer's labor demand must equal working-age households' total supply of effective labor hours. The capital market clearing condition (16) states that the supply of wealth must equal firms' demand for corporate capital plus households' demand for entrepreneurial capital. Note that all wealth, both hidden and reported, is included in the supply of capital. This is internally consistent with our assumption that hidden wealth earns the equilibrium interest rate r_t, but it is also externally consistent with the findings of several empirical studies that trace the route that offshore wealth takes through the global financial system. Zucman (2015) documents that U.S. households' offshore wealth is often ultimately reinvested in U.S. assets. Coppola et al. (2021) and Beck et al. (2023) find that bonds and other securities issued by multinational firms' foreign subsidiaries as part of these firms' tax avoidance schemes are often purchased by investors in these firms' home countries. Alternatively, one could model the U.S. as a small open economy that faces a fixed world interest rate in which supply and demand for capital are decoupled. We show in the online appendix that this setup yields similar results.

The government's budget constraint states that total expenditures must equal total tax revenues plus penalties levied on detected tax evaders:

$$
\begin{aligned}
&G + \sum_{j=0}^{J} \int_{\mathcal{S}} \left[T_t + \mathbb{1}_{\{j \geq R\}} B_t(e)\right] \, \mathrm{d}\Psi_{j,t}(s) = \qquad (17)\\
&\sum_{j=0}^{J} \int_{\mathcal{S}} \Bigg(\tau_\ell(e) W_t \zeta_j e \ell_{j,t}(s) + \tau_c c_{j,t}(s) + \tau_a a_r + \tau_k \max\left[\pi_{j,t}(s) - \max(a'_{h,j,t}(s) - a_h, 0), 0\right] + \\
&\qquad d_{j,t}(s) \Big\{ \chi_a a_h + \chi_\tau \tau_a a_h + \chi_\tau \tau_k \min[\pi_{j,t}(s), \max(a'_h - a_h, 0)] \Big\} \Bigg) \mathrm{d}\Psi_{j,t}(s),
\end{aligned}
$$

In our calibration, we set the lump-sum transfer to zero and set the level of public consumption so that the government's budget constraint is satisfied under the current U.S. tax code. Increasing the capital income tax rate or introducing a wealth tax may generate additional revenues that can be distributed lump-sum. Some of these revenues would be reduced, however, if households respond by concealing more of their wealth, although detection penalties would partly offset this effect. Moreover, if output and wages decline in equilibrium—and they would in many of our experiments—labor income and consumption tax revenues would fall, further offsetting the potential increase in revenue from higher capital taxes. As we will see, whether transfers outweigh the losses from lower wages plays a crucial role in determining the welfare consequences of tax reforms.

The distributions of households evolve according to the laws of motion,

$$
\Psi_{j+1,t+1}(S) = \phi_j \int_{\mathcal{S}} \left[\Pi_\iota(\iota'|\iota) F(E,e) \mathbb{1}_{\{z \in Z\}} M_{j,t}(s, A_r, A_h) \mathrm{d}\right] \Psi_{j,t}(s), \; j = 1, \ldots, J-1 \qquad (18)
$$

$$
\Psi_{0,t+1}(S) = \left[\mathbb{1}_{\{\iota'=1\}} p_0 + \mathbb{1}_{\{\iota'=0\}}(1-p_0)\right] \sum_{j=0}^{J} (1-\phi_j) \int_{\mathcal{S}} \left[\tilde{F}(E,e) \tilde{G}(Z,z) M_{j,t}(s, A_r, A_h)\right] \mathrm{d}\Psi_{j,t}(s), \qquad (19)
$$

where $S = E \times Z \times \{\iota'\} \times A_r \times A_h$ denotes a typical subset of the state space $\mathcal{S}$; E, Z, A_r, and A_h denote typical subsets of $\mathcal{E}$, $\mathcal{Z}$, $\mathcal{A}_r$, and $\mathcal{A}_h$, respectively; and

$$
M_{j,t}(s, A_r, A_h) = \left[(1 - d_{j,t}(s)) \mathbb{1}_{\left\{a'_{r,j,t}(s) \in A_r \wedge a'_{h,j,t}(s) \in A_h\right\}} + d_{j,t}(s) \mathbb{1}_{\left\{\hat{a}_{d,j,t}(s) \in A_r \wedge 0 \in A_h\right\}}\right]. \qquad (20)
$$

3.8 Equilibrium

An equilibrium is a sequence of aggregate prices and quantities, $\{W_t, r_t, K_t, L_t, Q_t, Y_t\}_{t=0}^{\infty}$, a sequence of value and policy functions, $\left\{\left(V_{j,t}(\cdot), k_{j,t}(\cdot), q_{j,t}(\cdot), c_{j,t}(\cdot), \ell_{j,t}(\cdot), a'_{r,j,t}(\cdot), a'_{h,j,t}(\cdot)\right)_{j=0}^{J}\right\}_{t=0}^{\infty}$, and a sequence of distributions, $\left\{\left(\Psi_{j,t}(\cdot)\right)_{j=0}^{J}\right\}_{t=0}^{\infty}$, that satisfy

1. the household's static and dynamic problems (10)–(13);
2. the representative firm's first-order conditions (6)–(8);
3. the market clearing conditions (15)–(16);
4. the government's budget constraint (17);
5. and the laws of motion for the distributions of households (18)–(19).

In the long run, an equilibrium always converges to a stationary equilibrium in which the objects listed above are constant over time. Each set of parameter values is associated with a unique stationary equilibrium.

4 Calibration

We calibrate our model so that, given the current tax code, its stationary equilibrium replicates salient features of the U.S. economy. We first assign standard values to common parameters like the capital share and apply estimates from other studies for parameters that have clear empirical counterparts. We then jointly calibrate the remaining parameters so that the model matches a set of facts about wealth inequality, offshore tax evasion, and entrepreneurship.

4.1 Externally assigned parameters

There are several sets of parameters that are assigned externally. Their values are listed in panels (a)–(e) of table 1.

Demographics and preferences. Households are born at age 25, retire at age 66, and can reach a maximum age of 85, which implies $R = 41$ and $J = 60$. We set the survival probabilities, ϕ_j, using the 2010 United States Life Tables (Arias, 2014). We set the relative risk aversion coefficient, σ, to 4 as in Conesa et al. (2009).

Labor productivity. Our labor productivity process is based on Guvenen et al. (2023)'s calibration. The deterministic life-cycle profile is set to $\log \zeta_j = -j^2/1800 - j/30$. The intra-generational AR(1) parameters are set to $\rho_e = 0.937$ and $\sigma_e = 0.201$, and the inter-generational parameters are set to $\tilde{\rho}_e = 0.568$ and $\tilde{\sigma}_e = 0.184$.

Entrepreneurial productivity. We set the inter-generational persistence of entrepreneurial ability, $\tilde{\rho}_z$, to Fagereng et al. (2018)'s estimate of 10%. The probability of being born with an entrepreneurial opportunity, p_0, is set to 8.74%, which is the fraction of 25-year-olds with business income in the 2016 Survey of Consumer Finances (SCF). The probability of losing an entrepreneurial opportunity, p_1, is set to Clementi and Palazzo (2016)'s estimate of 8.1%. Given these two assignments, we set the probability of regaining an entrepreneurial opportunity, p_2, to 2.26% so that 19.45% of all households have business income as in the SCF.

Production. We set the corporate capital share, γ, to 7.1%, which is the average ratio of corporate profits to GDP in the 2010–2017 NIPA tables. We then set α so that the labor share, $1-\alpha-\gamma$, is 58% as estimated by Giandrea and Sprague (2017). We set the depreciation rate, δ, to 5% as in Guvenen et al. (2023). We also use Guvenen et al. (2023)'s value of 0.9 for ν, which governs the elasticity of substitution between varieties of entrepreneurial capital.

Taxes. We set the consumption tax, τ_c, and the capital income tax, τ_k, to McDaniel (2007)'s estimates of 7.5% and 25%, respectively. The labor income tax rates, $\tau_\ell(e)$, are set using data on federal tax rates by income quintile from Congressional Budget Office (2021). We set the wealth tax, τ_a, to zero since the goal of the calibration exercise is to construct a stationary equilibrium that represents the U.S. economy under the current tax code, which does not feature a wealth tax. We set $\kappa(e)$, which governs the extent to which a household's idiosyncratic labor productivity affects its retirement benefits, using the formulae in Guvenen et al. (2023).

Detection penalties. The penalties the government assesses when it detects offshore evasion are based on information from the Internal Revenue Service. The penalty on the stock of unreported offshore wealth, χ_a, is set to 50% as described in Internal Revenue Service (2021c). We assume that the government collects three years' worth of unreported back taxes (Internal Revenue Service, 2021a) plus a penalty of 75% (Internal Revenue Service, 2021b; Di Nola et al., 2021). Tax evasion in the current period is used as a proxy for unpaid taxes in previous periods.[4] Thus, χ_τ is set to $1.75 \times \min(j+1, 3)$.

4.2 Internally calibrated parameters

We jointly calibrate the remaining parameters so that the model matches salient facts about the U.S. economy under the current tax code. There are eight parameters whose values are determined in this stage: entrepreneurial ability dispersion, $\tilde{\sigma}_z$; the discount factor, β; the consumption share, μ; the external financing constraint, λ;[5] the fixed cost of maintaining an offshore account, θ; the proportional cost of transferring funds to/from an offshore account, η; and the two detection probability parameters, ω_0 and ω_1. We choose the values of these parameters so that the model's stationary equilibrium replicates the following eight statistics:

- the wealthiest 0.1% of households own 20% of reported wealth (Saez and Zucman, 2019);
- aggregate reported wealth is three times GDP (Guvenen et al., 2023);
- households spend 40% of their time working on average (Guvenen et al., 2023);
- entrepreneurial debt is 1.29 times GDP (Guvenen et al., 2023)
- hidden wealth is 4% of total wealth (Zucman, 2015);

[4] Explicitly keeping track of unpaid back taxes would require another endogenous state variable, which would make our model computationally intractable. Tax evasion tends to grow over time as households accumulate wealth, so this approach overstates the true detection penalty, leading to a conservative assessment of the effects of tax evasion.

[5] We discretize the entrepreneurial ability distribution and adopt the following parameterization from Guvenen et al. (2023): $\lambda(z_n) = 1 + \lambda \frac{n-1}{N-1}, z_n \in \{z_1, z_2, ..., z_N\}$.

- 0.1% of households have tax shelters (Guyton et al., 2020);
- households in the top 0.01% of the income distribution evade 6% of their taxes on average (Guyton et al., 2020);
- and the average detection rate for tax evaders is 0.6% (Guyton et al., 2020).

We use Saez and Zucman (2019)'s estimate of the share of wealth held by households in the top 0.1% of the wealth distribution, which is computed by manually adding the Forbes 400 into the SCF, to ensure an accurate capital tax base that includes the assets of the ultra-wealthy. We compute this share in our model using reported wealth, rather than total wealth, so that our model is consistent with the fact that true wealth inequality is higher than reported wealth inequality (Alstadsæter et al., 2019). Our measure of the total amount of concealed wealth comes from Zucman (2015), who estimates that 4% of aggregate household wealth is held in offshore tax shelters. Our measure of the fraction of households with tax shelters comes from Guyton et al. (2020), who estimate that about 0.1% of U.S. taxpayers hold unreported offshore assets. The average tax evasion rate of households in the top 0.01% of the income distribution also comes from Guyton et al. (2020). Note that this figure includes only tax evasion that is related to wealth held in offshore accounts; we abstract from other forms of tax evasion (e.g. misreporting cash income). Lastly, we use other data from Guyton et al. (2020) to calculate an average detection rate of 0.6%. In the no-evasion counterfactual, we recalibrate the first four parameters listed above to match the first four target statistics; we ignore the evasion-related parameters and targets in this version of our model.

The internally calibrated parameters are not individually identified, but each target moment influences the identification of one of these parameters more than the others. Entrepreneurial ability dispersion, $\tilde{\sigma}_z$, is primarily identified by the level of wealth inequality. The higher this dispersion, the more wealth is concentrated among households at the top of the distribution. The discount factor, β, is determined largely by the ratio of aggregate wealth to GDP. The higher this ratio, the more patient households must be to generate the required level of saving. The average time spent working governs the share of consumption in utility, μ. The higher this share, the more households choose to work. The collateral constraint, λ, is identified by the ratio of entrepreneurial debt to GDP. The higher this ratio, the more external financing entrepreneurs can obtain. The fixed evasion cost, θ, determines the fraction of households with offshore tax shelters. The higher this cost, the larger the number of households for whom the cost of offshore shelters exceeds the benefit. The proportional evasion cost, η, governs the aggregate amount of concealed wealth. The higher this cost, the less wealth households with tax shelters conceal. ω_1, which governs entrepreneurs' detection rate, is identified by the amount of taxes evaded by households at the top of the income distribution. These households are disproportionately entrepreneurs, and the more sensitive their detection rate is to the amount of wealth they conceal, the less they evade. Lastly, ω_0, which governs workers' detection rate, is residually identified by the overall average detection rate.

Panel (f) of table 1 lists the internally calibrated parameter values. The values of the first four parameters are very similar in the baseline model and no-evasion counterfactual, reflecting the fact that tax evasion has relatively small macroeconomic effects under the current tax system, so we report only the values for the former. The fixed cost of maintaining a tax shelter is 106% of the average labor income, reflecting the fact that only the richest households engage in offshore tax evasion. The proportional cost of concealing additional funds is 10.8%. Finally, the detection rate is more sensitive to offshore transfers for entrepreneurs than workers: $\omega_1 > \omega_0$. This is consistent with the fact that businesses are more likely to be audited than individuals, as well as the fact that high-income households are more likely to be audited than low-income households (the highest earners in our model are entrepreneurs).[6]

4.3 Validation

In addition to replicating the facts targeted in our calibration, table 2 shows that our calibrated benchmark equilibrium is consistent with several additional facts about the distribution of wealth, external financing, and offshore tax evasion.

Wealth distribution. We target the share of reported wealth held by the wealthiest 0.1% of households in our calibration, but our model also matches the wealth shares of other groups reasonably well. Additionally, the amount of wealth transferred across generations in our model is consistent with Nishiyama (2000)'s estimate.

External financing. We calibrate our external financing constraint to match the aggregate amount of entrepreneurial debt, but our model is also consistent with firm-level evidence that more profitable firms can borrow more. Li (2022) shows that the elasticity of leverage to the capital-output ratio identifies the magnitude of this effect, and estimates a value of 3.2. In simulated firm-level data from our model, this elasticity is somewhat lower at 1.5, but still well above the value of zero that would be implied by a collateral constraint of the form $k \leq \lambda a$ that depends only on an entrepreneur's wealth. On the other hand, Lian and Ma (2020) estimate that the elasticity of debt to earnings is about 0.2, and our model generates a higher value of 1.2.

