The Economic Effects of Wealth Taxes and Wealth Tax Evasion

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Abstract

Rising wealth inequality has spurred calls to tax rich households' wealth, but critics have raised concerns about wealth tax evasion and adverse macroeconomic consequences. We use a calibrated dynamic general equilibrium model to analyze the effects of taxing the wealthy and study how tax evasion shapes these effects. Wealth taxation would reduce inequality but also output, and although welfare could rise, the gains would be unequally distributed and workers could lose. If evasion shifts capital offshore, the macroeconomic consequences would be larger and swifter, and the optimal wealth tax would feature a larger exemption and lower marginal tax rates.

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

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1 Introduction

The U.S. wealth distribution has grown increasingly concentrated in recent decades. Researchers have argued that wealth inequality has a range of adverse socioeconomic effects, and economists like Saez and Zucman (2019b) and Piketty (2014) have argued that reducing this inequality by taxing rich households' wealth could remedy these ills. During the 2020 Democratic Presidential Primary campaign, Senators Elizabeth Warren and Bernie Sanders published wealth tax proposals that received widespread media attention and spurred vigorous debate among economists and policymakers. Supporters of these policies claim that taxing the wealthy would hinder the accumulation of large fortunes and would raise substantial tax revenues. Critics, on the other hand, argue that these policies could reduce investment and economic activity, especially if the wealthy evade their tax liabilities by shifting assets offshore. In this paper, we use a dynamic general equilibrium model to quantify the macroeconomic and distributional consequences of taxing the wealthy, study how tax evasion shapes these consequences, and determine how the optimal wealth tax

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should be structured.

Our model, which builds on Guvenen et al. (2019b), features overlapping generations of finitely-lived households that are heterogeneous in labor market ability, entrepreneurial skill, and wealth. Households work in the labor market until retirement and, if they have entrepreneurial opportunities, operate businesses. Households save to smooth consumption over their life cycles, insure against idiosyncratic shocks, and leave bequests for their offspring as in Cagetti and De Nardi (2006) and Piketty and Saez (2013). Entrepreneurs also borrow against their wealth to finance capital expenditures. Higher-ability entrepreneurs earn greater returns on their wealth, and this rate-of-return heterogeneity generates a realistic level of wealth concentration (Quadrini, 2000; Cagetti and De Nardi, 2006; Benhabib et al., 2011, 2015, 2016). We calibrate our model so that its equilibrium under the current U.S. tax code matches the share of wealth held by the top 0.1% of households, which is the key statistic that governs the size of the potential wealth tax base. Our calibrated model replicates the overall wealth distribution, not just the top 0.1% share, and matches a number of other salient non-targeted statistics.

Starting from this no-wealth-tax benchmark equilibrium, we use our model to simulate the effects of taxing the wealthy on the U.S. economy. Wealth tax revenue is used to finance public consumption that households value as in Heathcote et al. (2017). Households evade wealth taxes by hiding a portion of their taxable wealth that increases with the rate at which this wealth is taxed. We consider two scenarios with different consequences of evasion for the real economy. In the first—*onshore avoidance*—hidden wealth remains onshore and entrepreneurs can use it to finance their own capital expenditures or lend it to other households. In the second scenario—*offshore evasion*—hidden wealth moves offshore and cannot be used to finance domestic businesses. In each scenario, we consider a range of values for the wealth tax evasion elasticity, which governs the degree of evasion in our model, in order to study how both the nature and degree of evasion determine these policies' effects. We examine transition dynamics as well as long-run changes in order to analyze the timing of wealth taxation's effects and study how tax evasion alters this timing.

In our first quantitative exercise, we use the Warren and Sanders proposals as case studies to demonstrate how taxing the wealthy would affect the U.S. economy. Both policies are progressive in two ways: they would exempt the vast majority of households; and they would feature marginal tax rates that increase with a household's wealth. Senator Warren's proposal features a 2% tax on wealth between $50 million–$1 billion and a 3% tax on wealth above $1 billion. Senator Sanders' proposal features 8 progressive brackets, starting with a tax of 1% on wealth between $32–$50 million and ending with a tax of 8% on wealth above $10 billion.

Both policies would reduce wealth inequality at the top of the distribution substantially. In the absence of wealth tax evasion, the Warren policy would reduce the share of wealth held by the top 0.1% of households by 5.5 percentage points (about one quarter), while the Sanders policy would reduce the top 0.1% share by 6.8 percentage points (about one third). In the onshore avoidance scenario, these policies would have smaller effects on wealth concentration because they would have less impact on rich households' saving.

By contrast, in the offshore evasion scenario wealth inequality would fall further because rich households' entrepreneurial income would decline, which would have a larger impact on these households' saving. Both policies would raise substantial revenues in the short run, consistent with the estimates of Saez and Zucman (2019b), but these revenues would fall over time because the decline in wealth inequality would shrink the tax base. Wealth tax revenues would be lower under offshore evasion than onshore avoidance because the tax base would shrink more.

Although the Warren and Sanders policies would both reduce inequality and improve public finances, they would also cause economic activity to decline. In the absence of wealth tax evasion, GDP and wages would fall by 1.1% and 1.3% in the long run under the two policies, respectively. The macroeconomic consequences would be smaller in the onshore avoidance scenario and larger in the offshore evasion scenario, where GDP could fall by more than 2% if the degree of evasion is high. As a result of these adverse macroeconomic effects, income taxes receipts would fall, offsetting some of the increase in wealth tax revenues; in fact, overall tax revenues would actually fall in the offshore evasion scenario with a high degree of evasion. The nature of wealth tax evasion also plays an important role in determining the timing of these policies' macroeconomic effects. There would be no-short run impact in the onshore avoidance scenario, where output and wages would fall gradually over time as the decline in rich households' saving slowly shrinks the aggregate capital stock. In the offshore evasion scenario, however, there would be an immediate macroeconomic contraction because hidden wealth would no longer be deployable in domestic capital markets.

Even though these policies would reduce economic activity, they would likely increase aggregate welfare, although popular support would depend on both the nature and degree of evasion. A strong majority of households would approve of both policies in the absence of evasion as well as in the onshore avoidance scenario with a low degree of evasion, but approval would be low in the offshore evasion scenario or if the extent of evasion is high. Moreover, the aggregate welfare gains from these policies would be unequally distributed. Wealthy entrepreneurial households would gain substantially, while poorer households would gain modestly or even lose. Offshore evasion would amplify the inequality in welfare outcomes; almost 70% of households would lose due to the large decline in wages in this scenario, but many high-ability entrepreneurial households would still gain substantially.

In our second quantitative exercise, we conduct a normative analysis of the optimal wealth tax structure and how it depends on the nature of wealth tax evasion. We consider a flexible wealth tax specification that allows us optimize over the two dimensions of progressivity displayed by the Warren and Sanders proposals: the amount of household wealth that should be exempted; and the elasticity of the marginal tax rate to a household's wealth. Under onshore avoidance, the optimal wealth tax would feature an exemption of $10.8 million, would tax lower levels of wealth at higher rates than both the Warren and Sanders plans, and would tax higher levels of wealth at lower rates than the Sanders plan. This policy would reduce wealth inequality more than both Senators' plans and would raise more revenue, but it would also cause a larger macroeconomic contraction. Under offshore evasion, the optimal policy would feature an exemption of

$27.5 million and lower tax rates than both the Warren and Sanders plans for all levels of wealth. This policy would have less impact on wealth inequality than either Senators' plan but would also have a smaller macroeconomic effect. Thus, we find that both the positive and normative consequences of wealth taxation hinge crucially on the nature of wealth tax evasion.

Our paper builds on and contributes to several strands of literature. First, several recent empirical studies like Saez and Zucman (2019a,b) and Wolff (2019) have estimated the revenues that wealth taxes like those proposed by Senators Warren and Sanders would raise given the current U.S. wealth distribution. Our work illustrates that although these studies' estimates may be accurate in the short run, the revenues generated by these policies would fall over time as the wealth distribution grows less concentrated. Moreover, we show that the macroeconomic consequences of these policies would partially offset the wealth tax revenues they would generate, and this effect would be particularly significant if wealth tax evasion causes capital to shift offshore. These contributions illustrate the importance of analyzing these policies in a dynamic general equilibrium setting.

A number of other empirical studies have analyzed the extent of wealth tax evasion. These studies report a wide range of estimates for the elasticity of evasion with respect to the tax rate. For example, Seim (2017) finds that in Sweden, a one-percentage-point increase in the wealth tax rate led to a 0.09% increase in evasion, while Brulhart et al. (2016) report an estimated elasticity of wealth tax evasion of up to 34 for Swizerland. Other studies have analyzed the extent of offshore tax evasion. Alstadsæter et al. (2018), for one, find that the richest 0.01% of Scandinavian households hide 15% of their wealth in offshore vehicles like the infamous Mossack Fonseca of the Panama Papers. Our paper contributes to this literature by incorporating wealth tax evasion into a general equilibrium model and analyzing its macroeconomic implications.

More broadly, our paper contributes to the large quantitative public finance literature. Capital income taxation has long been studied extensively (see, e.g., Judd, 1985; Chamley, 1986; Conesa et al., 2009; Straub and Werning, 2015), but wealth taxation has recently begun to receive more attention. Several quantitative papers have analyzed the effects of estate taxes (Cagetti and De Nardi, 2009; Benhabib et al., 2011), but the most similar paper to ours is Guvenen et al. (2019b), who show that using wealth taxes to reduce capital income tax rates would increase output, wages, and welfare by improving the allocation of capital across firms. By contrast, the policies that we analyze would not affect capital income tax rates. In our view, it is politically unlikely that capital income tax rates would be cut if a wealth tax is implemented—if anything, it as more likely that capital income tax rates would rise if the political circumstances required to implement a wealth tax materialize—so it is important for policymakers to understand the effects of wealth taxes *ceteris paribus*. Additionally, we build on the Guvenen et al. (2019b) model by incorporating a theory of wealth tax evasion. To our knowledge, our study is the first to analyze tax evasion in a general equilibrium setting, and our findings, which indicate that the nature and extent of wealth tax evasion play crucial roles in determining the effects of wealth taxation, provide important lessons for policymakers. Finally, we consider a more general form of wealth taxation than Guvenen et al. (2019b) in our optimal policy analysis, allowing for marginal tax rates that depend on the level of household wealth.

2 Model

The model economy, which builds closely on Guvenen et al. (2019b), features overlapping generations of finitely-lived households, competitive firms, and a government. Households in each cohort are heterogeneous in labor market ability, entrepreneurial ability, and wealth. They earn income from working, operating businesses, lending capital to other households' businesses, and, once they retire, social security. Households save in order to smooth consumption over their life cycles, insure against idiosyncratic shocks, and leave bequests for their offspring. Firms produce homogeneous final goods using labor and capital supplied directly by households as well as intermediate inputs purchased from households' businesses. The government provides public goods to all households as well as social security transfers to retirees. It finances these expenditures by levying taxes on income, consumption, and wealth. The government cannot perfectly enforce wealth taxes, however; households hide a portion of their taxable wealth that increases with the rate at which this wealth is taxed.

We consider two versions of our model with different forms of wealth tax avoidance or evasion. In the first—*onshore avoidance*—hidden wealth reduces wealth tax revenues but does not affect capital supply or demand. In this scenario, the only macroeconomic consequences stem from changes in households' saving behavior. In the second scenario—*offshore evasion*—hidden wealth reduces wealth tax revenues, but also reduces the capital supply and households' collateral. In this scenario, capital falls and the economy contracts even if households' saving behavior does not change.

