

The Marginal Net Taxation of Americans' Labor Supply

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Abstract

The U.S. has a plethora of federal and state tax and benefit programs, each with its own, typically major, work incentives and disincentives. Collectively, they place a large share of workers, particularly low-wage workers, in high net (of benefits) tax brackets. This paper uses the Fiscal Analyzer (TFA) to assess how our fiscal policies, in unison, impact work incentives. TFA is a life-cycle, consumption-smoothing program that incorporates cash-flow constraints and all major federal and state tax and benefit policies. We use TFA in conjunction with the 2019 Survey of Consumer Finances to calculate Americans' remaining lifetime marginal net tax rates (LMTRs), defined as the present expected (over household survival paths) value of additional current and future taxes, net of benefits, divided by a given increase in current labor earnings. Thus, the LMTR captures double taxation – the increase in future taxes, including asset income and sales taxes, or reduction in future benefits, including those due to labor income-, asset income-, total income-, and asset-based tests – associated with saving a portion of one's additional current earnings. We calculate annual future net taxes assuming all households smooth their living standards per equivalent adult, subject to borrowing constraints, and supply labor exogenously. These behavioral assumptions let us study labor supply distortions independent of responses to such distortions. Our findings are striking. Almost half of working-age Americans face LMTRs above 40%. One fourth of households in the bottom remaining lifetime-resource (human plus non-human wealth) quintile face LMTRs above 45%; one tenth face LMTRs above 65%. Such extremely high work disincentives may be locking major segments of the poor into poverty. These disincentive would be roughly one quarter larger were benefit take-up complete. Top resource households also face major work disincentives. The median LMTR for those in the top 1% of the resource distribution is 55.4%. We find remarkable dispersion in both LMTRs and current-year marginal net tax rates (CMTRs) even controlling for age, state, and resource level. Simply eliminating bottom-quintile LMTR dispersion produces, under simplifying assumptions, efficiency gains as high as one seventh of that quintile's labor income. Finally, double taxation matters. The median LMTR is 38.9% – considerably larger than the 33.2% median CMTR, which ignores future net taxes generated by additional current earnings.

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1 Introduction

This paper aims to provide the most comprehensive and systematic measurement to date of US work incentives and disincentives. A host of federal and state tax and benefit programs jointly determine Americans' marginal net tax brackets. Adopted with little apparent concern for their collective impact, most policies are highly non-linear, rendering lifetime budget constraints non-differentiable, discontinuous, and non-convex. The sources of budget-frontier "kinks" (changes in slope), "notches" (discontinuities where an extra dollar of income leads to a major tax or benefit change), and non-convexities (income increases that lower marginal net taxation), are complex provisions that condition tax payments and benefit receipts on labor income, asset income, total income, net assets, and household demographics. Earning more today can, if it elicits more saving, raise (lower) not just current, but also the entire path of future net taxes (taxes net of benefits). Such *double taxation* has been long discussed, but never carefully measured, one of our study's key tasks.

This paper focuses on marginal net tax rates and the incentives they present for individual behavior. [Auerbach et al. \(2023\)](#) uses a similar method to measure average lifetime net tax rates, i.e., to determine the progressivity of the fiscal system. As they show, average lifetime net tax rates rise sharply with lifetime resources. In simple tax/benefit systems with smoothly rising marginal net tax rates, average and marginal tax rates are closely related. But for US households, the net tax system is anything but smooth, particularly for low-wage workers who face severe earnings-, income-, or asset-related, benefit-program eligibility conditions. Hence, workers, particularly those with low wages, can face de minimis or even negative average lifetime net tax rates, but very high lifetime marginal net tax rates.

The US fiscal system comprises over 500 distinct tax and benefit programs with an array of work incentives and disincentives, some in the same program. Our largest fiscal program – the federal personal income tax – generates a plethora of kinks in household intertemporal choice sets. The tax's seven brackets and standard deduction are the best known sources of kinks, but other provisions make the budget frontier non-differentiable as well. These include the Alternative Minimum Tax, high-income Medicare wage- and asset-income taxes, the Child Tax Credit (CTC), and the Child and Dependent Care Tax Credit (CDCTC).¹ The Earned Income Tax Credit (EITC), for singles with three children, provides a 45% subsidy on the parent's first \$7,830 of earnings. But earnings above \$23,730 reduce the credit by 21 cent on the dollar.

If you receive Social Security benefits before you reach the system's full retirement age, every dollar of earnings above \$22,320 entails a loss of 50 cents in benefits per dollar earned due to the Earnings Test.² Among Social Security recipients, if a special measure of modified adjusted gross income (MAGI) exceeds \$25,000 (\$32,000 if married filing jointly), half of every extra dollar earned is subject to income tax (and 85 percent if MAGI exceeds \$34,000 or \$44,000 if married filing jointly). Social Security's 12.4% tax hits workers on each dollar earned through \$168,600.³ But we also incorporate the offsetting increase in the expected present value of future benefits, including child, spousal, and widows benefits, arising from additional covered earnings.

As for the 51 (including D.C.) states, 42 tax income and 46 tax sales. Those states that tax income do so very differently. Some state income taxes have features parallel to those of the federal income tax. For example, 31 states have their own EITC and 14 states have their

¹The OBBBA bill adds an additional off-the-top 6,000 deduction for individuals 65 and over – but only through 2028.

²The Adjustment of the Reduction Factor (ARF) largely undoes the Earnings Test for most beneficiaries, but Social Security fails to advertise this fact.

³We assume that "employer-paid" FICA taxes for both Social Security and Medicare are borne by workers in the form of reduced pay.

own CTC. Only 13 of the states with income taxes tax or full tax retirement income. And a somewhat different list of 13 states don't tax Social Security benefits.

Moreover, each state has its own version of federal benefit programs largely due to the dependence of eligibility cutoffs and benefit amounts on local economic conditions. Thus, there are 51 state-specific Medicaid, SNAP, Section-8 housing, ACA, TANF, and other benefit programs.⁴ In Rhode Island, \$975 monthly food stamp benefits are available for households with three children with a gross monthly income below \$4,810. In Mississippi, the benefit is the same, but the threshold is lower – \$3,380. A New Yorker can receive Medicaid as long as earnings are below \$20,784. In Montana, the limit is \$12,516.

Similarly, complex provisions affect other important transfer programs. Married and earn \$1 too much two years before starting Medicare, your joint annual medicare premium can rise by \$2,515. Earn or save \$1 too much and, depending on the state, lose thousands of dollars in your own or your family members' Medicaid benefits. Hold \$1 too much in assets and forfeit \$1,450 in annual federal Supplemental Security Income (SSI) and, depending on your state, your state supplemental SSI. Earn an extra dollar in a Medicaid non-expansion state and qualify for thousands of dollars in Affordable Care Act (ACA) subsidies.

These and many other tax/transfer programs invite this paper's central questions: What are the typical *combined* remaining lifetime marginal net tax (gross tax less gross benefit) rates (LMTRs) facing American workers? How do median LMTRs differ by age and resource (human plus non-human wealth) level? What is the dispersion in LMTRs holding age and resource-level fixed? Is the fiscal system locking large shares of the poor into poverty by confronting them with very high net marginal tax rates? How important is double taxation as measured by the difference in lifetime- and current-year marginal net tax rates (CMTRs)?⁵ How does state residency impact the incentive to work? How much higher would our LMTR and CMTR measures be were all workers to participate in all programs for which they are eligible? Finally, how large is the excess burden arising from the dispersion in marginal net taxation?

We address these issues by running respondents to the 2019 Survey of Consumer Finances (SCF) through The Fiscal Analyzer (TFA), a life-cycle consumption-smoothing software tool. TFA does its consumption smoothing subject to borrowing constraints and incorporates, in full detail, all major U.S. federal and state tax and transfer programs. To better capture marginal tax-rate dispersion, we augment the SCF data with imputations of respondent-specific earnings growth, retirement age, welfare program take-up rates, and survival-path probabilities. Our imputations are based on data from the 2019 American Community Survey (ACS), the Health and Retirement Study (HRS), the Current Population Survey, and the 2019 Annual Social and Economic Supplement (ASEC) to the CPS. We also incorporate program-specific lags in adjusting federal and state taxes, welfare payments, and Social Security benefits for inflation.

Our study is intentionally limited in one critical dimension. We seek to understand Americans' work disincentives, not their responses to those disincentives. While past studies have considered behavioral responses,⁶ we leave such analysis for future research. Hence, we treat labor supply as exogenous. Were we to posit a structural model and study not just the impact of the fiscal system on intertemporal budgets, but reactions to the system, we'd necessarily need to decompose provisions and reactions to understand which was at play. Hence, this paper is

⁴Actually, ACA's premium subsidy is county specific. It depends on the second-lowest-cost Silver plan in a qualifying household's county of residence. And sales taxes in some states also vary by county or even by city.

⁵For households that aren't borrowing constrained, additional earnings lead to additional saving, higher future assets and asset income, potentially higher federal and state income taxes, higher future sales taxation, and, potentially, lower income- and asset-tested future benefits.

⁶See [Moffitt et al. \(2012\)](#) for an excellent review of this literature.

a required first step toward a full evaluation of the impact of the U.S. fiscal system on labor supply.⁷ This said, we do present an illustrative excess burden calculation, which focuses on the deadweight loss arising from taxing otherwise identical low-wage workers at different rates.