Offshore tax evasion. We target the aggregate amount of offshore wealth, the fraction of households with tax shelters, tax evasion by ultra-high-income households, and the rate at which offshore evasion is detected, but our model matches several other evasion-related facts as well. Zucman (2015) estimates that $35 billion in capital income tax revenues were lost to offshore tax evasion in 2014, or about 0.2% of GDP. Lost capital income tax revenues in our model are of the same magnitude, at about 0.5% of GDP. Alstadsæter et al. (2019) document that Scandinavian households with offshore tax shelters conceal about a third of their wealth, and our model matches this fact quite closely as well.[7]

[6] See https://www.irs.gov/statistics/compliance-presence, specifically Table 17.

[7] Londoño-Vélez and Ávila Mahecha (2021) report similar findings for Colombia. To our knowledge, however, there are no such estimates available for the United States.

5 Raising taxes on capital income and wealth

In our first set of quantitative exercises, we study how changing the tax rates on capital income and wealth would affect offshore evasion and the implications for the macroeconomy, public finances, inequality, and welfare. We first compare our benchmark equilibrium to a series of steady states with different capital income tax rates, and then we do the same for a range of wealth taxes. We conduct each tax reform twice, once in our baseline model and once in our no-evasion counterfactual, to highlight how changes in evasion affect other outcomes. As outlined in section 3.7, fiscal balance is restored using lump-sum transfers. For the moment, we focus our analysis on the long run; we turn to transition dynamics in section 7.

5.1 Capital income taxes

Figure 1 illustrates the effects of changing the capital income tax rate. Panel (a) shows that raising capital income taxes would increase offshore tax evasion dramatically. For example, a 2p.p. tax hike would cause concealed wealth and lost revenue to rise by almost 50%, and a 10p.p. hike would cause them to triple and quadruple, respectively. Conversely, lowering capital income taxes would quickly reduce evasion, and a 15p.p. tax cut would eliminate it entirely.

Panel (b) demonstrates how the response of offshore tax evasion to capital income tax reform would affect public finances. In both the baseline model and no-evasion counterfactual, tax revenues would be maximized by raising capital income taxes by just under 30p.p., similar to the estimates of Trabandt and Uhlig (2011, 2012). However, the Laffer curve in the baseline model is essentially flat: any increase in capital income taxes, large or small, would generate a negligible transfer. The highest transfer that could be achieved is only 0.2% of the average household's labor income, equivalent to about $135. In the no-evasion counterfactual, on the other hand, raising capital income taxes could increase tax revenues substantially. The revenue-maximizing tax rate in this version of the model would yield a transfer of 2.17% of the average labor income, more than ten times larger than in the baseline.

Panel (c) shows how capital income taxes affect wealth inequality. In the baseline model, increasing the capital income tax rate would reduce the share of reported wealth held by the wealthiest 0.1% of households, but would actually increase these households' share of total wealth. Meanwhile, in the no-evasion counterfactual these households' share of wealth would truly fall. Thus, offshore tax evasion has two implications for the effect of capital income taxes on wealth inequality. First, the sign of the true effect changes: but for evasion, inequality in total wealth would fall rather than rise. Second, the effect on observed inequality would be illusory: inequality in reported wealth would fall but actual inequality would move in the opposite direction. Both of these effects stem from the fact that households at the top of the wealth distribution—the only households who actually maintain tax shelters—can avoid higher capital income taxes by concealing more of their wealth, while other households who cannot escape the effects of higher taxes would save less as a result.

Panel (d) plots the macroeconomic response to capital income tax reform. Output would fall in both versions of the model when capital income taxes rise, although the drop would be noticeably smaller in the baseline model than in the no-evasion counterfactual once taxes rise more than 15p.p. The source of this adverse macroeconomic effect is a decline in the supply of capital caused by a lower saving rate, and because offshore tax evasion offers a way to save without paying higher taxes, saving would fall less in the baseline model. Thus, offshore tax evasion would attenuate the negative effect of capital income taxes on output, rather than amplifying it.

Panel (e) shows how changing the capital income tax rate would affect welfare, which we measure in consumption-equivalent terms using a utilitarian criterion for newborn households as in Conesa et al. (2009) and Guvenen et al. (2023). These results qualitatively mirror the macroeconomic effects—raising capital income taxes would reduce welfare in both versions of the model—but the differences in welfare consequences between the baseline model and no-evasion counterfactual would be smaller than the differences in macro outcomes. The reason is that while output and wages would fall less in the baseline model, tax revenues would also rise less, and the smaller lump-sum transfer would roughly offset the smaller decline in wages. Although the aggregate welfare consequences of capital income tax reform would be largely unaffected by offshore tax evasion, table 3 shows that evasion would materially affect the distribution of these consequences. In the baseline model, increasing capital income taxes would hurt households at the bottom of the wealth distribution significantly more than other households, whereas the losses in the no-evasion model would be more evenly distributed. Declining wages would hurt households at the bottom of the distribution the most, and these households would be (partly) compensated with large lump-sum transfers in the no-evasion counterfactual but not in the baseline. In both versions of the model, it would be optimal to reduce capital income taxes by about 15p.p., which is in between the optima reported by Guvenen et al. (2023) and Boar and Midrigan (2020).[8]

5.2 Wealth taxes

Figure 2 shows the effects of wealth taxes. Panel (a) shows that wealth taxes would have even more pronounced effects on offshore tax evasion than higher capital income taxes. A 1% wealth tax would more than double lost revenue and quintuple concealed wealth, while a 4% tax would increase them both by an order of magnitude.

Panel (b) illustrates how offshore tax evasion would shape the effects of wealth taxes on public finances. In the baseline model, overall tax revenues would be maximized at a wealth tax rate of 1.6%, which would generate a lump-sum transfer of 1.0% of the average household's labor income. In the no-evasion counterfactual, the revenue-maximizing wealth tax rate is 5.8% and the associated transfer would be 3.7% of average labor income; both of these figures are about 3.7 times higher than in the baseline model. Thus, evasion would shift the wealth tax Laffer curve down and to the left.

[8] Guvenen et al. (2023) do not have a corporate sector that is exempt from financial frictions, so capital income taxes create more misallocation in their model than in ours. In Boar and Midrigan (2020), there is less misallocation because entrepreneurial opportunities are perfectly persistent over the life cycle, which allows more households to "save out of" external financing constraints as in Moll (2014).

Panel (c) demonstrates how taxing wealth would affect wealth inequality. In the baseline model, wealth tax rates below 5% would reduce the share of reported wealth held by the wealthiest 0.1% of households, but would increase their share of actual wealth. Larger taxes would increase both measures of inequality, but would increase the latter significantly more than the former. In the no-evasion counterfactual, the top 0.1% share of wealth would increase slightly as wealth taxes rise. This is consistent with Guvenen et al. (2023), who find that wealth taxes would increase wealth concentration because they would erode unproductive entrepreneurs' wealth more rapidly than productive entrepreneurs' wealth. These results depict a subtler message than in section 5.1. Wealth taxes would increase wealth inequality regardless of the presence of evasion, but this effect would be more pronounced once evasion is taken into account. Additionally, although most wealth taxes would appear to reduce inequality but actually increase it, very large taxes would increase reported inequality as well as actual inequality. Nevertheless, one consistent message emerges: wealth taxes would increase actual inequality more than observed inequality.

Panel (d) shows how output would respond to wealth taxes. As with capital income taxes, output would fall as wealth taxes rise. The source of this effect is essentially the same: the capital stock would shrink because households would save less. The macroeconomic response would again be smaller in the baseline model than in the no-evasion counterfactual for the same reason: concealing wealth offshore would allow sufficiently rich households to continue to save without paying higher taxes, so their saving wouldn't fall as much in the baseline model.

Panel (e) plots the welfare effects of wealth taxes. Again, these effects largely mirror the macroeconomic consequences, but in this case welfare would always fall more in the baseline model than in the no-evasion counterfactual. This is because the wealth tax base is larger than the capital income tax base, so the lump-sum transfers in this case—and the differences in these transfers between the two versions of the model—would also be larger. As table 3 shows, offshore tax evasion would also have a larger impact on the distribution of welfare effects for wealth taxes than capital income taxes. In the no-evasion counterfactual, households at the bottom of the wealth distribution would gain while those at the top would lose. This is because the latter would bear the brunt of wealth taxes, while the former would benefit from the large transfers that would be generated by the additional tax revenues despite the drop in wages. In the baseline model, on the other hand, the tables would be turned: households at the top of the distribution would gain at the expense of those at the bottom. Evasion would allow the former to escape the tax burden but would also significantly reduce the revenues that could be redistributed to the latter, who would still lose from falling wages.

6 Taxing the ultra-wealthy

In our second set of quantitative exercises, we study progressive wealth taxes that apply only to wealth above a threshold.[9] These kinds of policies, which would target the ultra-rich while exempting the vast

[9] We have also studied progressive capital income taxes like the one proposed by President Biden as part of his American Families Plan. These policies would have similar consequences for welfare as flat capital income taxes: they would always reduce welfare regardless of evasion. Since analyzing these policies provides no new insight, we focus our analysis in this section on progressive wealth taxes, which would have very different welfare consequences than flat wealth taxes.

majority of households, have been proposed by several prominent politicians and economists to reduce inequality and finance redistributive spending. The households that would pay these taxes are exactly the same households that engage in offshore tax evasion, however, and our model is uniquely positioned to tackle this issue head on. We use the proposals by Senators Elizabeth Warren and Bernie Sanders during the 2020 presidential primary campaign as case studies. The Warren proposal would tax wealth between $50 million–$1 billion at a rate of 2% and wealth above $1 billion at a rate of 3%.[10] The Sanders proposal is even more progressive, with tax rates of 1% on wealth between $32 million–$50 million; 2% from $50 million–$250 million; 3% from $250 million–$500 million; 4% from $500 million–$1 billion; 5% from $1 billion–$2.5 billion; 6% from $2.5 billion–$5 billion; 7% from $5 billion–$10 billion; and 8% on wealth above $10 billion.[11] As in section 5, we focus on the long-run effects of these policies for the moment. Table 4 lists the results of these experiments.

Precisely because many of the households that would be subject to these policies already maintain tax shelters to evade capital income taxes in the benchmark equilibrium, tax evasion would increase dramatically: concealed wealth would rise by 143–164%; more than half of the potential wealth tax revenues would be lost due to evasion; and overall lost revenues would rise by 90–113%. As a result, these policies would raise far less revenue than they would in the absence of offshore tax evasion. They would generate transfers of only 0.06-0.07% of the average labor income in the baseline model, five times less than in the no-evasion counterfactual. Moreover, these taxes would have noticeable macroeconomic consequences even though they would be paid by fewer than 0.1% of households because these households own a large share of total wealth, and consequently the decline in saving caused by these taxes would have a material effect on the aggregate capital stock. As in our previous exercises, these consequences would be smaller in the baseline model than in the no-evasion counterfactual, but the differences here would be particularly pronounced: GDP and wages would fall by 0.7–0.9% in the baseline model versus 1.3–1.6% in the counterfactual.

In contrast to flat taxes on capital income and wealth, where the welfare effects were similar in both versions of the model, offshore tax evasion would dramatically alter the welfare consequences of progressive wealth taxes. In the baseline model, the Warren and Sanders policies would reduce welfare by 0.34–0.43% and more than 98% of households would experience a welfare loss. Although the macroeconomic effects would be smaller in this version of the model, the decline in wages would still outweigh the negligible lump-sum transfers that these policies would generate. In the no-evasion counterfactual, on the other hand, welfare would rise by 0.39–0.44% and more than 82% of households would gain. Here, the larger transfers would be more than enough to compensate for the larger wage losses. Table 3 shows that evasion would also completely upend the distribution of welfare effects. In the no-evasion counterfactual, all households but those at the very top of the wealth distribution—the households targeted by these taxes—would gain. In the baseline model, the wealthiest households would still lose, but not nearly as much as in the counterfactual, while the poorest households would experience the largest welfare losses.

[10] https://elizabethwarren.com/plans/ultra-millionaire-tax

[11] https://berniesanders.com/issues/tax-extreme-wealth

The Warren and Sanders proposals would be clear policy failures in the presence of offshore tax evasion, but they are just two examples of a wide range of progressive wealth taxes that could be implemented. Could a progressive wealth tax with a different tax rate or exemption threshold generate better outcomes? To answer this question, we consider the entire space of possible tax rates and exemption thresholds. We use a global optimization algorithm to conduct an exhaustive search over this space and find that no wealth tax, either flat or progressive, would increase welfare in our baseline model. In the no-evasion counterfactual, on the other hand, there are progressive wealth taxes that could generate far larger gains than the Warren and Sanders policies. The optimal progressive wealth tax in this version of the model features a threshold of about $4.8 million and a tax rate of 3.25%. As the last column of table 4 shows, this policy would generate very large aggregate welfare gains in the counterfactual, although it would benefit fewer households and would have severe macroeconomic consequences.

7 Transition dynamics

Thus far, we have restricted our attention to the long-run effects of taxing capital income and wealth. Many of the policies we have studied would have adverse macroeconomic effects caused by a decline in the saving rate, but these consequences could take many years to fully materialize. Consequently, wages might be higher and transfers larger in the short run after these policies are implemented, and so the welfare consequences could be different once transition dynamics are taken into account. We address this issue by solving for the entire transition path after a tax reform, not just the long-run stationary equilibrium. The computational cost of solving for transitions in our model is immense, so we restrict attention to three example reforms: a 10p.p. increase in the capital income tax rate; a 2% flat wealth tax; and the progressive wealth tax proposed by Elizabeth Warren. We also study a temporary, one-time version of the Warren policy. This exercise, which is similar in spirit to the tax implemented in Argentina in 2021 to finance stimulus spending during the COVID-19 pandemic, allows us to study how the incentives to evade temporary taxes differ from the incentives to evade permanent ones. Figure 3 shows the transition dynamics in each of these experiments.

Increase in capital income taxes. The first row of figure 3 shows the transition dynamics that would follow a 10p.p. increase in the capital income tax rate. Tax evasion would jump immediately after this reform occurs: concealed wealth would rise by 70% and lost tax revenues would more than quadruple after just one period. As a result, tax revenues would be lower in the baseline model than in the no-evasion counterfactual in the short run as well as the long run. Although this reform would reduce welfare by a similar amount in the long run in both versions of the model, tax evasion would dramatically alter the transition dynamics of welfare. In the no-evasion counterfactual, welfare would actually rise by more than 3% when the reform occurs and would still be higher than in the benchmark equilibrium after a decade. In the baseline model, on the other hand, welfare would fall immediately.