2.1 Demographics and preferences

Households are born at age $j = 0$, retire at age $j = R$, and have a maximum lifespan of J years. They face mortality risk, however, and may die at a younger age. The probability that a household of age j will survive to reach age $j + 1$ is ϕ_j; households that reach the maximum age have a survival probability of $\phi_J = 0$. When a household dies, it is replaced by a newborn household that inherits the dying household's wealth, which we denote by $a \in \mathcal{A} = \mathbb{R}_+$.

Households derive utility from public and private consumption. A household's flow utility is given by

$$u(c, g) = \frac{c^{1-\sigma}}{1-\sigma} + \chi \frac{g^{1-\sigma}}{1-\sigma} \tag{1}$$

where c and g denote private consumption and per-capita government consumption, respectively. We assume that preferences are separable as in Heathcote et al. (2017), which implies that households' decisions, and thus macroeconomic aggregates, do not depend on the relative value of public consumption, χ. Consequently, the macroeconomic effects of wealth taxation do not depend on the calibration of this parameter.

Households also derive utility from the consumption (both public and private) of their offspring as well as their own consumption—they discount both at the same rate, β—and so these bequests are intentional, not accidental.

2.2 Taxes

Government tax revenue comes from a variety of sources: proportional taxes, τ_r, τ_k, and τ_c on interest income, entrepreneurial income, and consumption respectively; a progressive labor income tax, $\tau_{\ell,j}(e)$, that depends on a household's age and labor market ability; and a wealth tax that depends on a household's wealth at the beginning of the period.[1] We use $\tau_a(a)$ to denote the marginal wealth tax rate.

Income and consumption taxes are perfectly enforceable, but the government cannot perfectly enforce the wealth tax. Households hide a portion of their taxable wealth that depends on the rate at which this wealth is taxed. A household's hidden wealth, $\tilde{a}(a)$, and wealth tax payment, $\tilde{\tau}_a(a)$, are given by

$$\tilde{a}(a) = \int_0^a \min\left[\zeta\tau_a(a'), 1\right] \mathrm{d}a' \tag{2}$$

$$\tilde{\tau}_a(a) = \int_0^a \max\left[1 - \zeta\tau_a(a'), 0\right] \tau_a(a')\, \mathrm{d}a' \tag{3}$$

The parameter ζ represents the elasticity of wealth tax evasion with respect to the wealth tax rate. Under a flat wealth tax rate τ_a, a household would hide a fraction $\zeta\tau_a$ of its wealth. Under a progressive wealth tax in which higher wealth levels are taxed at higher rates, such as the policies proposed by Senators Warren and Sanders, richer households hide larger fractions of their wealth. We assume that when the product of the elasticity and the tax rate exceeds 1, households hide the entirety of that portion of their wealth.

We analyze two versions of our model that differ in the way that hidden wealth enters capital markets. In the first version, hidden wealth does not detract from the aggregate supply of capital and households can borrow against it to finance their entrepreneurial capital expenditures. We refer to this as the *onshore avoidance* scenario. In the second version, by contrast, hidden wealth is subtracted from the aggregate supply of capital and households cannot collateralize hidden wealth. We refer to this as the *offshore evasion* scenario. Formally, we define $\hat{a}(a)$ as a household's deployable wealth:

$$\hat{a}(a) = \begin{cases} a & \text{onshore avoidance} \\ a - \tilde{a}(a) & \text{offshore evasion} \end{cases} \tag{4}$$

Deployable wealth, not total wealth is used to compute the aggregate supply of capital and entrepreneurial

[1] Guvenen et al. (2019b) model wealth taxes that depend on households' cash-in-hand, which includes income earned in the current period as well as initial wealth. Roughly speaking, this is equivalent to levying wealth taxes at the end of the period rather than at the beginning. Under the Warren and Sanders policies, wealth taxes would be paid on the previous year's wealth, just as income taxes are paid on the previous year's income under the current U.S. tax code. Our model yields virtually identical results using Guvenen et al. (2019b)'s wealth tax timing in the absence of wealth tax evasion, and this timing makes it cumbersome to define deployable wealth in the onshore-avoidance and offshore-evasion scenarios.

collateral. We describe in detail how deployable wealth affects entrepreneurship and macroeconomic aggregates in sections 2.4 and 2.6 below.

2.3 Labor income and social security

Before retirement, households earn income by working in the labor market, and after retirement they earn social security benefits that depend on their income as workers. A household's labor market productivity is the product of two components: an idiosyncratic ability, $e \in \mathcal{E} = \mathbb{R}_{++}$, and a deterministic, life-cycle component, ζ_j, that increases over time. The former follows a Markov process with transition function $F(e'|e)$ until retirement; newborns draw their initial abilities from the ergodic distribution, $F(e)$, associated with this process.

Working-age households supply labor inelastically.[2] A household of age $j < R$ with ability e supplies $\ell_{j,t}(e) = \zeta_j e$ units of labor and earns net labor income

$$y_{\ell,j,t}(e) = (1 - \tau_{\ell,j}(e))W_t e \zeta_j,$$

where W_t is the wage rate. Retired households receive social security transfers that depend on their labor abilities and the current average labor income:

$$y_{R,t}(e) = \kappa(e) \sum_{j=0}^{R-1} \int_{\mathcal{E}} y_{\ell,j,t}(e) \, \mathrm{d}F(e).$$

The parameter $\kappa(e)$ represents the fraction of the average labor income that a retiree with labor ability e receives. Because households' labor abilities are fixed once they retire, this parameter captures the extent to which a household's lifetime labor income influences its social security benefits.[3]

2.4 Capital income

Households also earn income generated by their wealth. Our model of capital income follows that of Guvenen et al. (2019b), in which households earn entrepreneurial income by borrowing capital to produce differentiated intermediate goods and earn interest income by lending capital to other entrepreneurs.

A household's entrepreneurial productivity also consists of two components. The first component, $z \in \mathcal{Z} = \mathbb{R}_{++}$, is fixed throughout a household's life and partially transmitted across generations; newborn households draw their fixed entrepreneurial abilities from a distribution, $G(z|z^{\text{parent}})$, that depends on their parents' abilities. The second component, $\iota \in \mathcal{I} = \{1, 2, 3\}$, is an idiosyncratic shock that amplifies a

[2] A model with endogenous labor supply would yield similar quantitative results because the policy changes that we analyze have modest effects on the wage rate, which in turn would have little impact on workers' labor supply decisions with a realistically-calibrated labor supply elasticity.

[3] Rather than tracking each household's history of labor income shocks to measure realized lifetime labor income, we use average lifetime labor income conditional on labor ability upon retirement to determine social security benefits. Households that retire with high abilities are more likely to have enjoyed high abilities throughout their lives, and thus receive larger social security transfers.

household's fixed ability when $\iota = 1$ and diminishes it when $\iota = 3$. A household's overall entrepreneurial productivity is given by

$$x(z, \iota) = \begin{cases} z^{\omega} & \iota = 1 \\ z & \iota = 2 \\ 0 & \iota = 3 \end{cases}.$$

The parameter ω governs the extent to which good entrepreneurial shocks enhance households' fixed entrepreneurial abilities. Entrepreneurial ability shocks follow a Markov process with an absorbing state at $\iota = 3$:

$$\Pi = \begin{bmatrix} 1 - p_1 - p_2 & p_1 & p_2 \\ 0 & 1 - p_2 & p_2 \\ 0 & 0 & 1 \end{bmatrix}.$$

Thus, good or neutral entrepreneurial shocks ($\iota = 1, 2$) are transitory, whereas bad shocks ($\iota = 3$) are permanent. Households born with above-average fixed abilities start their lives with good shocks ($\iota = 1$), and households with below-average fixed abilities start immediately in the absorbing bad state ($\iota = 3$). Formally, a newborn household's entrepreneurial ability shock is given by

$$\iota_0(z) = \begin{cases} 1 & z > 1 \\ 3 & z \leq 1 \end{cases} \tag{5}$$

Guvenen et al. (2019b) show that this approach to modeling entrepreneurial productivity generates realistic wealth inequality and captures the fraction of ultra-wealthy households whose fortunes are "self-made."[4] We refer to households born with below-average fixed entrepreneurial abilities as "working households" and households with above-average fixed entrepreneurial abilities as "entrepreneurial households."

Households earn entrepreneurial income by using capital to produce differentiated varieties of intermediate goods which they sell to final goods producers. Entrepreneurs can self-finance their capital expenditures using their deployable wealth or finance externally at the interest rate r_t. Households that self-finance earn interest income by providing external financing to other households. Entrepreneurs that choose to finance externally face a collateral constraint,

$$k \leq \bar{k}(z, \hat{a}(a)). \tag{6}$$

Following Buera et al. (2011), we allow this constraint to depend on a household's fixed entrepreneurial ability as well as its wealth to capture the possibility that skilled entrepreneurs can credibly repay larger

[4] Guvenen et al. (2019b) assume that newborn households with below-average fixed abilities start with the neutral shock, $\iota = 2$, rather than starting immediately with the bad shock, $\iota = 3$. We have experimented with both approaches, and have found that our approach ensures a better fit on the low end of the wealth distribution. Our approach also generates data-consistent entrepreneurship rate and accounts for the fact that most households in the United States have no business income.

loans. Note, though, that a household's deployable wealth, $\hat{a}(a)$, not its total wealth, forms its collateral. Consequently, offshore wealth tax evasion in the second version of our model reduces external financing, capturing the idea that wealth hidden offshore may not be collateralizable. Entrepreneurs that self-finance lend out the difference between their deployable wealth and their capital, $\hat{a}(a) - k$; offshore evasion also reduces lending to other entrepreneurs.

A household with entrepreneurial productivity x that uses k units of capital produces $q = xk$ intermediate goods and sells them at a price $p_t(q)$ which we characterize shortly below. A household's entrepreneurial income is given by $p_t(q)q - \delta k - r_t \max(k - \hat{a}(a), 0)$, where δ represents the depreciation rate. A household's interest income is given by $r_t \max(\hat{a}(a) - k, 0)$. The tax rates on these two income streams are τ_k and τ_r, respectively. Given its fixed and stochastic entrepreneurial abilities, z and ι, and its wealth a, a household chooses capital to maximize its capital income—the sum of its entrepreneurial and interest income—net of taxes. A household's net capital income is given by

$$y_{k,t}(z,\iota,a) = \max_{k \le \bar{k}(z,\hat{a}(a))} \Big\{ (1-\tau_k)\left[p_t(x(z,\iota)k)x(z,\iota)k - \delta k - r_t \max(k - \hat{a}(a), 0)\right] + (1-\tau_r) r_t \max(\hat{a}(a) - k, 0) \Big\}. \tag{7}$$

We denote by $k_t(z,\iota,a)$ the household's optimal choice of capital, and use $q_t(z,\iota,a)$ to denote the associated output of intermediate goods.

2.5 Dynamic program

Each period, households choose how much of their disposable income to save. The value function that represents a working-age household's consumption-saving problem is

$$V_{j,t}(e,z,\iota,a) = \max_{c,a' \ge 0} \Big\{ \frac{c^{1-\sigma}}{1-\sigma} + \beta\phi_j \sum_{\iota' \in \mathcal{I}} \Pi_\iota(\iota'|\iota) \int_{\mathcal{E}} V_{j+1,t+1}(e',z,\iota',a')\, \mathrm{d}F(e'|e) + \beta(1-\phi_j) \sum_{\iota' \in \mathcal{I}} \Pi_\iota(\iota') \int_{\mathcal{E}\times\mathcal{Z}} V_{0,t+1}(e',z',\iota_0(z'),a')\, \mathrm{d}F(e')\mathrm{d}G(z'|z), \Big\} \tag{8}$$

subject to

$$(1+\tau_c)c + a' = y_{\ell,j,t}(e) + y_{k,t}(z,\iota,a) - \tilde{\tau}_a(a). \tag{9}$$

The first component of the continuation value represents the value of surviving and living to age $j+1$, which occurs with probability ϕ_j. The second component represents the expected lifetime utility of the household's offspring. The value function of a retired household is similar, except that its labor ability shock, e, is fixed, and its budget constraint includes social security income, $y_{R,t}(e)$, rather than net labor income, $y_{\ell,j,t}(e)$. We denote the optimal saving and consumption policies by $a'_{j,t}(e,z,\iota,a)$ and $c_{j,t}(e,z,\iota,a)$.

