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ABSTRACT

The U.S. has a plethora of federal and state tax and benefit programs, each with its own work incentives and disincentives. This paper uses the Fiscal Analyzer (TFA) to assess how these policies, in unison, impact work incentives. TFA is a life-cycle, consumption-smoothing program that incorporates household borrowing constraints and all major federal and state fiscal policies. We use TFA in conjunction with the 2016 Federal Reserve Survey of Consumer Finances to calculate Americans’ remaining lifetime marginal net tax rates. Our findings are striking. One in four low-wage workers face marginal net tax rates above 70 percent, effectively locking them into poverty. Over half face remaining lifetime marginal net tax rates above 45 percent. The richest 1 percent also face a high median lifetime marginal tax rate – roughly 50 percent. Double taxation matters. The overall median lifetime marginal net tax rate is 43.2 percent compared with an overall current-year marginal net tax rate of 37.6 percent. We also find remarkable dispersion in both lifetime and current-year marginal net tax rates, particularly among the poor, and major differences in marginal and average net taxation across states, providing typical households a large incentive to relocate to another state.

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1 Introduction

A plethora of federal and state tax and benefit policies jointly determine Americans' incentives to work. Adopted with apparently no regard to their collective impact on work incentives, many of these policies are extraordinarily complex, rendering lifetime budget constraints highly non-linear and remarkably non-convex. The source of the non-linearities and non-convexities are complex and often arcane provisions that condition tax payments and benefit receipts on labor income, asset income, total income, and/or the level of assets.

Social Security typifies our fiscal system's complexity. It has 2,728 primary rules governing the receipt of its 12 benefits, plus tens of thousands of secondary rules circumscribing these main rules.[1] As for fiscal-system non-convexities, they are nearly everywhere one looks. Earn $1 too much two years back and your Medicare Part-B premiums will rise by close to $800. Earn $1 too much and, depending on the state, lose thousands of dollars in your own or your family's Medicaid benefits. Hold $1 too much in assets and forfeit thousands in Supplemental Security Income. Earn an extra dollar and receive thousands of dollars in Obamacare subsidies. Earn $1 beyond Social Security's earnings ceiling and watch your Social Security payroll tax drop to zero. Earn $1 too much and flip onto the Alternative Minimum Tax (AMT), reducing your marginal income-tax bracket from a rate as high as 37 percent to 28 percent. Earn $1 too much and lose 22 cents, in the Earned Income Tax Credit and the list goes on.

The principal provisions of our federal and 42 state (including Washington, D.C.) personal income-tax systems are intricate enough. But they also embed special benefit programs, like the Earned Income Tax Credit and the Child Tax Credit, and special tax systems, including the Alternative Minimum Tax, the taxation of Social Security benefits, and extra Medicare taxes on labor and asset income for those with high total income. Moreover, most of our "federal" benefit programs are state specific. The list includes Medicaid, Obamacare, TANF, SNAP, Housing Assistance, Child Care Assistance, and Energy Assistance.

The myriad features of our fiscal system raise this paper's central questions: What are the typical levels of marginal net tax rates facing Americans of different ages and resource levels, taking the entire federal and state fiscal system into account? How different are marginal net tax rates within and across age and resource groups? How do current-year and remaining lifetime marginal net tax rates differ? How much does one's choice of the state in which to live impact one's incentive to work? What is the fiscal incentive to relocate across states?

We address these questions by running 2016 Survey-of-Consumer-Finances (SCF) data through The Fiscal Analyzer (TFA), a life-cycle consumption-smoothing software tool, which does its consumption smoothing subject to borrowing constraints and incorporates, in full detail, all fiscal systems listed in Table 1.[2]

[1]These rules include the intricate, partially indexed calculation of basic benefits, maximum family benefit provisions, reductions for taking benefits early, increases for taking benefits late, earnings testing of benefits received prior to full retirement, an adjustment at full retirement of benefits lost to the earnings test, annual re-computation of basic benefits in light of additional earnings, special rules governing benefits for divorcees and widow(er)s, and the list goes on.

[2]TFA relies on MaxiFi Planner's computation engine. MaxiFi Planner is a personal financial planning tool developed by Laurence Kotlikoff's software company – Economic Security Planning, Inc. Although the computation engines are the same, MaxiFi Planner considers a much smaller set of fiscal policies than does TFA.

Table 1: List of Tax and Transfer Programs Included in TFA

Taxes	Personal Income Tax (federal and state) Corporate Income Tax (federal and state) FICA Tax (federal) Sales Taxes (state) Medicare Part B Premiums (federal) Estate and Gift Tax (federal)
Transfer Programs	Earned Income Tax Credit (federal and state) Child Tax Credit (federal) Social Security Benefits (federal) Supplemental Security Income (SSI) (federal) Supplemental Nutritional Assistance Program (SNAP) (federal and state) Temporary Assistance for Needy Families (TANF) (federal and state) Medicaid (federal and state) Medicare (federal) The Affordable Care Act (ACA) (federal and state) Section 8 Housing Vouchers (state and county) Childcare Assistance (state and county)

Remaining lifetime marginal net tax rates, τ_L, can differ from current-year marginal net tax rates, τ_C, due to the "double taxation" of labor earnings. For households that aren't so severely borrowing constrained so as to spend all their cash on hand in the current year, additional earnings will lead to additional saving and, thus, higher levels of future assets. This, in turn, means higher future taxable asset income as well as total income and, thus, higher future asset-income taxation (e.g., Medicare's high-income asset-income taxation), higher future federal and state total-income taxation, and, potentially, lower income- and asset-tested future benefits. Since additional current earnings lead to additional future net taxes, proper measurement of marginal net tax rates on current labor supply must account for the present value of future as well as current net taxes. I.e., the measurement of remaining lifetime marginal tax rates must incorporate double taxation.

Our study is intentionally self-limited in a critical dimension. We seek to understand Americans' work disincentives, not the response to those disincentives, a task we leave for future research. Hence, we consider additional lifetime (henceforth, shorthand for remaining lifetime) and current-year net taxes resulting from exogenous temporary and permanent increases in labor earnings. Doing so lets us abstract from differences in household labor-leisure preferences. Were we to study not just the impact of the fiscal system on intertemporal budgets, but the reaction to them, we'd necessarily need to decompose provisions and reactions to understand which was at play. Hence, this paper, which seeks only to understand provisions – the structure of government work incentives and disincentives, is a necessary first step toward a full evaluation of the impact of the U.S. fiscal system on labor supply.

Our main findings, which focus on the fiscal consequences of SCF household heads earning $1,000 more in our base year – 2018, are striking.[3] One in four low-wage workers

[3]All SCF data are benchmarked to 2018 aggregate values. The year 2018 was chosen to incorporate

face lifetime marginal net tax rates above 70 percent, effectively locking them into poverty. Over half face remaining lifetime marginal net tax rates above 45 percent. The richest 1 percent also face a high median lifetime marginal tax rate – roughly 50 percent.

Double taxation matters. The overall median lifetime marginal net tax rate is 43.2 percent compared with an overall current-year marginal net tax rate of 37.6 percent. Depending on the age and resource group, the lifetime marginal net tax rates can be much higher than the current-year marginal net tax rate. For the top 1 percent of 40-49 year-olds, for example, the respective net tax rates are 41.5 percent and 30.4 percent.

Across all age groups, the median lifetime marginal net tax rate is 46.6 percent for those in the lowest resource quintile. This exceeds the median lifetime marginal net tax rates for the next three quintiles of 41.4 percent, 41.1 percent, and 42.6 percent, respectively. But it's lower than the 50.2 percent rate of the top quintile. For the top 5 and top 1 percent, median lifetime marginal net tax rates are 53.0 percent and 51.1 percent, respectively. These resource-percentile differences in marginal rates tell us how work disincentives differ among the rich and the poor. But, as indicated in Auerbach et al. (2016), they don't tell us about fiscal progressivity. Average lifetime net tax rates differ dramatically from median marginal lifetime net tax rates rendering the U.S. fiscal system highly progressive.

Median marginal net tax rates, whether lifetime or current-year, are generally very similar whether we consider a \$1,000 or \$10,000 increase in labor earnings for one year or for all future years through retirement. Across all households, the maximum difference in the four median rates is only 1.8 percentage points.

Both current and remaining rates are remarkably dispersed, particularly among the poor. For example, among the poorest quintile in the 40-49 year-old age group, the 25th, 50th, and 75th percentile values of the remaining lifetime marginal net tax rate are 29.4 percent, 45.6 percent, and 69.3 percent, respectively, with minimum and maximum rates of -1,228.1 and 10,168.1 percent. For this age cohort, the standard deviation in remaining rates is almost eight times larger for the bottom than for the top quintile.

One's choice of state in which to live can dramatically affect marginal net tax rates. Across all cohorts, the typical bottom-quintile household can lower its remaining lifetime marginal net tax rate by 99.7 percentage points by switching states! For one SCF household, the largest potential change in lifetime marginal net rates exceeds 17,000 percentage points! Average net tax rates can also differ markedly across states for a given households. Indeed, there is a major fiscal incentive for households to switch states. The typical household can raise its total remaining lifetime spending by 8.1 percent by moving from a high-tax to a low-tax state, holding its human wealth, housing expenses, and other characteristics fixed.

The next section briefly reviews prior studies measuring marginal fiscal work incentives and disincentives. Section 3 presents our remaining lifetime framework. Section 4 describes TFA, including its calculation method and the easy means of confirming its solution. Section 5 describes our methods for allocating SCF households to states, imputing both past and future labor earnings, and determining survival probabilities based on respondents' levels of current or past earnings. Section 6 presents our nationwide findings. Section 7 considers differences across states in marginal net taxation. Section 8 concludes.

MaxiFi Planner's available 2018 tax code.

2 Prior Studies

Over the years, several papers have estimated some form of marginal income tax rates for the United States. One of the earliest such papers, Joines (1981), used data from the IRS Statistics of Income and other sources, benchmarked to national income account totals, to compute marginal tax rates on labor and capital income from 1929 to 1975. Like our study, Joines took account not only of income taxes at the federal level, but also other federal taxes and a range of state and local taxes. However, his estimates of marginal tax rates were based on differences in tax liabilities for successive income groups, rather than for individuals, and he did not take into account transfer programs and the tax rates implicit in their design. Seater (1982) and Seater (1985) take a similar approach for estimating gross, not net marginal tax rates across income groups based on observed tax payments.

An oft-cited paper by Barro and Sahasakul (1983) takes a different approach, using actual tax rate schedules rather than actual tax payments to estimate marginal tax rates. The authors argue that the deductions and other methods of reducing individual tax liabilities from those dictated by the rate schedule alone involve tax avoidance costs that are ignored in looking simply at reduced tax liabilities and that these costs may vary across individuals. We deal with such unobserved characteristics by assuming a uniform objective of consumption smoothing across households, common portfolio decisions within groups with respect to tax-favored saving, and other assumptions that eliminate the potential effects of unobserved preference heterogeneity on estimated marginal tax rates. Unlike Joines, Barro and Sahasakul consider only the individual income tax in estimating marginal gross tax rates. However, they also note the importance for welfare analysis of marginal tax rate dispersion and considered the dispersion of marginal tax rates, showing the distribution of these tax rates for each year between 1961 and 1980.

A problem with using the statutory income tax rate schedule (the bracket values) to estimate marginal tax rates is that many other provisions of the income tax are also affected by income, so that the "full" marginal income tax rate may differ quite substantially from the statutory income tax rates. Examples include phase-outs in the exclusion of social security benefits from the income tax, increases or decreases in the Earned Income Tax Credit (EITC), and floor and ceilings on various income tax deductions, such as medical expenses and charitable contributions. Barthold et al. (1998) show how considering 22 such income tax provisions affected federal marginal income tax rates in 1998. Like these authors, we rely on the full income tax rules, rather than just the statutory tax rates, in computing marginal tax rates. However, we do not stop with the income tax, taking the same approach with respect to transfer payments as well in computing how net resources are affected by increments to income. The importance of doing so was emphasized by Shaviro (1999), who estimated current-year marginal net tax rates for representative low-income individuals, taking account of the effects of additional income on the receipt of various transfer benefits, including Tax Assistance for Needy Families (TANF), housing assistance, Medicaid, and Food Stamps (now SNAP). Shaviro showed that such individuals may face extremely high marginal tax rates as a consequence of income-induced benefit loss.

One particularly important cause of the deviation of marginal tax rates from those in the tax schedule, at least historically, was the Alternative Minimum Tax (AMT). Feenberg and Poterba (2004) analyze the importance of this provision and how marginal tax rates would have been affected by its reform, an issue relevant to how one analyzes the effects of the 2017 Tax Cuts and Jobs Act, which substantially reduced the impact of the AMT.

Recent work by authors at the U.S. Department of Health and Human Services (HHS) estimates marginal tax rates taking account of most important tax and transfer programs[4]. Using microdata from the Current Population Survey and the Urban Institute's Transfer Income Model, Version 3 (TRIM3), this research like ours considers taxation at the individual level and accommodates analysis of not only averages but also the dispersion of marginal tax rates. Unlike the HHS calculations, however, we go beyond current-year calculations to consider the effects of current income on the full present value of net taxes. In doing so, we follow the work of Gokhale et al. (2002) and Kotlikoff and Rapson (2007), who estimated the marginal tax rates on additional saving by computing the present value of the change in current and future net taxes arising from such saving, but did not incorporate such calculations into estimates of marginal tax rates on additional current labor income and assumed a fixed date of death rather than considering all survivor paths. Although Feldstein and Samwick (1992) considers current-year Social Security marginal taxation of labor earnings taking into account associated increases in future Social Security benefits, there are, to our knowledge, no comprehensive studies of remaining lifetime marginal net taxation of the type provided here.

3 Our Remaining Lifetime Framework

Consider any potential survival path, i. Along that path, the realized present value of total remaining lifetime discretionary plus non-discretionary spending, including bequests, denoted S_i, must equal the realized present value of lifetime net resources. I.e., the intertemporal budget must be satisfied.

$$S_i = R_i - T_i, \tag{1}$$

where R_i and T_i reference, respectively, the realized present values, on path i, of the household's remaining lifetime resources and net taxes (including estate taxes), respectively. The realized present value of remaining lifetime resources, R_i, is the sum of the household's current net wealth, W, and path $i's$ realized present value of future labor earnings, H_i. I.e.,

$$R_i = W + H_i. \tag{2}$$

The expected remaining lifetime present values of spending, S, labor earnings, H, resources, R, and lifetime net taxes, T, satisfy

$$S = \sum_i p_i S_i, \tag{3}$$

$$H = \sum_i p_i H_i, \tag{4}$$

$$T = \sum_i p_i T_i, \tag{5}$$

and

$$R = \sum_i p_i R_i, \tag{6}$$

[4]See, for example, Giannrelli et al. (2019) and Macartney and Chien (2019). Work associated with the HHS marginal tax rate project is published at https://aspe.hhs.gov/marginal-tax-rate-series.

where p_i is the probability the household experiences survival path i. The above equations imply

$$R = W + H, \tag{7}$$

$$S = R - T, \tag{8}$$

and

$$\tau_L = \frac{\Delta T}{\Delta R}. \tag{9}$$

Clearly, since τ_L incorporates future as well as current net taxes it can differ, potentially significantly, from the analogous current0year calculation, τ_C. And since the level of T will differ across households based on the level of each household's resources and the age-related extent to which the household's resources comprise human versus non-human wealth, τ_L will depend on the household's age as well as its position in the resource distribution. Consequently, we present most of our results on a cohort- and resource-specific basis.