Our main experiment is calculating the LMTRs 2019 SCF household heads face in earning an extra \$1,000 in 2019.⁸ Our findings are striking. Close to half of working-age Americans face LMTRs above 40%. One in four low-wage workers face LMTRs above 45%, and one in ten face rates above 65%. Labor supply disincentives of low-wage workers would be greater still were there full benefit-program participation. The top 1% resource (net wealth plus human wealth) percentile also face extremely high LMTRs. Their median rate is 55.4%. Both LMTRs and CMTRs are remarkably dispersed, particularly among the poor. For example, among the poorest quintile in the 30-39 year-old age group, the 25th, 50th, and 75th LMTR percentile values are 26.2%, 37.1%, and 45.3%, respectively.

Double taxation matters. The overall median LMTR of 38.9% is considerably higher than the median CMTR of 33.2%. Depending on one's age and resources, LMTRs can far exceed CMTRs. Take the top 1% of 40-49 year-olds, their median LMTR and CMTR are 55.4% and 41.3%, respectively. State residence can also dramatically affect marginal net tax rates. In contrast to their overall LMTR of 37.1 percent, the typical 30-39 year-old household in the lowest resource quintile faces a 41.2 percent LMTR in California, but only 30.8 percent in Alaska.

Unlike [Diamond \(1998\)](#) and [Saez \(2001\)](#)'s theoretical optimal income tax predictions, we do not find a U-shaped pattern in which either LMTRs or CMTRs are higher for the poor and rich than for the middle class. Instead, both measures of work disincentives rise with resources. The median LMTR of the those in the bottom resource quintile is 34.1%. It's 37.1% in the middle quintile, and 47.0% in the top quintile. But benefit-program take up matters for this result. With full participation, LMTRs and CMTRs would both have U-shaped patterns. Assuming full participation, the median LMTR in the bottom resource quintile is 43.9%. It's 38.6% for the middle quintile and 47.2% for the top quintile. Non-participation reflects inertia, stigma, and reluctance to deal with multiple, complex benefit programs (see [Moffitt 1983](#); [Riphahn 2001](#); [Yaniv 1997](#)).

For many working-age Americans, the labor-supply options may simply comprise not working, working part time, and working full time. Accordingly, we calculate, for non-working, able-bodied SCF respondents of working age, the lifetime net tax rate on working full time or part time.⁹ This rate is formed by dividing the present value increase in remaining lifetime net taxes by the present value increase in remaining lifetime earnings. For those in the lowest income quintile, the median full-time and part-time work taxes equals 43.5% and 30.5%, respectively. For top quintile households, these medians are much higher – 55.1% and 48.3%, respectively.

The next section provides three case studies detailing our LMTR and CMTR calculations. Section 3 briefly reviews prior studies measuring fiscal work incentives and disincentives. Section 4 presents our remaining lifetime framework. This and other sections, which describe our methodology and imputations, borrow heavily and, in some cases, verbatim, from [Altig et al. \(2024\)](#), [Auerbach et al. \(2023\)](#), and [Altig et al. \(2022\)](#). Section 5 describes TFA, including its

⁷Formulating a structural model requires global optimization given the non-differentiable, discontinuous, and non-convex nature of intertemporal budgets. [Brumm et al. \(2024\)](#) provides a new method of global optimization that, while still at an early stage, may permit analysis of behavioral responses to the entire U.S. fiscal structure. Certainly its stylized fiscal system, comprising the federal income tax brackets, a basic benefit for those earning less than \$15,000, and the FICA tax, suffice to produce massive labor-supply distortions with some workers cutting their labor supplies in half to avoid losing basic benefits and excess burdens reaching as high as one quarter of lifetime spending.

⁸In the Appendix, we discuss the effects of assuming alternative increments to income.

⁹Non-working references out of the labor force, i.e., neither employed or unemployed. Able-bodied means not reporting receipt of disability benefits.

iterative dynamic programming algorithm and the six ways one can confirm that its calculations are precise to the dollar. Section 6 briefly describes our aforementioned imputations, relegating details to the Appendix. Section 7 presents our findings. Section 8 presents a sensitivity analysis to the assumed real rate of return. Section 9 estimates the cost of labor force entry of non-working households. Section 10 considers differences across states in marginal net taxation. Section A3 examines the impact of the size of income increases on lifetime and current-year marginal net tax rates. Section 12 presents a simple excess burden calculation. Section 13 concludes.

2 Understanding Extreme Marginal Net Tax Rates - Three Case Studies

To help clarify our diverse findings, we illustrate our LMTR and CMTR calculations for three SCF households facing markedly different marginal net tax rates. Case I is a low-income household with an LMTR well above 100%. Case II illustrates the potential for a household to have a negative LMTR while its CMTR is positive. Case III describes a high-income, single earner with a much higher LMTR than CMTR. For each case, we decompose our two net marginal tax rates into tax and benefit changes. Federal and state refunds of tax credits are included in Other Transfers. The amounts of these taxes are reduced by tax credits – to zero if there are credit refunds. “Other taxes” include state sales taxes, federal excise taxes, and IRMAA taxes.

2.1 Case I

This case involves a bottom-resource quintile Idaho couple. Both spouses are age 37. They have six-year-old twins and a ten year-old. The couple’s limited resources place them in the bottom resource quintile. Their massive LMTR – 676.8% – mainly reflects the loss of SNAP benefits from earning the posited additional \$ 1,000. Idaho has three SNAP eligibility tests – one on gross income, one on net income, and one on assets. The 2023 gross income eligibility threshold for SNAP in Idaho is 130% of the Federal Poverty Level (FPL), the net income eligibility threshold is 100% of the FPL, and the asset test is just \$5,000.¹⁰ Clearly, earning even a bit too much can eliminate all SNAP benefits in the current year. Since the couple doesn’t exceed the SNAP threshold in future years, their CMTR of 820.3% exceeds their 676.8% LMTR.

¹⁰<https://www.fns.usda.gov/snap/broad-based-categorical-eligibility>

Table 1: Decomposition of LMTR and CMTR, Case I

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	-1,888	-1,776	112	36,595	36,272	-323
State Income Tax	2,995	3,065	70	63,320	63,117	-203
FICA Tax	9,442	9,584	142	172,536	172,678	142
Other Taxes	1,089	1,062	-27	46,084	45,508	-576
Total Taxes	11,638	11,935	297	318,534	317,574	-960
SNAP	6,485	0	-6,485	13,056	6,684	-6,372
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Social Security	0	0	0	192,809	192,887	78
SSI	0	0	0	0	0	0
Medicare	0	0	0	113,423	113,423	0
Medicaid	8,516	8,516	0	79,875	79,875	0
ACA	0	0	0	0	0	0
Other Transfers	1,421	0	-1,421	6,221	4,788	-1,434
Total Transfer Payments	16,422	8,516	-7,906	405,385	397,657	-7,728
Net Taxes	-4,784	3,419	8,203	-86,851	-80,083	6,768

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

Were this household to participate in all eligible programs, their LMTR would be far lower – 42.1% rather than 676.8%. The reason is that with full takeup, the couple would have received Section 8 housing support and income from the Child Care Development Fund (CCDF), making them ineligible for the SNAP benefit.¹¹ The \$1,000 in income is insufficient to eliminate either benefit in the current year, and hence their LMTR decreases with the reduction in loss of transfer payments.

2.2 Case II

This case illustrates the potential for negative LMTRs to coincide with positive CMTRs. It is for a couple from Alabama, ages 63 and 59, in which both spouses are currently working. The 63-year-old also receives about \$5,500 in Social Security benefits but (being below the full retirement age) is subject to an earnings test in the calculation of these benefits. Earning an extra thousand dollars reduces this individual’s current Social Security benefits by \$464,¹² leading to a substantial CMTR of 71.7%. However, the reduction in current benefits is accompanied by an increase in future Social Security benefits, through the Adjustment of the Reduction Factor (ARF), to the extent that the present value of Social Security benefits increases with the addition of \$1000 of current earnings. For this household, the increase in benefits more than offsets the increased taxes arising from the added earnings, leading to a LMTR of -24.4%.

¹¹Note that the CCDF is distinct from the Child and Dependent Care Tax Credit (CDCTC). Our study incorporates federal and state child tax credits (CTCs) in addition to the CCDF. However, it does not include the CDCTC as it requires childcare expense data, which is not reported in the SCF.

¹²The earnings test reduces benefits by 50 cents for each additional dollar of covered earnings, but the increase in covered earnings in this case is less than \$1000 because it is calculated net of the employer portion of the payroll tax.