We exclude public goods from our formulation of the value function because public goods enter households' preferences separably. Because households discount their children' utility at the same rate as their own, we can write a household's lifetime utility from a given period t onward as

$$U_{j,t}(e,z,\iota,a) = V_{j,t}(e,z,\iota,a) + \sum_{s=t}^{\infty} \beta^{s-t} \frac{g_s^{1-\sigma}}{1-\sigma}. \tag{10}$$

This formulation facilitates welfare measurements as we shall see in section 4.3.2.

2.6 Aggregation

The distribution of age-j households over exogenous states and wealth is given by $\Psi_{j,t}(e,z,\iota,a)$. $\mathcal{S} = \mathcal{E} \times \mathcal{Z} \times \mathcal{I} \times \mathcal{A}$ denotes the household's state space.

The final good, Y_t, is produced using labor, L_t, a bundle of differentiated intermediate goods purchased from households' businesses, Q_t, and corporate capital rented directly from households, K_t, according to the technology,

$$Y_t = K_t^{\gamma} Q_t^{\alpha} L_t^{1-\alpha-\gamma}. \tag{11}$$

As in Guvenen et al. (2019b), Q_t is a CES aggregate of intermediate inputs purchased from households' businesses:

$$Q_t = \left(\sum_{j=0}^{J} \int_{\mathcal{S}} q_{j,t}(z,\iota,a)^{\nu} \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a) \right)^{\frac{1}{\nu}}. \tag{12}$$

The parameter ν governs the elasticity of substitution between intermediate goods. We refer to Q_t as the aggregate intermediate bundle or the aggregate supply of entrepreneurial capital. We include corporate capital as well as entrepreneurial capital to account for the fact that public firms may not face the same financial frictions as privately-run businesses (Zetlin-Jones and Shourideh, 2017); wealth taxes may have different effects on the allocation of capital among the former as compared to the latter. Final-goods producers are competitive, and choose factor inputs to maximize profits taking the wage, W_t, the interest rate, r_t, and the price of each intermediate variety, $p_t(q)$, as given. The first-order conditions that characterize a final-goods producer's demand for labor, corporate capital, and intermediates are

$$W_t = (1-\alpha-\gamma) K_t^{\gamma} Q_t^{\alpha} L_t^{-\alpha-\gamma}. \tag{13}$$

$$r_t = \gamma K_t^{\gamma-1} Q_t^{\alpha} L_t^{1-\alpha-\gamma}. \tag{14}$$

$$p_t(q_{j,t}(z,\iota,a)) = \alpha K_t^{\gamma} Q_t^{\alpha-\nu} L_t^{1-\alpha-\gamma} q_{j,t}(z,\iota,a)^{\nu-1}, \tag{15}$$

We refer to $P_t = \alpha K_t^{\gamma} Q_t^{\alpha-\nu} L_t^{1-\alpha-\gamma}$ as the aggregate marginal product of entrepreneurial capital or the aggregate intermediate goods price. In our calibration, where $\alpha < \nu$, P_t is decreasing in Q_t, which implies that entrepreneurs receive higher prices for their varieties when Q_t is smaller; entrepreneurs earn greater returns on their wealth when there is less competition from other entrepreneurs.

The labor market clearing condition is

$$\sum_{j=0}^{R-1} \int_{\mathcal{S}} \ell_{j,t}(e) \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a) = L_t. \tag{16}$$

The capital market clearing condition is

$$\sum_{j=0}^{J} \int_{\mathcal{S}} \hat{a}(a) \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a) = K_t + \sum_{j=0}^{J} \int_{\mathcal{S}} k_t(z,\iota,a) \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a). \tag{17}$$

Note that households' deployable wealth, $\hat{a}(a)$, not their total wealth, forms the aggregate supply of capital. Consequently, offshore wealth tax evasion in the second version of our model reduces the supply of capital as well as tightening households' collateral constraints. Thus, the effect of a wealth tax on equilibrium interest rates in this version of the model is ambiguous; holding fixed the distribution of wealth and the interest rate, offshore wealth tax evasion causes both the supply and demand for capital fall.

The government's budget constraint requires that expenditures on public goods, g_t, and social security are equal to total tax revenues in each period:

$$\begin{aligned} &\sum_{j=0}^{J} \int_{\mathcal{S}} g_t \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a) + \sum_{j=R}^{J} \int_{\mathcal{S}} y_{R,t}(e) \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a) \\ &= \sum_{j=0}^{J} \int_{\mathcal{S}} \left[\tau_{j,t}(e,z,\iota,a) + \tau_c c_{j,t}(e,z,\iota,a) + \tilde{\tau}_a(a) \right] \, \mathrm{d}\Psi_{j,t}(e,z,\iota,a). \end{aligned} \tag{18}$$

$\tau_{j,t}(e,z,\iota,a)$ represents a household's total income tax payment, which includes taxes on labor income, entrepreneurial income, and interest income. In our calibration, we set the level of public consumption so that the government's budget constraint is satisfied under the current U.S. tax code, which does not feature a wealth tax. Introducing a wealth tax raises the level of public consumption as long as the difference between total revenues and social security benefits increases. Note, however, that if output declines in equilibrium—and it does in our analyses—income and consumption tax revenues decline, and this partially offsets wealth tax revenue.

The distributions of surviving households evolve according to the law of motion,

$$\begin{aligned} &\Psi_{j+1,t+1}(E \times Z \times \{\iota'\} \times A) = \\ &\quad \phi_j \int_{\mathcal{S}} \left[\Pi(\iota'|\iota) \int_E \mathrm{d}F(e'|e) \right] \mathbb{1}_{\left\{a'_{j,t}(e,z,\iota,a) \in A\right\}} \mathbb{1}_{\{z \in Z\}} \mathrm{d}\Psi_{j,t}(e,z,\iota,a), \; 1 < j < J, \end{aligned} \tag{19}$$

where E, Z, and A are typical subsets of $\mathcal{E}$, $\mathcal{Z}$, and $\mathcal{A}$, respectively. The distribution of newborn households evolves according to

$$\Psi_{0,t+1}(E \times Z \times \{\iota'\} \times A) = \tag{20}$$
$$\sum_{j=0}^{J}(1-\phi_j)\int_{\mathcal{S}}\left[\int_{E\times Z} \mathrm{d}F(e'|e)\mathrm{d}G(z'|z)\mathbb{1}_{\{\iota'=\iota_0(z')\}}\right]\mathbb{1}_{\left\{a'_{j,t}(e,z,\iota,a)\in A\right\}}\mathrm{d}\Psi_{j,t}(e,z,\iota,a).$$

2.7 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, $\left\{\left(V_{j,t}(\cdot), k_{j,t}(\cdot), q_{j,t}(\cdot), c_{j,t}(\cdot), a'_{j,t}(\cdot)\right)_{j=0}^{J}\right\}_{t=0}^{\infty}$, and a sequence of distributions, $\left\{\left(\Psi_{j,t}(\cdot)\right)_{j=0}^{J}\right\}_{t=0}^{\infty}$, that

1. solve the household's static and dynamic problems, (7)–(8);
2. satisfy the representative firm's first-order conditions, (13)–(15);
3. satisfy the market clearing conditions, (16)–(17);
4. satisfy the government's budget constraint, (18);
5. and satisfy the laws of motion for the distributions of households, (19)–(20).

In the long run, an equilibrium always converges to a stationary equilibrium in which the objects listed above are constant over time, and each set of parameter values is associated with a unique stationary equilibrium. The nature and length of the transition to a stationary equilibrium is determined by the distance of the initial distributions, $\left(\Psi_{j,0}(\cdot)\right)_{j=0}^{J}$, from their stationary counterparts.

3 Calibration

We calibrate our model so that its stationary equilibrium under the current U.S. tax code, which does not include a wealth tax, replicates the share of wealth held by the top 0.1% of households and other key facts about the U.S. economy. We refer to this stationary equilibrium as the no-wealth-tax benchmark equilibrium, or the benchmark equilibrium for short. Our calibration proceeds in two stages. First, we assign standard values to common parameters like the capital share and the depreciation rate, and apply estimates from other studies for parameters that have clear empirical counterparts. Second, we jointly calibrate the remaining parameters so that the model matches several additional moments from U.S. data. Our no-wealth-tax benchmark equilibrium closely matches the entire wealth distribution, not just the concentration of wealth among the richest households, and a number of other relevant statistics that we do not target in our calibration.

3.1 Assigned parameters

Table 1 lists the assigned parameter values, which we break into several groups.

3.1.1 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 assume that households have CRRA utility, $u(c) = \frac{c^{1-\sigma}}{1-\sigma} + \chi \frac{g^{1-\sigma}}{1-\sigma}$, and set $\sigma = 2$. Because preferences are separable, the weight on public goods, χ, does not affect households' decisions or macroeconomic variables and is therefore irrelevant to the calibration of our benchmark equilibrium. We discuss the assignment of this parameter in our discussion of the welfare consequences of wealth taxes in section 4.3. The discount factor, β, is determined in the second stage of our calibration procedure.

3.1.2 Taxes and interest rates

We set the consumption tax, τ_c, and the entrepreneurial income tax, τ_k, to McDaniel (2007)'s estimates of 7.5% and 25%, respectively. We set the interest income tax, τ_r, to the long-term capital gains tax rate of 15%. We set the labor income tax rates, $\tau_{\ell,j}(e)$, to match the average effective tax rate for each age and labor income group (see section 3.1.3 below). The overall average labor income tax rate is close to McDaniel (2007)'s estimate of 22%.

We set the wealth tax, $\tau_a(a)$, 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. The wealth tax evasion elasticity, ξ, is therefore irrelevant in our calibration. We discuss plausible values for this parameter in more detail when we describe our quantitative analysis in section 4 below.

3.1.3 Labor market ability

We use a discrete process for the stochastic component of labor market ability, e, with four possible states: $\mathcal{E} = \{e_1, \ldots, e_4\}$. The first three states represent the bottom three quintiles of the U.S. labor income distribution, and the fourth state represents the top two quintiles. We set the probabilities that newborn households draw these states to reflect this mapping: $F(e) = \{0.2, 0.2, 0.2, 0.4\}$. We set the values of these states using 2017 U.S. Census Bureau data on each quintile's share of equivalized household labor income.

To set the transition probabilities for labor market ability, we use Burkhauser et al. (1997)'s estimates of the probability of moving down one quintile in the labor income distribution. We assume that households cannot move up or down more than one quintile in a single year, and set the probabilities of moving up a quintile so that the mass of households in each state is constant. This approach ensures that our model matches the fraction of low-income households, the income of these households relative to other households in the economy, and the rate at which households move into and out of the low-income state.[5]

We set the deterministic life-cycle component of labor market ability to $\zeta_j = 1 + \min\{0.38j/30, 0.38\}$ to match Guvenen et al. (2019a)'s finding that households' labor income rises by 38% by age 55 and then

[5]We have also analyzed a version of our model with an AR(1) process for labor market ability, which yields similar results but requires a larger number of states, reducing its numerical tractability.

grows little thereafter.