Our baseline calculation of τ_L incorporates additional current as well as future net taxes from earning an extra \$1,000. Specifically, we measure the amount by which an extra \$1,000 in current labor earnings raises our SCF-respondents' present values of expected remaining lifetime net taxes.[5] As for the current-year marginal net tax rate, we simply form the ratio of additional current-year net taxes to \$1,000. In addition to measuring marginal net taxation arising from a one-time \$1,000 increase in earnings, we also consider an annual \$10,000 increase in earnings through respondents' retirement age.

4 The Fiscal Analyzer

The Fiscal Analyzer (TFA) developed in Auerbach et al. (2016), Auerbach et al. (2017) and Altig et al. (2019) is a life-cycle, consumption-smoothing tool that incorporates borrowing constraints and all major federal and state fiscal policies. These policies are listed in table 1. Detailed TFA documentation is available at Kotlikoff (2019). To abstract from preferences, TFA assumes that households smooth their living standards, defined as discretionary spending per household member adjusted for economies in shared living and the relative cost of children, to the maximum extent possible without borrowing (or, if already indebted, additional borrowing). This behavior is consistent with Leontief intertemporal preferences defined over the household's future living standard.

The relationship between a household's discretionary spending in year t, C_t, and its underlying living standard per effective adult, c_t, is given by

$$C_t = c_t(N + .7K)^{.642}, \tag{10}$$

where N stands for the number of adults in the household and K for the number of children. The coefficient .642 is chosen such that 2 adults can live as cheaply (with respect to discretionary spending) as 1.6.[6]

[5] As the above equations indicate, the term "expected" refers to the weighted average of the present value of additional lifetime net taxes along each household's possible future survivor paths, where the weights reference the probability of the particular survivor path in question.

[6] TFA's default assumption is perfect living-standard smoothing. But the program can be run with any desired age-living-standard path, any age-specific, child-equivalency factors, and any degree of economies in shared living. The program can also be run assuming any maximum age of life. In this study, we assume a maximum of age 100.

TFA inputs or provides default values for the data: marital status, birth dates of each spouse/partner, birth dates of children, current-year labor earnings, current regular and retirement account (tax-deductible and Roth) asset balances, current and projected future contributions to each type of retirement account, retirement-account withdrawal start dates, Social Security retirement-benefit collection dates, defined benefit pensions, housing expenses, real estate holdings, household debts, rates of return on assets, and the inflation rate.

4.1 TFA's Solution Method

TFA uses dynamic program to smooth each household's living standard per equivalent adult (the c_ts), subject to borrowing constraints. The program simultaneously calculates not just the household's smoothest living standard path if both the household head and spouse/partner live to their maximum ages of life, but also the household's year-specific demands for life insurance (and, thus, the life insurance premiums it will pay each year) to ensure that survivors have at least the same living standard as would otherwise have been the case.[7] The program also determines each of the household's above-referenced taxes and transfer payments along each of its potential survivor paths.

The problem TFA solves is computationally challenging for four reasons. First, there are tens of thousands of survivor-path-specific state asset variables. These are the levels of regular as well as spouse/partner-specific tax-deferred and Roth retirement accounts. Take, for example, a 40 year-old couple that could live to 100. They have over 200,000 survivor contingent regular and retirement account state variables. Second, taxes, transfer payments, discretionary spending, and life insurance holdings must be determined for all years of all survivor paths. Third, spending, insurance amounts, and net taxes on any survivor path are interdependent. Indeed, they are also interdependent across paths. Hence, one needs a simultaneous equations solution. Fourth, the program needs to run in finite time. TFA's computation method entails iterating between three dynamic programs: one that smooths consumption assuming household heads and spouses/partners reach their maximum ages of life, one that determines annual life insurance needs for the household heads and their spouse/partner, and one that determines annual net taxes assuming no early death.

Each program takes the output of the other programs as inputs. To ensure precision to many decimal places, TFA utilizes grid shrinking between iterations.[8] It also overcomes the curse of dimensionality via two key routes. First, the survivor-specific paths of retirement account contributions, account balances, and withdrawals are pre-determined. Thus, although TFA's problem involves hundreds of thousands of state variables, their values are known. Second, the life insurance routine is structured to generate the identical living standard path along all survivor paths as that generated in the consumption-smoothing routine.

[7]TFA generates positive life insurance holdings only for years when the insured's death would leave survivors with a lower living standard that were household adults to live to their maximum ages.

[8]This is critically important given that borrowing constraints introduce kinks in the discretionary spending functions and interpolation over kinked functions propagate backwards.

4.2 Confirming TFA's Solutions

Although TFA's internal workings are complex, its combination of iterative dynamic programming and grid shrinking permit highly precise solutions within seconds. TFA's solutions can be confirmed in seven ways. First, the lifetime budget constraint is satisfied to many decimal places along all survival paths. Hence, apart from terminal bequests and funeral expenses, each household ends, along each survival path, with precisely zero assets. Second, each unconstrained household's living standard (discretionary spending per effective adult) is smoothed (takes the same value) to the dollar across all future years. Third, for households that are constrained for one or more periods of time, the living standard is smoothed in each constrained interval. Furthermore, the living standard is higher in constrained intervals that occur later in time. Fourth, regular assets in the year before a borrowing constraint is lifted (via, for example, termination of mortgage payments) are zero. This is a requirement of constrained consumption smoothing. Bringing positive assets into years when the living standard is higher is inconsistent with consumption smoothing, which minimizes living standard discrepancies to the maximum extent consistent with the household's borrowing constraint. Fifth, if a spouse/partner dies, the living standard of survivors is, to the dollar, identical to what they would otherwise have experienced. Sixth, the household's regular assets never fall below the amount TFA is told the household can borrow.[9]

5 The SCF and Data Imputations

The SCF is a cross-section survey conducted every three years. The survey over-samples wealthy households in the process of collecting data from, in the case of the 2016 Survey, 6254 households.[10] These data include detailed information on household labor and asset income, assets and liabilities, and demographic characteristics.[11]

Our online TFA documentation details our sample selection and our benchmarking of the 2016 SCF data to national aggregates. Running TFA requires additional information not provided by the SCF. First, it needs state identifiers to calculate state-specific taxes and transfer payments. The public-use SCF release does not provide state identifiers[12], so we allocate SCF households to different states based on the 2016 American Community

[9]MaxiFi Planner is available for free to all academics by contacting Laurence Kotlikoff. Anyone running this commercial version of TFA can readily confirm each of the above solution properties.

[10]The SCF combines an area-probability sample of households with a "list" sample of generally wealthier households from administrative tax records from the IRS. The SCF includes sampling weights to account for oversampling of wealthier households from inclusion of the "list" sample and for differential response rates among wealthier groups. Wealthier households have lower response rates, particularly at the highest levels. See Bricker et al. (2016). The oversampling of wealthy households allows for inference about households in the top 1 percent of the resource distribution. For the 2004 SCF, Kennickell (2007) shows that 15.8 percent of sampled households were in the top 1 percent of the net worth distribution for the U.S. with 96.4 percent of these coming from the list sample. Another 38.5 percent of the 2004 SCF-sampled households were in the bottom 50 percent of the net worth distribution with only 5.7 percent of these households coming from the list sample.

[11]Using a multiple imputation algorithm, the Fed includes each household's record in the public-use SCF dataset in five so-called replicates to account for estimation of non-reported values (item non-response) or for disclosure limitations. We use the first replicate for our analysis. Auerbach et al. (2017, 2016) report no significant differences in results across replicates.

[12]Although the non public-use SCF data includes state identifiers, its household weights are national, i.e., not state-specific. They are, therefore, are of no value for our purposes of appropriately allocating SCF households by state.

Survey. Second, TFA needs future earnings to calculate resources along survival paths and past and future covered earnings to calculate Social Security benefits. Here we use Current Population Survey data to backcast and forecast each SCF respondent's past and future earnings through retirement[13].

5.1 State Residency

We use the 2016 American Community Survey to allocate state-specific weights to each SCF household such that the sum across states of each household's weights equals the household's original SCF weight. Specifically, we statistically matched the 2016 SCF households with the U.S. Census' 2016 American Community Survey (ACS). Our method assigns each SCF household to each of the 51 states (including D.C.) in appropriate proportion. This requires running, as we do, each SCF household through TFA 51 times: once for each state in which the household (actually, statistically similar households) might live.

The ACS includes over 1.3 million households covering 1 percent of the U.S. population. We first restrict both the SCF and ACS to household heads between the ages of 20 and 79. We then partition households into 1536 distinct cells (c) based on the household head's age, race/ethnicity, marital status and educational attainment as well as the value of the primary residence, total household income in 2015 and the presence or absence of at least one child under 17 years of age. For households in a given cell c, we create the household's weight for each state by multiplying their SCF sample weight by the weighted fraction of cell-c households in the 2016 ACS that reside in that state. Thus, the sum of all state weights for each state will equal the population of that state. We then duplicate all of the data 51 times, running it through TFA to apply all state specific tax and transfer program rules. We remove households with a present value of spending under $5000 and households where the program does not converge for every state in the sample. We are left with more than 4,500 SCF records in each of the 51-state residencies.

Note that the categorization of rich and poor by resources R is done at the national level. So, for example, California has a higher weighted fraction of its households (17.1 percent) in the top 10 percent of lifetime resources than does Mississippi (4.5 percent), and has significantly more residents. Thus, rich households in the U.S. are much more likely to be located in California than in Mississippi (18.2 percent of the top 10 percentile of households are in California versus 0.4 percent in Mississippi).

5.2 Earnings Imputations

To impute annual labor earnings, we first group CPS observations by age, sex, and education. Next, we estimate annual earnings growth rates by age and year for individuals in each sex and education cell. These cell growth rates are used to "backcast" and forecast each individual's earnings history. These forecasts assume a 1 percent real growth rate in economy-wide earnings.

Past and future cell growth rates ignore earnings heterogeneity within cells. To deal with such heterogeneity, we assume that observed individual deviations in earnings from cell means are partially permanent and partially transitory, based on an underlying earnings process in which the permanent component (relative to group trend growth) evolves

[13]To determine retirement age, we use respondents' stated retirement age. For those who say they will never retire, we set their retirement age to the larger of their current age plus 3 and age 70

as a random walk and the transitory component is serially uncorrelated. We also assume that such within-cell heterogeneity begins in the first year of labor force participation. In particular, suppose that, at each age, for group i, earnings for each individual j evolve (relative to the change in the average for the group) according to a shock that includes a permanent component, p, and an iid temporary component, e. Then, at age a (normalized so that age 0 is the first year of labor force participation), the within-group variance will be $\alpha\sigma_p^2 + \sigma_e^2$. Hence, our estimate of the fraction of the observed deviation of individual earnings from group earnings, $(y_{i,j}^a - \bar{y}_i^a)$, that is permanent is $a\sigma_p^2/(a\sigma_p^2 + \sigma_e^2)$. This share grows with age, as permanent shocks accumulate. Using this estimate, we form the permanent component of current earnings for individual j, $\hat{y}_{i,j}^a$,

$$\hat{y}_{i,j}^a = \bar{y}_i^a + (a\sigma_p^2/(a\sigma_p^2 + \sigma_e^2))(y_{i,j}^a - \bar{y}_i^a) = (a\sigma_p^2/(a\sigma_p^2 + \sigma_e^2))y_{i,j}^a + (\sigma_e^2/(a\sigma_p^2 + \sigma_e^2))\bar{y}_i^a \quad (11)$$

and assume that future earnings grow at the group average growth rate. Further, we make the simplifying assumption that the permanent and temporary earnings shocks have the same variance, a reasonable one based on the literature (e.g., Moffitt and Gottschalk (1995), and Meghir and Pistaferri (2011)), so that (10) reduces to:

$$\hat{y}_{i,j}^a = (a/(a+1))y_{i,j}^a + (1/(a+1))\bar{y}_i^a \quad (12)$$

For backcasting, we assume that earnings for individual j were at the group mean at age 0 (i.e., the year of labor force entry), and diverged smoothly from this group mean over time, so that the individual's estimated earnings t years prior to the current age a are

$$\bar{y}_i^{(a-t)} + ((a-t)/a)(\hat{y}_{i,j}^a - \bar{y}_i^a)(\bar{y}_i^{(a-t)}/\bar{y}_i^a) = (t/a)\bar{y}_i^{(a-t)} + ((a-t)/a)\hat{y}_{i,j}^a(\bar{y}_i^{(a-t)}/\bar{y}_i^a) \quad (13)$$

That is, for each age we use a weighted average of the estimate of current permanent earnings, deflated by general wage growth for group i, and the estimated age-a, group-i mean also deflated by general wage growth for group i, with the weights converging linearly so that as we go back we weight the group mean more and more heavily, with a weight of 1 at the initial age, which we assume is age 20.

5.3 Survival-Path Probabilities

Our survival-path probabilities are constructed from underlying mortality rates estimated by Committee on the Long-Run Macroeconomic Effects of the Aging US Population (2015). This study sorts Health and Retirement Study (HRS) respondents by average wage-indexed earnings between ages 40 and 50. For married or partnered couples, average indexed earnings are divided by the square root of 2 prior to sorting. It then estimates post age-50 mortality rates as functions of age and sex. We follow the same sorting procedure, except we sort SCF respondents based on average wage-indexed earnings from age 25 through age 60.

6 Results

We begin with an overview of our findings.

6.1 Overview of Findings

Our main findings, which focus on all respondents earning \$1,000 more in the current year, are striking. The median marginal remaining lifetime net tax rate (τ_L), across all households, regardless of age or resource position, is very high – 43.2 percent. The corresponding current year marginal net tax rate (τ_C) is lower at 37.6 percent. Median current-year marginal net rates are not only lower across the entire SCF sample; they are lower within all resource percentiles within all cohorts. This is not surprising, as the lifetime measure captures double taxation, although other differences between the construction of lifetime and current-year measures mean that this result needn't necessarily hold.