Flat wealth tax. The second row of the figure shows the transition dynamics for a 2% wealth tax. Tax evasion would rise quickly in this experiment as well: lost revenues would triple in the first period, while concealed wealth would quadruple after five periods and quintuple after ten. Nevertheless, tax revenues would actually be similar in the short run in the two versions of the model, although they would fall more quickly in the baseline. Again, there would be a stark difference in welfare dynamics between the baseline and the no-evasion counterfactual. In the counterfactual, welfare would rise by 8.5% when the tax is introduced and would still be more than 2.5% higher than in the benchmark equilibrium after a decade. In the baseline, welfare would rise by 2.5% in the first period, but these gains would turn to losses after only five periods.

Progressive wealth tax. The third row of the figure shows the transition dynamics for the progressive wealth tax proposed by Elizabeth Warren. The differences here between the baseline model and no-evasion counterfactual would be even sharper than in the first two experiments. Tax evasion would increase very quickly: after ten periods, concealed wealth would almost reach its new long-run level and lost revenues would completely converge. As a result, tax revenues would fall much more rapidly in the presence of evasion. In the baseline, revenues would fall by more than 50% after five periods and by more than 80% after ten periods. In the counterfactual, meanwhile, revenues would fall by only 16% after five periods and 30% after 10 periods. In turn, this would create a large difference in welfare dynamics between the two versions of the model. In the counterfactual, the welfare gain in the first period would be 3.5 times greater than the long-run gain and virtually all households would be better off initially. In the baseline, there would be a minor aggregate welfare gain in the first period, but more than two-thirds of households would be worse off, and the gain would become a loss after only a few periods.

Temporary progressive wealth tax. The last row of the figure shows the transition dynamics for a temporary version of the Warren wealth tax that lasts only one period. To make things more interesting, we assume that this tax is announced one period before it is levied. This assumption, which is based on the timing of Argentina's tax in 2021, allows households time to conceal additional wealth before it is subject to taxation.[12] In the baseline model, there would indeed be a modest uptick in evasion in the period the tax is announced, but the tax would still raise almost exactly the same amount of revenue in the short run in as in the no-evasion counterfactual.[13] Overall, there would be little difference in transition dynamics between the two model versions, although welfare gains would be lower in the baseline model because the increase in evasion during the period in which the tax is announced would lead to a slightly negative lump-sum transfer. In our view, the most striking result of this experiment is not the similarity of the two models' transition dynamics, but the persistence of the tax's effect on output in both models. Output would

[12] See `https://www.bbc.com/news/world-latin-america-55199058`. Note that if the tax was levied in the same period it was announced there would be no time for evasion to occur and the tax would raise exactly the same amount of revenue in the short run regardless of evasion.

[13] This is consistent with what happened in Argentina, where the one-time tax raised 74% of the expected revenues despite widespread concerns about offshore tax evasion. See `https://www.bloomberg.com/news/articles/2021-05-03/argentina-wealth-tax-fought-by-millionaires-raises-2-4-billion`.

fall in the period the tax is levied because rich households would save less when the tax is announced, and it would take many periods for this effect to dissipate completely.

8 Elasticities of reported income and wealth

We have calibrated our model to match facts about offshore tax evasion under the current tax code and used it to demonstrate that evasion would play a crucial role in determining how the economy would respond to tax reforms. Here, we compare these responses to empirical evidence from other studies.

In the empirical public finance literature, behavioral responses to tax reforms are typically measured by the elasticity of reported taxable income (or wealth, in the case of wealth taxes) to the net-of-tax rate:

$$\varepsilon = \frac{\Delta \log Y}{\Delta \log(1-\tau)}. \tag{21}$$

These responses include changes in labor supply, saving, and other real decisions that affect actual income, but also evasion that affects reported income (Saez et al., 2012). We use this formula to calculate two elasticities for each of the policy changes we have analyzed: short-run elasticities, which are driven purely by evasion; and long-run elasticities, which also include real microeconomic effects as well as macroeconomic general-equilibrium effects. Table 5 lists the results of these calculations alongside their empirical counterparts, which we discuss below.

8.1 Capital income taxes

To measure the short-run elasticity of reported capital income in our experiments, we hold fixed the prices and distribution of household states from the benchmark equilibrium and use the policy function for evasion under the new tax system to compute the change in reported capital income. The short-run elasticity in the no-evasion counterfactual is zero by construction because total capital income, which is equal to reported capital income in the absence of evasion, is determined only by a household's state variables. Thus, the short-run elasticity in the baseline model cleanly isolates the immediate evasion response. This elasticity ranges from 0.45 to 2.2. To measure the long-run elasticity, we use the prices and distribution from the stationary equilibrium associated with the new tax system as well as the new policy functions. The long-run elasticity ranges from 0.59–1.7 in the baseline model. In both horizons, the elasticity of reported capital income is inversely related to the size of the tax reform: the larger the reform, the lower the elasticity. For tax increases of less than 15 percentage points, the short-run elasticity is larger than the long-run elasticity, but for larger increases the reverse is true.[14]

The values at the upper ends of the ranges listed above, which are associated with small changes in tax rates that are most comparable to real-world reforms, are closely aligned with estimates in the empirical

[14] Agersnap and Zidar (2021) argue that capital income tax elasticities are higher in the short run than in the long run because of anticipation: if taxpayers know in advance about a future capital income tax cut, they may wait to realize capital gains until after the cut occurs. In our model, this is due to general-equilibrium effects. Interest rates rise in the long run when capital income taxes increase, and this boosts non-entrepreneurs' capital income.

literature. Dowd et al. (2012) and Agersnap and Zidar (2021) analyze the tax elasticity of reported capital gains. The former estimate that this elasticity ranges from 0.8–1.2 depending on the time horizon, while the latter report a higher range of 2.6–3.6.[15] Both studies estimate slightly higher elasticities in the short run than in the long run, consistent with our results for these kinds of reforms. Sillamaa and Veall (2001), Heim (2010), and Choi (2014) estimate the tax elasticity of self-employment income, finding values of 1.3, 0.9, and 1.0–2.8, respectively; these studies make no distinction between the short and long run.

In addition to comparing our results with estimates from the literature, we can also measure the long-run elasticity in our no-evasion counterfactual to determine the role of evasion in driving the overall long-run effect. We find that reported capital income barely responds at all in the long run to changes in the capital income tax rate in the counterfactual, indicating that evasion is in fact the primary driver.

8.2 Wealth taxes

Measuring the short-run elasticity of reported wealth requires a different approach. The change in a household's concealed wealth following a tax reform cannot be cleanly separated from the change in its reported wealth because these decisions are intertwined; households choose how much to save in total and what fraction of these savings to conceal. Moreover, savings respond immediately to wealth taxes even in the no-evasion counterfactual. To isolate the short-run evasion response to wealth taxes, we compute the change in reported wealth after one period in both the baseline model and the counterfactual, and then subtract the latter from the former. This approach captures the short-run effect of reported wealth caused solely by evasion by controlling for how households would respond if they could not evade taxes. We find elasticities ranging from 2.4–4.5 for flat wealth taxes and an elasticity of 9.9 for progressive taxes that target the ultra-wealthy. We measure the long-run elasticity the same way as before, simply comparing the new steady state to the old one. We find elasticities of 18.6–37.2 for flat taxes and 40.8 for progressive taxes. As with capital income taxes, larger wealth taxes have smaller elasticities.

Comparing our wealth tax elasticity results with the empirical evidence is more complicated than comparing our capital income tax elasticities. The United States has never had an annual wealth tax and estimates in the literature of reported wealth elasticities from other countries vary widely. Estimates from Scandinavia are quite low. Seim (2017) estimates an elasticity of 0.27 for Sweden, while Jakobsen et al. (2018) estimate values of 0.77 and 1.15 for moderately wealthy and very wealthy households in Denmark, respectively. Estimates from other countries are higher: 2 for Colombia (Londoño-Vélez and Ávila Mahecha, 2020); values ranging from 1.4 to 11.6 for the Netherlands (Zoutman, 2018); 15.6 for Catalonia (Durán-Cabré et al., 2019); and 35 for Switzerland (Brulhart et al., 2016). The economic and institutional contexts in these studies also differ substantially, both from each other and from our experiments. The low Scandinavian elasticities are likely due in part to the nature of the reforms in question. In the case of Sweden, Seim (2017) studies changes in the exemption threshold that were irrelevant to ultra-rich households who engage in offshore tax

[15] See the bottom of page 406 in Agersnap and Zidar (2021): "the estimated short-run elasticity…is 3.61 (SE 1.22), whereas the longer-run estimate…is somewhat lower at 2.59 (SE 1.42)."

evasion.[16] Similarly, the Danish policy studied by Jakobsen et al. (2018) exempted most households in the top 0.1% of the wealth distribution. On the other hand, studies likely estimate high elasticities in Catalonia and Switzerland because these wealth taxes vary across regions within the same country; moving wealth from one region of a country to another is likely much easier than moving wealth internationally, especially in the Swiss context given its strong tradition of banking secrecy. In our view, all of these studies have issues that make it difficult to compare their findings with our own.

These caveats aside, the elasticities of reported wealth in our experiments are in the middle of the range of values reported in the literature. Many of the papers listed above analyze how many individuals "bunch" below exemption thresholds or tax brackets immediately following tax reforms, which captures short-run evasion responses but not long-run changes in actual wealth (Londoño-Vélez and Ávila Mahecha, 2020). These estimates should therefore be compared with our short-run elasticities, which are driven solely by evasion. Additionally, these papers study policies with low exemption thresholds (typically a few hundred thousand dollars), making them more akin to flat taxes than the highly progressive taxes with thresholds in the tens of millions of dollars that we have studied. Our short-run elasticities for flat wealth taxes lie between Londoño-Vélez and Ávila Mahecha (2020)'s estimate of 2 for Colombia and Zoutman (2018)'s higher estimate of 11.6 for the Netherlands. Our long-run elasticities are similar to Durán-Cabré et al. (2019)'s estimate of 15.6 for Catalonia and Brulhart et al. (2016)'s estimate of 35 for Switzerland. The latter study analyzes differences in aggregate reported wealth and tax rates across regions, which would make it the best point of comparison for our long run results but for the issues raised above. Overall, we conclude that the results of our wealth tax experiments are plausible in light of the empirical evidence, but we are cautious about drawing stronger conclusions given the difficulties in comparing our results with this evidence.

Comparing reported wealth elasticities in our baseline model to their counterparts in the no-evasion counterfactual reveals a different pattern than in the case of capital income tax reforms. Here, reported wealth responds strongly in the long run even in the absence of evasion. In our flat wealth tax experiments, the long-run elasticity of reported wealth in the counterfactual ranges from 10.5 to 17.2, indicating that roughly half of the long-run response is driven by real effects as opposed to evasion. In our experiments with progressive wealth taxes that target the ultra-rich, the long-run elasticity in the counterfactual is 15.4, which is about a third of the baseline elasticity.

9 Sensitivity analysis

Our quantitative experiments demonstrate that offshore tax evasion has significant implications for capital income tax reform and wealth taxation. To demonstrate the robustness of our approach to modeling this phenomenon, we present two sets of sensitivity analyses. In the first, we analyze several alternative calibrations with higher evasion costs. In the second, we analyze a version of our model in which some households cannot evade taxes regardless of their income or wealth, which yields lower elasticities of reported wealth

[16] The threshold varied from $130,000 USD (the 93rd percentile of the wealth distribution) to $430,000 USD (the 97th percentile) between 2000 and 2006, which is the period Seim (2017) focuses on.

in our policy experiments. Table 6 lists the results of these analyses.

We have also conducted a number of additional analyses that demonstrate the robustness of our results to other assumptions. We have studied a model in which detection penalty revenues do not enter the government's budget constraint; a model in which concealed wealth is not collateralizable; a model in which additional tax revenues are used to reduce labor income tax rates as in Conesa et al. (2009) and Guvenen et al. (2023) instead of providing lump-sum transfers; a small open economy model in which the capital market does not have to clear and the interest rate is constant; and a model without rate-of-return heterogeneity in which wealth inequality is generated purely by luck as in Castañeda et al. (2003). The online appendix contains the results of these analyses.

9.1 Higher evasion costs

We have calibrated the costs of offshore tax evasion in our model to match a set of facts about this phenomenon, but these estimates could be imprecise because households engage in this behavior precisely to conceal information about themselves. To explore the sensitivity of our results to these key parameters, we have analyzed three alternative calibrations with higher evasion costs. The first has a higher cost of transferring wealth into a tax shelter, the second has a higher probability of being detected, and the third has a higher detection penalty. In each alternative, we first solve for the benchmark equilibrium, and then repeat the experiments in sections 5 and 6.

High transfer costs. Here, we increase the cost of transferring wealth into a tax shelter, η, by 50%. Taxing capital more heavily would actually lead to worse outcomes in this calibration than in the baseline. The revenue-maximizing capital income tax rate in this model is 21p.p. lower and would generate a 25% smaller transfer, while the revenue-maximizing wealth tax rate is 60 basis points lower and would yield a slightly smaller transfer. Progressive wealth taxes would generate essentially zero net revenues and would lead to larger welfare losses. The reason is that although there would be less evasion in the benchmark equilibrium in this calibration, raising taxes on capital income or wealth would still cause evasion to rise dramatically. One way to demonstrate this is to compare the elasticities of reported wealth in this calibration to the baseline model. We use a wealth tax of 1.5% as an illustrative example. The short-run elasticity in this experiment is actually higher than in the baseline model and the long-run elasticity is similar.

High detection rate. Here, we double the parameters that govern the elasticity of the detection rate to the amount transferred, ω_ι. Holding fixed the amount transferred, this increases the detection rate by 50–100%. This calibration paints a better picture for the consequences of taxing capital more heavily, albeit one that is still much worse than the no-evasion counterfactual. The revenue-maximizing capital income tax rate is 95 basis points lower than in the baseline model and would raise 130% more revenue, while the revenue-maximizing wealth tax is 25 basis points higher and would raise 9% more revenue. The Warren proposal would raise twice as much revenue but would still reduce aggregate welfare and hurt the vast majority of households. Again, this version of the model's benchmark equilibrium has less tax evasion than the baseline's, but raising tax rates on capital income or wealth would still cause evasion to rise just as quickly, which can be seen by inspecting elasticities of reported wealth.

High penalty. Here, we increase the detection penalties, χ_a and χ_τ, by 50%. This calibration yields very similar results to the previous one in all respects. The revenue-maximizing capital income tax rate is 1.05p.p. higher and would raise slightly less revenue; the revenue-maximizing wealth tax rate is exactly the same but would raise slightly more revenue; the Warren wealth tax would raise slightly less revenue and would cause larger welfare losses; and elasticities of reported wealth are slightly lower.