3.1.4 Entrepreneurial ability

We assume that fixed entrepreneurial ability follows an AR(1) process across generations:

$$\log z = \rho_z \log z^{\text{parent}} + \epsilon_z, \quad \epsilon_z \sim N(0, \sigma_z). \tag{21}$$

We set $\rho_z = 0.15$ based on the estimates of Fagereng et al. (2018). The dispersion parameter, σ_z, is determined in the second stage of our calibration procedure. We use Guvenen et al. (2019b)'s values for the parameters of the entrepreneurial ability shock process. ω, which governs the degree to which fixed entrepreneurial abilities are amplified by the good shock, is set to 5. p_1, the probability of transiting from the good shock to the neutral shock, is set to 5%, and p_2, the probability of transiting from the neutral shock to the bad shock, is set to 3%. The collateral constraint, $\bar{k}(z, \hat{a}(a))$, is also determined in the second stage of our calibration procedure.

3.1.5 Production

We set the corporate capital share, γ, to 0.053, the average ratio of corporate income to GDP reported in the NIPA tables, and then set α so that the aggregate capital share, $\alpha + \gamma$, is equal to the standard value of 0.4. We set the depreciation rate, δ, to 5%. We use Guvenen et al. (2019b)'s value of 0.9 for ν, the curvature parameter in the entrepreneurial capital bundle.

3.2 Calibrated parameters

After assigning the parameter values listed above, there are three parameters that still must be calibrated: σ_z, the dispersion of entrepreneurial abilities; β, the discount factor; and $\bar{k}(z, \hat{a}(z))$, the collateral constraint. Following Guvenen et al. (2019b), we discretize the entrepreneurial ability process, $\mathcal{Z} = \{z_1, z_2, \ldots, z_k\}$, and parameterize the collateral constraint as

$$\bar{k}(z_k, \hat{a}(a)) = \left[1 + \lambda \left(\frac{k-1}{\#\mathcal{Z} - 1}\right)\right] \hat{a}(a), \; k = 1, \ldots, \#\mathcal{Z}. \tag{22}$$

The parameter λ governs the extent to which higher-ability entrepreneurs can borrow more against their wealth. We jointly calibrate σ_z, β, and λ to match three moments from U.S. data: the share of aggregate net wealth held by the top 0.1% of households; the ratio of aggregate wealth to GDP; and the average ratio of debt to assets for private firms.

We use the top 0.1% share of 20% reported by Saez and Zucman (2019b), who manually add the Forbes 400 to the Survey of Consumer Finances (SCF). This is an important target in our calibration because it determines the size of the tax base for progressive wealth taxes like those proposed by Senators Warren and Sanders that exempt the vast majority of households.[6]. We use the most recent SCF data to compute an aggregate net wealth to GDP ratio of 4.79. The third statistic comes from Asker et al. (2011), who estimate that the average private firm's debt to assets ratio is 0.31. Each of these parameters effects all three moments to some degree. Roughly speaking, however, σ_z controls the top 0.1% share, β controls the net wealth-GDP ratio, and λ controls the debt-assets ratio. The calibrated model matches all three moments exactly. Table 2 lists the values of the jointly calibrated parameters.

3.3 Non-targeted moments

Our calibrated model matches a number of other relevant statistics from U.S. data that we do not target in our calibration. Although we target only the share of wealth held by the top 0.1% of households, our model matches other quantiles at the top of the wealth distribution reasonably well, ensuring that it accurately captures the size of the wealth tax base. In fact, our calibrated wealth distribution yields similar predictions to Saez and Zucman (2019b) about the revenue that would be generated by Senator Warren's proposed wealth tax in the short run; they estimate that with an evasion elasticity of 7.5 this policy would raise 1% of GDP in revenue, whereas our model predicts revenues of 1.09% of GDP. Moreover, we match closely estimates in the literature of the entrepreneurship rate and the fraction of government revenues that come from capital income taxes. Lastly, the model also accurately matches the the aggregate ratio of bequests to net wealth. These statistics are reported in table 3.

4 Assessing the Warren and Sanders proposals

Our first quantitative exercise is a positive analysis of the wealth taxes recently proposed by Senators Elizabeth Warren and Bernie Sanders during the 2020 Democratic Presidential Primary campaign. Starting from the no-wealth-tax benchmark equilibrium, we implement these proposals in our model as permanent, unanticipated changes to the wealth tax, $\tau_a(a)$. First, we quantify the aggregate long-run effects of these policies in both versions of our model—onshore avoidance and offshore evasion—for a range of values of the evasion elasticity, ξ, to analyze how these effects depend on both the nature and extent of wealth tax evasion. Next, we explore the distributional consequences of these policies and discuss the general-equilibrium forces that drive these results. Last, we analyze the transition dynamics that would follow the implementation of these policies to illustrate how wealth tax evasion matters in both the short run and the long run.

[6] In a previous version of this paper we targeted the top 0.1% share in the SCF, which is only 15%. Our results in this version were similar but muted compared to the results we report in the current version. With a less-skewed wealth distribution, wealth taxes raise less revenue but have smaller macroeconomic consequences.

4.1 Implementation

Senators Warren and Sanders both proposed progressive wealth taxes that would exempt about 99.9% of households. The Warren proposal entails a tax of 2% on wealth between \$50 million–\$1 billion and a tax of 3% on wealth above \$1 billion.[7] The Sanders policy is 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.[8] Both policy proposals state that wealth tax revenues would be used to finance increased public consumption like universal healthcare, construction of affordable housing, and green infrastructure.

For each of these two policies, let $\underline{a}_1, \underline{a}_2, \ldots, \underline{a}_N$ denote the model equivalents of the wealth tax thresholds (e.g. \$50 million and \$1 billion in the Warren proposal) and let $\tau_{a,1}, \tau_{a,2}, \ldots, \tau_{a_N}$ denote the tax rates associated with these thresholds. For example, $\tau_{a,1}$ is the tax on wealth between $\underline{a}_1$ and $\underline{a}_2$, and $\tau_{a,N}$ is the tax on wealth above the highest threshold $\underline{a}_N$. We compute hidden wealth, $\tilde{a}(a)$, and wealth tax payments, $\tilde{\tau}_a(a)$, as

$$\tilde{a}(a) = \left\{ \sum_{i=1}^{N-1} \left[\max\left(\min(a, \underline{a}_{i+1}) - \underline{a}_i, 0 \right) \min(\tau_{a,i}\xi, 1) \right] \right\} + \max\left(a - \underline{a}_N, 0 \right) \min(\tau_{a,N}\xi, 1), \tag{23}$$

$$\tilde{\tau}(a) = \left\{ \sum_{i=1}^{N-1} \left[\max\left(\min(a, \underline{a}_{i+1}) - \underline{a}_i, 0 \right) \max\left(1 - \tau_{a,i}\xi, 0 \right) \tau_{a,i} \right] \right\} + \max\left(a - \underline{a}_N, 0 \right) \max\left(1 - \tau_{a,N}\xi, 0 \right) \tau_{a,N}, \tag{24}$$

In line with the Senators' proposals, we assume that revenues generated by these policies are used to finance increased provision of public consumption.[9] As we will show, these policies cause output and wages to contract, reducing income tax revenues and thereby offsetting the revenues generated from wealth taxation. Consequently, public consumption rises less than wealth tax revenues—in some cases, significantly less.

In their analysis of Senator Warren's plan, Saez and Zucman (2019b) assume a wealth tax evasion elasticity of 7.5. This value is the average of elasticities estimated in the literature for other countries that have introduced progressive wealth taxes in the past: Sweden (Seim, 2017); Denmark (Jakobsen et al., 2018); Colombia (Londoño-Vélez and Ávila-Mehcha, 2018); and Switzerland (Brulhart et al., 2016). These elasticity estimates vary widely, however, ranging from less than 1 for Sweden and Denmark to 35 for Switzerland, and there is considerable disagreement among economists and policymakers about how much wealth tax evasion would occur in the United States. Instead of assigning a single value to ξ, the evasion elasticity parameter in our model, we analyze the Warren and Sanders proposals for three different values: 0, 7.5, and 35. The first allows us to study the effects of these policies in the absence of wealth tax evasion. The

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

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

[9] In a previous version of this paper, the government rebated wealth tax revenues as lump-sum transfers instead of providing public goods. Although the results of this version of the analysis were similar, referees pointed out that lump-sum transfers induce poorer households to save less, which could alter the macroeconomic and distributional consequences of wealth taxation. Under our current approach, these consequences are independent of the value that households place on public goods.

other two values allow us to explore the interactions between the nature—onshore avoidance or offshore evasion—and the extent of wealth tax evasion.

4.2 Long-run effects on the macroeconomy, inequality, and public finances

We begin our analysis of the Warren and Sanders wealth taxes with a discussion of these policies' long-run effects on output, prices, aggregate wealth and wealth inequality, wealth tax revenue, and public consumption. Table 4 reports differences in these outcomes between the benchmark no-wealth-tax equilibrium and the stationary equilibria with the Warren and Sanders wealth taxes in each evasion scenario (onshore avoidance and offshore evasion) and each of the three evasion elasticities we consider ($\xi \in \{0, 7.5, 35\}$).[10]

4.2.1 Macroeconomic variables

The first four columns of table 4, which report our long-run results for macroeconomic variables, show that the Warren and Sanders policies would cause macroeconomic contractions in all of the scenarios that we have analyzed. The intuition, articulated by wealth tax critics like Larry Summers,[11] is straightforward: aggregate wealth would fall because rich households save less, and this would reduce the aggregate capital stock and lower the marginal product of labor. The size of this effect, however, would differ greatly across the two policies and with the nature and extent of wealth tax evasion.

In the absence of wealth tax evasion (an evasion elasticity of $\xi = 0$) both policies would cause GDP and wages to fall by more than 1%.[12] The Sanders policy is more aggressive than the Warren policy, and so the former would cause a larger decline in aggregate wealth and a correspondingly larger decline in macroeconomic activity than the latter. Although the effects of these policies on interest rates are potentially ambiguous—the decline in wealth would reduce demand for capital as well as supply because households with less wealth can deploy less capital in their businesses—we find that interest rates would rise slightly under both policies. Finally, both policies would cause the aggregate marginal product of entrepreneurial capital, P_t, to rise because the aggregate entrepreneurial capital stock, Q_t, would fall.

In the onshore avoidance scenario, these policies' macroeconomic effects would be smaller than in the no-evasion scenario and would shrink as the evasion elasticity increases. Here, the decline in GDP under the Warren policy would be about 9% smaller with $\xi = 7.5$ and about 39% smaller with $\xi = 35$. The differences would be larger for the Sanders policy, under which the decline in GDP would be about 12% smaller with $\xi = 7.5$ and almost 50% smaller with $\xi = 35$. Conversely, in the offshore evasion scenario, the macroeconomic effects would be larger and would grow as the evasion elasticity increases. Here, the decline in GDP under the Warren policy would be about 36% larger than in the no-evasion scenario with $\xi = 7.5$ and almost 120% larger with $\xi = 35$. Under the Sanders policy, the decline in GDP would be about

[10] The results for $\xi = 0$ are the same in both evasion scenarios.

[11] http://larrysummers.com/2019/04/01/fair-comprehensive-tax-reform-is-the-right-path-forward/

[12] These policies would have the same effects on wages as on output due to our assumption that households supply labor inelastically.

29% larger with $\xi = 7.5$ and almost 100% larger with $\xi = 35$. Interest rates would rise less as the evasion elasticity increases in both scenarios, but for different reasons. Under onshore avoidance, a higher evasion elasticity reduces the impact on rich households' saving and therefore reduces the impact on capital supply and demand. Under offshore evasion, by contrast, capital supply and demand both fall further as the evasion elasticity increases.