There is some evidence of a U-shaped pattern of marginal net taxation, as justified theoretically in Diamond (1998). As indicated earlier, marginal net lifetime tax rates are generally higher for those in the lowest quintile than for those in the middle three quintiles, but these tax rates then rise again in the highest quintile. However, contrary to a full U-shaped pattern, lifetime net tax rates typically fall near the very top of the resource distribution, as one moves from the bottom quintile to the top 1 percent, reaching a peak for all age cohorts among those in the top 5 percent before falling again. The general pattern is quite similar for tax rates measured on a current-year basis.

We also find huge dispersion in values of τ_Ls among the poor at all ages. Consider the bottom quintile of 20-29 year olds. This group's median τ_L is 42.1 percent. The 25th and 75th percentile values are 29.6 percent and 67.4 percent, for a spread of 37.8 percentage points, which is almost as large as the median rate. The group's minimum τ_L is -178.8 percent; its maximum is 2,099.6 percent; and its standard deviation is 233.6. Compare this group's tremendous τ_L dispersion with that of the top quintile of 50-59 year olds. For this set of households, the median τ_Ls is 53.6 percent, the 25th percentile value is 43.0 percent, and the 75th percentile value is 55.0 percent. Hence, the 25th-75th percentile difference is 12 percentage points compared with 37.8 percentage points for the poorest 20-29 year olds.

Across all households, the maximum τ_L is 17,914.0 percent and the minimum is -4,060.3 percent. The household with the maximum rate experiences over a \$179,140 increase in net taxes as a result of earning an extra \$1,000. The household with the minimum rate of negative 4,060 percent experiences over a \$40,600 increase in net benefits from earning another \$1,000.

The potential poverty trap arising under our fiscal system is highlighted by the 75th τ_L-percentile values for the bottom quintiles. Moving from the youngest to the oldest cohorts, these values are 67.4 percent, 75.9 percent, 69.3 percent, 76.5 percent, 74.4 percent, and 73.9 percent. Hence, one in four of our poorest households, regardless of age, make between two and three times as much for the government than they make for themselves in earning an extra \$1,000. The precise degree to which disincentives of this magnitude discourage work remains an open question.

In general, we find small differences in the size of τ_L when we alter the magnitude and duration of the household's earnings increase. For example, among the middle quintile of 40-49 year-olds, the median τ_L arising from a \$10,000 permanent (through the retirement age) increase in earnings is 40.9 percent, while that associated with an increase of only \$1,000, lasting for only one year, is 42.1 percent. Across all age-cohorts and resource groups, the comparable tax rates are 40.7 percent and 41.1 percent, respectively. However, as mentioned above and discussed further below, there are bigger differences for those in the bottom quintile, for which benefit qualification is more important and is sensitive to the size of income changes.

Another key finding involves differences across states in a household's τ_Ls. To measure this, we considered the τ_Ls each household would face in each state assuming it earned an extra \$1,000 in the current year. We then computed the difference in maximum and minimum values of τ_Ls for each household across all states. Our findings here are remarkable.

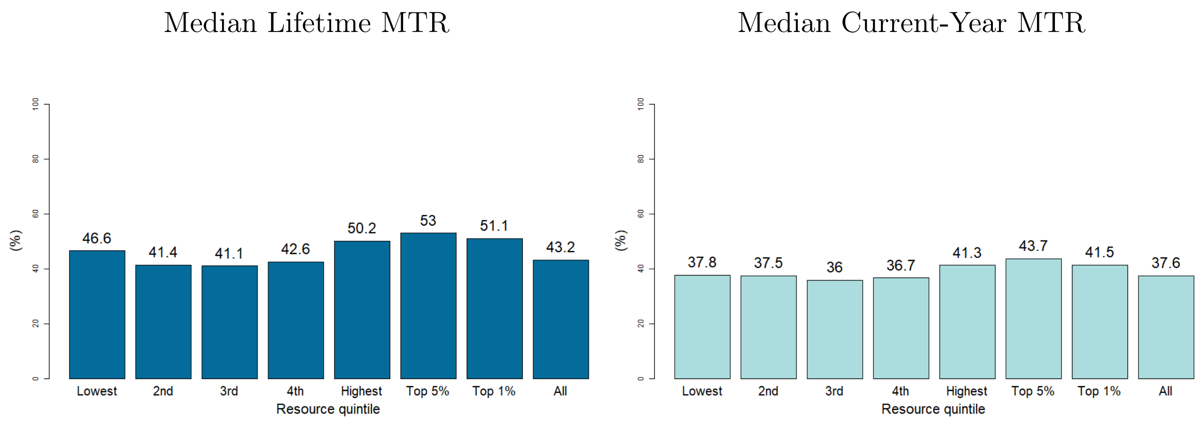
For the bottom quintile, there is a 99.7 percentage-point median difference between minimum and maximum τ_L. I.e., the typical SCF poor household can lower its τ_L by 99.7 percent by switching states! For one SCF household, the largest τ_L potential change exceeds 17,000 percentage points! Finally, there is a major incentive for households to switch states. The typical household can raise its total remaining lifetime spending by 8.1 percent by moving across states.

6.2 Median Marginal Tax Rates by Age-Resource Quintiles

In this section we present in more detail our calculations of the median lifetime (τ_L) and current-year marginal tax rates (τ_C) breaking them down by age-resource cohorts. Both measures are calculated based on a \$1,000 increase in the current-year earnings.

Figure 1 shows the median marginal tax rates for all age groups by resource quintiles. For the population as a whole as well as for each resource quintile, median values of τ_L are higher than median values of τ_C. For all resource quintiles median τ_L is 43.2 percent while median τ_C is 37.6 percent. The top 1% faces median τ_L of 51.1 percent and a median τ_C of 41.5 percent. Corresponding values for the bottom quintile, 46.6 percent and 37.8 percent, respectively, are both lower but with a similar gap between τ_L and τ_C.

Figure 1: Ages 20-79



In figures 2 - 7, we provide estimates of median τ_L and τ_C by resource quintiles for each age cohort separately. For each age group it is still true that median current-year marginal tax rates are substantially lower than their lifetime counterparts. In general, the discrepancy is the most pronounced for the lowest and highest quintiles. For example, in the lowest resource quintile age 30-39, the median value of τ_L is 42.6 percent while the median current-year tax rate is just 29.4 percent, a gap of 13.2 percentage points. For the top quintile, the gap is 11.3 percentage points (54.1 percent versus 42.8 percent). That is, the partial U-shaped pattern mentioned above, which holds as one moves from the bottom quintile to the top quintile, is more pronounced for the median lifetime marginal tax rates than for the median current-year marginal tax rates.

Figure 2: Ages 20-29

Median Lifetime MTR | Median Current-Year MTR

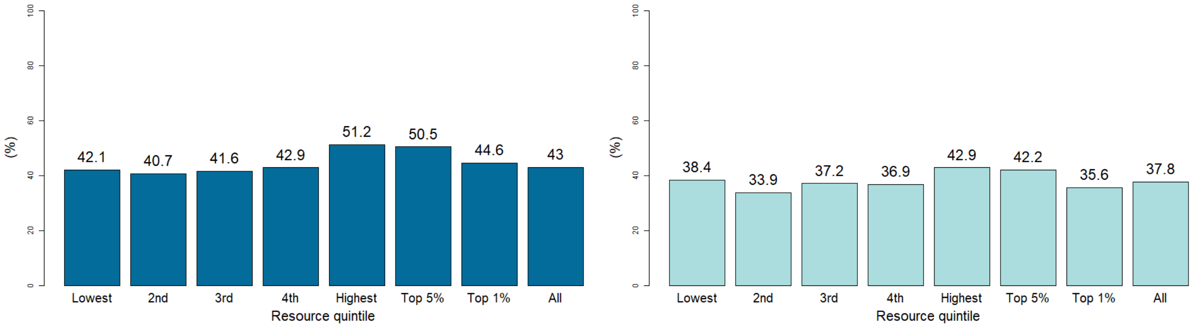


Figure 3: Ages 30-39

Median Lifetime MTR | Median Current-Year MTR

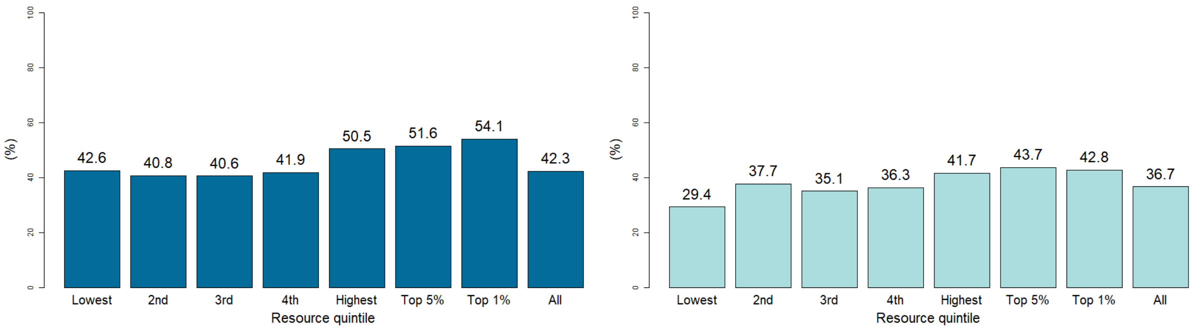


Figure 4: Ages 40-49

Median Lifetime MTR | Median Current-Year MTR

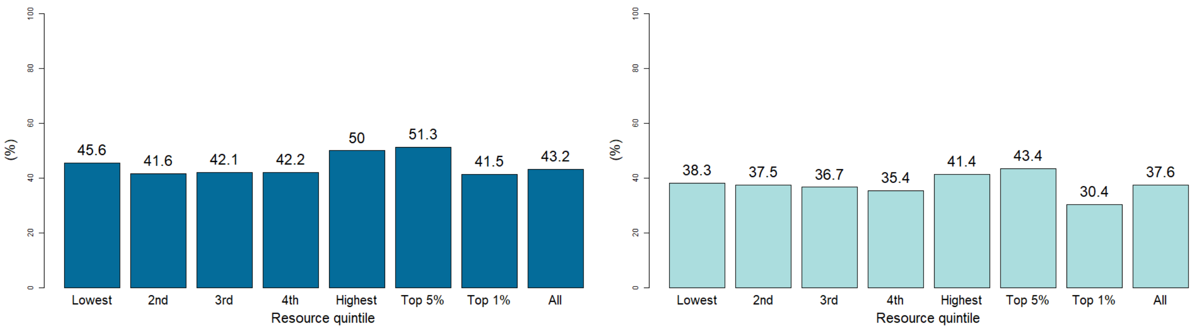


Figure 5: Ages 50-59

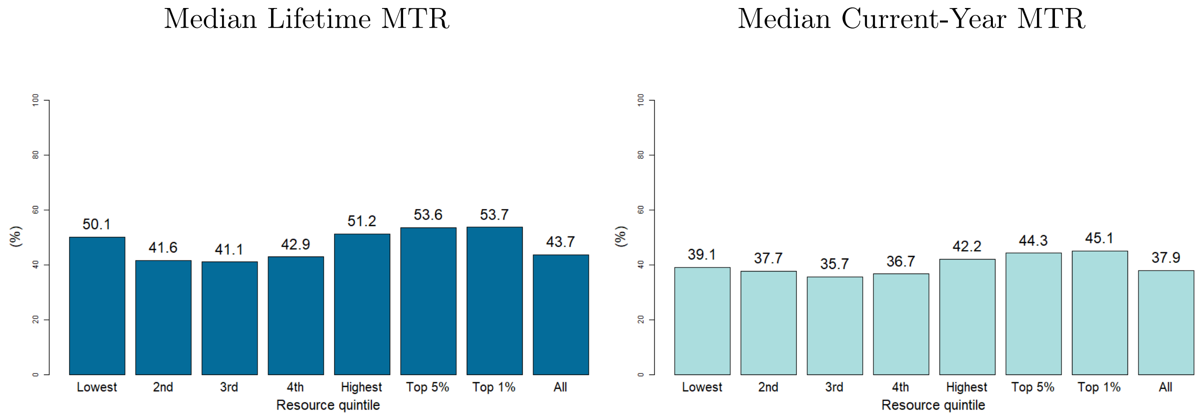


Figure 6: Ages 60-69

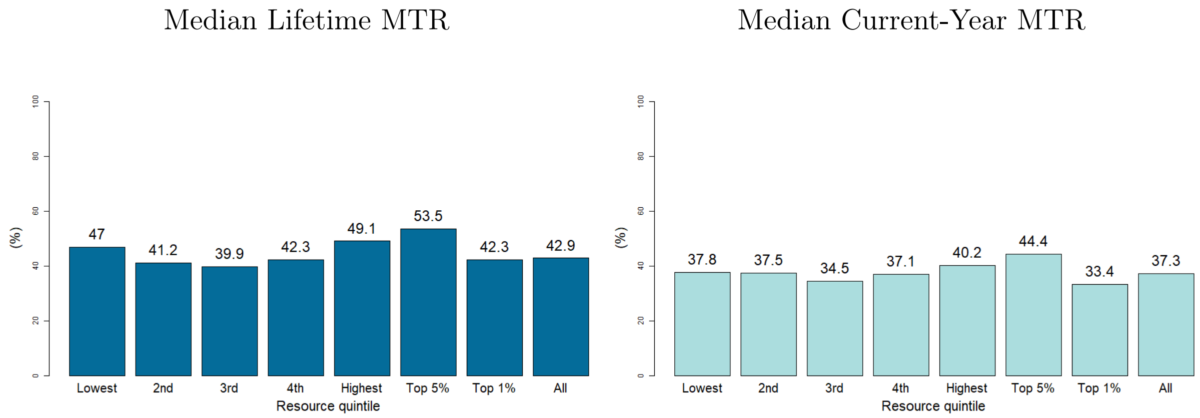
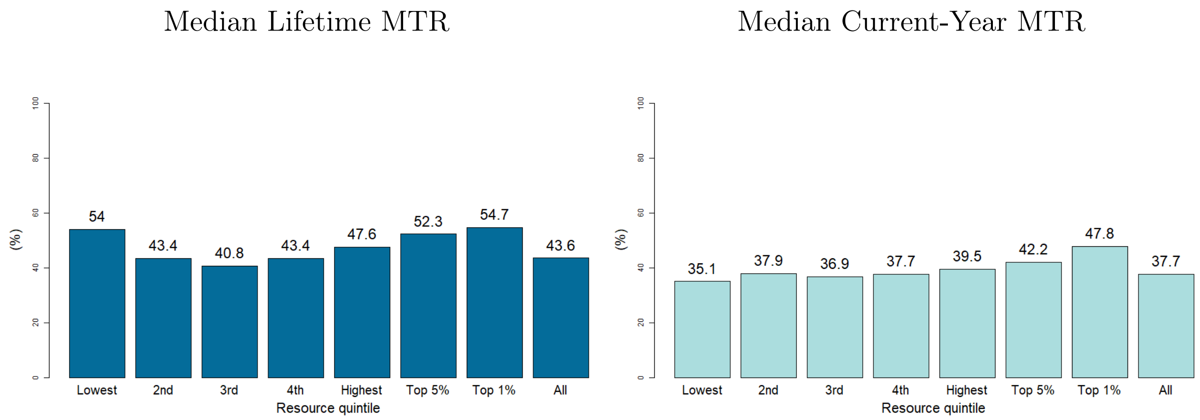


Figure 7: Ages 70-79



6.3 Distribution of Lifetime Marginal Net Tax Rates

Next, we describe the distribution of lifetime marginal tax rates for the U.S. population. Figures 8 and 9 plot the distribution of lifetime and current-year marginal tax rate respectively. Measures are calculated based on the $1,000 increase in the current-year earnings. Several observations can be made. First, the distribution of τ_L for households with low lifetime resources exhibits significant dispersion. Some households face extremely high lifetime marginal tax rates (in some cases greater than 100 percent), while others face low or even negative lifetime marginal tax rates. Second, as already discussed, lifetime marginal tax rates are higher than the current-year marginal tax rates for each level of lifetime net resources. This may be seen by looking at the plot of current versus lifetime tax rates in figure 10.