Table 2: Decomposition of LMTR and CMTR, Case II

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	5,474	5,538	64	18,821	18,888	67
State Income Tax	2,563	2,602	39	11,289	11,327	38
FICA Tax	10,490	10,632	142	50,610	50,752	142
Other Taxes	963	971	8	68,593	68,669	76
Total Taxes	19,491	19,744	253	149,313	149,636	323
SNAP	0	0	0	0	0	0
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Social Security	5,466	5,002	-464	395,034	395,604	570
SSI	0	0	0	8	8	0
Medicare	0	0	0	235,945	235,945	0
Medicaid	0	0	0	0	0	0
ACA	0	0	0	0	0	0
Other Transfers	0	0	0	3,265	3,261	-4
Total Transfer Payments	5,466	5,002	-464	634,251	634,817	566
Net Taxes	14,025	14,742	717	-484,937	-485,181	-244

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

2.3 Case III

This household comprises a 53 and 48 year-old couple who live in New York. The respondents are very high earners in the top resource quintile. As shown in table 3, they pay \$104,690 in current-year federal income taxes on a pre-tax income of \$377,738. The respondents' CMTR is 42.0%, but their LMTR is much higher – 63.5%.¹³

Table 3: Decomposition of LMTR and CMTR, Case III

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	104,690	105,017	327	1,433,712	1,434,183	471
State Income Tax	24,955	25,018	63	322,765	322,857	92
FICA Tax	43,914	43,942	28	500,577	500,605	28
Other Taxes	15,107	15,108	1	372,525	372,569	44
Total Taxes	188,666	189,085	419	2,629,580	2,630,215	635
SNAP	0	0	0	0	0	0
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Social Security	0	0	0	779,331	779,331	0
SSI	0	0	0	0	0	0
Medicare	0	0	0	288,782	288,782	0
Medicaid	0	0	0	0	0	0
ACA	0	0	0	0	0	0
Other Transfers	0	-1	-1	0	0	0
Total Transfer Payments	0	-1	-1	1,068,113	1,068,113	0
Net Taxes	188,666	189,086	420	1,561,467	1,562,102	635

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

Double taxation under the federal income tax amounts, in this case, to \$144. This is a 14.4 percentage point contribution to this respondent's 63.5 percentage-point LMTR. Double taxation via state income taxation contributes \$29 in expected present value, and other taxes, primarily the state sales tax (the New York state baseline rate is 4.0%), add an additional \$44.¹⁴

¹³Because the household head is above the income ceiling for Social Security taxes, payroll taxes are collected only for Medicare and the additional assumed labor income has no impact on future Social Security benefits

¹⁴State sales and federal excise taxes constitute implicit labor-income taxation since they curtail the ability to consume per dollar earned.

3 Prior Studies

Prior studies use a variety of methods and data sources to form CMTR measures. [Joines \(1981\)](#) is an early example. Joines uses IRS data to compute weighted-average marginal tax rates on labor and capital income over the years 1929 through 1975. His estimates assume proportional and non-proportional rate schedules for various federal, state, and local tax liabilities. Non-proportional rates on capital are estimated from changes in average personal-income tax payments associated with aggregated adjusted gross income classes reported in the *Statistics of Income*. Non-proportional effective rates on labor are derived similarly, with the addition of weighted average calculations for combined employer-employee and self-employed Social Security tax rates derived from statutory rate schedules. An aggregate measure of the effective marginal tax rates is obtained from these estimates by adding all other taxes – sales taxes, corporate income taxes, and property – which are assumed to be proportional.

[Seater \(1982\)](#) and especially [Seater \(1985\)](#) take a similar approach, though without the detailed breakdown by source of income, and only focusing on federal taxation. [Barro and Sahasakul \(1986\)](#) point out that actual tax payments incorporate endogenous behavioral responses, including changes in work and saving as well as tax avoidance and evasion. To control for such responses, they simply measure marginal tax rates using federal tax-rate schedules. Average marginal tax rates are derived by weighting the marginal rates applicable to each AGI class by either the income shares or return shares that they represent. Unlike [Joines \(1981\)](#), but as in [Seater \(1985\)](#), [Barro and Sahasakul \(1986\)](#) consider only the federal personal income tax and Social Security.

Given the heterogeneity in LMTRs and CMTRs reported here, Barro and Sahasakul’s reliance on bracket values to estimate marginal tax rates is problematic on other grounds as well. The approach ignores a range of provisions that render the “full” marginal tax rate schedule substantially different from the statutory schedule. Examples include the taxation of first, up to half, and then, up to 85%, of Social Security benefits beyond two nominal thresholds, the earnings-dependent provision and clawback of the Earned Income Tax Credit (EITC), not to mention ever changing floors and ceilings on various income tax deductions, such as medical expenses and charitable contributions.

Several studies have focused on characterizing actual effective, as opposed to statutory, tax rates. [Barthold et al. \(1998\)](#), for example, show how considering 22 such income tax provisions impacted effective federal marginal income taxation in 1988. Along the same vein, [Feenberg and Poterba \(2004\)](#) analyze the importance of the Alternative Minimum Tax and how marginal tax rates have been affected by its reform. [Guner et al. \(2014\)](#) exploit 2000 IRS public use files to estimate effective tax functions by incorporating multiple deductions and adjustments to reported income.

None one of these studies include transfer payments – a serious omission. [Moffitt \(1992\)](#) provides a comprehensive review of the incentive effects of the U.S. welfare system. [Shaviro \(1999\)](#) stresses the need to include negative benefit programs. He estimated current-year marginal net tax rates for representative low-income individuals incorporating Tax Assistance for Needy Families (TANF), housing assistance, Medicaid, and the Supplemental Nutrition Assistance Program (SNAP). Shaviro showed that income-induced benefit losses can be far more important to marginal net taxation than tax-side provisions. [Borella et al. \(2023\)](#) estimate marginal tax rates and the dynamic impact of tax reform on labor supply, inclusive of transfer payments. Their methodology relies on estimating the parameters of a simplified tax function by regressing measures of post-tax income (inclusive of transfers) on pre-tax income obtained from observations in the Panel Study on Income Dynamics. Focusing on changes in tax regimes over time, they find meaningful effects on labor supply on both intensive and extensive margins.

The U.S. Department of Health and Human Services (HHS) has, of late, begun estimating CMTRs incorporating key tax and transfer programs. HHS uses data from the Current Population Survey and the Urban Institute’s Transfer Income Model, Version 3 (TRIM3).¹⁵

Another recent study by the Congressional Budget Office 2015 considers the level and dispersion of marginal tax rates taking into account state income taxes and federal taxes as well as two important benefit programs – SNAP and subsidies provided by the ACA. This study finds high median and dispersed CMTRs for those with incomes between 100% and 150% of the federal poverty line. Kosar and Moffitt (2017) take a similar approach, but consider more benefit programs, including housing subsidies and TANF, and incorporate adoption rates. They also consider valuation discounts associated with in-kind benefits (housing and health care programs). Similar to the CBO, Kosar and Moffitt find more dispersed and higher median marginal tax rates among those just above the FPL. However, they estimate that the problem of very high marginal tax rates among the poor, including rates exceeding 100%, is concentrated among a relatively small share of the eligible population who actually participate in more than two of the benefit programs they consider.¹⁶

Gokhale et al. (2002) and Kotlikoff and Rapson (2007) are closest to our study. They used an early version of our computation engine to make LMTR calculations and, in the case of Kotlikoff and Rapson (2007), also measure the lifetime marginal net tax on saving. However, both studies consider only a small set of stylized households assumed to live in Massachusetts. Kotlikoff and Rapson (2007) incorporates actuarial valuation, but not the dependency of survival rates on income included here. Neither paper handles our range of transfer programs, nor considers benefit-program take up. Although the two papers anticipate many of the general conclusions reached here, their failure to process actual data precludes understanding central tendencies and dispersion in the distributions, across and within resource level, of LMTRs and CMTRs. This also holds for comparisons of marginal net tax rates over time. However, the two studies represent critical foundational exercises for our analysis, breaking new ground in conceptualizing and calculating comprehensive average and marginal *lifetime* rates of net taxation.

4 Our Remaining Lifetime Framework

Consider any potential survival path, i . Along that path, the realized present value of total remaining lifetime spending – discretionary plus non-discretionary spending, including in-kind healthcare transfers, imputed rent on home ownership, and bequests (home equity and financial), denoted by 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 theoretically appropriate discount rate implicit in this and related equations – the one that accords with economy-wide, household-sector, and government intertemporal budget bal-

¹⁵See, for example, Giannrelli et al. (2019) and Macartney and Chien (2019). HHS CMTR project’s website is <https://aspe.hhs.gov/marginal-tax-rate-series>. The analysis models a large set of public assistance programs including TANF, SNAP, CCDF child care subsidies, housing assistance, Medicaid/CHIP, Women Infants and Children (WIC), Low Income Heating and Energy Assistance Program (LIHEAP), and unemployment insurance.

¹⁶Fleck et al. (2021) is another salient study that incorporates an extensive set of transfer payments in the calculation of rates. Their emphasis is on differences in the progressivity of tax rates across states. Section 10 discusses their work in more detail.

ance – is the pre-all-net tax rate of return on national wealth, including returns to business assets.¹⁷ The sum over all households, current and future, provides the household sector’s intertemporal budget. As shown in Kotlikoff (2002), this constraint, summed together with the government’s intertemporal budget, equals the economy-wide intertemporal budget. Thus, T_i necessarily includes all net taxes, whether labeled federal or state, business or personal.

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 human wealth – the realized, along path i of the present value of remaining future labor earnings, H_i . i.e.,

$$R_i = W + H_i. \quad (2)$$

The expected remaining lifetime present value of spending, S – the sum of the lifetime present values of discretionary spending, C , non-discretionary (fixed) spending, F , labor earnings, H , resources, R , and lifetime net taxes, T , satisfy

$$C = \sum_i p_i C_i, \quad (3)$$

$$F = \sum_i p_i F_i, \quad (4)$$

$$S = C + F, \quad (5)$$

$$H = \sum_i p_i H_i, \quad (6)$$

$$T = \sum_i p_i T_i, \quad (7)$$

and

$$R = \sum_i p_i R_i, \quad (8)$$

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

$$R = W + H, \quad (9)$$

$$C = R - F - T, \quad (10)$$

and

$$LMTR = \frac{\Delta T}{\Delta R}, \quad (11)$$

where $\Delta T = \Delta S$.