To sum up, progressive wealth taxes like those proposed by Senators Warren and Sanders would cause the macroeconomy to contract in the long run, but the size of this contraction would depend on the aggressiveness of the policy, the extent to which rich households would evade these taxes, and whether this evasion would affect capital supply and demand. Onshore avoidance that reduces wealth tax payments but has no direct impact on capital supply or demand would reduce these policies' macroeconomic effects. By contrast, offshore avoidance that reduces capital supply and demand would increase these effects.

Before turning to the effects of these policies on wealth inequality, we wish to address an argument made by Saez and Zucman (2019b,a) in their analysis of Senator Warren's proposal. They claim that the macroeconomic effects of a wealth tax would be more muted in a small open economy because foreign capital would flow into the economy to offset the decline in capital supplied by rich households, instead of the interest rate rising to clear the domestic capital market as in our closed-economy model. Our results indicate that this open-economy effect would be negligible. Interest rates rise by at most two tenths of a percentage point across all of the scenarios we analyze, and our results are very similar when we analyze a partial-equilibrium version of our model with an exogenous interest rate. The reason is that although the decline in household wealth would reduce the aggregate supply of capital in equilibrium, it would also reduce aggregate demand for capital even in the no-evasion and onshore-avoidance scenarios. Wealth taxes would reduce rich households' wealth in all of the scenarios we have analyzed, and in our model this always reduces, at least to some extent, the amount of capital that they can deploy in their businesses. Moreover, in the offshore-evasion version of the model, in which wealth taxes have the largest macroeconomic consequences, interest rates rise the least because aggregate demand for capital falls the most. Thus, the scope for foreign capital to offset the decline in domestic capital supply is smallest in the scenarios with the largest macroeconomic consequences.

4.2.2 Wealth inequality

The fourth and fifth columns of 4 show how the Warren and Sanders policies would affect the distribution of wealth in the long run. We find that both Senators' proposed policies would indeed reduce wealth inequality, as measured by the Gini coefficient, and the share of wealth held by the richest 0.1% of households. The distributional effects are seen primarily at the top of the wealth distribution, however, because both policies target by construction only the ultra-wealthy; the Gini coefficient moves little in all of the scenarios we study.

The top 0.1 share of wealth would drop dramatically in all of the scenarios we have analyzed. In the absence of wealth tax evasion, the top 0.1% share would fall by 5.47 percentage points—about 27%—under the Warren policy, and by 6.75 percentage points under the Sanders policy—more than one third. In the onshore avoidance scenario, the effect of these policies on the top 0.1% share would be lower than in the no-evasion case and it would diminish as the evasion elasticity increases. In this scenario, wealth taxes would have less effect on rich households' savings as the evasion elasticity increases because these households would pay less wealth taxes but are still able to deploy their hidden wealth in capital markets. In the offshore evasion scenario, the Warren and Sanders policies would have larger effects on the top 0.1% share than in the no-evasion case, and these effects would grow as the evasion elasticity increases. In this version of the model, evasion reduces rich households' wealth payments but also reduces their ability to generate business income, and the net effect is that rich households' savings fall more as the evasion elasticity increases, rather than rising as in the onshore-avoidance version of the model.

These results illustrate an important tension between the goal of reducing wealth inequality and the macroeconomic consequences of wealth taxation: the scenarios we have analyzed in which wealth inequality falls most are also the scenarios in which output falls most. The Sanders policy is more aggressive than the Warren policy, and while it would have a larger effect on wealth inequality, it would also have a larger effect on output and wages. Similarly, offshore wealth tax evasion would amplify these policies' effects on wealth inequality, but also amplify their macroeconomic consequences.

4.2.3 Public finances

The last three columns of table 4 show how much tax revenue the Warren and Sanders policies would raise in the long run and how much public consumption these revenues would finance.

The no-evasion scenario is the best case for both policies in terms of public finances. The Warren policy would raise 0.7% of GDP in wealth tax revenue in this scenario and the Sanders policy would raise 0.81%. Public consumption expenditures would rise by 4.5% under the former policy and 5.06% under the latter. Both onshore avoidance and offshore evasion would reduce wealth tax revenues and their effect on public consumption; in both versions of the model, wealth tax revenues and government spending decrease as the evasion elasticity increases. Offshore evasion would have a more significant effect on public consumption, however, because it would cause more macroeconomic harm. If $\xi = 35$, public consumption would actually fall in this scenario under both the Warren and Sanders policies because the decline in income tax revenue would be larger than the increase in wealth tax revenue.

These results highlight another important tension between two of the primary goals of wealth taxation: reducing wealth inequality diminishes the tax base from which wealth taxes generate revenues. We find that the Warren policy would raise less revenue in the long run than Saez and Zucman (2019b)'s estimate of 1% of GDP, and this is precisely because this policy would reduce the share of wealth held by the richest households; Saez and Zucman (2019b) assume that the wealth distribution would not change when this policy is implemented. Our results also indicate that enforcement is critical for wealth taxes to meet their public-finance goals. Overall tax revenues could even fall if enforcement is weak, as declining income tax revenues could outweigh the revenues generated by taxing the wealthy.

4.3 Long-run welfare consequences

We turn now to the long-run effects of the Warren and Sanders policies on households' welfare. First, we discuss our calibration of the value of public goods in households' utility functions and our measures of welfare. Next, we present our results for aggregate welfare and discuss how the nature and extent of wealth tax evasion shape these effects. Last, we provide additional context for these results by analyzing these policies' welfare consequences for groups of households in different regions of the state space.

4.3.1 Calibrating the utility value of public goods

The welfare consequences of the Warren and Sanders policies are shaped by several forces: declining wages and rising interest rates, reallocation of capital across households' businesses, and increased provision of public goods. Households' decisions do not depend on public goods in our model, so we can determine these policies' effects on macroeconomic variables, the wealth distribution, and public finances without assigning a value to the parameter χ, which governs the value that households place on public goods. To quantify these policies' welfare consequences, however, we must assign a value to this parameter.

Heathcote et al. (2017) show that in this class of models there is a one-to-one relationship between χ and the optimal steady-state ratio of public consumption to private consumption. In our model, this relationship is given by

$$\frac{g}{g + \sum_{j=0}^{J} \int_{\mathcal{S}} c_j(e, z, \iota, a)\, \mathrm{d}\Psi_j(e, z, \iota, a)} = \frac{\chi^{\frac{1}{\sigma}}}{1 + \chi^{\frac{1}{\sigma}}}, \tag{25}$$

where the integral in the denominator measures average consumption per household; we omit time subscripts from steady-state formulae for notational brevity. Heathcote et al. (2017) calibrate χ so that the public-private consumption ratio observed in the data is optimal and then explore the welfare consequences of revenue-neutral changes in income tax progressivity. Applying this calibration strategy in our context is complicated by the fact that the policies we study increase tax revenue and public consumption.

We use a similar approach to compute two alternative values of χ that provide plausible bounds on welfare effects. First, we use equation (25) to find the value of χ for which public-consumption provision in the benchmark equilibrium is optimal. This value is $\chi = 0.029$. Then, for each experiment—defined by a wealth tax policy, an evasion/avoidance scenario, and an evasion elasticity—we use this equation to compute a second experiment-specific value of χ such that public-consumption provision in the new stationary equilibrium is optimal.[13] We also report welfare results when households do not value public goods ($\chi = 0$), because a number of households approve of these policies in this case even though output

[13] Setting χ so that the new stationary equilibrium's public-private consumption ratio is optimal does not immediately imply welfare is higher in the new stationary equilibrium. This is because welfare is determined by both the ratio of private and public consumption and their levels, which may decline as wages decline and interest rates rise. Indeed, we find that welfare falls in several of our experiments for both values of χ that we consider.

and wages fall.

4.3.2 Welfare measures

Our measure of long-run aggregate welfare is the fraction of annual private consumption that a household randomly placed into the no-wealth-tax benchmark would give up to be placed randomly into the new stationary equilibrium with a wealth tax instead. This measure is similar to the Rawlsian consumption-equivalent measure of Conesa et al. (2009). Public consumption is constant in a stationary equilibrium, so we can use equation (10) to compute aggregate welfare as

$$CE = \left\{ \frac{\sum_{j=0}^{J} \int_{\mathcal{S}} V_j^{\dagger}(e,z,\iota,a)\ \mathrm{d}\Psi_j^{\dagger}(e,z,\iota,a) + \chi \left[\frac{(g^{\dagger})^{1-\sigma} - (g^{*})^{1-\sigma}}{(1-\beta)(1-\sigma)} \right]}{\sum_{j=0}^{J} \int_{\mathcal{S}} V_j^{*}(e,z,\iota,a)\ \mathrm{d}\Psi_j^{*}(e,z,\iota,a)} \right\}^{\frac{1}{1-\sigma}} - 1, \tag{26}$$

where stars denote equilibrium objects in the no-wealth-tax benchmark and daggers denote objects in the new stationary equilibrium. We also measure the aggregate approval rate of each policy, i.e. the fraction of households for whom $U_j^{\dagger}(e,z,\iota,a) > U_j^{*}(e,z,\iota,a)$:

$$AR = \sum_{j=0}^{J} \int_{\mathcal{S}} \mathbb{1}_{\left\{U_t^{\dagger}(e,z,\iota,a) > U_j^{*}(e,z,\iota,a)\right\}} \mathrm{d}\Psi_{j,t}(e,z,\iota,a). \tag{27}$$

Here, we hold the distribution constant at its initial value, $\left(\Psi_j^{*}(\cdot)\right)_{j=0}^{J}$. We measure welfare and approval rates for sub-populations of households in a similar way by summing over the appropriate age range and/or integrating over the appropriate portion of the state space.

4.3.3 Aggregate welfare

Table 5 reports the long-run aggregate welfare consequences of the Warren and Sanders policies. As one might expect, the welfare gains and approval rates are higher for the experiment-specific values of χ than for the benchmark value of χ, but all of the differences are small, indicating that our calibration strategy provides tight bounds on these effects.

The no-evasion scenario is the best case for welfare and popular support under both policies. In this scenario, both policies would increase aggregate welfare by at least 0.5% and would receive approval from more than 60% of households. The Sanders policy would increase aggregate welfare more than the Warren policy but would receive less widespread support. Interestingly, both policies would still increase aggregate welfare in this scenario even if households do not value public goods at all (i.e., if $\chi = 0$), although most households would disapprove.

In the onshore-avoidance scenario, both policies would still increase welfare regardless of the evasion elasticity, but the welfare gains and approval rates would be lower for both policies than in the no-evasion scenario. If the evasion elasticity is high ($\xi = 35$), the welfare gains would shrink dramatically and less than a third of households would approve of either policy. These policies would raise aggregate welfare even if households do not value public goods in this scenario as well, although approval would again be low.

In the offshore-evasion scenario, both policies would raise welfare, albeit negligibly, if the evasion elasticity is low ($\xi = 7.5$), but they would both lower welfare substantially if the evasion elasticity is high ($\chi = 35$) because public consumption would fall. A majority of households would disapprove of both policies in this scenario regardless of the evasion elasticity. Both policies would lower welfare if households do not value public goods regardless of whether the evasion elasticity is high or low.

In summation, although wealth taxes like those proposed by Senators Warren and Sanders would have adverse macroeconomic consequences, they would increase aggregate welfare in many scenarios and would enjoy support from a majority of households if wealth tax evasion does not shift capital offshore and the degree of evasion is mild. However, if wealth tax evasion does shift capital offshore or the degree of evasion is high, most households would disapprove of these policies and welfare could even fall.