Figure 8: Lifetime Marginal Tax Rates from $1000 Earnings Increase in Current Year, Ages 20-79

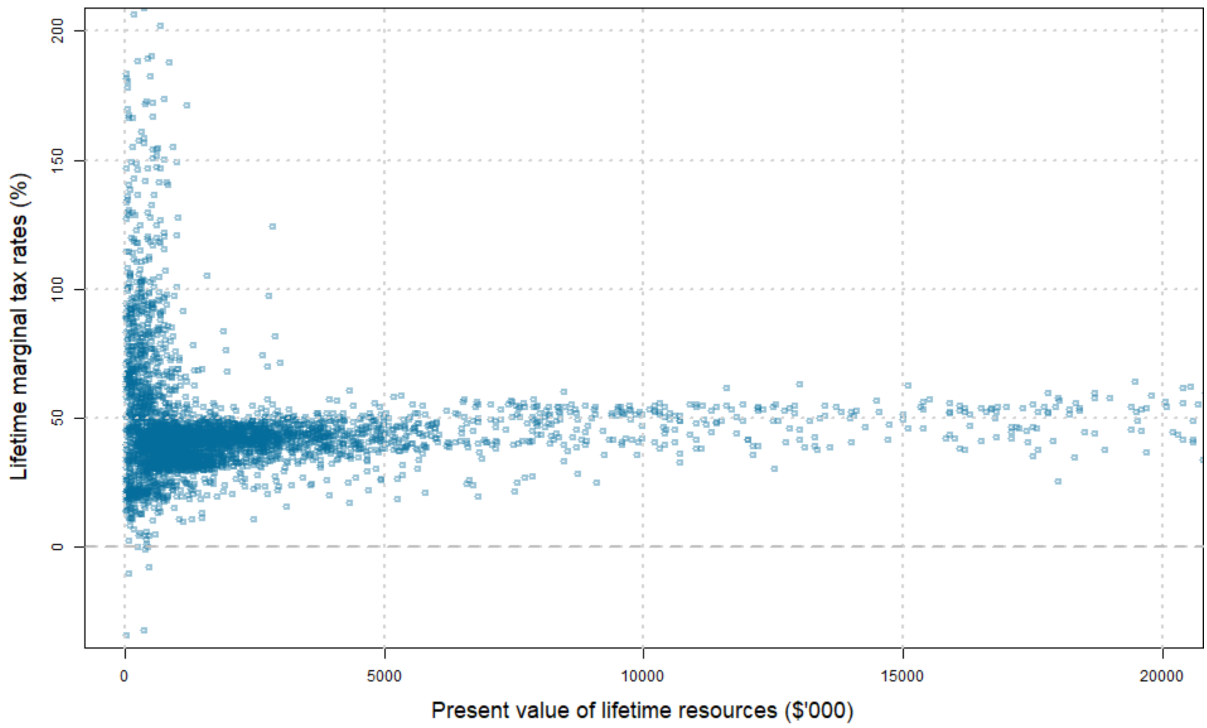


Figure 9: Current-Year Marginal Tax Rates from $1000 Earnings Increase in Current Year, Ages 20-79

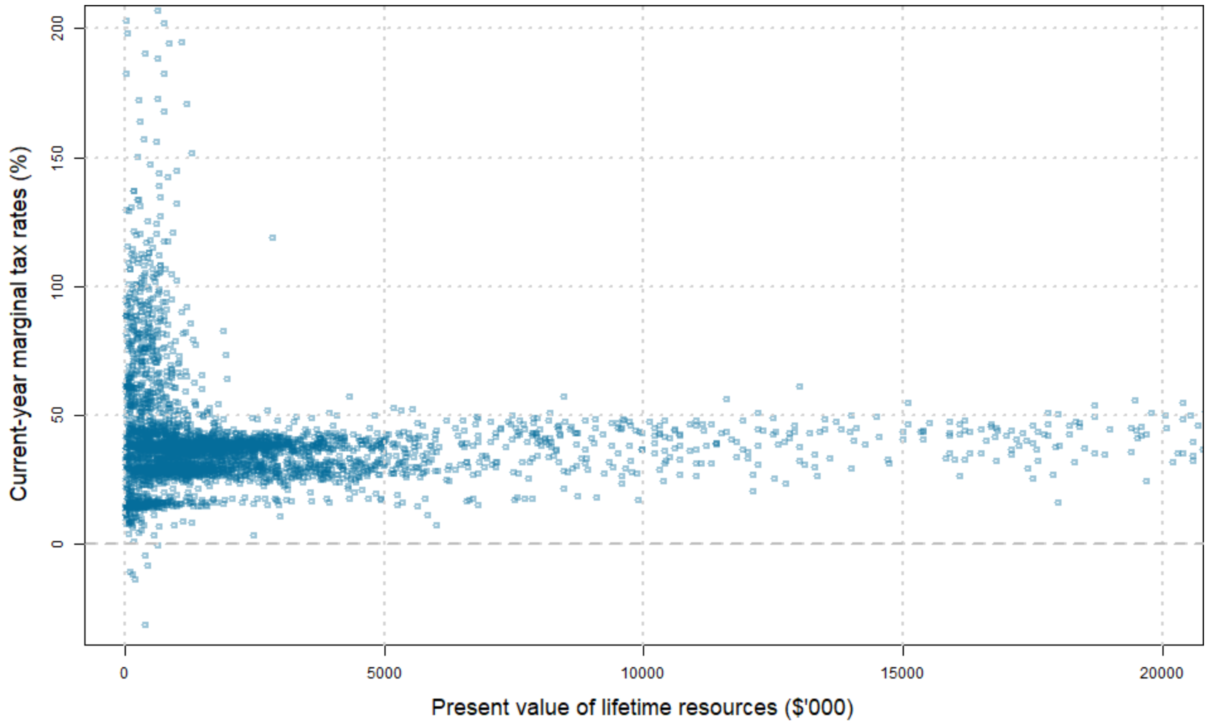
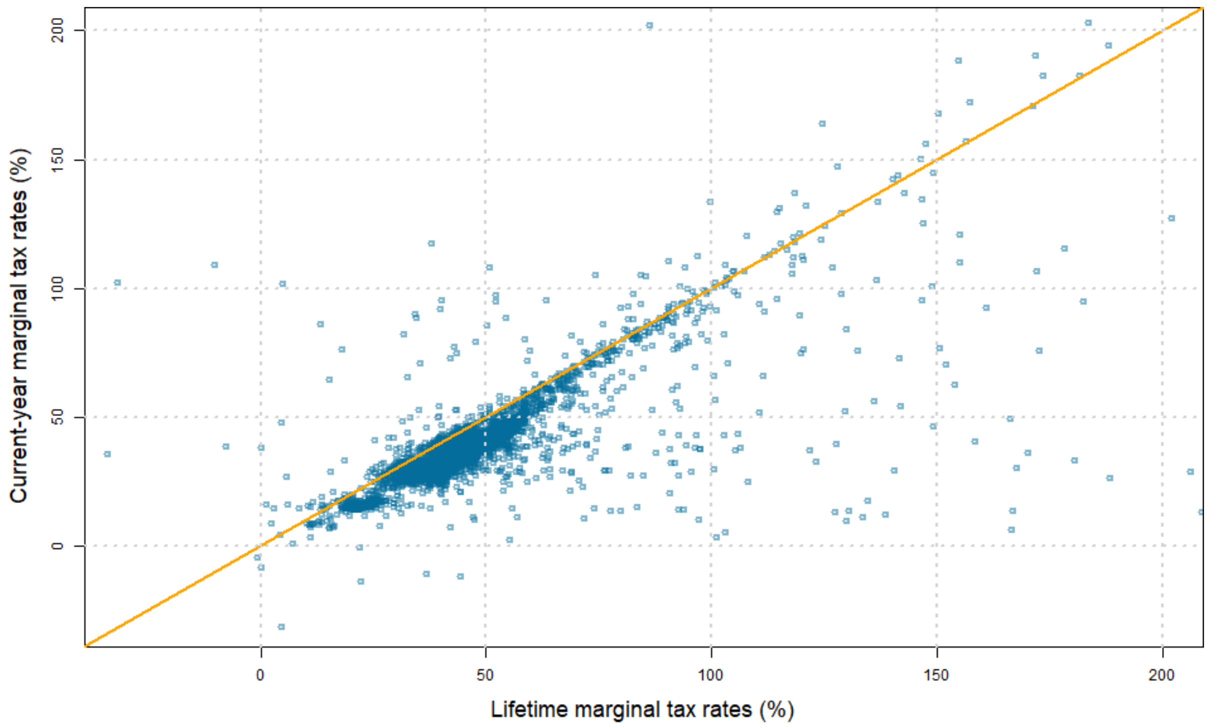


Figure 10: Current-Year vs Lifetime Marginal Tax Rates from $1000 Earnings Increase in Current Year, Ages 20-79



(a) Note: Both measures of marginal tax rates are based on the $1,000 increase in the current-year earnings. All figures are truncated at 200%.

Table 3 provides summary statistics for the distribution of lifetime marginal tax rates across different age-resource quintiles. Table 13 in the Appendix provides similar summary statistics for the current-year marginal tax rates.

Table 2: Summary Statistics for the Lifetime Marginal Tax Rates

	min	q25	median	mean	q75	max	st.dev
Age 20-29							
Lowest	-178.8	29.6	42.1	77.0	67.4	2,099.6	233.6
2nd	-612.4	32.8	40.7	51.6	46.1	5,024.5	38.8
3rd	-1,717.4	37.8	41.6	40.6	44.6	13,972.8	5.6
4th	-331.1	40.0	42.9	59.4	46.0	2,448.5	153.5
Highest	-1,549.4	43.1	51.2	49.7	54.6	4,290.6	8.9
Top 5%	26.6	42.7	50.5	48.5	56.4	414.5	12.4
Top 1%	36.1	38.4	44.6	42.5	56.3	58.3	13.9
All	-1,717.4	37.1	43.0	55.7	50.3	13,972.8	126.9
Age 30-39							
Lowest	-2,424.8	21.7	42.6	12.0	75.9	7,118.0	187.6
2nd	-3,319.5	33.6	40.8	53.4	46.5	6,458.6	60.1
3rd	-1,417.5	34.2	40.6	43.4	44.9	5,331.4	37.6
4th	-1,019.6	37.6	41.9	41.1	45.2	9,284.3	5.6
Highest	-846.1	40.7	50.5	49.7	54.7	2,516.1	26.9
Top 5%	-3.8	43.6	51.6	49.7	56.5	2,516.1	9.0
Top 1%	22.3	43.6	54.1	51.2	57.5	2,516.1	6.5
All	-3,319.5	35.3	42.3	39.9	50.1	9,284.3	91.7
Age 40-49							
Lowest	-1,228.1	29.4	45.6	61.0	69.3	10,168.1	65.7
2nd	-1,299.9	35.6	41.6	59.9	47.4	6,711.4	151.3
3rd	-2,166.1	36.6	42.1	41.3	44.4	1,276.5	8.2
4th	-1,227.4	38.9	42.2	42.4	45.7	2,333.5	8.8
Highest	-571.7	41.7	50.0	48.3	54.9	17,914.0	8.7
Top 5%	-571.7	40.8	51.3	48.8	56.3	752.8	11.0
Top 1%	-27.3	39.1	41.5	41.6	51.2	287.3	11.9
All	-2,166.1	37.4	43.2	50.6	50.0	17,914.0	74.3
Age 50-59							
Lowest	-2,845.7	34.3	50.1	57.9	76.5	3,691.1	162.4
2nd	-1,950.6	33.9	41.6	50.7	47.4	1,483.5	45.6
3rd	-1,613.9	33.3	41.1	44.1	44.6	3,360.0	41.1
4th	-3,310.0	39.5	42.9	42.5	45.9	2,454.6	7.0
Highest	-1,547.1	43.0	51.2	49.2	55.0	4,200.5	8.0
Top 5%	-122.6	48.4	53.6	51.6	56.1	4,200.5	6.3
Top 1%	26.1	49.7	53.7	52.3	57.6	284.6	5.7
All	-3,310.0	37.6	43.7	48.9	51.6	4,200.5	78.0
Age 60-69							
Lowest	-4,060.3	33.3	47.0	60.9	74.4	4,653.4	125.6
2nd	-3,076.6	34.8	41.2	48.5	47.5	1,923.5	113.7
3rd	-2,378.2	33.0	39.9	41.9	44.3	1,417.5	22.6
4th	-2,407.4	39.0	42.3	41.6	45.0	3,928.4	5.4
Highest	-2,357.9	42.3	49.1	47.8	53.9	1,998.7	8.0
Top 5%	-1,162.9	47.4	53.5	51.3	55.8	1,998.7	7.5
Top 1%	21.2	40.0	42.3	45.5	54.7	1,291.3	9.2
All	-4,060.3	36.3	42.9	48.1	50.7	4,653.4	77.0
Age 70-79							
Lowest	3.7	33.7	54.0	58.3	73.9	1,513.1	76.3
2nd	14.0	34.5	43.4	76.3	53.4	4,007.6	221.9
3rd	-149.7	34.2	40.8	41.8	43.6	1,997.7	13.7
4th	10.5	40.8	43.4	43.2	46.0	207.5	8.2
Highest	-400.3	41.5	47.6	47.4	54.1	1,345.0	8.1
Top 5%	-400.3	47.1	52.3	51.0	55.9	1,345.0	7.7
Top 1%	19.0	48.5	54.7	53.7	57.4	88.8	5.0
All	-400.3	37.5	43.6	53.4	52.3	4,007.6	105.9
Age 20-79							
Lowest	-4,060.3	30.7	46.6	53.8	74.0	10,168.1	147.2
2nd	-3,319.5	34.3	41.4	55.2	47.9	6,711.4	117.6
3rd	-2,378.2	34.3	41.1	42.4	44.4	13,972.8	27.8
4th	-3,310.0	39.0	42.6	43.6	45.4	9,284.3	45.2
Highest	-2,357.9	42.0	50.2	48.6	54.7	17,914.0	13.0
Top 5%	-1,162.9	45.9	53.0	50.4	56.1	4,200.5	8.8
Top 1%	-27.3	40.8	51.1	47.8	55.7	2,516.1	10.0
All	-4,060.3	36.9	43.2	48.7	50.8	17,914.0	88.0

Note: Marginal tax rates are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated. Absolute Maximums and Minimums across all states are presented.