These results indicate that even if the costs of offshore tax evasion were substantially higher, neither capital income tax reform nor wealth taxes could generate substantial increases in tax revenue, and even highly progressive wealth taxes targeted at the wealthiest households would still reduce welfare. In addition to demonstrating that our main results are robust to changes in the costs of evasion, these analyses also provide an important lesson for policymakers. Proposals to tax capital more heavily, including the Warren and Sanders proposals we have studied, often include provisions for increasing the budget of the IRS' enforcement arm. Our findings suggest that even substantially improving enforcement would not be sufficient for higher taxes on capital income and wealth to be successful.

9.2 Lower elasticity of reported wealth

As discussed in section 8 above, our results are consistent with a range of empirical evidence on how households respond to tax reforms, but our model's elasticity of reported wealth is higher than some estimates in the literature. Since alternative calibrations with higher costs of offshore evasion have similar elasticities to our baseline model, a different approach is required to study the effects of taxing capital more heavily in a setting with a lower elasticity. Here, we study a version of our model in which some households are unable to evade taxes, which results in less evasion in the benchmark equilibrium and also smaller responses to tax reforms.[17]

In this version of the model, each household's ability to engage in offshore tax evasion is exogenously assigned at birth and remains fixed throughout their life. We choose the fraction of households who can evade so that the short-run elasticity of reported wealth in response to a 1.5% wealth tax is equal to 1.36, the smallest elasticity estimated by Zoutman (2018) for the Netherlands.[18] In order to match this elasticity, the model requires that only 35% of households can evade. This generates a benchmark equilibrium in which 1.38% of total wealth is held offshore and lost revenues are 0.19% of GDP. As fractions of their counterparts in the baseline model, these figures are almost exactly the same as the number of households who can evade

[17] We thank one of our referees for suggesting this analysis.

[18] This policy is similar to the Dutch tax on wealth as well as taxes in Scandinavia studied by Seim (2017) and Jakobsen et al. (2018). Note that we do not recalibrate any of parameters that govern tax evasion costs or detection rates because it is impossible to simultaneously match this elasticity and our other evasion-related target moments. Specifically, when some households exogenously cannot evade taxes, we need lower costs of evasion and lower detection rates to match the fraction of households who do evade in equilibrium and the aggregate amount of offshore wealth, which actually increases the short-run reported wealth elasticity rather than decreasing it.

taxes (36% and 38%, respectively).

Unlike the alternative calibrations with higher evasion costs, this model has both less evasion in the benchmark and in our policy experiments. Generally speaking, the results in this model are roughly two-thirds of the way between the baseline results and the results in the no-evasion counterfactual, which again is about the same as the fraction of households who cannot evade taxes. The revenue-maximizing capital income tax in this version of the model generates a lump-sum transfer of 1.32% of the average household's labor income, more than six times higher than in the baseline model and about 40% less than in the no-evasion counterfactual. The revenue-maximizing wealth tax rate is 4.4%, about two-thirds of the way between the baseline model's 1.67% and the counterfactual's 5.79%. It yields a transfer of 2.53% of the average labor income, 150% higher than in the baseline model and 32% lower than in the counterfactual. The Warren wealth tax generates a transfer almost as large as in the no-evasion counterfactual, improves welfare for almost half of the population, and increases aggregate welfare by about half as much as in the counterfactual.

These results indicate that if the elasticity of reported wealth was substantially lower than in our baseline calibration, taxing capital more heavily could generate material increases in tax revenue and it could be optimal to levy progressive wealth taxes on ultra-rich households as Warren and Sanders have proposed, although the effects of these reforms would still be markedly different than in the no-evasion counterfactual. This highlights the need for more evidence on the magnitude of households' responses to wealth taxes, especially taxes targeted specifically at the ultra-rich. One particularly promising avenue of inquiry would be to study the extent to which differences in economic fundamentals and policies across the various contexts studied in the literature, as well as differences in researchers' estimation methodologies, contribute to the differences in elasticity estimates.

10 Conclusion

Wealth inequality has spurred calls to tax capital income more heavily and introduce new taxes on wealth, but rich households could evade these tax increases by concealing their assets offshore. We have developed a model of offshore tax evasion, disciplined it with data on the extent of this evasion under the current U.S. tax system, and used it to study the implications of this evasion for taxing capital more heavily. We have found that these implications are significant. In the absence of offshore tax evasion, raising capital income taxes or levying new taxes on wealth could significantly improve public finances, and progressive wealth taxes targeted at ultra-rich households would lead to widespread welfare gains. In the presence of tax evasion, however, higher taxes on capital income and wealth would have little impact on tax revenues, and progressive wealth taxes would harm virtually all households.

Our analysis is limited to a specific form of tax evasion: the use of offshore tax shelters by rich households. Other forms of tax evasion, such as under-reporting of cash income, are prevalent across the wealth distribution (Johns and Slemrod, 2010) and have larger effects on public finances under the current tax code.[19] However, wealth and capital income are concentrated among rich households, and we show that these households would engage in far more offshore evasion if capital were taxed more heavily. Our analysis also excludes offshore tax avoidance by multinational corporations that shift profits to affiliates in low-tax jurisdictions abroad. This, too, has greater implications as things stand today: Zucman (2015) and Tørsløv et al. (2018) estimate that $130–$140 billion of tax revenues are lost per year due to U.S. multinationals' profit shifting. Analyzing profit shifting is undoubtedly an important line of inquiry but it is beyond the scope of our study, as different methodological tools are needed to model transfer pricing, intellectual property licensing, and other key aspects of this phenomenon. And again, our analysis shows that even small changes in capital income taxes or wealth taxes could make offshore tax evasion by households far more important than it is today.

Our results are broadly consistent with reduced-form estimates of how tax reforms affect reported taxable income and wealth, and they show that offshore tax evasion is a major driver of these responses. Of course, the effects of changes in tax policy on the broader economy also depend on how investment, wages, and other macroeconomic variables respond in equilibrium. Our study lays out a framework for analyzing how tax evasion and the real economy interact, providing new insights for policymakers and creating a range of new research opportunities.

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[19] The most recent IRS report on tax compliance estimates that lost revenues from all forms of evasion exceed $400 billion per year. See https://www.irs.gov/pub/irs-pdf/p1415.pdf.

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Table 1: Calibration

Parameter	Description	Value	Target or source
(a) Demographics and preferences (assigned)			
J	Lifespan	60	Max. lifespan of 85 years
R	Retirement age	41	Retirement at age 66
ϕ_j	Survival probability	Varies	Arias (2014)
σ	Risk aversion	4	Conesa et al. (2009)
(b) Endowments (assigned)			
$\log \zeta_j$	Life-cycle labor productivity	$-\frac{j^2}{1800} - \frac{j}{30}$	Guvenen et al. (2023)
σ_e	Intra-generational labor productivity variance	0.20	Guvenen et al. (2023)
ρ_e	Intra-generational labor productivity persistence	0.94	Guvenen et al. (2023)
$\tilde{\sigma}_e$	Inter-generational labor productivity variance	0.57	Guvenen et al. (2023)
$\tilde{\rho}_e$	Inter-generational labor productivity persistence	0.18	Guvenen et al. (2023)
$\tilde{\rho}_z$	Entrepreneurial ability persistence	0.10	Fagereng et al. (2018)
p_0	Probability of opportunity at birth	8.7%	SCF (2016)
p_1	Probability of losing opportunity	8.1%	Clementi and Palazzo (2016)
p_2	Probability of regaining opportunity	2.3%	SCF (2016)
(c) Production (assigned)			
γ	Corporate capital share	7.1%	NIPA
α	Entrepreneurial capital share	34.9%	Giandrea and Sprague (2017)
δ	Depreciation rate	5.0%	Guvenen et al. (2023)
ν	Elasticity of substitution between varieties	0.90	Guvenen et al. (2023)
(d) Taxes (assigned)			
τ_c	Consumption tax rate	7.5%	McDaniel (2007)
τ_k	Capital income tax rate	25%	McDaniel (2007)
$\tau_\ell(e)$	Labor income tax rates	Varies	Congressional Budget Office (2021)
τ_a	Wealth tax rate	0	U.S. tax code
$\kappa(e)$	Retirement benefits	Varies	Guvenen et al. (2023)
(e) Detection penalties (assigned)			
χ_a	Penalty on stock of concealed wealth	0.50	IRS
χ_τ	Penalty on unpaid back taxes	$1.75 \times \min(j, 3)$	IRS; Di Nola et al. (2021)
(f) Jointly calibrated			
$\tilde{\sigma}_z$	Entrepreneurial ability variance	0.42	Top 0.1% reported wealth share = 20%
β	Discount factor	0.98	Reported wealth/GDP = 3
μ	Consumption share	0.43	Average labor supply = 40%
λ	Collateral constraint	2.00	Debt/GDP = 1.29
θ	Fixed evasion cost ($\times$ avg. labor income)	1.06	Share of households w/ tax shelter = 0.1%
η	Proportional evasion cost	10.8%	Hidden/total wealth = 4%
ω_1	Detection probability (entrepreneurs)	2.44×10^{-4}	Tax evasion by top 0.01% = 6%
ω_0	Detection probability (workers)	8.00×10^{-6}	Probability of detection = 0.6%

Table 2: Non-targeted moments

Statistic	Model	Data	Source
Reported wealth distribution			
Top 1% share	36	39	SCF (2016)
Top 10% share	66	77	SCF (2016)
Top 20% share	79	88	SCF (2016)
Bottom 50% share	4	1	SCF (2016)
Gini coefficient	0.78	0.86	SCF (2016)
Bequests (% reported wealth)	1.0	1.2	Nishiyama (2000)
Aggregate tax evasion (% GDP)	0.5	0.2	Zucman (2015)
Avg. % wealth concealed by evaders	29.0	31.0–42.3	Alstadsæter et al. (2019)
Elasticity of leverage to capital-output ratio	1.5	3.2	Li (2022)
Elasticity of debt to profit	1.2	0.2	Lian and Ma (2020)

Notes: Aggregate tax evasion is measured as total lost capital income tax revenues less total detection penalties. The average percent of wealth concealed by evaders is the mean of $a_h/(a_h + a_r)$ for all households with $a_h > 0$. The elasticity of leverage to the output-capital ratio is the coefficient β from the regression $\log k/a = \alpha + \beta \log q/k + \epsilon$. The elasticity of debt to profit is the coefficient β from the regression $\log d/k = \alpha + \beta \log \pi/k + \epsilon$. In both regression equations, a is total wealth: $a = a_h + a_r$. In the second regression, debt is defined as $d = k - a$ and both sides are normalized by assets as in Lian and Ma (2020).

Table 3: Welfare effects of taxing capital more heavily by position in the wealth distribution

Percentile	10p.p. increase in capital income tax	2% flat wealth tax	Warren wealth tax
(a) Baseline model			
0–20	-4.94	-4.74	-0.22
20–40	-4.18	-4.14	-0.16
40–60	-3.33	-4.29	-0.13
60–80	-3.12	-4.15	-0.11
80–90	-2.74	-5.50	-0.13
90–95	-2.32	-6.16	-0.06
95–99	-1.79	-7.36	-0.09
99–99.9	-0.79	-7.86	-0.09
99.9–99.99	-0.14	+3.06	-0.70
99.99–100	+0.68	+1.04	-7.06
(b) No-evasion counterfactual			
0–20	-1.72	+0.36	+0.47
20–40	-1.37	+0.83	+0.42
40–60	-1.22	+0.14	+0.36
60–80	-1.16	-0.65	+0.40
80–90	-1.25	-2.14	+0.42
90–95	-0.68	-2.41	+0.54
95–99	-0.14	-2.67	+0.68
99–99.9	+0.74	-2.42	+1.07
99.9–99.99	+0.77	-2.78	-0.23
99.99–100	+0.67	-3.26	-12.48

Notes: Table reports median welfare gain/loss for households in each percentile range measured in consumption-equivalent terms. Column 2 reports results for a 10p.p. increase in the capital income tax. Column 3 reports results for a 2% flat wealth tax. Column 4 reports results for the progressive wealth tax proposed by Elizabeth Warren.

Table 4: Long-run effects of progressive wealth taxes

Outcome	Warren	Sanders	Optimal
(a) Baseline model			
Tax rate (%)	2–3	1–8	–
Tax threshold ($M)	50	32	–
Transfer (% avg. wage)	0.06	0.07	–
Concealed wealth (benchmark = 1)	2.43	2.64	–
Lost revenues (benchmark = 1)	1.91	2.13	–
GDP (% chg.)	-0.69	-0.89	–
Top 0.1% share, reported (p.p. chg.)	-6.48	-7.59	–
Top 0.1% share, actual (p.p. chg.)	-1.45	-1.74	–
Welfare (% chg.)	-0.34	-0.43	–
Approval rate (%)	1.73	1.58	–
(b) No-evasion counterfactual			
Tax rate (%)	2–3	1–8	3.25
Tax threshold ($M)	50	32	4.81
Transfer (% avg. wage)	0.30	0.36	1.00
GDP (% chg.)	-1.32	-1.60	-4.55
Top 0.1% share, actual (p.p. chg.)	-2.80	-3.34	-4.67
Welfare (% chg.)	0.39	0.44	1.08
Approval rate (%)	82.36	82.17	51.00

Notes: Changes are measured relative to the benchmark equilibrium under the current tax code in each version of the model. Welfare is measured in consumption-equivalent terms. Dashes (–) indicate "not applicable". This applies to one experiment (optimal progressive wealth tax in the baseline model).