Since LMTR incorporates future and current net taxes, it will differ from the analogous current-year calculation, CMTR. CMTR is given by

$$CMTR = \frac{\Delta T_t}{\Delta R_t}, \quad (12)$$

where T_t references current-year net tax payments.

T and ΔT (equivalently, ΔS), can differ across households for a host of reasons including the household’s age, household demographics, and level as well as composition of resources. Our

¹⁷Income from proprietorships is treated as self-employment income. Ownership rights to all other businesses are included in the household’s net worth.

baseline calculation of LMTR 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, pre-tax labor earnings raises our SCF-respondents' present values of expected remaining lifetime net taxes.¹⁸ As for the current-year marginal net tax rate, we simply form the ratio of additional current-year net taxes to \$1,000.¹⁹

Note from (10) that

$$\frac{\Delta T}{\Delta R} = \frac{\Delta R - \Delta C}{\Delta R}, \quad (13)$$

since ΔF , the present value of fixed spending, is not impacted by changes in current-year labor earnings. Thus, LMTR is solely determined by the response of lifetime discretionary spending to extra current-year earnings. In particular, housing expenses are held fixed and don't impact LMTR or, for that matter, CMTR.²⁰

4.1 Measuring Lifetime Discretionary Spending

Our goal is to measure earnings-induced changes in S , i.e., changes in expected (over survivor paths) lifetime discretionary and non-discretionary annual spending. Annual non-discretionary spending on each survivor path is computed/imputed based on our SCF data and ancillary assumptions, such as the retention of owner-occupied housing. It includes in-kind consumption transfers, such as Medicare and Medicaid benefits, plus actual or imputed rent on housing plus terminal home equity and financial bequests.²¹

But how do we calculate survivor-path-specific annual discretionary spending? First, we posit a relationship between annual discretionary spending and living standard per adult-equivalent household member. Second, we adopt the standard model of lifetime utility maximization under lifespan uncertainty, namely Yaari (1965). This seminal paper indicates that households will smooth their consumption (living standard in our context) subject to borrowing constraints taking maximum longevity – the latest year to which a head or spouse/partner could survive – as the planning horizon. As indicated, this max longevity case is central to TFA's calculations as it determines survivor living standard paths to be protected, via life insurance, in the case of early deaths of heads or spouse/partners. Our calculations take age 100 as each SCF's respondent's maximum lifespan.

Our assumed 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

$$C_t = c_t(N + .7K)^{.642}, \quad (14)$$

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 adults living by themselves.²² Clearly, a single household's living standard in

¹⁸As 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 path, where the weight references the probability of the particular survivor path in question.

¹⁹Section A3 presents sensitivity analyses using alternate income amounts of \$100 and \$10,000.

²⁰This does not deny the tax system's implicit subsidy to home ownership from failure to impute rent.

²¹The expected present value of non-discretionary spending is added to that of discretionary spending in forming S .

²²OECD (2013) discusses OECD equivalency scales. The "old" scale treated each additional adult as 70% as expensive and each additional child as 50% as expensive as a single adult. The "OECD-modified equivalence scale" treats each additional adult as 50% and each child as 30% as expensive as a single

a given year is simply its discretionary spending. In the case of an early (before age 100) death of a head or spouse/partner, the path of c_t calculated under maximum longevity coupled with the above formula, setting N equal to 1 or, for singles, 0, indicates the annual discretionary spending needed by survivors, in this case young or disabled children, to maintain their living standard. This, in turn, indicates the additional resources required in the form of life insurance. Life insurance is set to zero if survivors can maintain a higher than max-longevity living-standard path. Due to adverse selection, term life insurance premiums rise dramatically with age, making its purchase unaffordable and rare among the elderly. To accommodate this reality, we assume no purchase of term insurance after age 55.

5 The Fiscal Analyzer

The Fiscal Analyzer (TFA), developed in [Auerbach et al. \(2017\)](#), [Altig et al. \(2020\)](#), [Auerbach et al. \(2023\)](#), and [Altig et al. \(2024\)](#), is a life-cycle, consumption-smoothing tool that incorporates cash flow (borrowing) constraints and all major federal and state fiscal policies. These policies are listed in table 4.²³

Virtually all the fiscal programs listed in table 4 include income tests, labor-earnings tests, or asset tests that distort household work and saving decisions. As indicated, our focus is not on economic responses to disincentives but on the magnitude of marginal net taxation of labor supply. In holding behavior fixed, we a) treat labor supply as exogenous, b) assume preferences are Leontief in the household’s underlying annual living standard after adjusting for household composition, and c) posit a pure rate of time preference equal to the discount rate. By assuming Leontief preferences, we effectively also make saving exogenous. Saving can be predicated on any specified structure of time-preference rates, i.e., any desired age-living-standard profile.

Although we target perfect consumption smoothing, households’ age-discretionary expenditure profiles, along given survival paths, typically vary substantially as the household’s demographic composition changes due to the departure of children and emergence from a borrowing-constrained interval. Figure A1 in [Auerbach et al. \(2023\)](#) shows that the average living standard profile across our SCF sample rises fairly steadily with age. This reflects the large share of the sample, 68.2%, that is subject to one or more cash-flow constrained intervals as they age. TFA’s algorithm treats non-discretionary outlays as given. The latter comprises housing expenses, including direct expenses, bequests of housing equity, and foregone interest, special expenses, and endogenously computed net taxes.

The assumption of Leontief preferences over a household’s period-specific living standard is critical not simply for fixing saving behavior. The ubiquitous kinks and notches of our myriad, highly complex federal and state fiscal policies render household lifetime budget frontiers non-

adult. A third OECD scale divides household income by the square root of the number of household members. In comparing single versus married households, our scale splits the difference between the old and modified OECD scales, but it provides for increased economies with the number of household members.

²³We assume that all tax and transfer policies are those that prevailed as of 2018. We also assume that all tax and transfer policies, specifically eligibility rules, thresholds, brackets, and schedules, are or are not adjusted through time, to inflation and economy-wide wage growth in accord with explicit legislation or general practice. Examples are the lagged indexation of federal income tax brackets based on the C-CPI, the non-indexation of thresholds governing Social Security benefit taxation, the lagged indexation of Social Security benefits to the CPI, and the indexation through age 60 of workers’ past covered earnings to the economy’s Average Wage Index. [Altig et al. \(2024\)](#) as well as [Auerbach et al. \(2023\)](#) provide a full description of our procedures. Since our sample excludes the unemployed, Table 4 does not include unemployment insurance.

differentiable, non-convex, and discontinuous. Finding global optima in such settings, based on general preference structures, requires challenging global search – a long-term bane of structural behavioral analysis.²⁴ However, the computation problem is considerably simplified for Leontief preferences.

To see this, ignore cash-flow constraints and assume that household spouses/partners live to their maximum ages of life – the maximum lifespan path. In this case, one can simply search exhaustively for the highest time-invariant living standard per household member that satisfies the household’s after-net-tax intertemporal budget constraint. As described in the Appendix, the TFA solves the following far harder credit-constrained problem for the maximum lifespan path. And it does so taking into account simultaneity between solution paths for the household’s maximum-lifespan living standard path, which may be discontinuous due to cash-flow constraints, its annual net taxes, and its annual life insurance holdings and associated premium payments, needed to preserve the living standards of survivors.

The time- t optimization problem is given by

$$\max [\min (\alpha_t c_t, \alpha_{t+1} c_{t+1}, \dots, \alpha_{t+N} c_{t+N})] \quad (15)$$

s.t.

$$\sum_{i=t}^E C_i = R_i - F_i - T_i \quad (16)$$

and

$$C_i \leq a_i + y_i - F_i - T_i, \quad (17)$$

where the α terms can, as desired, alter the shape of the household’s age-living profile,²⁵ E references the household’s maximum end year of existence, R_i , T_i , and F_i are defined in equations 3 through 8, c_i , the living standard per household member (discretionary spending per household member with adjustments for economies of shared living and the relative cost of children) maps to total household discretionary spending, C_i , via equation (14), a_t equals the household’s assets at time t , and y_t equals the household’s after net-tax income in period t . The sum $a_t + y_t$ equals the household’s cashflow at time t . The maximand (15) comprises Leontief preferences modified to value the household’s future minimum living standard when its current living standard is subject to a cashflow constraint.

Note that a household’s path of annual assets, asset income, net taxes, after-tax net income, and non-discretionary (fixed) spending, which includes life-insurance premiums, depends on the household’s living standard path. However, the household’s living standard path impacts the household’s asset path, which determines its paths of asset income and taxable asset income. The path of taxable asset income influences, in turn, the path of taxes. In short, this is a simultaneous-equations problem.

6 Data, Benchmarking, Imputations, and Adjustments

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 2019 Survey, 5,777 house-

²⁴Brumm et al. (2024) provide a global solution method, albeit for a highly simplified fiscal system.

²⁵For example, a geometrically rising or declining path of will tilt the household’s age-living-standard profile, emulating the impact under, say, CRRA preferences of time-varying differences between after-tax marginal rates and time preference rates.