Table 3: Summary Statistics for the Lifetime Marginal Tax Rates: Households Without Children

	min	q25	median	mean	q75	max	st.dev
Age 20-29							
Lowest	-405.4	29.6	40.2	83.1	59.0	13,972.8	256.2
2nd	-419.6	32.6	38.2	40.6	44.6	2,797.9	13.6
3rd	-1,549.4	38.4	42.1	40.8	44.6	11,741.4	5.3
4th	-1,717.4	39.7	43.1	69.2	46.0	4,290.6	193.4
Highest	-612.4	41.3	49.6	49.1	55.4	5,024.5	9.4
Top 5%	-87.5	40.1	52.3	49.1	55.4	2,973.1	12.7
Top 1%	-87.5	40.1	40.1	40.1	40.1	786.7	
All	-1,717.4	36.1	42.4	57.2	47.5	13,972.8	148.9
Age 30-39							
Lowest	-1,417.5	21.1	37.9	-0.6	64.3	7,118.0	198.3
2nd	-3,319.5	33.1	38.9	38.9	44.6	9,284.3	11.6
3rd	-2,424.8	35.0	40.9	39.4	44.8	6,458.6	7.2
4th	-1,689.9	38.1	42.0	41.1	45.3	3,234.5	6.1
Highest	-1,490.6	39.8	49.0	49.8	54.8	2,894.4	32.3
Top 5%	-908.9	43.6	51.2	49.5	56.9	1,496.9	9.8
Top 1%	-146.6	43.6	51.2	49.9	57.5	746.2	7.3
All	-3,319.5	33.6	41.6	32.0	47.1	9,284.3	100.4
Age 40-49							
Lowest	-1,366.3	26.7	41.4	56.6	63.5	16,581.6	65.1
2nd	-1,901.1	33.8	39.1	55.3	44.1	6,639.1	172.8
3rd	-2,166.1	37.8	42.4	41.6	44.7	17,914.0	9.0
4th	-1,343.0	39.8	44.1	43.2	46.0	6,711.4	4.8
Highest	-1,299.9	41.2	49.6	48.2	54.8	16,562.8	8.8
Top 5%	-1,299.9	40.8	54.5	50.3	56.3	16,562.8	10.4
Top 1%	-571.7	39.1	41.7	45.0	55.7	1,052.2	9.3
All	-2,166.1	36.8	43.2	49.7	48.3	17,914.0	85.9
Age 50-59							
Lowest	-2,904.3	31.3	44.1	47.2	64.0	3,691.1	176.6
2nd	-2,845.7	33.0	39.7	41.7	44.2	2,964.8	31.8
3rd	-2,082.4	36.3	42.2	40.0	44.6	4,200.5	7.1
4th	-3,310.0	40.3	43.7	43.4	47.9	2,338.9	8.1
Highest	-2,442.4	44.0	51.7	49.5	55.6	3,360.0	8.5
Top 5%	-1,155.5	47.2	53.6	51.6	56.9	3,360.0	6.6
Top 1%	-946.1	49.7	57.5	53.6	57.6	834.1	5.8
All	-3,310.0	37.1	43.3	44.5	49.6	4,200.5	86.6
Age 60-69							
Lowest	-3,492.4	31.3	44.1	57.7	67.7	3,928.4	138.1
2nd	-3,087.6	33.7	39.5	34.8	45.3	2,761.5	97.7
3rd	-3,076.6	34.8	40.4	39.7	44.0	4,653.4	8.4
4th	-2,571.5	38.9	42.9	41.9	45.7	4,009.8	6.2
Highest	-4,060.3	43.2	49.4	47.9	53.9	2,944.3	8.3
Top 5%	-3,889.7	48.9	53.8	51.5	56.1	2,893.9	7.6
Top 1%	1.5	35.2	50.6	46.2	56.0	2,425.6	10.5
All	-4,060.3	36.0	42.8	44.9	48.9	4,653.4	81.5
Age 70-79							
Lowest	-1.4	23.9	50.3	54.5	70.3	2,589.8	82.6
2nd	-48.7	33.3	41.2	43.4	47.7	3,064.3	19.3
3rd	-400.3	36.1	41.3	40.3	43.9	2,989.4	7.6
4th	-75.5	41.2	43.5	43.5	46.1	2,724.6	9.1
Highest	0.2	41.2	46.4	46.8	53.9	4,007.6	8.2
Top 5%	2.4	47.4	52.8	50.6	55.9	3,783.6	6.9
Top 1%	2.9	47.7	48.6	52.1	60.1	222.8	5.7
All	-400.3	36.4	43.2	46.2	50.3	4,007.6	42.1
Age 20-79							
Lowest	-3,492.4	27.3	43.1	47.5	65.1	16,581.6	159.4
2nd	-3,319.5	33.3	39.4	42.2	44.8	9,284.3	89.5
3rd	-3,076.6	36.0	41.5	40.2	44.4	17,914.0	7.8
4th	-3,310.0	39.7	43.3	45.0	46.2	6,711.4	59.1
Highest	-4,060.3	41.7	49.7	48.6	54.8	16,562.8	14.9
Top 5%	-3,889.7	46.5	53.4	50.7	56.3	16,562.8	8.8
Top 1%	-946.1	41.3	50.9	48.9	57.5	2,425.6	8.9
All	-4,060.3	36.1	42.8	44.8	48.9	17,914.0	91.2

Note: Marginal tax rates are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated. Absolute Maximums and Minimums across all states are presented.

With a couple exceptions, for the poorest and 2nd quintiles, the τ_Ls are extremely dispersed, as measured by their standard deviation. But for the other quintiles as well as the 5th and 1st percentiles, variation in τ_Ls is generally quite minor. This is to be expected. First- and second-quintile households remain eligible for income- and asset-tested benefit programs. Their eligibility is strongly influenced by the presence of children.

6.4 Decomposing Average Marginal Net Tax Rates

Table 4 shows the sources of mean lifetime and current-year marginal tax rates for one particular group, the lowest resource quintile of 20-29 year-olds. We present mean values in this table to ensure that items in each column add to the totals, and that the change in net taxes equals the value after the increment to income less the value before the increment to income.

As the table shows, current year taxes rise and current year transfers fall with an increase of $1,000 in labor income, although one important transfer, the ACA subsidy, rises. The pattern is similar for the present value of lifetime net taxes, but the magnitudes are larger, especially for transfers.

Table 4: Breakdown of τ_L and τ_C sources. Ages 20-29, Lowest Resource Quintile

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	532	632	100	4,558	4,664	106
State Income Tax	338	372	34	2,686	2,722	37
Other Taxes	5,667	5,811	144	61,596	61,788	193
Total Tax	6,516	6,800	284	63,666	63,998	332
TANF	0	0	0	0	0	0
SNAP	0	0	0	1,859	1,859	-0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Medicaid for Children	0	0	0	0	0	0
Medicaid for Adults	0	0	0	21,445	21,445	0
ACA	0	0	0	11,215	11,215	0
Medicare	0	0	0	62,861	62,861	0
SSDI	0	0	0	0	0	0
SSI	0	0	0	402	402	0
Social Security	0	0	0	82,919	82,936	16
Total Transfers	11,258	0	-90	195,756	82,936	-127
Net Tax	-4,742	-4,368	374	-132,090	-131,632	459

Note: All numbers are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated. Mean values are presented.

6.5 Understanding Very High and Very Low Lifetime Marginal Tax Rates

Table 3 shows that minimum and maximum values of τ_L can be extremely low (less than 4,000 percent) and extremely high (greater than 17,000 percent). This subsection considers five particular households to illuminate the sources of these extreme work incentives and disincentives. Extremely high values of τ_L can arise due to the loss of Section 8 housing voucher, childcare support, child Medicaid benefits, and the ACA subsidy. Extremely low values of τ_L can arise when a household, which lives in a state that hasn't expanded Medicaid coverage, earns just enough to become eligible for the ACA subsidy – 100 percent of the Federal Poverty Level (FPL).

6.5.1 Case I: Single Oregon Mother with Three Children, τ_L is 17,914 Percent

SCF household number 4,409 is in the highest resource quintile of the age 40-49 cohort. The household resides, in this instance, in Oregon[14] The household head, who we'll call Mary, is a 41 year-old single female with three young children. She pays $2,000 per month in rent and earns $37,157 per year.

There are two eligibility criteria for receipt of Section 8 housing vouchers. The first, called the Initial Eligibility Test, is more stringent than the second, called the Continuing Eligibility Test. Since we don't know whether SCF respondents became eligible for Section 8 vouchers in the past, we assume that as of the time of the survey, none were enrolled in the program[15]. We make the same assumption with respect to child care allowances, which also have initial and continuing eligibility criteria. Given our assumption of no prior eligibility for either program, we apply, for each program separately, both the initial eligibility criteria to Mary in the current and future years until she become eligible. Once this occurs, we apply the continuing eligibility criteria.

Table 5 breaks down Mary's benefits and taxes. As the table shows, Mary's income and family composition make her eligible for a Section 8 housing voucher, which covers $15,015 of her current-year $24,000 rental expense. Mary's lifetime benefit totals $227,154, reflecting the fact that in future years, Mary meets the Section 8 continuing eligibility rule. In contrast, Mary never meets the initial qualification criterion for childcare support, which is denoted CCDF and references Child Care and Development Fund.

Mary does, however, receive SNAP, ACA (Obamacare), Medicaid, and Social Security benefits, although the later two benefits start in future years. Of the five benefits, Social Security has the largest present value, at $369,761.

Now consider how Mary's benefits change were she to earn an additional $1,000 in the current year. The extra earnings push Mary over the Section 8 housing voucher initial eligibility threshold, eliminating all of her current and most of her future housing support. The present value price tag for her working associated just with the loss of housing support is enormous – $184,456. Surprisingly, the extra earnings cost Mary $223 in SNAP in the current year, but raise her lifetime SNAP benefits by $1,666. Mary loses SNAP in the current year because her income increases. But her current-year benefit loss means she saves less, which, paradoxically, permits her, in the future, to pass the SNAP asset test. Another surprise is the small, but positive change in ACA subsidies. Here's why. Due to the loss of SNAP and Section 8 Housing Voucher, Mary's MAGI (Monthly Gross Adjusted Income) declines somewhat, which increases her ACA subsidy. The ACA subsidy is calculated as full ACA premium cost less a fixed share of MAGI. Hence, when MAGI falls, the government covers larger part of her health insurance premium.

The main explanation, then, for Mary's enormous 17,980 percent lifetime marginal tax

[14] Recall, we consider each SCF household as living in each of the 51 states in order to generate a nationally representative sample.

[15] For programs with tiered eligibility and continuing-benefit provisions, our assumption that individuals face the lower eligibility thresholds at the time of an income increase implies that our estimates are upper bounds on marginal tax rates. Also related to transfer program eligibility, we assume throughout that individuals receive all benefits for which they are eligible. The fact this is not the case in reality – see, for example, Chien (2015) Chien (2015) – also implies that our estimates for lower-income and resource households will tend to be upper bounds.

rate is the loss of Section 8 housing support. The initial eligibility threshold is based on the Department of Housing and Urban Development's (HUD) Very Low Income Limits (VLIL), namely 50 percent of Area Median Income. HUD's continuous eligibility is based on HUD's Low Income Limits (LIL) – 80 percent of Area Median Income. In Oregon, to be continuously eligible, a household of four must have income below \$59,217 and to be initially eligible, it's income must be below \$37,310. Recall that Mary's current-year income is \$37,157, which is very close to the \$37,310 threshold.

Table 5: Breakdown of τ_L and τ_C sources. Case 1.

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	-2,674	-2,367	307	18,158	18,438	280
State Income Tax	1,441	1,540	99	31,214	31,287	73
Other Taxes	6,221	6,027	-194	86,562	82,811	-3,751
Total Tax	4,988	5,200	212	135,934	132,536	-3,398
TANF	0	0	0	0	0	0
SNAP	1,334	1,111	-223	7,521	9,187	1,666
Section 8	15,015	-0	-15,015	227,154	42,698	-184,456
CCDF	0	0	0	0	0	0
Medicaid for Children	0	0	0	0	0	0
Medicaid for Adults	0	0	0	12,874	12,874	0
ACA	11,372	11,766	394	95,471	95,883	412
Medicare	0	0	0	26,741	26,741	0
SSDI	0	0	0	0	0	0
SSI	0	0	0	0	0	0
Social Security	0	0	0	42,235	42,253	18
Total Transfers	27,720	0	-14,844	369,761	42,253	-182,378
Net Tax	-22,732	-7,676	15,056	-233,827	-54,847	178,980

Note: All numbers are calculated based on the \$1,000 increase in the current-year earnings.

6.5.2 Case II: Working Father with Four Children in Wyoming, τ_L is 13,973 Percent

Loss of the Child Care and Development Fund (CCDF) childcare support plays the major role in producing this household's enormous τ_L. This case, SCF record number 3,314, involves a partnered father, whom we will call John, who lives in Wyoming with his four young children. John has a high school degree and earns \$57,432 per year. As indicated in table 6, in the current year, John receives \$23,921 in CCDF childcare support and a \$40,337 ACA subsidy to cover his family's medical expenses. The \$1,000 assumed earnings increase causes the loss of his entire childcare subsidy, which has a present value cost of \$149,197. As in the case of the Section 8 Housing Voucher, CCDF initial eligibility rule is stricter than its continuous eligibility rule. According to federal guidelines, a family is eligible for CCDF support if its earnings fall below 85 percent of state median income. In addition, states can set their own initial-eligibility income thresholds. Wyoming requires that income for a family of six be below \$58,032 to be eligible for the childcare assistance.[16] But the difference between this threshold and John's current-year income is less than \$1,000. Hence, when John earns the additional \$1,000, he loses childcare care subsidies, indeed all present and future child-care subsidies. Table 6 shows how John's other benefits as well as taxes are impacted by his extra earnings.

[16] Wyoming's continuous eligibility threshold is \$80,748.

Table 6: Breakdown of τ_L and τ_C sources. Case 2.