Table 5: Elasticities of reported taxable income and wealth

Horizon	Baseline	No evasion	Data	Source
(a) Capital income tax reforms				
Short-run	0.45–2.2	–	0.90–3.6	Dowd et al. (2012); Heim (2010); Choi (2014); Agersnap and Zidar (2021)
Long-run	0.65–1.7	0.15–0.2	0.8–2.6	
(b) Flat wealth taxes				
Short run	2.4–4.5	–	0.3–15.6	Seim (2017); Jakobsen et al. (2018); Londoño-Vélez and Ávila Mahecha (2020); Zoutman (2018); Durán-Cabré et al. (2019)
Long run	18.6–37.2	10.5–17.2	35.0	Brulhart et al. (2016)
(c) Progressive wealth taxes				
Short run	9.9	–	–	–
Long run	40.8	15.4	–	–

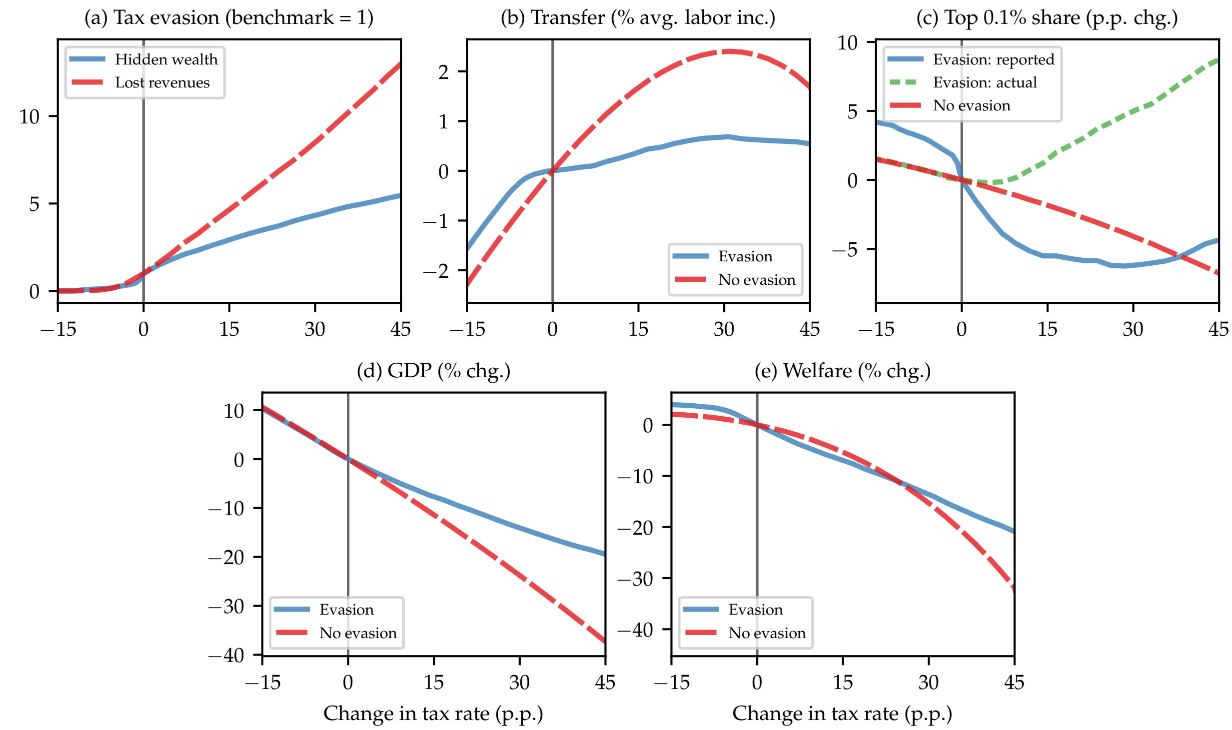
Notes: For baseline and no-evasion model, the table reports ranges across all experiments shown in figures 1–2 and table 4. For the data, the table reports ranges across the relevant empirical studies. See section 8 for a detailed discussion of these studies.

Table 6: Effects of taxing capital income and wealth in alternative calibrations

			Higher evasion costs			
Outcome	Baseline	No evasion	High transfer cost	High detection rate	High penalty	Lower rep. wealth elast.
(a) Benchmark equilibrium						
Concealed wealth (% total)	3.79	–	0.60	2.05	2.33	1.38
Lost revenues (% GDP)	0.50	–	0.04	0.41	0.43	0.19
(b) Revenue-maximizing capital income tax						
Change in tax rate (p.p.)	26.05	28.42	4.74	25.00	26.05	25.00
Transfer (% avg. wage)	0.20	2.17	0.15	0.46	0.42	1.32
Concealed wealth (bench. = 1)	4.68	–	5.65	7.32	6.73	4.66
Lost revenues (bench. = 1)	7.69	–	9.24	7.91	8.19	8.37
(c) Revenue-maximizing wealth tax						
Tax rate (%)	1.67	5.79	1.07	1.93	1.93	4.44
Transfer (% avg. wage)	1.01	3.70	0.96	1.11	1.15	2.53
Concealed wealth (bench. = 1)	6.60	–	25.94	11.99	10.46	8.02
Lost revenues (bench. = 1)	4.00	–	19.40	4.98	4.82	11.72
(d) Warren wealth tax						
Transfer (% avg. wage)	0.06	0.30	0.01	0.12	0.10	0.28
Concealed wealth (bench. = 1)	2.43	–	11.94	3.75	3.26	2.34
Lost revenues (bench. = 1)	1.91	–	13.17	1.83	1.87	1.87
Welfare (% chg.)	-0.34	0.40	-0.53	-0.10	-0.19	0.24
Approval (%)	1.73	82.36	1.33	19.87	8.31	48.43
(e) Reported wealth elasticity to 1.5% tax						
Short run	3.88	–	4.30	3.77	3.71	1.36
Long run	32.42	16.10	32.19	31.82	31.39	18.37

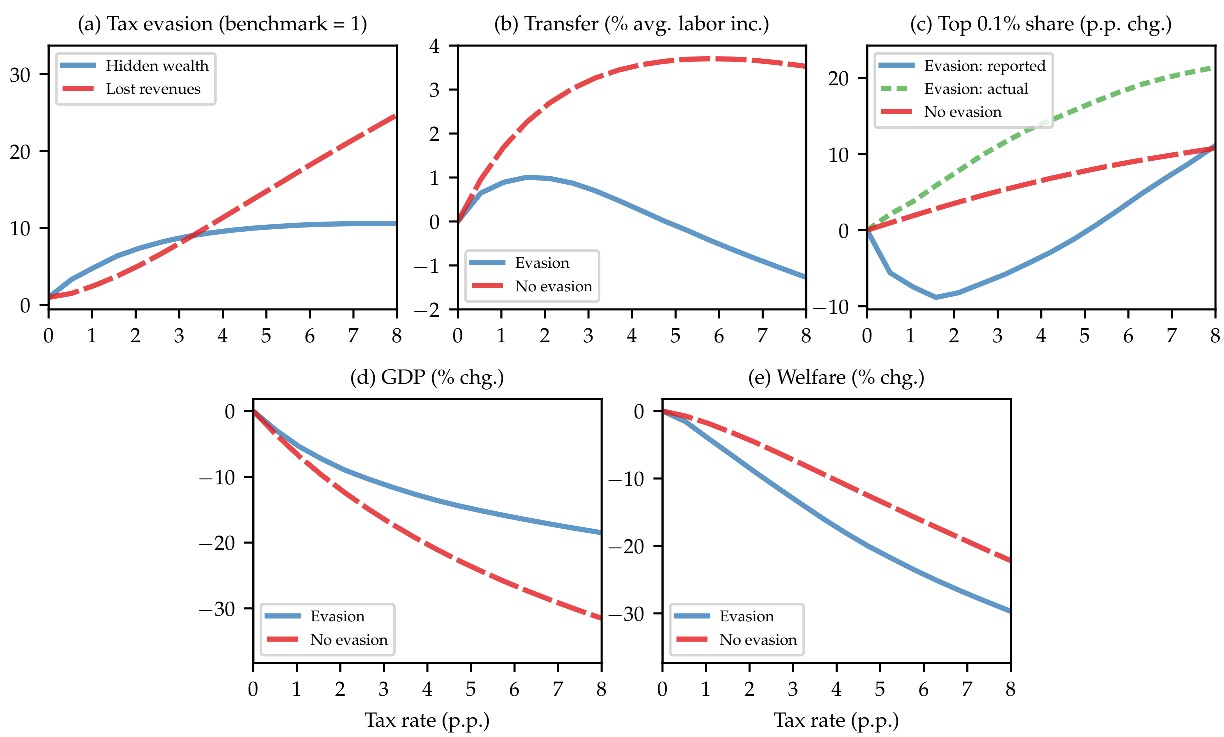
Notes: Outcomes in alternative calibrations are measured relative to the benchmark equilibrium in those calibrations, not the baseline model's benchmark equilibrium. Definitions of alternatives are as follows. High transfer cost model: η is 50% higher. High detection rate model: ω_ι are twice as high. High penalty model: χ_τ and χ_a are 50% higher. Short-run elasticity=1.36 model: only 35% of households can evade. Dashes (–) indicate "not applicable" for evasion-related outcomes in the no-evasion counterfactual.

Figure 1: Long-run effects of capital income tax reform



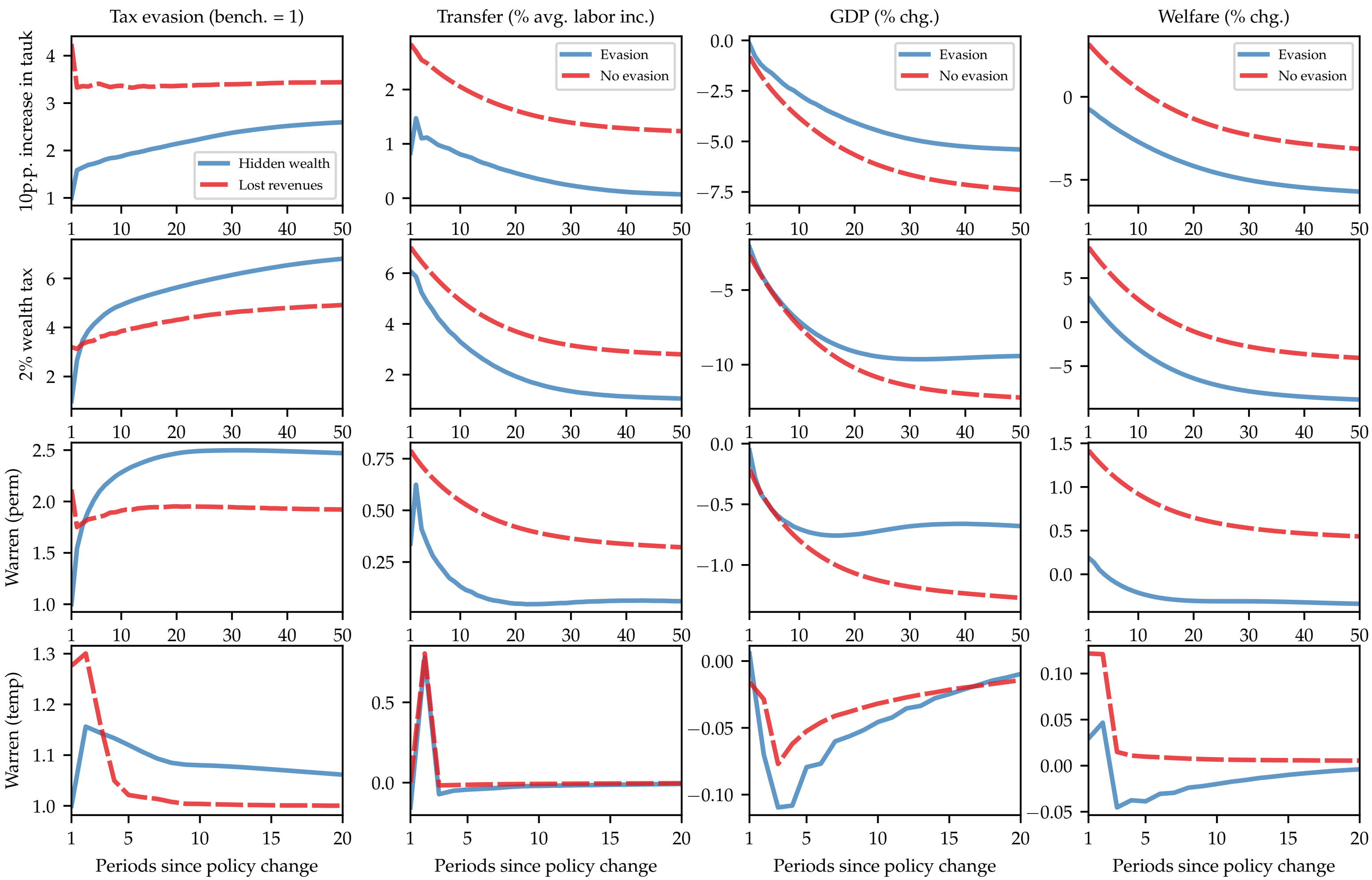
Notes: X-axis of all panels is the change in the capital income tax rate from the benchmark equilibrium. Panel (a) shows outcomes for the baseline model only, while panels (b)–(e) show outcomes in the baseline (labeled "Evasion") and no-evasion counterfactual (labeled "No evasion"). Panel (a) plots hidden wealth and lost tax revenues relative to the benchmark equilibrium. Panel (b) plots the lump-sum transfer as a fraction of the average household's labor income. Panel (c) plots the change in the share of wealth held by the top 0.1% of households relative to the benchmark. In the baseline model, this panel shows this share of reported wealth and actual wealth (concealed plus reported). Panel (d) shows GDP relative to the benchmark. Panel (e) shows welfare relative to the benchmark measured in consumption-equivalent terms.

Figure 2: Long-run effects of wealth taxes



Notes: X-axis of all panels is the wealth tax rate. Panel (a) shows outcomes for the baseline model only, while panels (b)–(e) show outcomes in the baseline (labeled ”Evasion”) and no-evasion counterfactual (labeled ”No evasion”). Panel (a) plots hidden wealth and lost tax revenues relative to the benchmark equilibrium. Panel (b) plots the lump-sum transfer as a fraction of the average household's labor income. Panel (c) plots the change in the share of wealth held by the top 0.1% of households relative to the benchmark. In the baseline model, this panel shows this share of reported wealth and actual wealth (concealed plus reported). Panel (d) shows GDP relative to the benchmark. Panel (e) shows welfare relative to the benchmark measured in consumption-equivalent terms.

Figure 3: Transition dynamics



Notes: Each row shows the outcomes for a particular experiment. Row 1: permanent 10p.p. increase in capital income taxes. Row 2: permanent 2% wealth tax. Row 3: permanent Warren wealth tax. Row 4: temporary Warren wealth tax that lasts only for one period. Column 1: Tax evasion (hidden wealth and lost revenues) relative to the benchmark equilibrium. Column 2: Lump-sum transfer as a percentage of the average labor income. Column 3: GDP relative to the benchmark equilibrium. Column 4: Welfare relative to the benchmark equilibrium measured in consumption-equivalent terms. Column 1 shows outcomes in the baseline model only, show outcomes in the baseline (labeled ”Evasion”) and no-evasion counterfactual (labeled ”No evasion”). In the first three rows, the policy change occurs in period 1. In the last row, the policy change occurs in period 2 but is announced in period 1. In all figures, the length of a period is one year.

Online Appendix for "Tax Evasion and Capital Taxation"

Shahar Rotberg and Joseph B. Steinberg

Appendix A describes data sources and the steps taken to calculate calibration moments using these data. Appendix B describes the code used to solve the model. Appendix C describes additional sensitivity analyses we have performed, and appendices D contains the additional tables and figures associated with these analyses.