4.3.4 Distributional consequences

Our aggregate welfare results indicate that while the Warren and Sanders wealth taxes could raise aggregate welfare, the gains would be unequally distributed. For example, the Sanders policy would generate larger average welfare gains than the Warren policy but would be supported by fewer households. For another, both policies would raise aggregate welfare with onshore evasion and a high evasion elasticity, but less than a third of households would support the policies in this experiment. Here, we dig deeper into the welfare consequences of these policies by analyzing how they would affect households with different levels of wealth or exogenous characteristics. For the sake of brevity, we report results only for the low-evasion ($\xi = 7.5$) scenarios using the benchmark public-goods utility value ($\chi = 0.029$). These results are sufficient to highlight the distributional consequences of the two policies and how these consequences depend on the nature of wealth tax evasion; the extent of evasion and the value of public goods do not alter the primary qualitative lessons drawn from this analysis.

Table 6 reports the welfare consequences of the Warren and Sanders taxes for households in different percentiles of the wealth distribution. Ultra-wealthy households in the top 0.1% of the distribution would actually gain under both policies in the onshore avoidance scenario despite the fact that they are the only ones that would pay these taxes, although these households would lose substantially in the offshore scenario.[14] Other rich households in the top 20% of the distribution would gain under both policies and in both scenarios. Households between the 60th and 80th percentiles of the distribution would gain in the onshore avoidance scenario but lose in the offshore evasion scenario. Finally, households in the bottom 60%

[14] The top 0.1% of the wealth distribution gain in the onshore avoidance case even though they are the ones paying the tax because their marginal utility from private consumption is lower than their marginal utility from public consumption. In our experiments with lump-sum transfers instead of public-goods provision, the top 0.1% lose in both evasion scenarios, but all of our other distributional results are unchanged.

of wealth distribution would lose under both policies and in both evasion scenarios, although they would lose more in the offshore evasion scenario. These results indicate that these policies would actually benefit many wealthy households at the expense of poor households.

Table 7 reports the welfare effects of these policies for households with different combinations of entrepreneurial skill and labor market ability. In the onshore avoidance scenario, households in all skill groups would gain from both policies on average but the gains would be concentrated amongst the highest-ability households. In particular, entrepreneurial households (z_5–z_9) would gain substantially more than working households (z_1–z_4). In the offshore avoidance scenario, the distribution of welfare effects would be even more skewed: all working households would lose, while all entrepreneurial households would still see large welfare gains. Table 8, which reports welfare effects for entrepreneurial households with different entrepreneurial ability shocks, shows that the welfare gains from these policies would be unequally distributed even among the entrepreneurial households. In particular, entrepreneurial households with good shocks ($\iota = 1$) would see significantly larger welfare gains than households with neutral ($\iota = 2$) or bad ($\iota = 3$) shocks.

Why would the welfare gains from the Warren and Sanders policies be unequally distributed? Why would wealthy entrepreneurial households gain from these policies while poor working households would gain little or even lose? The answers to these questions can be found by analyzing these policies' general-equilibrium effects on wages, interest rates, and the marginal product of entrepreneurial capital. We have conducted a variety of partial-equilibrium experiments that isolate these effects, and we have found that reduced wages would primarily hurt low-wealth working households, while increased interest rates and entrepreneurial capital prices would primarily benefit wealthy entrepreneurial households. These results are available upon request; the intuition is straightforward so we have omitted them from the paper for brevity's sake.

To sum up our welfare analysis, we have found that the Warren and Sanders wealth taxes would raise aggregate welfare in a wide range of scenarios but popular support for these policies would hinge on the nature and extent of wealth tax evasion. Moreover, the welfare gains from these policies would accrue primarily to high-ability entrepreneurs—in fact, working households' welfare would fall under both policies if wealth tax evasion causes capital to shift offshore. Wealth tax advocates, who argue that the benefits of these policies would accrue primarily to low-income, low-wealth households, should heed these conclusions carefully.

4.4 Transition dynamics

Our results indicate that the nature and extent of tax evasion both play important roles in shaping the long-run consequences of taxing the wealthy. Here, we demonstrate that evasion also plays a crucial role in the short run by analyzing the transition dynamics that would follow the implementation of these policies. Figure 1 presents the results of this analysis. As in our discussion of long-run distributional consequences, we focus on the the low-evasion ($\xi = 7.5$) scenarios using the benchmark public-goods utility value ($\chi = 0.029$), both for the sake of brevity and because computing transitions in our model is computationally costly.

Panels (d) and (e) of figure 1 show that these policies would erode rich households' wealth gradually regardless of the nature of wealth tax evasion: aggregate wealth and wealth inequality would fall slowly in both the onshore avoidance and offshore evasion scenarios. Consequently, the effects on public finances would be largest in the short run because the wealth tax base would shrink over time as rich households' wealth falls. Panels (f)–(g) show that these taxes would raise more revenue and would finance more public consumption in the short run than in the long run. The differences between the short- and long-run public-finance effects would be larger in the offshore evasion scenario than the onshore avoidance scenario. In the former, the Warren policy would raise 70% more revenue in the short run than in the long run, while the Sanders policy would raise 91% more. In the latter, the two policies would raise 117% and 166% more revenue, respectively, in the short run than in the long run.

Panel (a) of figure 1 shows that the nature of wealth tax evasion has striking implications for macroeconomic dynamics. In the onshore avoidance scenario, both policies would have no immediate macroeconomic impact and would cause output to decline slowly. In the offshore evasion scenario, however, these policies would cause GDP to drop immediately and converge quickly. In the onshore avoidance scenario, hidden wealth is deployable, so entrepreneurial capital would not change when these policies are implemented until aggregate wealth begins to fall. In the offshore evasion scenario, by contrast, hidden wealth is not deployable, and so entrepreneurial capital would fall immediately when these policies are implemented, which would cause an immediate macroeconomic contraction. Panel (c) shows that the trajectory of the aggregate intermediate goods price, P_t, would largely mirror the trajectory of output. In the onshore avoidance scenario, the intermediate goods price would not change in the short run and then would rise gradually as GDP falls. In the offshore avoidance scenario, the intermediate goods price would rise immediately when these policies are implemented and overshoot before converging to its higher long-run level. On the other hand, panel (b) shows that interest rates would rise gradually regardless of the nature of wealth tax evasion. In fact, they would rise substantially more slowly than output would fall—GDP would converge to its new steady state in 20–30 years, but interest rates would take 70–80 years—because the wealth distribution would also evolve slowly.

Panels (h) and (i) of figure 1, which plot the transition dynamics of aggregate welfare and the two policies' approval rates, show that the short-run macroeconomic consequences of wealth tax evasion have important welfare implications. In the onshore avoidance scenario, where output and wages do not fall in the short run, both policies would initially be supported by virtually all households. In the offshore evasion scenario, on the other hand, where output and wages would fall immediately, neither policy would receive majority support even in the short run. The non-monotonic dynamics of aggregate welfare are driven by the fact that the welfare consequences for different segments of the distribution would materialize at different time horizons. In particular, wages would fall more quickly—immediately in the offshore evasion scenario—than interest rates, and so low-wealth working households' welfare would fall more quickly than high-wealth entrepreneurial households' welfare would rise. Consequently, aggregate welfare falls during the first part of the transition and then recovers once wages have converged. Aggregate welfare would increase more in the short run than in the long run in the onshore avoidance scenario, and would fall more in the short run than in the long run in the offshore evasion scenario.

5 Optimal progressive wealth taxes

Our second quantitative exercise is a normative analysis of the optimal wealth tax structure. We parameterize the wealth tax function, $\tau_a(a)$, as

$$\tau_a(a) = \underline{\tau}_a \left(\frac{a}{\underline{a}}\right)^{\psi}. \tag{28}$$

There are three parameters in this wealth tax function: a threshold, $\underline{a}$, below which household wealth is not taxed; an initial marginal tax rate, $\underline{\tau}_a$, which is applied to wealth at the the threshold; and a progressivity parameter, ψ, that governs how the marginal tax rate varies with a household's wealth as it rises above the threshold. This structure allows us to capture two forms of progressivity. First, by increasing the threshold, $\underline{a}$, we can make the tax more progressive by exempting a larger portion of household wealth from the tax. Second, by increasing the exponent, ψ, we can make the tax more progressive by raising the marginal tax rate for higher levels of wealth. By contrast, Guvenen et al. (2019b) consider flat-tax policies with $\psi = 0$ and optimize over the threshold and the tax rate only.

This flexible structure allows us to consider a wide range of candidate wealth taxes, but it can also be used to mimic the Warren and Sanders policies almost exactly. This allows us to compare the structure of the optimal wealth tax to these policies' structures directly as well as comparing economic effects. We take the thresholds, $\underline{a}$, and the initial marginal tax rates, $\underline{\tau}_a$, directly from the policies' texts: for the Warren policy, $\underline{a} = \$50$ million and $\underline{\tau}_a = 0.02$; for the Sanders policy, $\underline{a} = \$32$ million and $\underline{\tau}_a = 0.01$. We then calculate the value of the progressivity exponent, ψ, that minimizes the sum of squared errors between the parameterized marginal tax rates and the actual tax rates for each policy. For the Warren policy we find $\psi = 0.076$, and for the Sanders policy we find $\psi = 0.344$. Figure 2 plots the actual Warren and Sanders wealth tax rates against the fitted parameterized versions. In our model, the economic effects of the fitted versions of the policies are indistinguishable from the actual policies' effects.

Our social planner's objective in this analysis is to maximize long-run aggregate welfare; like Guvenen et al. (2019b) we do not take transition dynamics into account when solving for optimal wealth taxes. Optimizing over three parameters is computationally onerous even when we restrict attention to long-run steady states, and our analysis in section 4.4 indicates that the ordering of policies' welfare effects is preserved when transitions are taken into account. As in our analyses of distributional consequences and transition dynamics, we focus on the low-evasion ($\xi = 7.5$) scenarios using the benchmark public-good utility value ($\chi = 0.029$). Table 9 reports the results of our optimal-policy experiments and figure 2 provides a visual comparison of marginal wealth tax rates under the optimal policies and the Warren and Sanders policies.

Panel (a) of table 9 reports the results of our optimal-policy exercise in the onshore avoidance scenario. The optimal threshold is $10.8 million, the optimal initial marginal tax rate is 2.05%, and the optimal progressivity exponent is 0.16. Thus, the optimal policy is less progressive than both the Warren and Sanders policies in terms of the amount of household wealth that would be exempted, and in between the two policies in progressivity in terms of the elasticity of the marginal tax rate to the level of household wealth. In other words, as figure 2 shows, the wealth tax base should be broader and lower levels of wealth should be taxed at higher rates than under both the Warren and Sanders policies, but higher levels of wealth should be taxed less than under the Sanders policy. In this scenario, the optimal policy would reduce wealth inequality more than either the Warren or Sanders policies and would raise more revenue, but it would also cause a greater macroeconomic contraction because the larger tax base would have a larger impact on household saving and thus on aggregate wealth. Despite the greater macroeconomic contraction that it would bring, the optimal wealth tax in this scenario would raise aggregate welfare by 29% more than the Sanders policy and 34% more than the Warren policy. However, fewer households would approve of the optimal wealth tax in this scenario than both the Warren and Sanders policies, although a majority of households would still approve of the optimal policy. This is because the welfare gains from the optimal policy would be even more unequally distributed than the welfare gains from the two Senators' proposed policies. We speculate that a social planner who cares about inequality as well as aggregate welfare would choose a less aggressive policy; we leave this exercise for future work.