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	-3,681	-3,570	111	49,930	49,777	-153
State Income Tax	0	0	0	0	0	0
Other Taxes	12,883	11,874	-1,009	237,202	228,345	-8,857
Total Tax	9,202	8,304	-898	287,132	278,122	-9,010
TANF	0	0	0	0	0	0
SNAP	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	23,921	0	-23,921	149,197	0	-149,197
Medicaid for Children	0	0	0	0	0	0
Medicaid for Adults	0	0	0	0	0	0
ACA	40,337	40,234	-103	553,312	553,899	587
Medicare	0	0	0	30,158	30,158	0
SSDI	0	0	0	0	0	0
SSI	0	0	0	0	0	0
Social Security	0	0	0	33,338	33,349	11
Total Transfers	64,258	0	-24,024	732,666	33,349	-148,610
Net Tax	-55,056	-31,930	23,126	-445,535	-305,935	139,600

Note: All numbers are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated.

6.5.3 Case III: Retired Alaskan Couple, $\tau_L = 4{,}004$ Percent

Values of τ_L can be very high even for older households. Take Alaskan household number 3,716, which we'll call the Kims. Mr. Kim is 73; Mrs. Kim is 71. The Kims have $63,039 in assets. Their reported 2016 income is $4,266. Their low income makes the family eligible for SSI. In Alaska, eligibility for SSI makes a household automatically eligible for Medicaid. Therefore, the Kims cover part of their medical expenses, which are very high, because Mr. Kim is disabled, through Medicaid and the rest through Medicare. With the assumed increase in labor earnings, the Kims lose both SSI and Medicaid benefits, which totals, in present value, $39,539, and is the main reason their lifetime marginal tax equals 4,004 percent. Table 7 shows financial impact on the Kims of the $1,000 rise in earnings.

Table 7: Breakdown of τ_L and τ_C sources. Case 3.

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	0	0	0	0	0	0
State Income Tax	0	0	0	0	0	0
Other Taxes	3,870	4,014	144	36,924	37,092	168
Total Tax	3,870	4,014	144	36,924	37,092	168
TANF	0	0	0	0	0	0
SNAP	0	0	0	118	118	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Medicaid for Children	0	0	0	0	0	0
Medicaid for Adults	39,539	-0	-39,539	287,948	248,409	-39,539
ACA	0	0	0	0	0	0
Medicare	14,140	14,140	0	210,468	210,468	0
SSDI	0	0	0	0	0	0
SSI	310	0	-310	3,281	2,951	-330
Social Security	26,662	26,662	0	246,577	246,577	0
Total Transfers	53,989	26,662	-39,849	501,815	246,577	-39,869
Net Tax	-50,119	-10,126	39,993	-464,891	-424,854	40,037

Note: All numbers are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated.

6.5.4 Case IV: Wyoming Couple without Children, τ_L = - 4,060 Percent

As discussed above, very low marginal tax rates can arise due to the eligibility structure for the ACA subsidy. To be eligible for this subsidy, a household's income must be more than 100 percent of the Federal Poverty Level (FPL). Therefore, in some cases, a $1,000 increase in the current-year earnings is enough to put a family above the eligibility threshold. To illustrate that, consider the case of a family we'll call the Ramones (SCF case 215).

The Ramones live in Wyoming. Mr. Ramone, age 60, is unemployed. His wife, age 57, has non-salary sources of income - $18,503 in total - which is slightly below the FPL for two-persons households. Wyoming has not expanded Medicaid under the ACA and therefore, the Ramones are trapped in the so called "coverage gap" i.e. they have to purchase unsubsidized health insurance on the private market because they earn too much to be covered by Medicaid but not enough to receive an ACA subsidy. Table 8 shows that a $1,000 increase in current-year earnings is just enough to give the Ramones access to the health exchange where they receive the ACA subsidy of $40,868. Therefore, the family's total healthcare costs decline significantly, resulting in the very low marginal tax rate of -4,060 percent.

Table 8: Breakdown of τ_L and τ_C sources. Case 4.

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	-527	-461	66	-3,299	-3,233	66
State Income Tax	0	0	0	0	0	0
Other Taxes	2,813	2,960	147	51,315	51,509	194
Total Tax	2,285	2,498	213	48,017	48,277	260
TANF	0	0	0	0	0	0
SNAP	0	0	0	6,737	6,737	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Medicaid for Children	0	0	0	0	0	0
Medicaid for Adults	0	0	0	49,461	49,461	0
ACA	0	40,868	40,868	7,625	48,493	40,868
Medicare	0	0	0	134,893	134,893	0
SSDI	0	0	0	0	0	0
SSI	0	0	0	21,483	21,479	-4
Social Security	0	0	0	211,944	211,944	0
Total Transfers	0	0	40,868	220,200	211,944	40,864
Net Tax	2,285	-38,370	-40,655	-172,183	-212,787	-40,604

Note: All numbers are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated.

6.5.5 Case V: NY Couple with Children; τ_L is -1,715 Percent

This is SCF case 4714. The couple, which is partnered and has four children, faces an extremely low lifetime marginal tax. The reason is complex. When the couple earns the additional $1,000 in the current year, it loses two different cash benefits (see the CY Diff column) in the current year, totalling $2,246.[17] This reduces the couple's assets in future years, which leaves them, in 2028 and 2029, under the child- and adult-Medicaid asset thresholds, making the couple eligible for both in these two years. As indicated in table 9, the couple receives an additional $10,762 in lifetime Adult Medicaid benefits and $9,523 in the lifetime Medicaid for Children benefits.

[17]Recall, we treat SNAP as a cash benefit.

Table 9: Breakdown of τ_L and τ_C sources. Case 5.

	CY Baseline	CY Marginal	CY Diff	PV Baseline	PV Marginal	PV Diff
Federal Income Tax	-8,493	-8,437	56	-62,382	-62,335	47
State Income Tax	-945	-848	97	2,845	2,927	82
Other Taxes	6,307	6,439	132	117,547	117,415	-132
Total Tax	-3,131	-2,846	285	58,010	58,007	-3
TANF	2,023	-0	-2,023	2,023	-0	-2,023
SNAP	7,173	6,950	-223	7,173	6,950	-223
Section 8	5,639	5,361	-278	58,191	58,080	-111
CCDF	39,644	38,864	-780	153,302	152,522	-780
Medicaid for Children	10,935	10,935	0	94,497	104,020	9,523
Medicaid for Adults	9,268	9,268	0	92,959	103,721	10,762
ACA	0	0	0	0	0	0
Medicare	0	0	0	20,419	20,419	0
SSDI	0	0	0	0	0	0
SSI	0	0	0	1	1	0
Social Security	0	0	0	11,401	11,407	6
Total Transfers	74,681	0	-3,304	428,564	11,407	17,148
Net Tax	-77,812	-74,223	3,589	-370,554	-387,705	-17,151

Note: All numbers are calculated based on the \$1,000 increase in the current-year earnings. Figures are not truncated.

7 Sensitivity Analysis

This section consider the sensitivity of our calculations to the size and duration of the change in labor earnings. We calculate lifetime marginal tax rates based on four different changes in labor earnings: i) our base-case \$1,000 one-year increase in labor earnings; ii) a \$10,000 one-year increase in labor earnings; iii) a \$1,000 increase in labor earnings through to retirement; iv) a \$10,000 increase in labor earnings through to retirement. Table 10 compares lifetime median marginal tax rates in the four cases. The first two columns consider one-year earnings increases, whereas columns three and four consider permanent increases.

Consider first the effects of the scale of the income change. For the top 1 percent, the scale of the change has little impact on the marginal tax rate, whether for a current-year change or a permanent change. These individuals are generally already at the top of the marginal income tax rate, so a larger income increase does not push them into a higher tax bracket. As one moves down the resource distribution, effects of scale do begin to appear. For 40-49 year-olds, for example, the highest quintile shows slightly higher marginal tax rates for \$10,000 changes (columns 2 and 4) than for \$1,000 changes. These effects become more pronounced in the third quintile of that age cohort, and even more so for the second and, especially, the first quintile. As these results highlight, the marginal tax rates for those at the bottom of the resource distribution are not only higher than for those in the middle of the resource distribution, but also more sensitive to changes in resources – effectively a very progressive rate schedule because of the increasing possibility of losing benefits. These patterns are even more pronounced for those in younger age cohorts.

The other interesting pattern one observes is between current-year income changes and permanent income changes. For the lowest resource quintile, permanent changes in income tend to have lower marginal tax rates, especially for large (e.g., \$10,000) income changes. This may be because, with permanent changes in income, individuals are more likely to move beyond phase-out ranges that increase marginal tax rates.

While these variations associated with the scale and duration of income increases are interesting, they do not undercut the basic conclusions discussed above, that the marginal tax rate schedule is U-shaped with respect to the resource distribution, and that, for those at the bottom of the resource distribution, marginal tax rates can be quite high and sensitive to income changes because of the means tests of the social safety net.

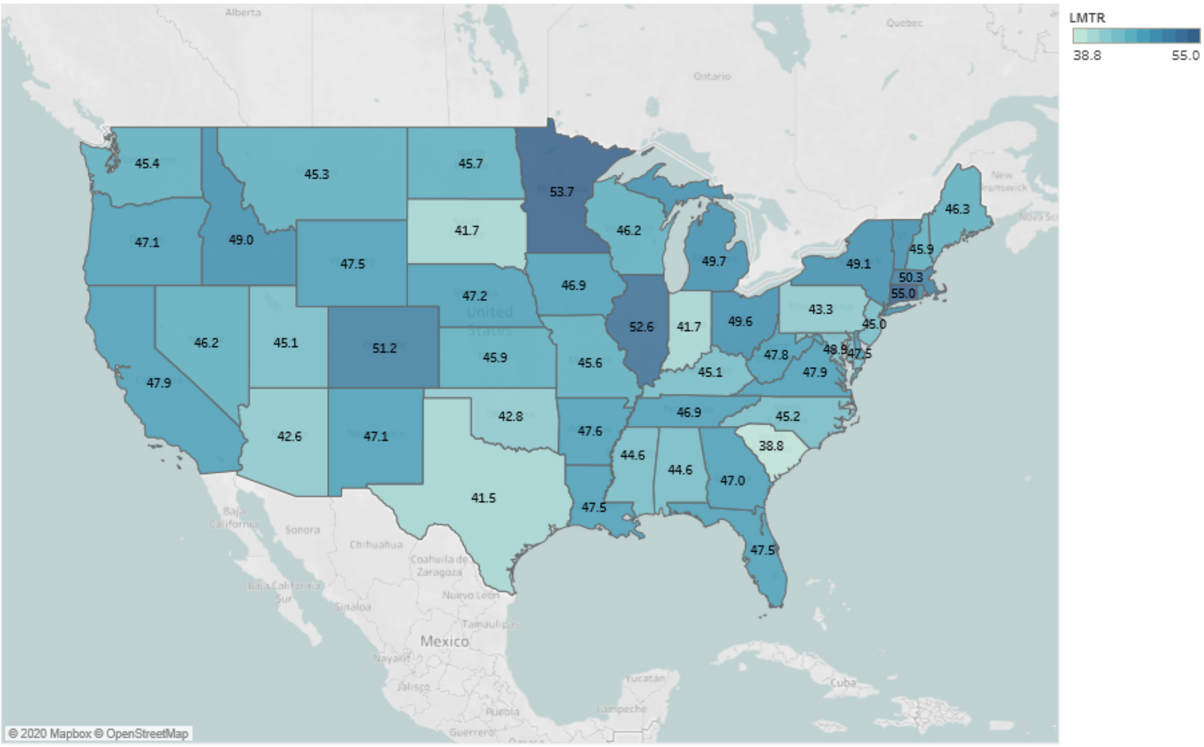
Table 10: Sensitivity Analysis – Median τ_Ls for Alternative Changes in Labor Earnings

	\$1,000 in CY	\$10,000 in CY	\$1,000 in LT	\$10,000 in LT
Age 20-29				
Lowest	42.1	56.6	45.5	52.8
2nd	40.7	42.5	41.0	42.5
3rd	41.6	42.0	39.9	40.9
4th	42.9	42.3	41.1	41.1
Highest	51.2	51.2	49.1	49.2
Top 5%	50.5	50.5	50.5	51.0
Top 1%	44.6	44.5	42.6	42.6
All	43.0	43.6	42.1	42.7
Age 30-39				
Lowest	42.6	47.0	39.2	41.8
2nd	40.8	42.1	40.6	43.5
3rd	40.6	41.0	39.4	40.6
4th	41.9	42.1	41.3	41.7
Highest	50.5	50.8	49.1	49.0
Top 5%	51.6	53.1	50.6	50.5
Top 1%	54.1	54.1	51.0	51.1
All	42.3	43.0	41.5	42.5
Age 40-49				
Lowest	45.6	52.8	45.2	47.8
2nd	41.6	42.6	41.2	42.5
3rd	42.1	42.5	40.3	40.9
4th	42.2	42.3	41.1	41.1
Highest	50.0	50.3	48.4	48.6
Top 5%	51.3	51.3	50.4	50.4
Top 1%	41.5	41.5	39.3	39.3
All	43.2	43.9	42.0	42.3
Age 50-59				
Lowest	50.1	53.6	46.1	47.5
2nd	41.6	42.2	40.8	41.8
3rd	41.1	41.7	40.1	40.6
4th	42.9	43.0	41.9	42.0
Highest	51.2	51.3	49.5	50.0
Top 5%	53.6	53.7	52.2	52.2
Top 1%	53.7	53.7	52.7	52.5
All	43.7	44.2	42.3	42.9
Age 60-69				
Lowest	47.0	55.9	44.6	51.9
2nd	41.2	42.9	40.9	41.4
3rd	39.9	40.8	39.4	40.5
4th	42.3	42.7	41.1	41.5
Highest	49.1	49.5	47.7	48.5
Top 5%	53.5	53.5	52.0	52.0
Top 1%	42.3	42.3	41.0	41.0
All	42.9	43.7	41.6	42.5
Age 70-79				
Lowest	54.0	53.3	48.6	50.2
2nd	43.4	47.3	44.8	45.1
3rd	40.8	41.7	40.4	40.6
4th	43.4	43.5	42.3	42.3
Highest	47.6	47.7	46.0	46.1
Top 5%	52.3	52.2	49.4	49.4
Top 1%	54.7	54.7	52.4	52.4
All	43.6	44.3	43.1	43.3
Age 20-79				
Lowest	46.6	53.2	44.8	47.8
2nd	41.4	42.7	41.3	42.3
3rd	41.1	41.6	40.1	40.7
4th	42.6	42.7	41.4	41.6
Highest	50.2	50.2	48.5	48.7
Top 5%	53.0	53.0	51.2	51.2
Top 1%	51.1	50.9	50.2	50.2
All	43.2	43.9	42.1	42.7

8 Cross-State Variation

This section describes the variation in lifetime marginal tax rates across U.S. states. To illustrate how τ_L varies from state to state, we calculate the median τ_L for households in the 30-39 age cohort in the lowest resource quintile in each state. (Recall that the quintiles are defined at the national level, so that moving from one state to another does not affect the quintile into which a household falls.) Figure 11 shows the cross-state variation in median lifetime marginal tax rates. Figure 13 in the Appendix provides similar information for the current-year marginal tax rates.