A Data

Most of our assigned parameter values and calibration targets are taken directly from the literature. There are a few, however, that we constructed ourselves from several data sources.

Labor productivity process. We model our idiosyncratic labor productivity process after Guvenen et al. (2023). Their process has two parts: a fixed effect that is constant over a household's life and transmitted according to an AR(1) process in logs across generations; and a persistent shock that evolves according to an AR(1) process in logs over a household's life but is not transmitted across generations. Our process is simpler: we have one component that follows one AR(1) process over a household's life and follows a different AR(1) process across generations. To set the parameters of our process, we simulate data from Guvenen et al. (2023)'s process and estimate the parameters of our process on that data. Specifically, we first simulate the two Guvenen et al. (2023) processes:

$$\begin{aligned}\log \kappa_i^{\text{child}} &= \rho_\kappa \log \kappa_i^{\text{parent}} + \sigma_\epsilon \epsilon_{i,\kappa},\\ \log y_{i,j} &= \rho_y \log y_{i,j-1} + \sigma_\nu \nu_{i,j},\ i \text{ survives to reach age } j.\end{aligned}$$

The first is the intergenerational fixed effect process and the second is the intragenerational shock process. i denotes the index of a household and the residuals are drawn from the standard normal distribution. The probability of surviving from age j to $j+1$ is taken from our calibration, and the other parameters are taken from Guvenen et al. (2023): $\rho_\kappa = 0.5$, $\sigma_{\epsilon_\kappa} = 0.305$, $\rho_y = 0.9$, and $\sigma_\nu = 0.2$. Defining $\log e_{i,j} = \log \kappa_i + \log y_{i,j}$, we then estimate

$$\begin{aligned}\log e_{i,0} &= \tilde{\rho}_e \log e_{i,j-1} + \tilde{\sigma}_e \tilde{\epsilon}_{i,0}, \quad i \text{ dies after age } j-1,\\ \log e_{i,j} &= \rho_e \log e_{j-1} + \sigma_e \epsilon_{i,j}, \quad i \text{ survives to reach age } j.\end{aligned}$$

This gives us the values of $\tilde{\rho}_e$, $\tilde{\sigma}_e$, ρ_e, and σ_e used in our calibration.

Entrepreneurial opportunity process. We use the 2016 wave of the Survey of Consumer Finances (SCF) to calculate (i) the fraction of all working-age households with strictly positive business or farm income, and (ii) the fraction of 25-year old households with strictly positive business or farm income. We set the probability of having an entrepreneurial opportunity at birth, p_0, to (i). Given our assignment of the probability of losing an entrepreneurial opportunity, p_1, we then set the probability of regaining an entrepreneurial opportunity, p_2, so that the model is consistent with (ii).

Labor income tax rates. We use data from Table B-1 in Congressional Budget Office (2021) to compute the average labor income tax rates for different segments of the distribution, and then map these rates to our discretized labor productivity process, which has five states. The bottom 20% of households, which corresponds to the first two labor productivity states in our model, pay no taxes. The middle 60%, which corresponds to the third state in our model, have a 12.5% average tax rate. The top 20%, which corresponds to the fourth state in our model, pay 24.4% in taxes on average. To compute the tax rate for the fifth state in our model, which contains the top 2.5% of labor income earners, we take the weighted average of the tax rates for the top 1% and the 96th-99th percentiles, which yields 27.2%.

Corporate capital share. We calculate the corporate income share by dividing profits of nonfinancial domestic corporations (line 13 in NIPA Table 6.16D) by nominal gross domestic product (line 1 of NIPA Table 1.1.5). We use the average corporate income share for 2010–2017.

Detection rate. To obtain an estimate for the rate at which offshore evasion is detected, we multiply the audit rate for individuals in the top 0.1% of the income distribution by the probability that an auditor correctly detects an unfulfilled requirement to report offshore wealth. Based on figure A7 in Guyton et al. (2020), we calculate that the average audit rate for individuals in the top 0.1% from 2009-2019 was 8.1%. Furthermore, figure 4(a) in their study shows that auditors correctly detected unfulfilled requirements to report offshore wealth for 10 individuals out of the 135 individuals audited, which comes to a 7.4% detection rate for individuals audited. Multiplying the former by the latter, gives us approximately a 0.6% detection rate. We thank Daniel Reck, one of the authors of the aforementioned study, for suggesting this approach.

B Code

The model described in section 3 of the main text and calibrated in section 4 is solved using a set of computer programs written in C. The code, along with the Python scripts used to process the program's output are available on Github at `https://www.github/com/joesteinberg/tax-evasion`. The source code is contained in the folder `c/src`. The binary executables, which are created by compiling the program, are contained in the folder `c/bin`. The output of the program, which is created by running the executables, is contained in the folder `c/output`. The makefiles used to create the executables, are contained in the top level of the `c` folder. The scripts used to process the output are contained in the `python` folder. The tables and figures shown in the paper and appendix are in the `python/output` folder.

B.1 Programs and system requirements

There are three main programs: `model`, `model_2type`, and `optpol`. All three programs write output in the form of CSV files. There is one file per equilibrium. The first line contains variable names (e.g. `Y` for GDP, `WtaxRev_lost` for wealth tax revenues lost to evasion...). Each row contains the values for a given period. A stationary equilibrium output file has one line. A transition has many lines, one per period.

`model`. This program solves for the model's equilibrium (both in the long-run and transition dynamics) for a given set of parameters. It uses OpenMP to parallelize the solution of the household's problem and iteration of the distribution. It can be run by simply typing `./bin/model` from the command line. This program has many command-line options that allow the user to run the baseline and no-evasion counterfactuals, various sensitivity analyses, and transition dynamics. To see all the options, run `./bin/model -help`. Note that this program can be run in principle on any computer, but it requires a large amount of memory and lots of CPU cores to run in practice. We used a dual-CPU Xeon workstation with 40 cores and 92GB of RAM. It takes several hours to solve for a single equilibrium and at least a week to solve for a transition. The bash script `optimize.sh` in the main `c` folder contains the batch processing submission request we used.

`model_2type`. This program solves the model in which some households can evade while others cannot. This version requires a different approach to memory management and the easiest way to do it was to simply create an entirely separate version of the code.

`optpol`. This program conducts a global search for the optimal progressive wealth tax using the differential evolution algorithm.[1] This algorithm is implemented using MPI to parallelize the solution of many steady states (associated with different tax parameters) simultaneously. This program still uses OpenMP to parallelize the household problem and distribution updating. In other words, it is a hybrid OpenMP-MPI approach. This program must be run on a supercomputer cluster such as the University of Toronto's Niagara system. We used 100 compute nodes (each with 40 cores) to run this program, assigning 4 MPI tasks to each node. Thus, each iteration of the optimization algorithm solves for 400 equilibria simultaneously.

To compile the programs, simply navigate to the `c` folder and type `make model` or `make optpol` in the command line. In addition to the standard C codebase, these programs require the GNU gcc compiler[2] or the Intel icc compiler,[3] the GNU GSL library,[4], OpenMP[5] and OpenMPI[6]. We used Ubuntu Linux 20.04 to compile and run the programs, and we cannot guarantee that these programs will work without modifications in Windows or other operating systems.

[1] https://en.wikipedia.org/wiki/Differential_evolution
[2] https://gcc.gnu.org
[3] https://www.intel.com/content/www/us/en/develop/documentation/cpp-compiler-developer-guide-and-reference/top.html
[4] https://www.gnu.org/software/gsl
[5] https://www.openmp.org
[6] https://www.open-mpi.org

B.2 Source code

The source code is broken down into several files.

`calibration.c, calibration.h`. This header and source file contain all of the declarations and assignments of the model's parameters, along with several small utility routines.

`eqm.c, eqm.h`. This header and source file contain the code to solve the household's problem, update the distribution, solve for a long-run equilibrium, and solve the transition dynamics given a set of parameter values.

`main.c` This file contains the `main` routine for the program `model`.

`main_2type.c,eqm_2type.c,eqm_2type.h`. Analogous source files for the version of the model in which some households can evade while others cannot.

`diff_evo_mpi.c, diff_evo_utils.c, diff_evo_utils.h, externs.c`. These files contain the code the for MPI implementation of the differential evolution global optimization algorithm in the program `optpol`.

B.3 Processing scripts

In addition to the program's source code, we use several Python scripts to create the tables and figures shown in the paper and appendix.

`tables_figs_main.py`. This script creates table 4 and figures 1–2, which show the main long-run results. It also reports all of the short- and long-run elasticities discussed in section 8.

`table_dist.py`. This script creates table 3, which shows how welfare consequences of capital taxes are distributed.

`tables_figs_trans.py`. This script creates figure 3 and table D.1, which show transition dynamics.

`table_figs_sens.py`. This script creates table 6 and figure D.1, which show the results of the sensitivity analyses we discuss in the main text, as well as versions of the model where detection revenues do not enter the government's budget constraint and hidden wealth cannot be collateralized.

`figs_chi0.py`. This script creates figures D.2–D.3, which show the effects of capital income and wealth taxes when hidden wealth cannot be collateralized

`figs_taul.py`. This script creates figures D.4–D.5, which show the effects of capital income and wealth taxes when additional revenues are used to reduce labor income taxes.

`figs_soe.py`. This script creates figures D.6–D.7, which show the results in our small-open-economy sensitivity analysis.

`tables_figs_noconst.py`. This script creates figures D.8–D.9, which show the results in our sensitivity analysis in which there is no external financing constraint.

C Additional sensitivity analyses

In addition to studying how the costs of tax evasion affect our results, we have analyzed the sensitivity of our results to two additional assumptions about offshore evasion: whether detection penalties enter the government's budget constraint and whether concealed wealth can be used as collateral by entrepreneurs. We have also analyzed the sensitivity of our results to larger differences in the overall structure of the model: how additional tax revenues are used, whether the capital market is closed to international flows, and the source of wealth inequality; note that these differences affect the no-evasion counterfactual as well as the baseline model. Here, we restrict attention to long-run changes in tax rates. We omit the long-run effects of progressive wealth taxes because these results are very similar to the Laffer curves in terms of the differences with the baseline model. We omit optimal progressive wealth taxes and transition dynamics due to the immense computational burden of these analyses.

C.1 Model where detection revenues do not enter government's budget constraint

We have assumed that one of the costs of tax evasion is a penalty for getting detected moving wealth offshore, and that these penalties are collected by the government. When evasion increases, so do aggregate penalty revenues, and this offsets the increase in lost tax revenues to some degree. Here we study a version of the model in which penalty revenues do not enter the government's budget constraint to see how large this offsetting effect is.

Figure D.1 shows the results of this analysis on the Laffer curves for capital income taxes and wealth taxes. This change does not affect tax evasion, inequality, or output (it does affect welfare but not materially). The figure shows that detection revenues play a minor role in the public-finance implications of offshore tax evasion. The Laffer curves in both cases are shifted slightly down from the baseline, but the differences are small.

C.2 Model where concealed wealth cannot be collateralized

We have assumed that entrepreneurs can use concealed wealth as collateral to obtain external financing, just as they can reported wealth. In a previous version of the paper with a different model, we assumed that concealed wealth was less collateralizable. Here we study a version of the model where hidden wealth cannot be collateralized at all.

Figures D.2–D.3 show the results of this analysis. In the case of both capital income and wealth taxes, the results are similar to the baseline results. This because making hidden wealth less concealable causes tax evasion to have a larger macroeconomic effect (by reducing entrepreneurs' demand for capital when they conceal more of their wealth) but also makes the opportunity cost of evading larger. There is slightly less evasion in this model, but the effects of this evasion are slightly more severe, so on balance the effects on public finances, output, and welfare do not change much. The largest difference is that the capital income tax Laffer curve now slopes downward after rising slightly, rather than staying flat.

C.3 Redistribution vs. reducing distortions

We have assumed that changes in government revenues from capital income tax reform and wealth taxation are distributed lump-sum to households. Our analysis is intended to highlight the consequences of tax evasion in a transparent way that captures the spirit of recent calls for increased redistribution. An alternative approach in the quantitative public finance literature is to use the revenues generated by tax reforms to reduce distortionary taxes. Here, we construct Laffer curves as in section **??**, but clear the government's budget by changing the labor income tax rate as in Guvenen et al. (2023) and Conesa et al. (2009) instead of with lump-sum transfers. Since we have a progressive labor income tax structure, we change all values of $\tau_\ell(e)$ by the same multiple. For example, if, in a given experiment, labor income tax rates must change by a multiple v to clear the government's budget constraint, we set $\tau_\ell^{new}(e) = v\tau_\ell(e)$ for all e, where $\tau_\ell(e)$ is the benchmark tax rate and $\tau_e^{new}(\ell)$ is the new tax rate.

Figures D.4–D.5 show the results of this analysis. The results largely mirror the main results shown in the paper with lump-sum transfers. In the absence of evasion, labor income taxes could be reduced dramatically by increasing capital income taxes or levying new taxes on wealth, and the revenue-maximizing tax rates are similar, although as before neither option would improve welfare. In the presence of evasion, however, there is little scope to use capital taxation to reduce labor income taxes. Raising capital income taxes would reduce labor income taxes negligibly (by less than 1p.p. at most). Small wealth taxes could be used to reduce labor income taxes slightly, but far less than in the no-evasion counterfactual. Raising capital taxes would still appear to reduce inequality (except for large wealth taxes), but would still in actuality cause inequality to increase once offshore wealth is taken into account. The macroeconomic results are also similar to the main results, except that the macroeconomic consequences are essentially the same in both versions of the model (instead of larger as in the no-evasion counterfactual). This is because the larger reduction in labor income taxes in the no-evasion model would allow for a larger reduction in distortions, making the economy relatively more efficient compared to the baseline model.

C.4 Small open economy

We have assumed that our model economy is closed to international capital flows: the interest rate adjusts to equate the supply and demand for capital in equilibrium. We have also assumed that hidden wealth remains part of the supply of capital, consistent with the findings of Zucman (2015) that offshore U.S. wealth often ends up being reinvested in U.S. assets. Here, we analyse a small-open-economy version of our model in which the interest rate is held fixed exogenously and the capital market is not required to clear.

Figures D.6–D.7 show the results of this analysis. In the case of capital income taxes, the results are very similar to the baseline results, except that wealth inequality rises slightly in the no-evasion counterfactual (instead of falling as in the baseline model). In the case of wealth taxes, the peak of the Laffer curve shifts far to the right in the no-evasion counterfactual. This is because the massive decline in saving caused by these taxes does not affect the macroeconomy nearly as much since the supply of capital is determined exogenously. Consequently, welfare losses are smaller. In the model with evasion, though, the Laffer curve and welfare effects are very similar to the curve in the baseline model. Thus, the implications of offshore tax evasion for wealth taxes are even more important in a small open economy.