Table 4: List of Tax and Transfer Programs Included in TFA

Taxes	Personal Income Tax (federal and state)
	Corporate Income Tax (federal and state)
	Social Security Employer and Employee FICA Taxes (federal)
	Social Security Self Employment FICA Tax (federal)
	Medicare HI Tax (federal)
	Additional Medicare Tax (federal)
	High Income Medicare Tax (federal)
	Sales Taxes (state)
	Medicare Part B IRMAA Premium (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)
Energy Assistance (state)	
Childcare Assistance (state and county)	

Note: Section 8 Housing benefits and Childcare Assistance are also county specific. ACA subsidies are also zip-code specific. TFA lacks data on county or zip codes needed to calculate benefits based on county or zip code.

holds.²⁶ These data include detailed information on household labor and asset income, assets and liabilities, and demographic characteristics.²⁷ For all subsequent imputations and adjustments, we assume that each SCF primary economic unit (PEU), including reported dependents, comprise a single tax unit.²⁸

TFA’s SCF-available data include marital status, birth dates of each spouse/partner, birth dates of children, current-year labor earnings, current regular, Roth, and non-Roth retirement account asset balances, retirement-account contributions, housing expenses, real estate holdings, household debts, and defined benefit pensions. Imputed data include past and future labor earnings, workers’ retirement ages, welfare and benefit program take up, and state of residence. We also provide TFA with the observed post-war pre-tax real return on national wealth, an assumed inflation rate, a Social Security benefit collection age (taken as the age of retirement), and a retirement-account withdrawal start date.

Household-weighted survey totals of various economic and fiscal aggregates differ from their direct counterparts in the National Income and Product Account (NIPA) and Federal Reserve

²⁶The 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 (Bricker et al. 2016). The oversampling of wealthy households allows for inference about households in the top 1% of the resource distribution. For the 2004 SCF, Kennickell (2007) shows that 15.8% of sampled households were in the top 1% of the net worth distribution for the U.S. with 96.4% of these coming from the list sample. Another 38.5% of the 2004 SCF-sampled households were in the bottom 50% of the distribution, with only 5.7% of these households coming from the list sample.

²⁷Using 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, 2023) report no significant differences in results across replicates.

²⁸SCF also records data on financially independent adults outside the PEU, which are not used in calculations.

Financial Accounts (FA). To ensure concordance, we follow [Dettling et al. \(2015\)](#) and set SCF benchmark factors to match SCF-weighted aggregates precisely to NIPA and FA counterparts.²⁹ Running the TFA also requires seven imputations and adjustments to provide inputs not available from the SCF.³⁰ We summarize our methods here referring readers to the Appendix Sections [A2.2](#) through [A2.10](#) for details.

First, state identifiers are needed to calculate state-specific taxes and transfer payments. The reason? The public-use SCF release does not provide state identifiers.³¹ Hence, we allocate SCF households to different states based on the 2019 American Community Survey using the approach in [Altig et al. \(2020\)](#). Specifically, we impute state residency based on a statistical match to the American Community Survey (ACS) and assign each SCF household to each state (plus the District of Columbia) such that the sum of each household's state-specific weight equals its SCF weight.

Second, TFA needs future earnings to calculate resources along survival paths and past and future covered earnings to calculate Social Security benefits. Following [Auerbach et al. \(2023\)](#), we use CPS data to backcast and forecast each SCF respondent's past and future earnings through retirement.

Third, SCF respondents do not all respond to questions about retirement and those that do appear to be overly optimistic about their ability to continue working. Here we follow [Altig et al. \(2022\)](#) and use the 2019 ACS to impute age- and demographic-specific retirement hazards.

Fourth, the SCF provides limited information about public-assistance program take-up. To match nationally reported participation rates, we use the TFA to directly calculate eligibility and combine SCF data with observations from the Annual Social and Economic Supplement (ASEC) and other sources to probabilistically infer household and program-specific participation ([Ilin and Terry 2021](#)). The complete approach is detailed in the appendix [A2.5](#).

Fifth, TFA requires assumptions about pre-tax, real and nominal rates of return on assets held by households. We assume an inflation rate of 2%. As to the real rate of return, there is more than one option available. One approach, following [Auerbach et al. \(2023\)](#), would be to set the real rate of return to the average return on national wealth, which between 1948 and 2018, as estimated by NIPA, was 6.49%. However, this rate of return may be less relevant for individuals not participating in equity markets, for which a safe rate of return, such as the rate of return on 30-year Treasury Inflation-Protected Securities (TIPS) – which between 2010 and 2018 averaged 1.08% – may be more appropriate. Because we wish to use a common rate of return across households to isolate the fiscal system's impact, we use a simple average of these two real rates of return, 3.785%, for our base case, considering below the impact of assuming either of the other two rates of return for our calculations.

Sixth, TFA requires survival-path probabilities, which we construct from mortality rate estimated by the [Committee on the Long-Run Macroeconomic Effects of the Aging US Population \(2015\)](#). Finally, TFA requires precise inflation indexation of federal and state taxes, Social Security benefits, and Medicare and Medicaid benefits. These adjustments are implemented per [Altig et al. \(2024\)](#).

²⁹See the Appendix Section [A2.1](#) for details.

³⁰Most of the imputations and adjustments are described in detail in our other papers.

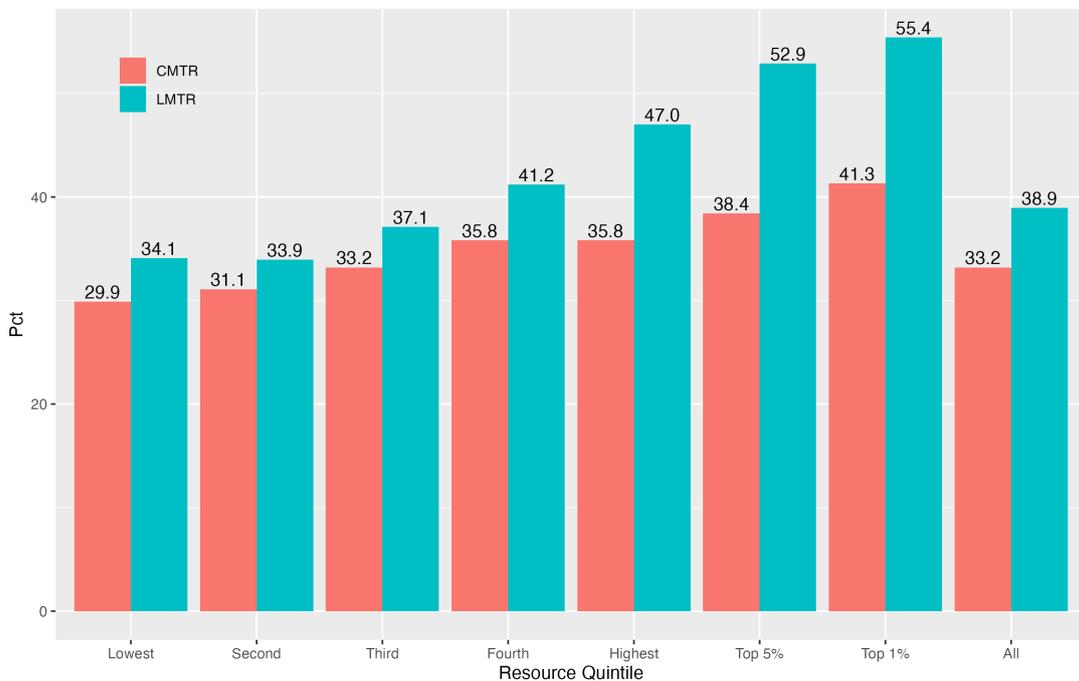
³¹The Federal Reserve's data set does include state identifiers, but not state-specific weights.

7 Results

7.1 Median Results

We now turn to the distribution of results in the aggregate. For all subsequent results, we restrict the sample to households age 20 to 69 where the head and spouse (if applicable) are not both retired or disabled. Figure 1 shows median marginal tax rates for all age groups by their age-group specific lifetime-resource quintile, where lifetime resources equal initial wealth plus the present expected (over survival paths) value of future labor income – resources that would, on average, be available for consumption in the absence of taxes and transfers. Both measures are calculated based on a \$1,000 increase in current-year earnings.³² For the overall population, the median LMTR is 5.7 percentage points higher than the median CMTR – 38.9% versus 33.2%. This revealed impact of double taxation is particularly striking for the top 1%. For this group, the median LMTR is 55.4% – considerably higher than the corresponding median CMTR of 41.3