Figure 11: Cross-State Variation in the Median τ_L (Age 30-39, Lowest Resource Quintile)

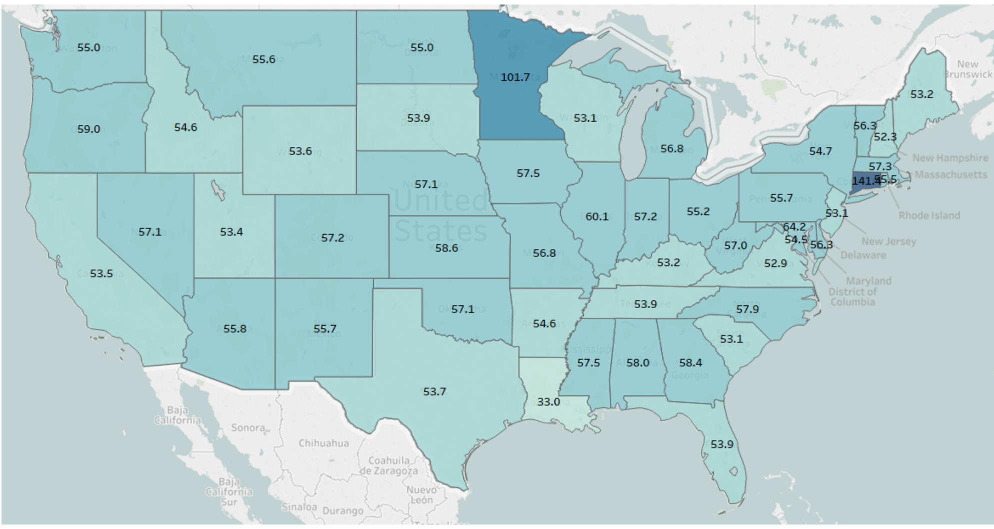


(a) Note: This measure of marginal tax rates is based on a $1,000 increase in the current-year earnings.

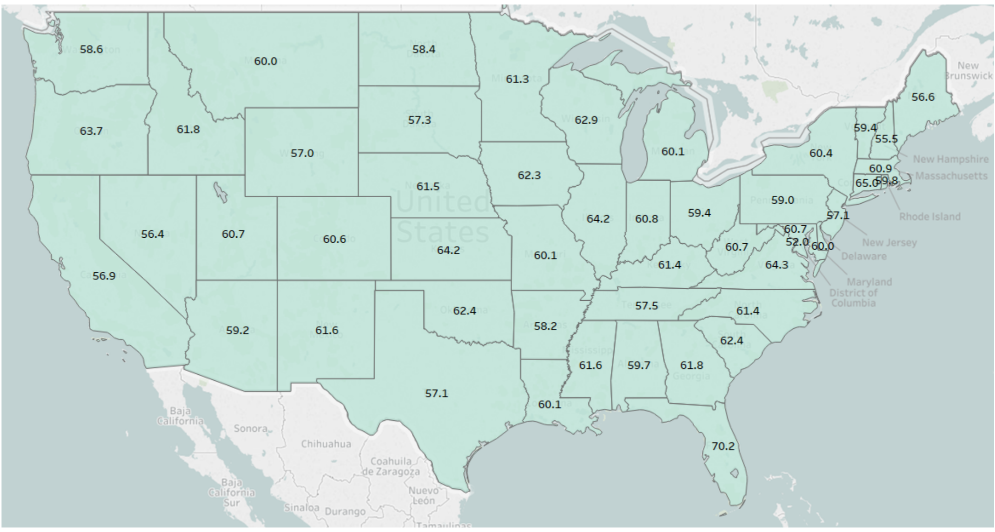
Figure 11 reveals significant state-level variation in *median* τ_L for this subset of the population. The figure's median rates varies between a low of 38.8 percent in South Carolina and a high of 55.0 percent in Connecticut. Clearly, where people live can matter a lot for their incentives to work.

To illustrate this point more clearly, we randomly select three households from the above mentioned age-resource cohort and calculated their τ_L in each state assuming they lived in each state. Figure 12 shows the substantial cross-state variation in lifetime marginal tax rates for each of the randomly selected households. Household 1 faces a 33.0 percent τ_L if it lives in Louisiana. The rate is 141.9 percent if it lives in Connecticut. For household 2, the low rate is 52.0 percent in Washington, D.C. and 70.2 percent in Florida. For household 3, Oregon has the lowest τ_L at 16.1 percent. North Carolina has the highest at 16.1 percent.

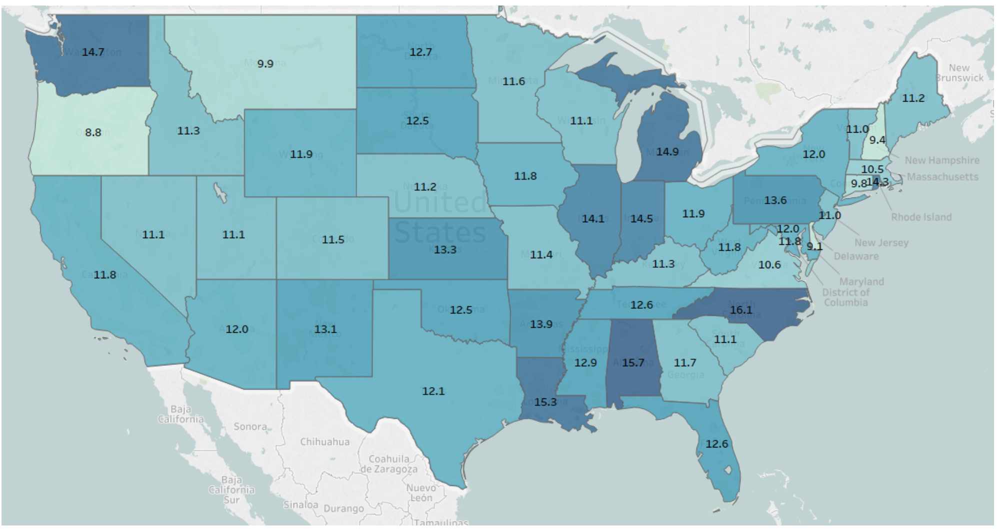
Figure 12: Cross-State Variation in Individual Households' τ_L



(a) Household 1



(b) Household 2



(c) Household 3

(d) Note: The panels in the figure show lifetime net marginal tax rate variations across states for three randomly selected SCF households. Marginal tax rate calculations are based on a $1,000 increase in the current-year earnings.

Another way to quantify the variation in lifetime marginal taxation across states is to calculate for each household the lifetime marginal tax rate it faces in each state and then compute the difference between the maximum and the minimum rates. Table 11 reports this measure for households in different resource quintiles. Table 14 in the Appendix provides results broken down by age as well as resources.

Table 11 shows that where one lives can make a major difference to one's work disincentive. This is particularly true for the bottom quintile, whose median max-min difference in marginal tax rates is an astounding 99.7 percent. A full quarter of those in this group can reduce their marginal tax rate by over 365.8 percent by moving across states. The max-min differences are smaller for higher resource groups. But even among the top 1 percent, there's a 13.4 percent median max-min difference across states in marginal tax rates.

Table 11: Measure of the State-Level τ_L Dispersion

	min	q25	median	mean	q75	max	st.dev
Lowest	4.9	16.8	99.7	393.4	365.8	10,187.3	777.2
2nd	4.3	9.9	18.3	274.7	118.3	17,906.2	989.5
3rd	5.0	9.3	10.1	87.9	19.0	13,936.2	572.3
4th	6.1	9.3	9.8	27.5	11.1	3,243.5	167.6
Highest	6.6	10.2	12.1	19.5	14.6	302.4	24.4
Top 5%	7.9	12.5	13.4	21.0	16.3	136.2	26.1
Top 1%	9.4	12.8	13.4	22.9	16.4	136.2	30.2
All	4.3	9.6	12.7	160.8	45.1	17,906.2	640.4

Note: The table shows the distribution by resource and age group of the percentage point difference between the maximum and minimum state- and household-specific lifetime marginal tax rates.

The major differences in state-specific marginal net taxation raises the question about differences in average net taxation. Specifically, can households materially raise the present value of their total remaining lifetime spending by moving from a high to a low net-tax state? By total spending, we refer to all outlays apart from net taxes. In particular, it incorporates the household's present expected bequests and imputed rent on owned primary and vacation homes. Table 12 presents summary statistics for our measure of lifetime spending dispersion at the state level. The measure is constructed by calculating for each household the percentage difference between the highest and the lowest levels of lifetime spending the household would experience were it to live in the respective states. Table 15 in the Appendix provides a breakdown by age cohort and resource level.

Table 12 indicates that the typical household can raise its living standard by as much as 8.1 percent by moving across states. One quarter of households can raise their living standards by 10.5 percent by switching states. For some households, the gains can be particularly large. One of our SCF households, which is in the bottom cohort, can raise its remaining lifetime spending by 63.4 percent.

Table 12: Measure of State-Level Total Spending Dispersion

	min	q25	median	mean	q75	max	st.dev
Lowest	2.6	5.6	7.9	9.9	12.3	63.4	6.2
2nd	1.5	5.6	7.6	8.2	9.5	38.9	4.2
3rd	1.1	6.5	8.8	8.5	10.2	24.0	2.8
4th	1.1	7.0	9.5	9.0	11.2	14.8	2.8
Highest	0.7	5.7	6.9	7.8	9.3	22.9	3.3
Top 5%	2.1	5.8	6.5	7.6	8.1	22.9	3.3
Top 1%	3.6	6.1	6.6	7.9	8.1	22.9	3.6
All	0.7	5.9	8.1	8.7	10.5	63.4	4.1

Note: The measure is constructed by calculating the percentage difference between the maximum and minimum lifetime total spending that each household would it experience were it to live in each states. The distribution is for all age cohorts.

9 Conclusion

This paper used the Fiscal Analyzer, a life-cycle consumption smoothing tool incorporating all major federal and state tax and benefit programs, to study the marginal net taxation of Americans' labor supply based on data from the Federal Reserve's 2106 Survey of Consumer Finances. The idea is simple: calculate how much each household is able to consume, on an expected (average) basis over each household's potential survival paths. Then compare this remaining expected lifetime spending with the corresponding amount the household can expect to spend were it to earn more either on a temporary (current year) or permanent (through retirement) basis. Subtracting 1 from the ratio of the difference in present value spending to the present value change in human wealth tells us the household's remaining lifetime marginal net tax rate.

Our findings are striking. First, American households typically face high marginal net taxes on working. Their median tax rate is 43.2 percent. Second, when one disaggregates by age and resource level, one sees a U-shaped pattern, albeit it minor, in median rates with the bottom and top quintiles facing higher rates of marginal net taxation than those in the middle three quintiles. Third, marginal tax rates among the poor are very highly dispersed. Fourth, one in four bottom-quintile households, regardless of age, face marginal tax rates above 65 percent. Thus, a major share of poor households are effectively locked into poverty by America's fiscal system. Fifth, in ignoring the double taxation of earnings (because of the subsequent taxation of earnings from saving), conventionally measured marginal tax rates – current-year marginal tax rates – significantly understate the more comprehensive remaining lifetime marginal tax rate. Sixth, state-specific tax and benefit provisions produce major differences across states in marginal and average tax rates. Indeed, a typical household can raise its lifetime living standard by as much as 8.1 percent simply by moving states.