C.5 Castañeda et al. (2003) model without external financing constraints

We have assumed that wealth inequality in our model is generated by rate of return heterogeneity, and that this heterogeneity is in turn generated by external financing constraints that prevent some entrepreneurs from operating at their efficient scales as in Cagetti and De Nardi (2006, 2009) and Guvenen et al. (2023). Here, we study a version of the model without financing constraints in which all households earn the same rate of return on their wealth. Wealth inequality in this model is generated purely by saving motives as in Castañeda et al. (2003); households with high entrepreneurial abilities save when they have entrepreneurial opportunities to insure against the possibility of losing these opportunities (which happens $p_1 = 8.1\%$ of the time).

In this version of the model we cannot calibrate to the ratio of entrepreneurial debt to GDP. Instead, we follow the approach of Dyrda and Pedroni (2022) and calibrate the highest value of the entrepreneurial ability grid directly to match the share of wealth held by the top 0.1%. We also must recalibrate all of the evasion costs in order to match the evasion-related targets in this model's benchmark equilibrium. In this model, the fixed cost of maintaining an account is higher, the proportional transfer cost is lower, and detection rates are more sensitive to the amount transferred.

Figures D.8–D.9 show the results of this analysis. This model is significantly different in structure from our baseline model, so is is not surprising that there are some differences in results. In response to both capital income tax reforms and wealth taxes, concealed wealth rises more than lost tax revenues, whereas the reverse is true in the baseline model. This is undoubtedly due to the changes in the calibration of the evasion costs. Additionally, the top 0.1% of households' share of reported wealth actually rises more than their share of actual wealth. This is because households just below the 99.9% cutoff are responsible for the bulk of the increase in evasion. Despite these differences our main results stand completely. In the absence of offshore tax evasion, raising taxes on capital income or wealth would generate substantial new tax revenues. Once this evasion is accounted for, though, tax evasion would increase dramatically, and as a result tax revenues would barely rise at all. In fact, the differences in Laffer curves between this model's baseline and no-evasion counterfactual are even starker than in the main text of the paper.

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D Additional tables and figures

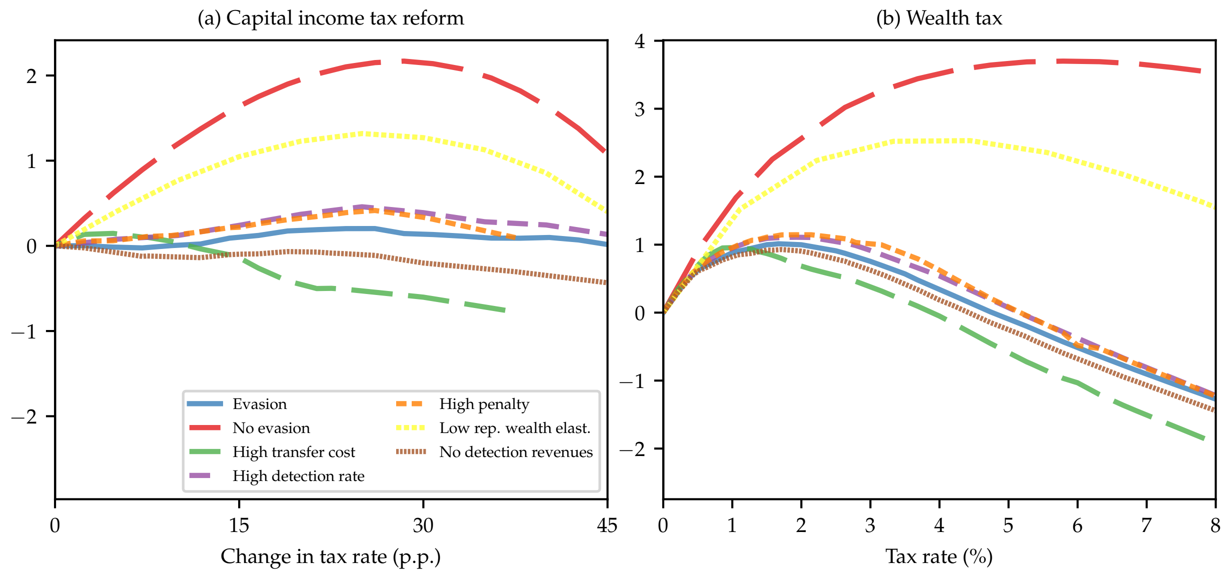
For figures D.2–D.9, please see notes to figures 1–2 in the main text of the paper.

Table D.1: Transition dynamics

		10p.p. increase in capital income tax				2% wealth tax				Warren wealth tax (permanent)				Warren wealth tax (temporary)			
Outcome	*t* =	1	5	10	∞	1	5	10	∞	1	5	10	∞	1	2	5	10
(a) Baseline model																	
Transfer (% avg. wage)		0.83	0.95	0.81	0.00	6.08	4.56	3.29	1.00	0.34	0.28	0.13	0.06	-0.15	0.78	-0.08	-0.02
Concealed wealth (benchmark = 1)		1.00	1.69	1.87	2.74	1.00	4.12	4.91	7.23	1.00	2.01	2.28	2.43	1.00	1.16	1.12	1.08
Lost revenues (benchmark = 1)		4.25	3.53	3.36	3.45	3.20	3.46	3.85	5.09	2.12	1.84	1.91	1.91	1.28	1.30	1.02	1.00
GDP (% chg.)		-0.18	-1.62	-2.68	-5.58	-2.13	-5.04	-7.10	-8.56	-0.06	-0.54	-0.70	-0.69	0.01	-0.07	-0.08	-0.05
Welfare (% chg.)		-0.73	-1.71	-2.71	-6.09	2.77	-0.27	-3.06	-8.42	0.19	-0.06	-0.21	-0.34	0.03	0.05	-0.04	-0.02
Approval rate (%)		15.76	1.05	0.90	0.06	58.56	19.43	16.48	0.19	48.70	18.79	3.37	1.73	74.69	94.92	1.93	3.93
(b) No-evasion counterfactual																	
Transfer (% avg. wage)		2.84	2.40	2.05	1.15	7.02	5.94	4.93	2.70	0.79	0.66	0.55	0.30	-0.00	0.80	-0.01	-0.01
GDP (% chg.)		-0.81	-2.44	-3.83	-7.79	-2.68	-5.12	-7.44	-12.42	-0.22	-0.54	-0.80	-1.32	-0.02	-0.03	-0.05	-0.03
Welfare (% chg.)		3.18	1.82	0.49	-3.60	8.51	5.47	2.55	-4.50	1.42	1.15	0.92	0.39	0.12	0.12	0.01	0.01
Approval rate (%)		70.79	65.13	21.91	4.66	83.02	68.49	64.04	22.29	99.96	99.96	99.97	82.36	99.70	99.71	3.17	10.06

Notes: For the first three experiments (10p.p. increase in capital income tax, 2% wealth tax, permanent Warren wealth tax), reform occurs in period $t = 1$ and $t = \infty$ denotes the long-run steady state. For the last experiment (temporary Warren wealth tax), reform occurs in period $t = 2$ but is announced in period $t = 1$. Changes are measured relative to the benchmark equilibrium under the current tax code in each version of the model. The length of a period is one year.

Figure D.1: Laffer curves in alternative models



Notes: X-axis in panel (a) is the p.p. change in the capital income tax rate from the benchmark equilibrium. X-axis in panel (b) is the wealth tax rate. Y-axis in both panels is the lump-sum transfer as a percentage of the average household's labor income. Blue lines are the baseline model, red lines are the no-evasion counterfactual, and other lines show results in alternative calibrations. Definitions of alternative calibrations are as follows. High transfer cost model (green): η is 50% higher. High detection rate model (purple): ω_ι are twice as high. High penalty model (orange): χ_τ and χ_a are 50% higher. Lower rep. wealth elast. (yellow): 35% of households cannot evade taxes, which generates a short-run elasticity of reported wealth of 1.36. No detection revenues model (brown): detection penalties do not enter government's budget constraint. Outcomes in alternative calibrations are measured relative to the benchmark equilibrium in those calibrations, not the baseline model's benchmark equilibrium.

Figure D.2: Long-run effects of capital income tax reform when hidden wealth cannot be collateralized

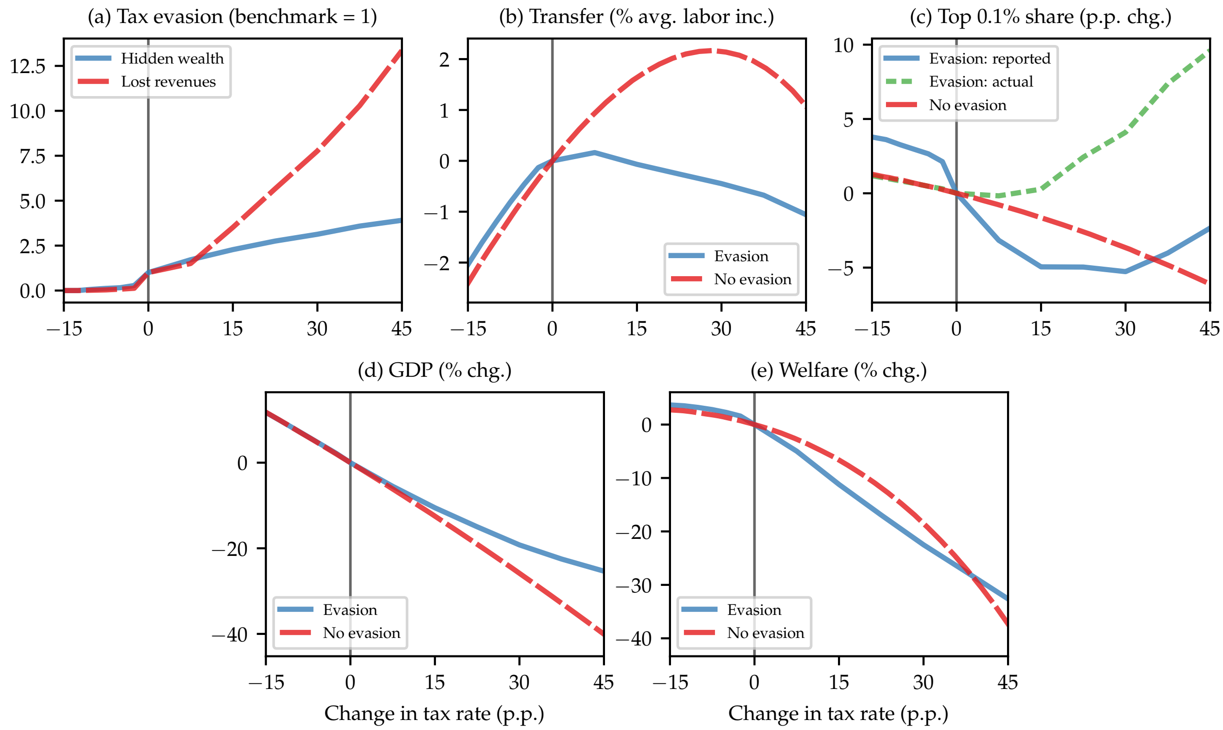


Figure D.3: Long-run effects of wealth taxes when hidden wealth cannot be collateralized

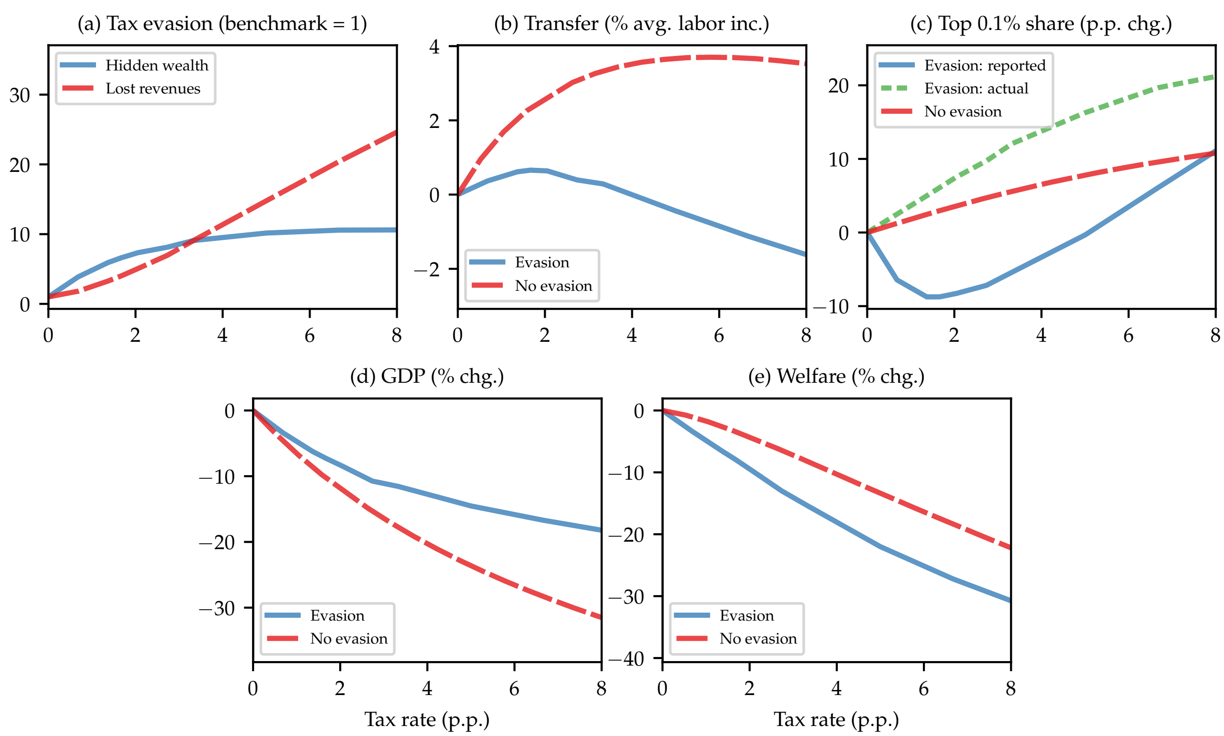


Figure D.4: Long-run effects of capital income tax reform used to finance labor income tax reductions