Figure 1: Median Lifetime and Current-Year MTR, Ages 20-69

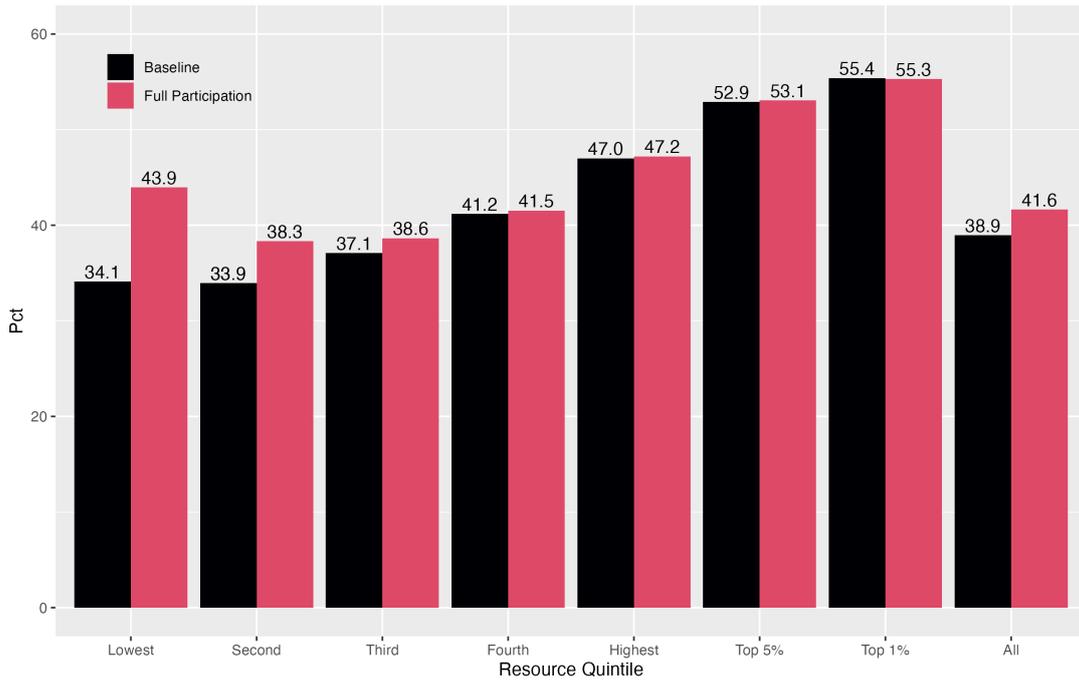


These general findings are significantly affected by our use of actual take-up rates of benefits in calculating marginal tax rates. Had we instead assumed full take-up based on eligibility, this would have resulted in substantially higher tax rates at the bottom of the resource distribution, as figure 2 shows. For the bottom quintile, the median LMTR would be 43.9% rather than 34.1%. As shown in figure A4, their median CMTR would be 39.3% rather than 29.9%. As expected, the welfare take-up assumption has virtually no impact on middle- and high-income households in the top three resource quintiles.

Under the full participation assumption, we observed a clear U-shaped pattern for both LMTRs and CMTRs as suggested by [Diamond \(1998\)](#) and [Saez \(2001\)](#). However, this pattern

³²In Appendix Section A3, we consider the sensitivity of our results to the size of the assumed increase in labor income. Our median findings are highly robust to the magnitude of the earnings increment. The median LMTR generally increases somewhat with the size of the increment, reflecting the greater likelihood, among higher-resource individuals, of being pushed into a higher tax bracket, and among lower-resource individuals of being thrown off benefit programs.

Figure 2: Median Lifetime MTR by Welfare Participation Assumption, Ages 20-69



disappears assuming realistic take-up. Exceptionally high LMTRs and CMTRs are often a product of households losing multiple benefits simultaneously when receiving additional income. Under realistic participation, such households are relatively rare, lowering median rates of the bottom quintiles to below those of the middle and upper quintiles.

Figures A5 - A9 present age-cohort-specific LMTR and CMTR values broken down by lifetime-resource quintiles. Median values of CMTR are substantially lower than their LMTR counterparts for all cohorts. However, there are important cohort-specific differences. LMTRs don't vary much by resource group for those between 20 and 29, with the maximum difference in median LMTR across resource quintiles being only 5.8%. At higher ages, this pattern gradually disappears, as lifetime tax rates rise more rapidly across resource groups. For 50 to 59 year-olds, the maximum difference across resource quintiles is 17.5%.

In our baseline analysis, we value all transfer payments at cost. However, households may assign lower values to some in-kind transfer payments. Recalculating LMTR under our baseline assumptions but assuming, per Moffitt and Wolfe (1992), that Medicaid is valued at 50 cents on the dollar and Section 8 housing is valued at 30 cents on the dollar does not substantively change our base case median LMTR of 38.9 percent. For the bottom resource quintile, reducing the value of Medicaid and Section 8 decreases the median LMTR from 34.1 to 33.9 percent and the mean LMTR from 32.6 percent to 31.2 percent.³³

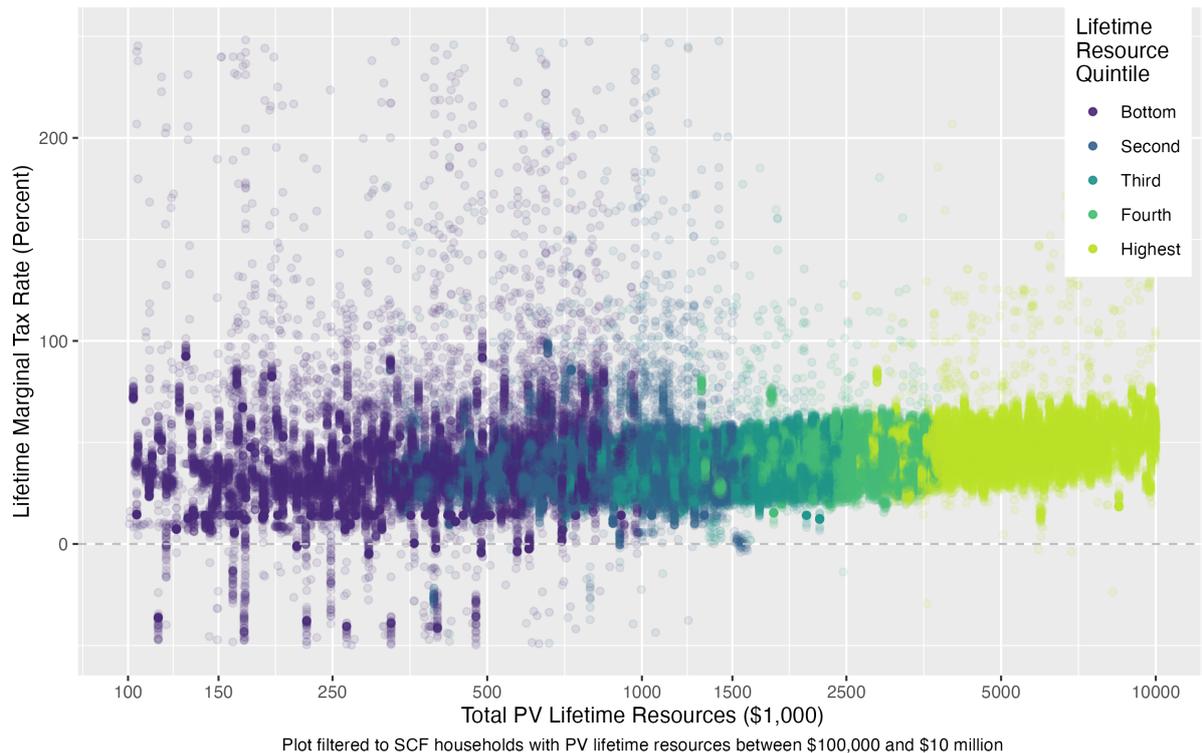
³³Note that Medicaid contributes \$26 to the average LMTR of the bottom quintile as shown in table 6, which is consistent with a reduction of 1.3% when valued at 50 percent (and section 8 only contributing \$2, or a reduction of approximately 0.1%).

Under full participation, reducing the value of Medicaid and section 8 reduces the overall median LMTR from 41.6 percent to 41.4 percent. The effect is however much larger for the bottom quintile, which sees their median LMTR decrease from 43.9 percent to 41.8 percent (and the mean from 40.5 to 27.6 percent).

7.2 Distribution of Lifetime Marginal Net Tax Rates

Figures 3 and A10 plot distributions of LMTR and CMTR, respectively. There is major dispersion in work disincentives at all resource levels.³⁴ But whether one considers LMTR or CMTR, the dispersion is dramatic at the bottom of the resource distribution. Among those in the bottom resource quintile, one in ten households face lifetime rates above 61.5%. One in four bottom-quintile households face CMTRs above 39.0%, higher than the median rate of 38.4% experienced by households among the top 5%.

Figure 3: LMTR from \$1,000 Earnings Increase in Current Year, Ages 20-69



³⁴There is overlap in lifetime resource quintiles because we assign quintiles within each age cohort (e.g. 30-39 year-olds). Therefore, a younger household in a lower resource quintile may have more lifetime resources than an older household in a higher quintile.