Panel (b) of table 9 reports the results of our optimal-policy exercise in the offshore evasion scenario. Here, the optimal threshold is $27.5 million, the optimal initial marginal tax rate is 0.87%, and the optimal progressivity exponent is 0.15. This policy would exempt more wealth than the optimal policy under onshore avoidance but would still exempt less wealth than both the Warren and Sanders policies. As figure 2 shows, it would also apply lower marginal tax rates than the other three policies at all levels of wealth, and would tax even extremely high levels of wealth (e.g. greater than $10 billion) at little more than 2%. The optimal policy in this scenario would have a smaller macroeconomic effect than either the Warren or Sanders policies, but would also have less impact on wealth inequality. Interestingly, this policy would still raise more tax revenue than either the Warren or Sanders policies despite the fact that it would apply substantially lower marginal tax rates. This is due in part to the lower exemption threshold, but also because the lower tax rates would induce less evasion. Finally, more households would approve of the optimal policy in this scenario than both the Warren and Sanders policies, although the optimal policy's approval rate would still be well under 50%.

In summation, the structure and economic effects of the optimal wealth tax greatly depend on the nature of wealth tax evasion. The optimal wealth tax under onshore avoidance would exempt a smaller amount of household wealth and would apply higher marginal rates, especially to extremely high levels of wealth, than the optimal policy under offshore evasion. The optimal policy under onshore avoidance would have a larger macroeconomic impact and a larger effect on wealth inequality than both the Warren and Sanders policies, while the optimal policy under offshore evasion would have smaller effects on both the macroeconomy and the wealth distribution.

6 Conclusion

Wealth inequality has grown dramatically in recent decades, and several prominent policymakers have proposed taxing rich households' assets to reverse this trend. Economists like Saez and Zucman (2019a,b) estimate that wealth taxes could raise substantial revenues that could finance increased government spending, but critics argue that these policies could hamper macroeconomic activity and that tax evasion could limit their efficacy. In this paper, we use a dynamic general equilibrium model to quantitatively assess the consequences of wealth taxation and wealth tax evasion for inequality, public finances, macroeconomic dynamics, and welfare.

We calibrate our model so that it matches salient facts about the U.S. economy under the current tax code, and then analyze the positive and normative consequences of taxing rich households' wealth. In order to study how the nature of tax evasion would shape these consequences, we consider two scenarios that have different implications for capital markets and macroeconomic activity. In the first scenario—onshore avoidance—households avoid a fraction of their wealth taxes by hiding some of their taxable wealth, but they can still use this hidden wealth to finance their their entrepreneurial activities or rent it to other households' businesses. In the second scenario—offshore evasion—households shift part of their wealth offshore to evade taxes, and this wealth cannot be used to finance domestic capital expenditures. In order to study how the extent of wealth tax evasion would shape these policies' effects, we analyze these policies for a range of degrees of wealth tax evasion that have been documented in the empirical literature. We also analyze transition dynamics, not just long-run changes, in order to study how wealth tax evasion would shape these policies' immediate effects.

In our positive analysis, we use the wealth tax schemes proposed by two leading politicians as case studies to demonstrate the economic effects of taxing the wealthy. The first scheme, proposed by Senator Elizabeth Warren, would tax wealth between \$50 million–\$1 billion at a rate of 2% and wealth above \$1 billion at 3%. The second, backed by Senator Bernie Sanders, is more aggressive, starting with a 1% tax on wealth between \$32 million–\$50 million and rising in several increments to a tax of 8% on wealth above \$10 billion. We find that the Warren and Sanders policies would indeed be effective at reducing the richest households' share of wealth. In the long run, the share of wealth held by the top 0.1% of households would fall by one quarter under the Warren policy and one third under the Sanders policy if these policies are enforced perfectly. Onshore avoidance would mitigate this effect, especially for high degrees of evasion, but offshore evasion would actually amplify it. These policies would also raise substantial revenues in the short run—1.1% of GDP for the Warren policy and 1.5% of GDP for the Sanders policy—but these revenues would fall substantially over time as the wealth distribution becomes less concentrated. We also find, however, that both policies would cause the economy to contract in the long run. The more-progressive Sanders policy would cause a larger contraction than the Warren policy in all of the scenarios that we study. Offshore wealth tax evasion would cause more substantial long-run macroeconomic harm than onshore avoidance and would cause this harm to materialize more quickly. Under onshore avoidance, there would be no short-run macroeconomic effect at all, and output and wages would fall gradually over time. Under offshore evasion, where hidden wealth is removed from domestic production, output and wages would fall immediately when the tax is implemented.

Although the Warren and Sanders policies would cause output and wages to fall, they would raise aggregate welfare under most circumstances and would be supported by a majority of households if the degree of wealth tax evasion is low and capital does not move offshore. Public support would be higher in the short run than in the long run, especially in the onshore avoidance scenario in which there would be no short-run macroeconomic consequences. The welfare gains from these policies would be unequally distributed, however, especially if tax evasion causes capital to more offshore. High-wealth, high-ability entrepreneurial households would gain substantially from these policies because the marginal revenue product of entrepreneurial capital would rise, even though these households are the most likely to pay wealth taxes. Working households, on the other hand, would gain slightly on average under onshore avoidance, and would actually lose under offshore evasion because the large decline in wages in this scenario would outweigh the gains from increased public consumption. Moreover, households at the bottom of the wealth distribution would lose regardless of the nature of wealth tax evasion.

In our normative analysis, we analyze the optimal wealth tax structure and how this structure depends on the nature of wealth tax evasion. We optimize over two forms of progressivity: how much wealth should be exempted; and how sensitive the marginal tax rate should be to a household's level of wealth above this exemption threshold. Under onshore avoidance, the optimal policy would have a smaller exemption and would tax lower levels of wealth at higher rates than both the Warren and Sanders policies, but would tax higher levels of wealth at lower rates than the Sanders policy. This policy would have a large effect on wealth inequality and would raise more revenue than both Senators' policies, but it would also have a larger macroeconomic impact. Under offshore evasion, the optimal policy would still feature a lower exemption than the Warren and Sanders policies, but would exempt almost three times as much wealth as the optimal policy under onshore evasion. It would also tax all levels of wealth at lower rates than both the Warren and Sanders policies, and would have smaller effects on inequality and macroeconomic variables than both Senators' policies. Thus, we find that the nature of wealth tax evasion has important implications for both the positive and normative consequences of wealth taxation.

Our results highlight four lessons for policymakers. First, there is a tension between the twin goals of reducing wealth inequality and raising tax revenues: these policies would raise the most revenue in the short run before the wealth distribution evolves, and would raise less revenue over time as the wealth distribution becomes less concentrated. Second, there is a tradeoff between these goals and macroeconomic consequences: the more-progressive Sanders policy, for example, would raise more revenue and reduce wealth inequality more than the less-progressive Warren policy, but would also have more pronounced effects on output and wages. Third, wealth taxes would raise aggregate welfare unless tax evasion shifts a substantial amount of capital offshore, but high-wealth, high-ability entrepreneurs would reap most of the benefits, while low-wealth working households would lose. Fourth, the optimal wealth tax would be significantly more modest under offshore evasion than onshore avoidance, so policymakers who believe offshore evasion is likely should be wary of dramatic changes to the way household wealth is taxed.

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Table 1: Assigned parameter values

Parameter	Description	Value	Target or source
(a) Demographics and preferences			
J	Lifespan	60	Max. lifespan of 85 years
R	Retirement age	41	Retirement at age 66
ϕ_j	Survival prob.	Varies	Arias (2014)
σ	Risk aversion	2	Standard
(b) Labor market ability			
e	Stoch. labor ability	$\{0.083, 0.22, 0.384, 1.0\}$	McNeil (2001)
$F(e)$	Ergodic labor ability dist.	$\{0.2, 0.2, 0.2, 0.4\}$	U.S. Census Bureau
$F(e'\|e)$	Labor ability trans. probs.	Varies	Burkhauser et al. (1997)
ζ_j	Life-cycle labor ability	$1 + \min\{0.38j/30, 0.38\}$	Guvenen et al. (2019a)
(b) Entrepreneurial ability			
ρ_z	Intergen. persist.	0.15	Fagereng et al. (2018)
ω	Fast lane amplification	5	Guvenen et al. (2019b)
p_1	Prob. of losing good entrepreneurial shock	0.05	Guvenen et al. (2019b)
p_2	Prob. of losing neutral entrepreneurial shock	0.03	Guvenen et al. (2019b)
(c) Production			
γ	Corporate capital share	0.053	Corporate profits/GDP
α	Entrepreneurial capital share	0.347	Total capital share $= 0.4$
ν	CES curvature	0.9	Guvenen et al. (2019b)
δ	Depreciation rate	0.05	Standard
(d) Taxes			
τ_c	Consumption tax	0.075	McDaniel (2007)
τ_k	Capital income tax	0.25	McDaniel (2007)
τ_r	Investment income tax	0.15	U.S. tax code
$\tau_\ell(e)$	Labor income tax	Varies	U.S. tax code

Table 2: Jointly calibrated parameters

Parameter	Description	Value	Target statistic	Source
σ_z	Std. dev. entr. ability	0.0692	Top 0.1% share = 20%	Saez and Zucman (2019b)
β	Discount factor	0.955	Net wealth/GDP = 4.79	SCF (2016)
λ	Collateral constraint	1.296	Debt/assets = 0.31	Asker et al. (2011)

Table 3: Non-targeted moments

Statistic	Model	Data	Source
(a) Wealth distribution			
Top 1% share	35%	39%	SCF (2016)
Top 10% share	62%	77%	SCF (2016)
Top 20% share	74%	88%	SCF (2016)
Bottom 50% share	6%	1%	SCF (2016)
Gini coefficient	0.73	0.86	SCF (2016)
(b) Other statistics			
Warren policy SR tax rev. (%GDP, $\xi = 7.5$)	1.09%	1%	Saez and Zucman (2019b)
Entrepreneurship rate	15.4%	16.7%	Cagetti and De Nardi (2006)
Bequests (% net wealth)	1.7%	1.2%	Nishiyama (2000)
Revenue from τ_k, τ_r (% total revenue)	22%	25%	Guvenen et al. (2019b)

Table 4: Long-run effects on the macroeconomy, wealth inequality, and public finances

	Macro variables				Wealth inequality		Public finances	
Scenario	GDP (% chg.)	Interest rate (p.p. chg.)	Wealth (% chg.)	P (% chg.)	Gini (chg.)	Top 0.1% share (p.p. chg.)	Tax revenue (% GDP)	Public goods (% chg.)
(a) Warren policy								
No evasion ($\xi = 0$)	-1.072	0.147	-4.217	1.081	-0.021	-5.465	0.704	4.541
Onshore avoidance								
$\xi = 7.5$	-0.971	0.135	-3.880	0.973	-0.019	-5.036	0.621	3.960
$\xi = 35$	-0.655	0.092	-2.656	0.649	-0.013	-3.328	0.194	0.655
Offshore evasion								
$\xi = 7.5$	-1.461	0.130	-4.072	1.720	-0.018	-6.390	0.488	2.183
$\xi = 35$	-2.348	0.079	-4.497	3.245	-0.019	-9.153	0.084	-2.468
(b) Sanders policy								
No evasion ($\xi = 0$)	-1.344	0.175	-5.160	1.396	-0.025	-6.765	0.811	5.059
Onshore avoidance								
$\xi = 7.5$	-1.182	0.160	-4.601	1.202	-0.022	-5.837	0.709	4.394
$\xi = 35$	-0.705	0.096	-2.809	0.708	-0.013	-3.322	0.086	0.381
Offshore evasion								
$\xi = 7.5$	-1.731	0.138	-4.678	2.101	-0.022	-7.426	0.360	2.075
$\xi = 35$	-2.667	0.088	-5.071	3.707	-0.021	-10.109	0.075	-2.699

Table 5: Long-run aggregate welfare effects and approval rates

Scenario	Benchmark $\chi = 0.029$		Experiment-specific χ		$\chi = 0$	
	Welfare (% chg.)	Approval (%)	Welfare (% chg.)	Approval (%)	Welfare (% chg.)	Approval (%)
(b) Warren policy						
No evasion	0.508	69.2	0.563	74.0	0.018	16.9
Onshore avoidance						
$\xi = 7.5$	0.471	67.9	0.514	72.1	0.042	17.3
$\xi = 35$	0.097	30.0	0.099	30.4	0.024	17.3
Offshore evasion						
$\xi = 7.5$	0.030	26.0	0.045	27.4	-0.209	12.2
$\xi = 35$	-1.007	7.0	-0.999	7.1	-0.728	11.1
(b) Sanders policy						
No evasion	0.544	63.2	0.613	68.3	0.001	16.1
Onshore avoidance						
$\xi = 7.5$	0.490	63.6	0.543	67.9	0.016	16.8
$\xi = 35$	0.052	23.3	0.053	23.4	0.009	16.7
Offshore evasion						
$\xi = 7.5$	-0.055	20.7	-0.040	21.5	-0.282	11.8
$\xi = 35$	-1.139	7.2	-1.130	7.2	-0.834	11.2

Table 6: Long-run welfare by wealth percentile ($\xi = 7.5$, $\chi = 0.029$, % chg.)