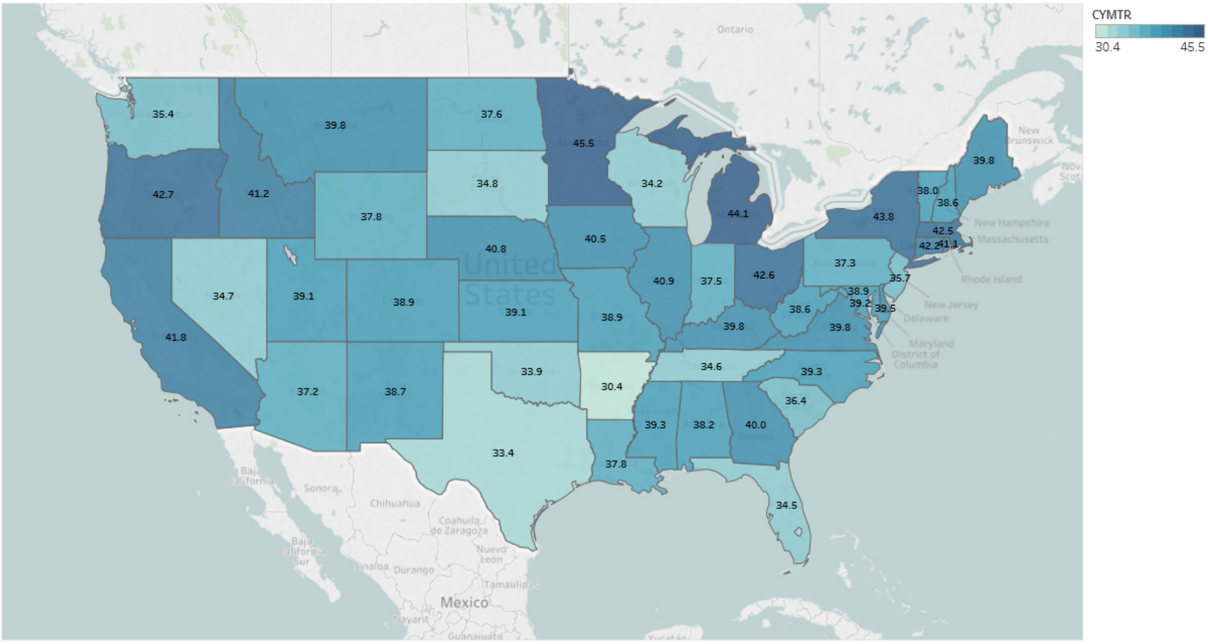
Appendix

Table 13: Summary Statistics for the Current-Year Marginal Tax Rates

	min	q25	median	mean	q75	max	st.dev
Age 20-29							
Lowest	-107.9	26.9	38.4	71.9	61.0	978.7	231.4
2nd	-417.9	29.2	33.9	45.3	38.9	1,341.0	45.2
3rd	-109.5	31.0	37.2	35.6	38.8	2,708.9	5.5
4th	-331.6	29.9	36.9	52.1	39.7	683.0	153.3
Highest	-330.7	35.6	42.9	41.7	47.2	1,186.0	9.6
Top 5%	21.8	32.8	42.2	41.4	48.2	195.2	12.8
Top 1%	34.9	28.6	35.6	34.2	46.3	56.9	11.7
All	-417.9	29.8	37.8	49.3	42.2	2,708.9	126.5
Age 30-39							
Lowest	-1,686.5	15.8	29.4	6.3	52.8	3,006.3	178.9
2nd	-1,664.0	28.9	37.7	43.8	44.1	2,296.8	26.6
3rd	-374.7	28.9	35.1	37.3	39.1	2,051.0	27.8
4th	-426.4	29.5	36.3	34.5	38.8	3,064.9	6.1
Highest	-749.4	31.3	41.7	40.3	45.5	2,530.3	18.1
Top 5%	3.2	35.8	43.7	41.8	47.5	2,530.3	9.3
Top 1%	25.9	35.8	42.8	41.5	48.2	2,530.3	6.5
All	-1,686.5	28.7	36.7	32.4	42.1	3,064.9	83.4
Age 40-49							
Lowest	-540.0	24.5	38.3	45.4	57.5	2,695.7	37.2
2nd	-1,300.4	29.4	37.5	52.5	42.0	993.6	149.2
3rd	-1,138.4	31.1	36.7	37.2	39.0	1,137.8	11.2
4th	-1,231.9	29.8	35.4	34.8	38.9	2,314.1	9.2
Highest	-478.0	32.3	41.4	39.3	46.0	1,515.2	10.0
Top 5%	-13.3	30.2	43.4	40.8	48.0	653.0	11.0
Top 1%	22.1	28.7	30.4	33.6	45.1	492.1	11.6
All	-1,300.4	29.6	37.6	41.8	42.5	2,695.7	69.2
Age 50-59							
Lowest	-2,130.8	28.8	39.1	42.2	60.9	3,682.1	156.8
2nd	-837.1	29.0	37.7	44.0	42.6	2,290.9	45.2
3rd	-1,610.5	29.5	35.7	37.5	38.8	3,265.9	26.8
4th	-3,305.3	30.7	36.7	35.2	39.5	2,753.2	6.6
Highest	-1,546.3	35.2	42.2	40.5	46.3	725.3	8.0
Top 5%	-123.8	39.3	44.3	42.8	48.2	725.3	6.2
Top 1%	19.2	40.3	45.1	43.8	49.4	512.4	6.0
All	-3,305.3	29.9	37.9	39.9	43.0	3,682.1	74.2
Age 60-69							
Lowest	-4,065.5	25.6	37.8	42.9	58.7	4,650.1	112.8
2nd	-3,072.2	29.2	37.5	46.2	43.5	1,916.1	57.9
3rd	-2,382.5	29.1	34.5	35.8	38.6	1,313.8	15.3
4th	-2,406.6	30.7	37.1	35.3	39.4	1,991.9	5.9
Highest	-2,357.3	32.4	40.2	38.8	45.0	1,990.9	8.6
Top 5%	-1,136.6	37.8	44.4	42.0	46.5	1,990.9	8.5
Top 1%	11.6	25.8	33.4	35.3	45.6	1,284.0	9.6
All	-4,065.5	29.4	37.3	39.8	41.9	4,650.1	57.5
Age 70-79							
Lowest	-10.0	25.8	35.1	48.7	62.4	1,660.7	59.5
2nd	8.3	29.3	37.9	67.3	45.4	3,999.2	219.9
3rd	6.8	29.9	36.9	36.9	39.1	1,991.3	11.4
4th	1.5	31.1	37.7	35.3	39.0	224.8	6.0
Highest	8.7	33.8	39.5	39.1	45.0	1,342.1	8.5
Top 5%	13.4	37.6	42.2	42.8	46.8	1,342.1	7.8
Top 1%	13.4	39.4	47.8	46.0	48.7	87.6	6.3
All	-10.0	29.6	37.7	45.4	42.6	3,999.2	102.6
Age 20-79							
Lowest	-4,065.5	24.5	37.8	40.7	59.4	4,650.1	138.3
2nd	-3,072.2	29.2	37.5	48.7	42.8	3,999.2	104.7
3rd	-2,382.5	29.5	36.0	36.8	38.8	3,265.9	19.6
4th	-3,305.3	30.2	36.7	36.5	39.2	3,064.9	45.1
Highest	-2,357.3	33.1	41.3	39.8	45.7	2,530.3	10.8
Top 5%	-1,136.6	37.7	43.7	42.0	47.6	2,530.3	9.1
Top 1%	11.6	29.9	41.5	38.9	48.2	2,530.3	10.0
All	-4,065.5	29.5	37.6	40.5	42.4	4,650.1	80.9

Note: Marginal tax rates are calculated based on the $1,000 increase in the current-year earnings. Figures are not truncated.. Absolute Maximums and Minimums across all states are presented.

Figure 13: Cross-State Variation in the Median τ_C (Age 30-39, Lowest Resource Quintile)



(a) Note: This measure of marginal tax rates is based on the \$1,000 increase in the current-year earnings

Table 14: Measure of the State-Level τ_L Dispersion. By Age-Resource Cohorts

	min	q25	median	mean	q75	max	st.dev
Age 20-29							
Lowest	4.9	14.6	93.1	475.8	609.5	3,644.2	752.8
2nd	6.5	9.8	16.0	266.5	210.7	2,779.7	584.2
3rd	7.1	9.4	9.8	35.2	16.6	1,386.7	156.8
4th	6.1	9.4	9.8	93.8	10.7	3,243.5	454.5
Highest	6.7	10.4	12.8	21.7	16.1	126.6	24.7
Top 5%	9.8	12.9	13.4	27.2	17.3	126.6	32.6
Top 1%	12.9	12.9	14.9	14.9	17.0	17.0	2.0
All	4.9	9.6	12.3	178.6	43.5	3,644.2	507.4
Age 30-39							
Lowest	6.9	15.8	122.8	435.8	416.4	3,920.0	730.5
2nd	4.4	10.1	20.6	350.9	183.0	7,353.2	1,118.8
3rd	6.2	9.5	11.2	123.2	19.6	5,297.0	558.1
4th	6.5	9.3	9.8	14.9	11.2	199.8	21.4
Highest	6.6	10.4	11.6	19.7	14.4	131.0	23.5
Top 5%	8.2	12.6	13.6	21.6	16.1	131.0	27.4
Top 1%	10.4	10.4	13.3	13.8	16.1	19.7	3.0
All	4.4	9.7	12.7	189.2	47.6	7,353.2	671.4
Age 40-49							
Lowest	5.0	14.9	67.2	365.8	317.7	10,187.3	933.0
2nd	4.3	11.0	21.7	331.8	120.5	17,906.2	1,527.1
3rd	5.0	9.3	10.0	46.7	16.3	1,267.1	165.5
4th	6.1	9.4	9.8	14.4	10.7	141.4	18.3
Highest	8.2	10.3	12.4	17.9	15.4	127.1	19.4
Top 5%	8.7	12.6	14.2	20.2	16.3	127.1	22.8
Top 1%	9.4	12.6	13.3	14.6	16.5	23.7	4.0
All	4.3	9.6	12.5	155.4	32.8	17,906.2	817.3
Age 50-59							
Lowest	5.1	20.4	93.5	430.2	359.6	6,513.7	907.2
2nd	5.9	9.7	14.6	239.6	52.2	8,360.8	804.9
3rd	7.0	9.3	10.0	120.3	18.6	13,936.2	995.2
4th	6.5	9.3	9.8	17.7	10.7	388.8	34.6
Highest	7.9	10.1	12.0	19.0	13.9	302.4	28.2
Top 5%	7.9	12.1	13.4	21.4	16.1	136.2	27.7
Top 1%	9.6	12.9	13.4	34.4	16.2	136.2	45.2
All	5.1	9.6	12.3	165.5	31.0	13,936.2	718.7
Age 60-69							
Lowest	5.7	21.7	117.2	358.0	320.9	4,134.4	616.5
2nd	7.2	9.9	19.0	214.0	111.8	9,542.9	761.6
3rd	5.3	9.3	10.4	78.8	26.1	3,601.1	300.4
4th	6.2	9.3	9.8	35.7	11.4	2,277.2	203.0
Highest	7.2	10.0	11.7	19.6	13.9	129.7	23.1
Top 5%	8.0	12.1	13.3	16.7	14.2	123.8	18.5
Top 1%	9.5	12.7	13.4	21.2	16.4	95.1	23.3
All	5.3	9.7	13.1	141.4	58.4	9,542.9	485.0
Age 70-79							
Lowest	4.9	13.0	121.1	313.2	368.1	3,102.3	523.7
2nd	6.5	11.3	35.2	286.6	194.6	4,616.4	662.4
3rd	7.0	9.3	10.7	96.3	16.4	3,005.5	370.4
4th	7.2	9.3	9.8	20.3	11.5	478.7	50.9
Highest	7.9	10.0	12.2	21.4	16.3	146.2	26.3
Top 5%	10.6	12.9	13.8	25.4	16.9	128.1	31.3
Top 1%	11.1	12.9	13.2	36.5	14.9	127.0	46.3
All	4.9	9.7	12.9	147.8	62.0	4,616.4	432.4
Age 20-79							
Lowest	4.9	16.8	99.7	393.4	365.8	10,187.3	777.2
2nd	4.3	9.9	18.3	274.7	118.3	17,906.2	989.5
3rd	5.0	9.3	10.1	87.9	19.0	13,936.2	572.3
4th	6.1	9.3	9.8	27.5	11.1	3,243.5	167.6
Highest	6.6	10.2	12.1	19.5	14.6	302.4	24.4
Top 5%	7.9	12.5	13.4	21.0	16.3	136.2	26.1
Top 1%	9.4	12.8	13.4	22.9	16.4	136.2	30.2
All	4.3	9.6	12.7	160.8	45.1	17,906.2	640.4

Note: The table shows the distribution for each resource group and age cohort of a measure equal to the percentage point difference between the maximum and minimum lifetime marginal tax rates that each household faces across all U.S. states.

Table 15: Measure of the State-Level Total Spending Dispersion. By Age-Resource Cohorts

	min	q25	median	mean	q75	max	st.dev
Age 20-29							
Lowest	3.7	5.7	7.5	10.5	12.5	43.3	7.6
2nd	2.9	5.8	8.4	8.9	10.0	23.0	4.6
3rd	3.8	6.9	8.9	9.0	10.5	19.9	2.8
4th	1.3	6.8	9.5	9.2	11.4	14.3	2.9
Highest	4.1	5.8	7.2	8.0	8.7	22.4	3.5
Top 5%	4.4	5.8	6.3	7.0	7.2	14.3	2.6
Top 1%	4.8	6.5	7.0	8.2	12.1	14.0	3.5
All	1.3	6.0	8.2	9.1	10.6	43.3	4.7
Age 30-39							
Lowest	2.6	5.3	7.5	9.8	13.0	40.7	6.1
2nd	2.6	5.8	7.7	8.6	9.8	31.6	4.3
3rd	1.4	6.2	8.7	8.3	10.1	24.0	3.1
4th	1.7	6.6	9.6	9.0	11.2	14.8	2.7
Highest	0.7	5.7	7.1	7.9	9.6	21.8	3.6
Top 5%	2.1	5.7	6.5	8.1	9.1	21.8	4.3
Top 1%	5.5	6.1	6.6	9.5	16.1	17.1	4.6
All	0.7	5.9	8.0	8.7	10.6	40.7	4.2
Age 40-49							
Lowest	2.6	5.2	7.1	8.9	11.6	27.8	5.1
2nd	1.9	6.0	7.8	8.5	9.6	36.0	4.4
3rd	1.1	6.2	8.8	8.2	10.2	15.0	2.6
4th	2.4	6.9	9.4	9.1	11.3	14.3	2.7
Highest	1.3	5.6	6.6	7.5	8.9	20.4	2.9
Top 5%	3.8	5.6	6.2	6.8	7.4	20.4	2.5
Top 1%	5.1	5.8	6.2	6.9	8.1	10.0	1.5
All	1.1	5.8	7.9	8.5	10.3	36.0	3.7
Age 50-59							
Lowest	2.8	6.0	8.4	10.4	12.2	63.4	7.2
2nd	1.5	5.4	7.5	8.3	9.7	38.9	4.7
3rd	1.5	7.2	9.3	8.8	10.5	20.6	2.7
4th	1.1	7.4	9.7	9.1	11.1	14.8	2.8
Highest	0.7	5.9	7.0	8.0	9.6	21.0	3.3
Top 5%	3.8	6.1	6.7	7.4	7.9	16.8	2.3
Top 1%	5.7	6.3	6.7	7.4	8.0	13.5	2.1
All	0.7	6.1	8.4	8.9	10.6	63.4	4.6
Age 60-69							
Lowest	3.4	5.7	7.9	10.0	12.4	41.7	5.9
2nd	1.8	5.4	7.6	7.6	8.9	25.5	3.1
3rd	1.7	6.7	8.7	8.5	10.1	20.2	2.8
4th	1.5	7.3	9.5	9.1	11.1	14.3	2.6
Highest	1.2	5.6	6.7	7.6	9.6	20.9	3.1
Top 5%	3.2	5.6	6.4	7.9	9.6	20.9	3.6
Top 1%	3.6	5.6	6.3	6.8	6.9	14.5	2.6
All	1.2	5.9	8.1	8.5	10.3	41.7	3.8
Age 70-79							
Lowest	3.2	6.8	8.5	10.0	12.8	34.5	5.0
2nd	2.7	5.3	6.9	7.9	9.6	23.3	4.0
3rd	1.8	5.7	8.1	8.0	10.1	19.8	3.1
4th	2.8	6.2	9.1	8.7	11.1	14.1	2.8
Highest	1.3	5.7	6.7	7.9	8.6	22.9	3.5
Top 5%	3.8	6.0	6.6	8.2	8.4	22.9	4.3
Top 1%	6.0	6.3	6.3	10.5	11.5	22.9	6.4
All	1.3	5.8	7.8	8.5	10.4	34.5	3.9
Age 20-79							
Lowest	2.6	5.6	7.9	9.9	12.3	63.4	6.2
2nd	1.5	5.6	7.6	8.2	9.5	38.9	4.2
3rd	1.1	6.5	8.8	8.5	10.2	24.0	2.8
4th	1.1	7.0	9.5	9.0	11.2	14.8	2.8
Highest	0.7	5.7	6.9	7.8	9.3	22.9	3.3
Top 5%	2.1	5.8	6.5	7.6	8.1	22.9	3.3
Top 1%	3.6	6.1	6.6	7.9	8.1	22.9	3.6
All	0.7	5.9	8.1	8.7	10.5	63.4	4.1

Note: The measure is constructed by calculating the percentage difference between the maximum and minimum lifetime total spending which each household achieves across all U.S. states.

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