Table 5: Summary of Marginal Tax Rates, Age 20-69, Imputed Participation

Lifetime Marginal Tax Rates

Resource Group	q25	median	mean	q75	q90	std.dev
Bottom	24.6	34.1	32.6	43.8	61.5	307.3
Second	28.1	33.9	40.6	40.9	47.8	64.5
Third	30.7	37.1	37.9	44.1	49.7	21.1
Fourth	35.9	41.2	41.0	47.6	53.2	27.6
Highest	39.9	47.0	47.7	54.8	60.8	114.7
Top 5%	42.8	52.9	51.7	59.5	64.8	156.5
Top 1%	44.0	55.4	52.4	61.1	65.7	210.5
All	31.3	38.9	40.0	47.0	55.2	145.5

Current-Year Marginal Tax Rates

Resource Group	q25	median	mean	q75	q90	std.dev
Bottom	24.3	29.9	33.3	39.0	54.8	78.0
Second	28.2	31.1	38.4	37.3	41.4	56.7
Third	29.4	33.2	33.8	38.3	40.8	17.8
Fourth	30.5	35.8	34.9	39.5	41.7	22.9
Highest	29.7	35.8	35.3	40.4	43.9	8.4
Top 5%	32.5	38.4	37.8	42.8	46.7	8.1
Top 1%	37.3	41.3	40.2	44.1	48.8	8.6
All	28.5	33.2	35.2	39.1	42.8	40.8

Figures A11, A12, and table A6 repeat figure 3, figure A10 and table 5, but assumes full welfare program participation. For the subset of households who do partake in all welfare programs, work disincentives are far more severe. Indeed, for the bottom quintile, 13.7% of LMTR values in figure A11 and 9.7% of CMTR values in figure A12 values exceed 75%.³⁵

These full participation results are important for two reasons. First, they show the potential full extent of the poverty lock underlying the design of the U.S. federal and state tax and transfer systems. Second, they indicate that, absent reform that lowers work disincentives program by program or via an end-of-year adjustment, for example through the federal income tax, encouraging full participation in existing fiscal programs come at the price of considerably less labor supply, particularly among the poor. Thus, we have what might be considered a welfare paradox – more tax and benefit programs that claw back benefits in response to higher labor earnings, or greater participation in such programs, can induce less work, lower labor earnings, and, on balance, increase well-being.

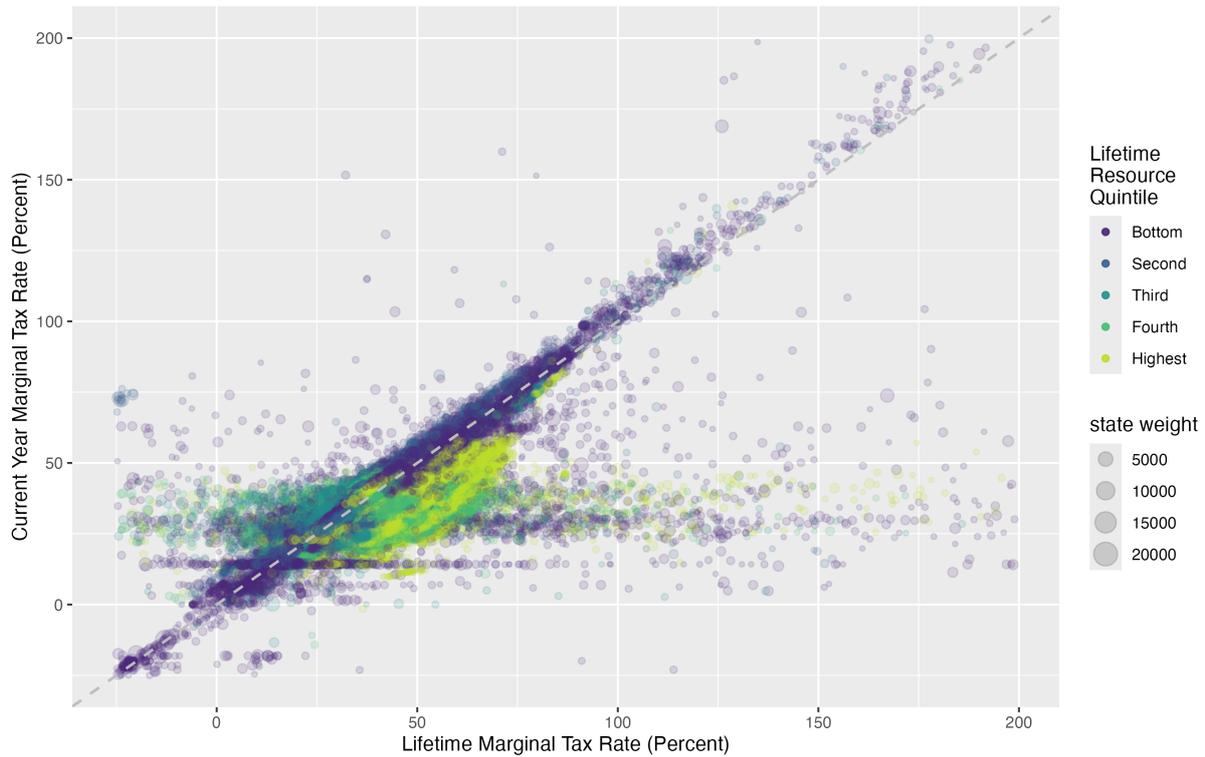
Consider next figure 4, which retains our standard assumption of partial participation. The figure, whose dots are population weighted using our imputed state weights, shows that CMTRs are a very poor proxy for LMTRs for a large share of households. Were the two measures identical, all dots would lie along the chart’s dashed 45 degree line. But for large numbers of households, particularly low-income households, the dots lie to the right of the 45-degree line. These are cases in which the LMTR exceeds the corresponding CMTR, often dramatically, due to double taxation.

There are also many cases, especially among those in the bottom quintile, in which things go the other way – the CMTR exceeds the LMTR, again, often dramatically. This is because the loss of benefits from welfare programs associated with extra income in the current year reduces savings. The reduction in savings may allow a household to pass asset tests and become eligible for the same, or other, welfare programs in subsequent years.

Figures 3, A10, and 4, in conjunction, also convey a critical message. Contrary to the

³⁵Recall, these and all other statements incorporate SCF population weights adjusted by imputed state residency.

Figure 4: Current-Year vs Lifetime Marginal Tax Rates from \$1,000 Earnings Increase in Current Year, Ages 20-69



prescriptions of optimal tax theory, we find huge dispersion in values of both the LMTR and the CMTR among households at all ages with essentially the same level of lifetime resources. Absent some compelling rationale for this variation, this dispersion constitutes a potentially huge deadweight loss – one we partially assess in section 12.

For the poorest and 2nd quintiles, the LMTRs are extremely dispersed, as measured by their standard deviation. But for the other quintiles as well as the 5th and 1st percentiles, variation in LMTRs is generally much smaller. This is to be expected since, with some exceptions, most households eligible for income- and asset-tested benefit programs are in the first and second resource quintiles.

Whereas most of our results focus on dispersion by resource and age, LMTRs also vary across other attributes. Table A7 summarize LMTRs by resource group and the number of under-18 children in the household. As shown, LMTRs in the bottom quintile are highest for those with one or two children. This is because low-income households with only one to two children are, relative to those with 3+ children, more likely to fail demographic-dependent asset or income tests when receiving additional earnings. Those with no children likely qualify for fewer benefits and, consequently, face lower rates.

This effect is not, however, limited to the bottom quintile. Among middle-class households in the second, third, and fourth quintiles, each additional child significantly lowers the LMTR. For those in the third quintile, for example, the median LMTR is 40.4% for households with no children, but only 29.6% for those with three or more. For those in the fourth quintile, the corresponding rates are 44.2% and 37.1%.

7.3 Decomposing Average Marginal Net Tax Rates

Table 6 shows the sources of mean lifetime and current-year marginal tax rates for one particular group, the lowest lifetime resource quintile among 20-69 year-old SCF households.³⁶ We present mean values to ensure that the elements in each column sum to totals. As shown, 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 transfer payments.

Table 6: Breakdown of LMTR and CMTR sources, Lowest Resource Quintile

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	1,035	1,125	90	19,957	20,066	108
State Income Tax	572	596	23	7,590	7,618	28
FICA Tax	4,366	4,507	141	56,570	56,711	141
Other Taxes	433	437	4	30,460	30,489	29
Total Taxes	6,406	6,665	258	114,578	114,884	306
SNAP	779	757	-22	8,298	8,272	-26
TANF	34	33	-1	68	68	-0
Section 8	206	204	-1	2,724	2,722	-2
CCDF	341	338	-3	1,528	1,524	-3
Social Security	732	732	0	144,720	144,760	40
SSI	275	261	-13	8,939	8,929	-10
Medicare	729	729	0	105,856	105,856	0
Medicaid	1,615	1,585	-30	22,656	22,630	-26
ACA	889	894	5	13,681	13,687	6
Other Transfers	293	283	-10	6,261	6,262	1
Total Transfer Payments	5,891	5,817	-75	314,731	314,711	-20
Net Taxes	515	848	333	-200,154	-199,827	326

Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

Table 6 shows that, for households in the bottom quintile, their 33.3% average CMTR arises from an average reduction of transfer payments of \$75 and increase in taxes of \$258 for \$1,000 in additional current earnings. The corresponding present-value reduction in lifetime benefits is smaller, at \$326. The increase in lifetime taxes is \$306. \$26 of the present-value reduction in benefits can be attributed to loss of SNAP benefits, and another \$26 to loss of Medicaid.