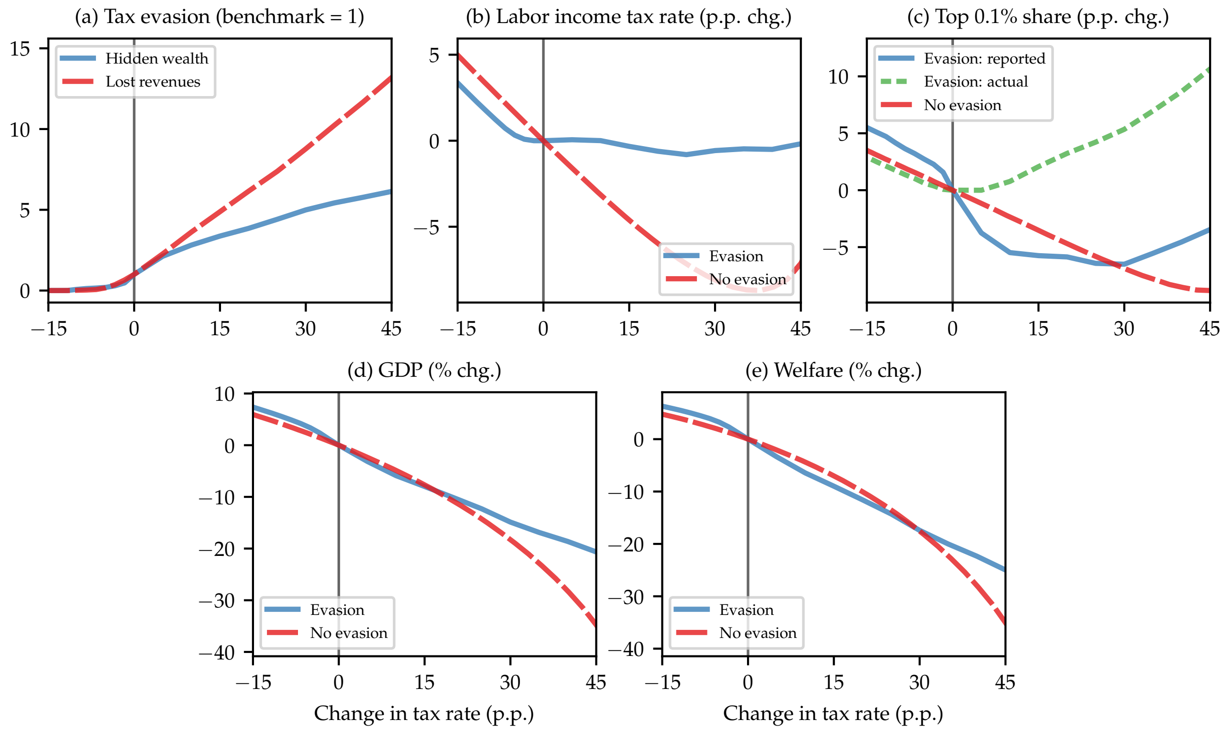


Figure D.5: Long-run effects of wealth taxes used to finance labor income tax reductions

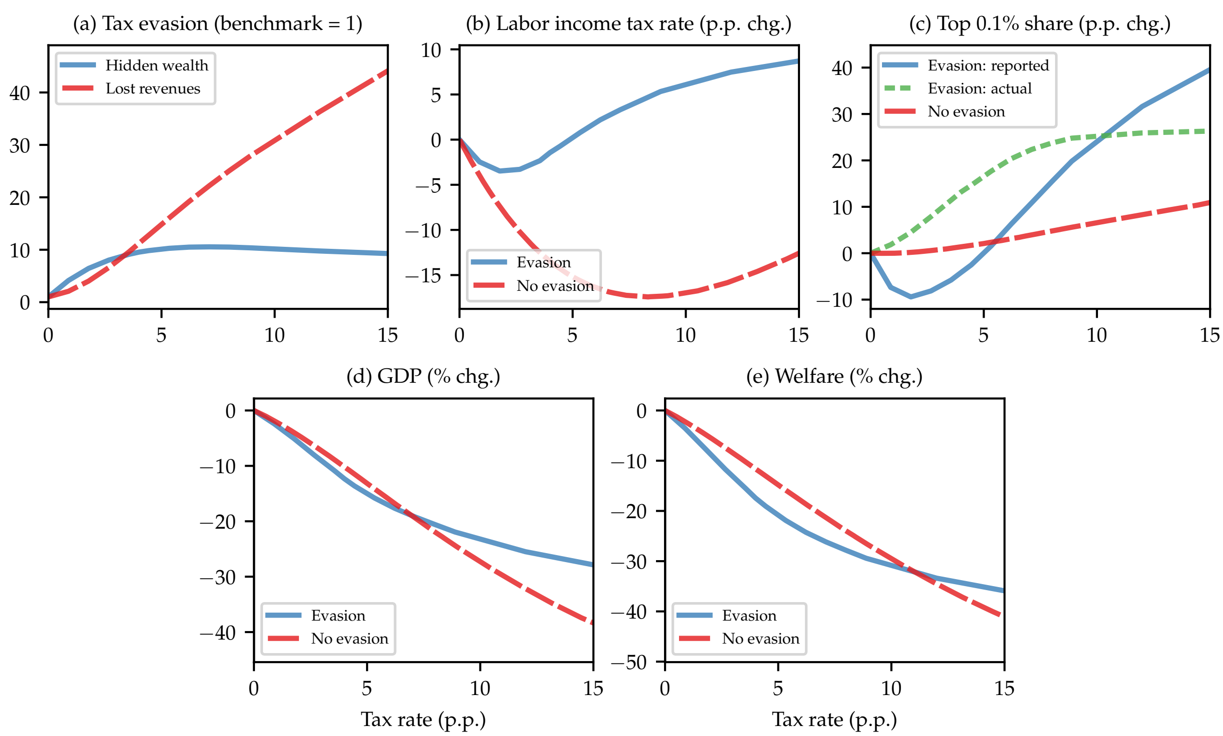


Figure D.6: Long-run effects of capital income tax reform in a small open economy

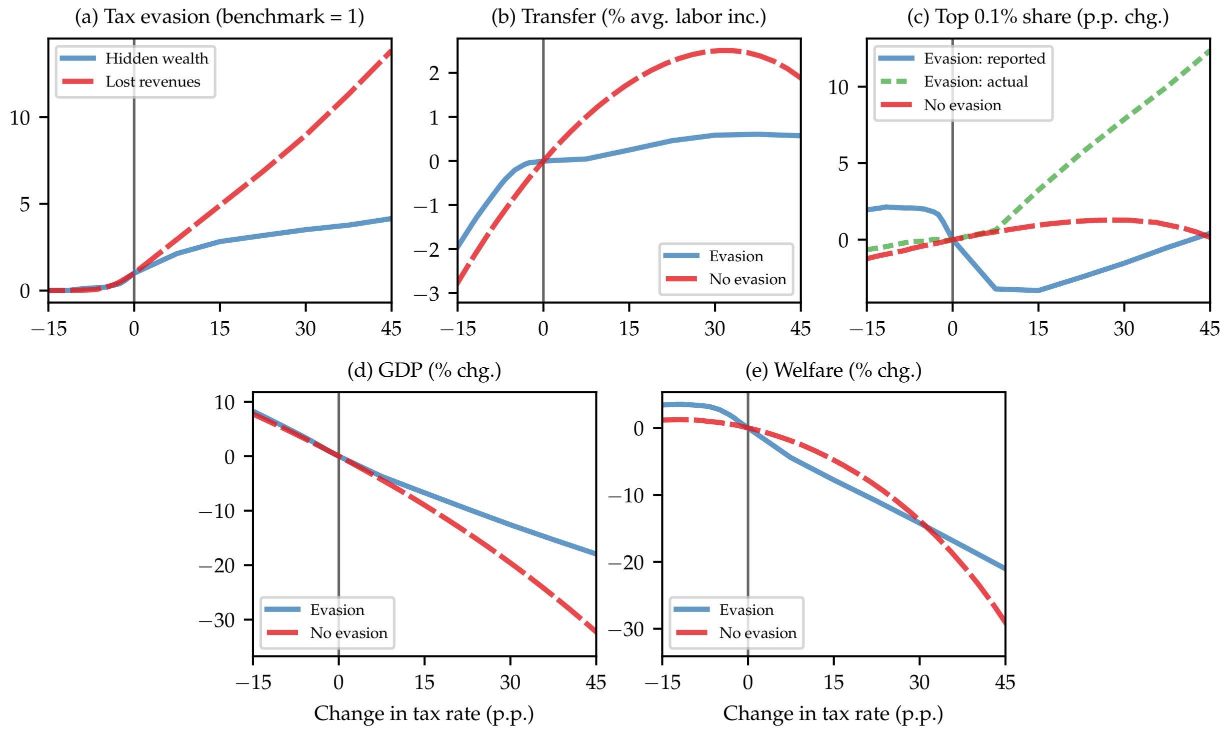


Figure D.7: Long-run effects of wealth taxes in a small open economy

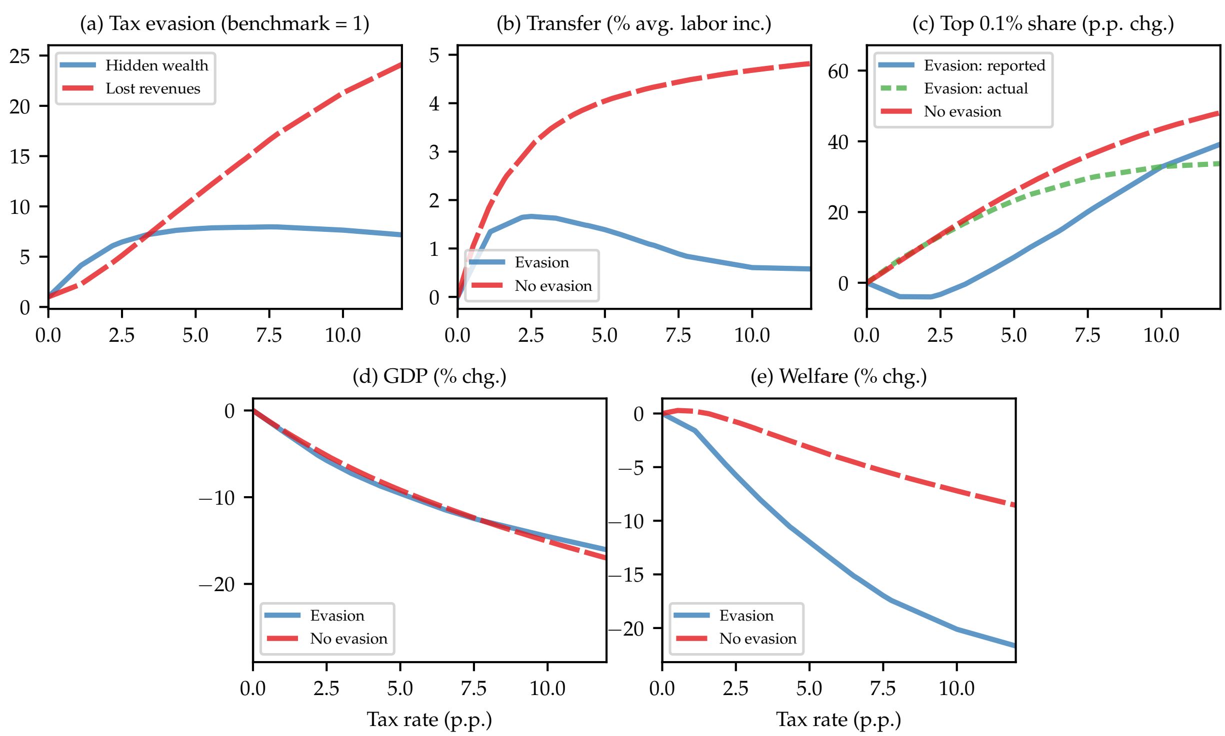


Figure D.8: Long-run effects of capital income tax reform in a Castañeda et al. (2003) model without financing constraints

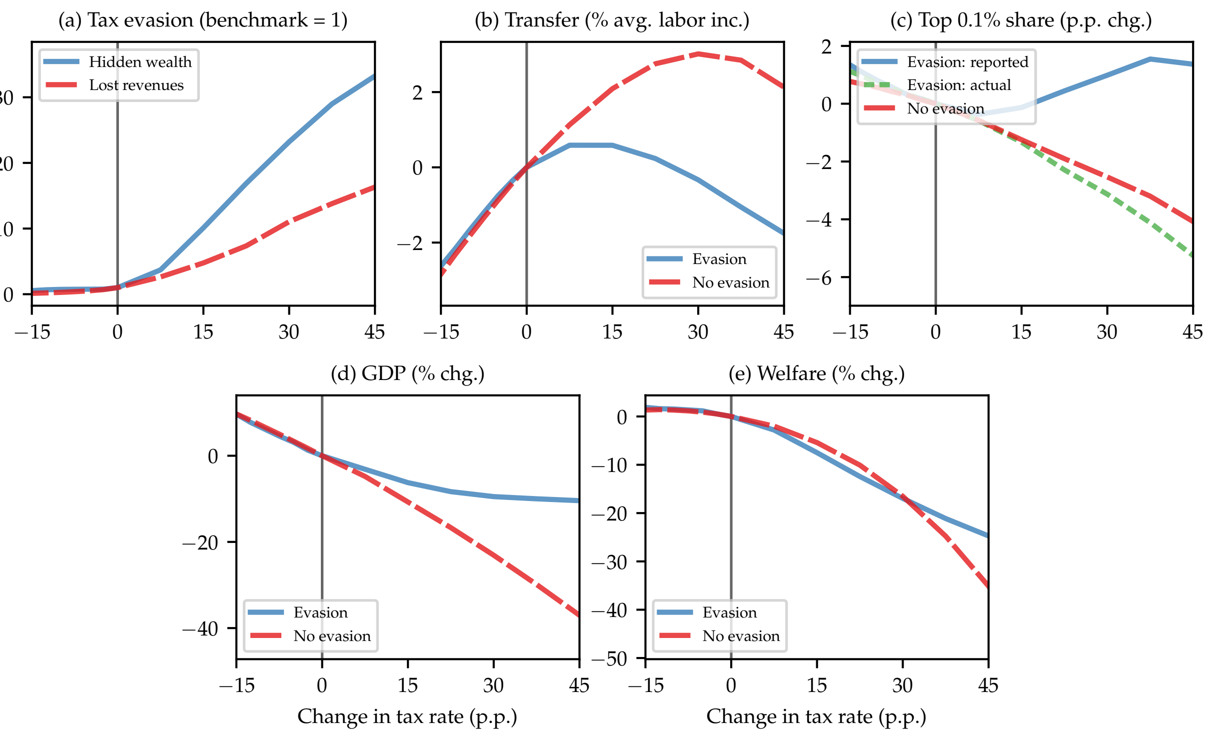


Figure D.9: Long-run effects of wealth taxes in a Castañeda et al. (2003) model without financing constraints