Percentile	Warren	Sanders
(a) Onshore avoidance ($\xi = 7.5$)		
0–20	-0.324	-0.434
20–40	-0.206	-0.317
40–60	-0.132	-0.166
60–80	+0.245	+0.250
80–90	+0.565	+0.662
90–95	+0.509	+0.605
95–99	+1.476	+1.687
99–99.9	+2.531	+2.950
99.9–100	+0.419	+0.153
(b) Offshore evasion ($\xi = 7.5$)		
0–20	-0.789	-0.961
20–40	-0.598	-0.776
40–60	-0.549	-0.714
60–80	-0.205	-0.338
80–90	+0.232	+0.150
90–95	+0.400	+0.374
95–99	+1.084	+1.097
99–99.9	+1.705	+1.789
99.9–100	-3.739	-5.524

Table 7: Long-run welfare by labor market and entrepreneurial abilities ($\xi = 7.5$, $\chi = 0.029$, % chg.)

$z \backslash e$	Warren policy				Sanders policy			
	e_1 (20% of pop.)	e_2 (20% of pop.)	e_3 (20% of pop.)	e_4 (40% of pop.)	e_1 (20% of pop.)	e_2 (20% of pop.)	e_3 (20% of pop.)	e_4 (40% of pop.)
(a) Onshore avoidance								
z_1 (0.7% of pop.)	+0.044	+0.118	+0.346	+0.509	+0.005	+0.080	+0.334	+0.534
z_2 (6.2% of pop.)	+0.057	+0.123	+0.348	+0.473	+0.026	+0.098	+0.335	+0.501
z_3 (24.1% of pop.)	+0.078	+0.167	+0.361	+0.556	+0.059	+0.136	+0.393	+0.568
z_4 (37.9% of pop.)	+0.127	+0.194	+0.442	+0.644	+0.106	+0.179	+0.450	+0.612
z_5 (24.1% of pop.)	+0.665	+0.679	+0.841	+0.962	+0.736	+0.741	+0.941	+1.088
z_6 (6.2% of pop.)	+1.188	+1.158	+1.267	+1.381	+1.341	+1.303	+1.464	+1.572
z_7 (0.6% of pop.)	+1.925	+1.813	+1.853	+1.970	+2.173	+2.045	+2.126	+2.213
z_8 (0.02% of pop.)	+2.083	+2.104	+2.268	+2.390	+2.453	+2.457	+2.606	+2.713
z_9 (0.0004% of pop.)	+2.462	+2.451	+2.603	+2.724	+2.818	+2.763	+2.908	+3.009
(b) Offshore evasion								
z_1 (0.7% of pop.)	-0.435	-0.383	-0.202	-0.069	-0.590	-0.546	-0.361	-0.227
z_2 (6.2% of pop.)	-0.408	-0.364	-0.201	-0.115	-0.561	-0.525	-0.349	-0.219
z_3 (24.1% of pop.)	-0.378	-0.319	-0.137	-0.022	-0.516	-0.466	-0.286	-0.163
z_4 (37.9% of pop.)	-0.327	-0.276	-0.104	+0.005	-0.444	-0.408	-0.218	-0.126
z_5 (24.1% of pop.)	+0.534	+0.484	+0.582	+0.621	+0.576	+0.521	+0.620	+0.660
z_6 (6.2% of pop.)	+1.234	+1.137	+1.174	+1.149	+1.385	+1.259	+1.276	+1.223
z_7 (0.6% of pop.)	+1.980	+1.795	+1.748	+1.728	+2.181	+1.974	+1.915	+1.865
z_8 (0.02% of pop.)	+2.331	+2.318	+2.373	+2.384	+2.662	+2.640	+2.656	+2.626
z_9 (0.0004% of pop.)	+2.601	+2.482	+2.464	+2.438	+2.760	+2.621	+2.531	+2.480

Table 8: Long-run welfare by entrepreneurial ability and shock ($\xi = 7.5$, $\chi = 0.029$, % chg.)

$z \backslash \iota$	Warren policy			Sanders policy		
	3 (50.5% of pop.)	2 (26.4% of pop.)	1 (23.1% of pop.)	3 (50.5% of pop.)	2 (26.4% of pop.)	1 (23.1% of pop.)
(a) Onshore avoidance						
z_5 (24.1% of pop.)	+0.614	+0.966	+1.126	+0.670	+1.094	+1.280
z_6 (6.2% of pop.)	+0.915	+1.690	+1.973	+1.029	+1.935	+2.267
z_7 (0.6% of pop.)	+1.456	+2.534	+3.224	+1.638	+2.875	+3.669
z_8 (0.02% of pop.)	+1.821	+2.917	+3.877	+2.091	+3.412	+4.507
z_9 (0.0004% of pop.)	+2.112	+3.546	+5.210	+2.373	+3.935	+5.889
(b) Offshore evasion						
z_5 (24.1% of pop.)	+0.217	+1.005	+1.075	+0.176	+1.171	+1.215
z_6 (6.2% of pop.)	+0.617	+2.015	+2.204	+0.606	+2.347	+2.505
z_7 (0.6% of pop.)	+1.200	+2.899	+3.370	+1.263	+3.336	+3.711
z_8 (0.02% of pop.)	+1.806	+3.711	+3.990	+2.001	+4.359	+4.402
z_9 (0.0004% of pop.)	+2.027	+3.879	+4.474	+2.094	+4.162	+4.550

Table 9: Warren and Sanders policies vs. optimal wealth taxes ($\xi = 7.5$, $\chi = 0.029$)

	Policy parameters			Summary of economic effects				
Policy	Threshold ($\bar{a}$, \$M)	Initial tax (τ, %)	Progressivity exponent (ψ)	GDP (% chg.)	Top 0.1% share (p.p. chg.)	Tax revenue (% GDP)	Welfare (% chg.)	Approval (%)
(a) Onshore avoidance								
Warren	50.000	2.000	0.076	-0.971	-5.036	0.621	0.471	67.9
Sanders	32.000	1.000	0.344	-1.182	-5.837	0.709	0.490	63.6
Optimal	13.054	2.084	0.158	-1.919	-7.200	1.168	0.634	59.0
(b) Offshore evasion								
Warren	50.000	2.000	0.076	-1.461	-6.390	0.488	0.030	26.0
Sanders	32.000	1.000	0.344	-1.731	-7.426	0.360	-0.055	20.7
Optimal	27.497	0.872	0.152	-1.235	-4.857	0.516	0.127	37.3

Figure 1: Transition dynamics following implementation of Warren and Sanders wealth taxes

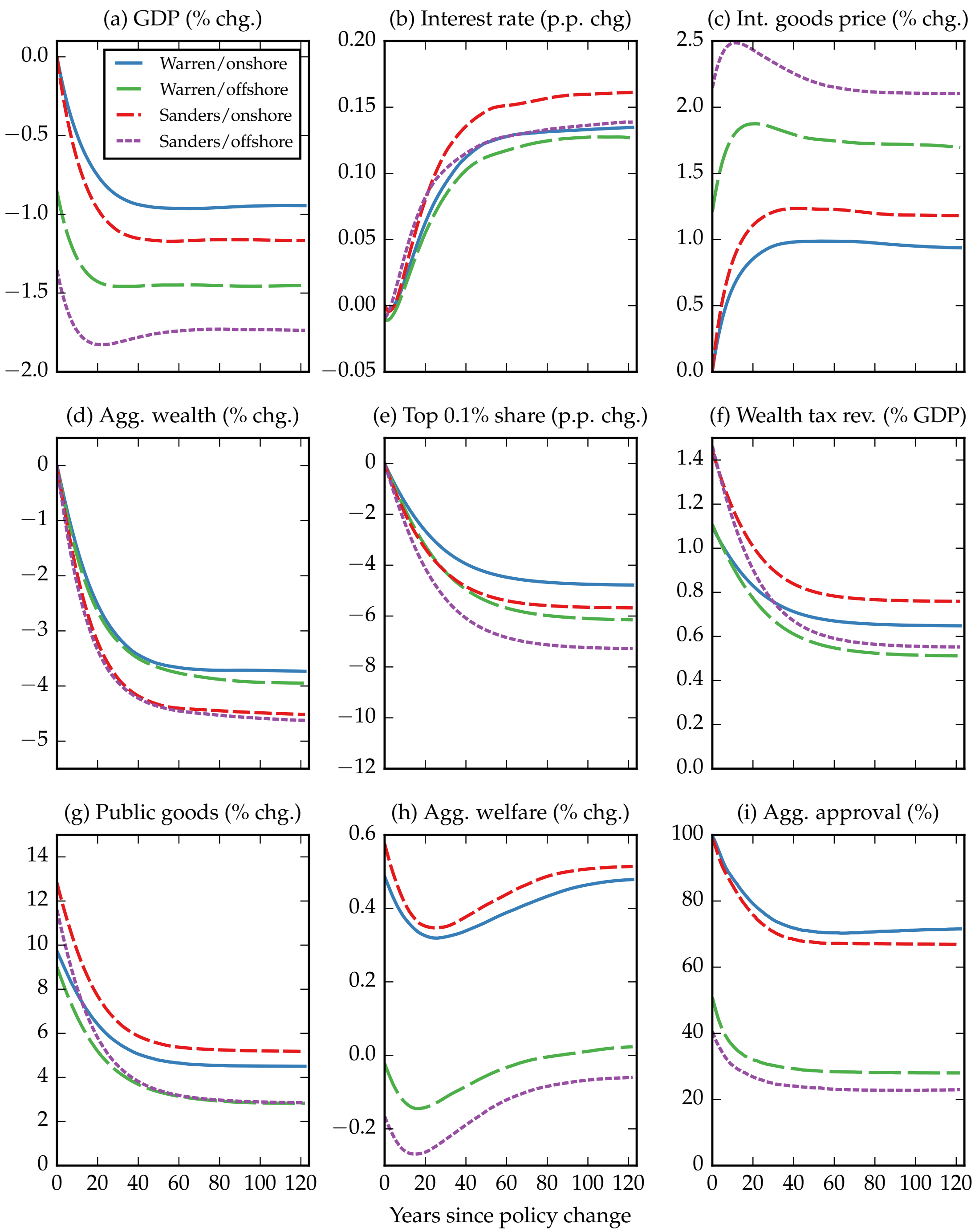

Figure 2: Optimal wealth tax structure versus the Warren and Sanders plans