8 Sensitivity to the Real Rate of Return

This section considers the sensitivity of our results to the assumed rate of return. Recall that our base-case rate is 3.78%, which is half way between the average 30-year TIPS yield recorded between 2010, the first year 30-year TIPS were issued annually on a permanent basis, and 2018, 1.08%, and the average real return to national wealth between 1948 and 2018, 6.49%.³⁷

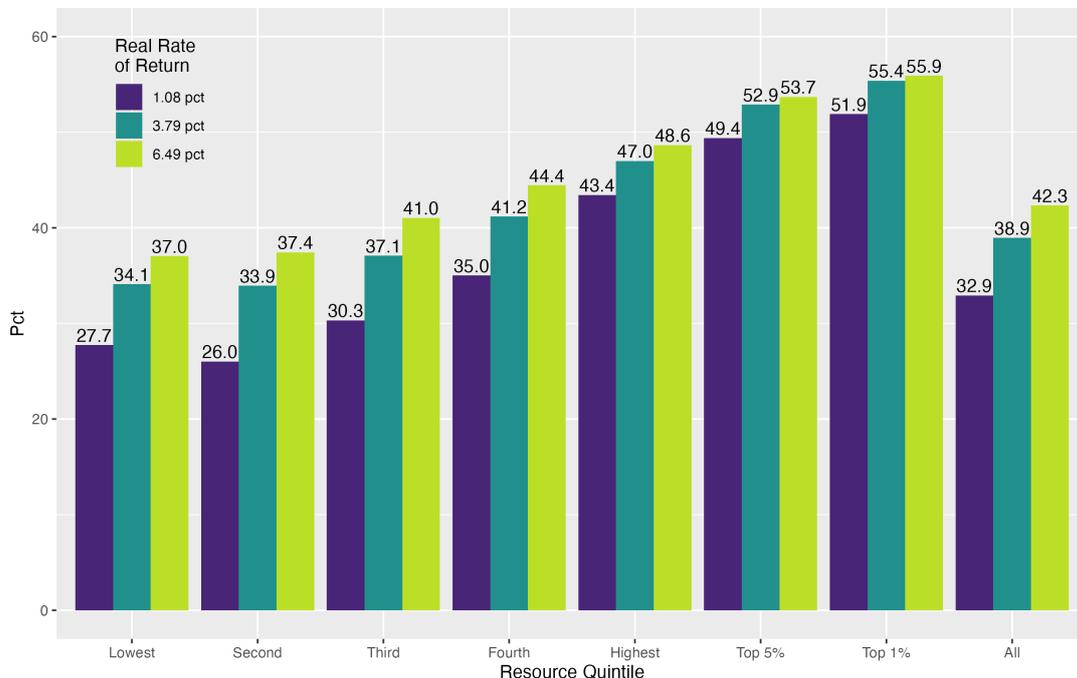
The median LMTR is 32.9% assuming a 1.08% return, 38.9% assuming our 3.78 base-case return, and 42.3% assuming a 6.49% return. The difference between 32.9% and 42.3% is considerable but expected. Lower asset income moves households into lower marginal-tax brackets.

³⁶Tables A8 through A11 present the same decompositions, respectively, for the second through fifth lifetime resource quintiles.

³⁷See Appendix section A2.6 for a detailed discussion of the construction of these rates

But, as figure 5 shows, this impact is less significant for the top resource quintiles. Higher resource households, e.g. the top 1%, have sufficient assets that their taxable income and marginal brackets remain very high even in light of much lower pre-tax asset income.

Figure 5: Median LMTR by Real Rate of Return, Ages 20-69



The difference in interest-rate sensitivity between resource groups is striking. Consider the bottom quintile and the top 5%. For the former group, the median marginal tax rate is one third higher – 27.7% versus 37.1% – in switching the interest rate from 1.08% to 6.49%. For the top 5%, the increase is only 4.3 percentage points, less than one tenth of the group’s LMTR assuming a 1.08% rate of return. A major factor in this higher interest-rate sensitivity for lower-resource households is the impact of additional earnings on future Social Security benefits. Lower-resource workers enjoy a larger increase in future annual benefits from higher covered earnings for two reasons. The first is the progressivity of Social Security’s Primary Insurance Amount benefit formula. The second is the fact that a larger share of high-resource workers have earnings above the taxable maximum. For such workers, the increase in earnings has no impact on covered earnings and, thus, no impact on Social Security benefits. Discounting larger additional future benefits at a lower rate produces larger reductions in LMTRs.

Table 7 shows the percent of households with an LMTR exceeding 50% by the rate of return assumption. Based on our baseline 3.79% rate, almost 18% of the workforce face what be called confiscatory net taxation on additional labor supply. This share ranges from 8.8% in the second to 36.4% in the highest resource quintile. It’s 15.4% for the bottom quintile. Assuming the arguably most appropriate discount rate – the 6.49% pre-tax return on national wealth, almost one quarter of workers face 50% or higher lifetime marginal net tax rates. Based on this discount rate, almost 40% of workers in the top quintile and roughly one quarter of workers in the bottom and fourth quintiles face confiscatory marginal net taxation. The confiscatory marginal net taxation share is much smaller – only 7.1% – assuming a 1.08% discount rate.

Table 7: Percent of Households with LMTR Exceeding 50% by Resource Group and Rate of Return

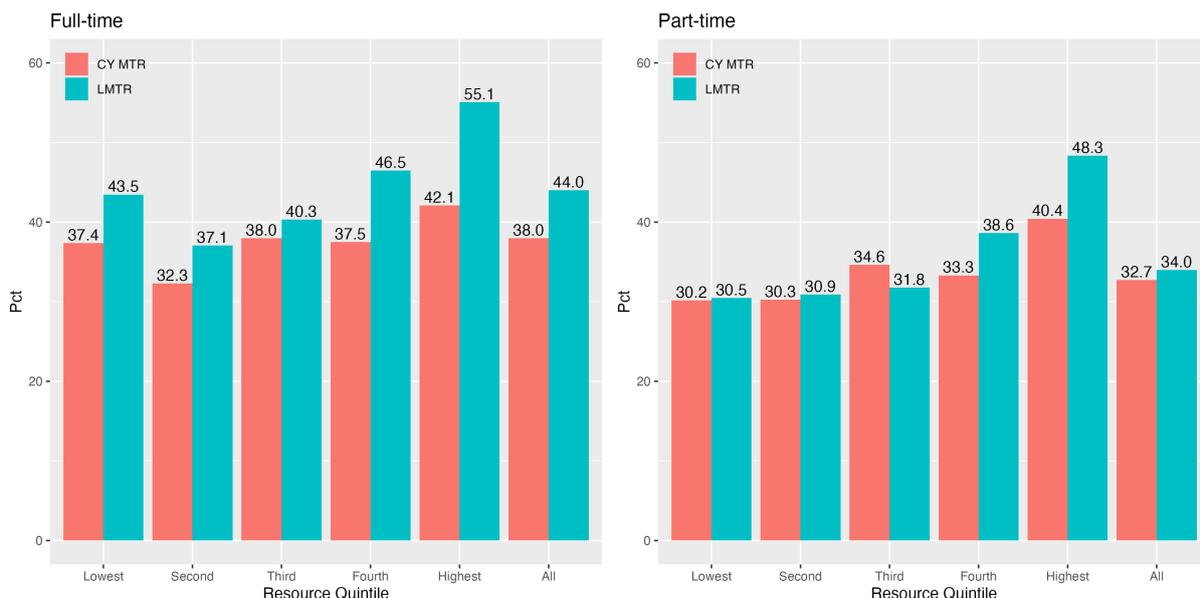
Resource Group	1.08 pct	3.79 pct	6.49 pct
Bottom	10.5	15.4	25.8
Second	1.1	8.8	16.3
Third	1.3	12.4	16.7
Fourth	3.4	16.5	24.0
Highest	19.2	36.4	38.1
All	7.1	17.9	24.2

9 The Cost of Labor Force Entry

This section considers the work-participation tax for the subset of SCF respondents who report they are neither working, disabled, collecting Social Security, nor older than their imputed retirement age. Rather than assume the households earn an extra \$1,000, we assume they work either part-time, earning \$15,000 annually, or full-time, earning \$30,000 annually. We assume that the return to work is permanent – continuing through respondents’ imputed retirement ages, with wages adjusting to inflation in future years. For a household with two respondents, we only consider a return to work by the household head. The two income levels simulate people going back to, respectively, approximately half-time and full-time work at an hourly wage rate of \$15 per hour. We estimate CMTRs and LMTRs based on this amount.

Figure 6 summarizes. Across all households in our sub-sample, the median full-time work-participation LMTR is 44.0%. The median part-time work-participation LMTR is lower at 34.0%. For the bottom quintile, going back to full-time work entails a median LMTR and CMTR of respectively 43.5% and 37.4%. Part-time participation is taxed at a lower rate, although the median CMTR and LMTR are still 30.2% and 30.5%, respectively.

Figure 6: Median LMTR and CMTR From Labor Force Entry, Pre-Retirement Age and Non-working SCF Households



Tables 8 and A12 decompose contributions to high rates from, respectively, returning to full-time and part-time work. For example, for an average working age, bottom-quintile non-working

household, returning to full time at \$15 an hour lowers their current-year SNAP benefits by \$655 and the total amount of transfer payments received by \$3,403. The remainder of the average current-year tax bill of \$12,831 comes from increased taxes. Even though their federal income tax rate is under 15%, they still retain just slightly more than 50 cents for each dollar earned. The breakdown of lifetime taxes is similar, with an average lifetime work-participation tax increase of \$150,912 based on average present value earnings of \$372,387. Roughly \$26,200 of this tax increase is from losses in benefits and \$124,700 from higher taxes.

Table 8: Breakdown of LMTR and CMTR sources from Full-time Labor Force Entry, Pre-Retirement Age, Bottom Resource Quintile, Non-working SCF Households

	C Baseline	C Marg.	C Diff	L Baseline	L Marg.	L Diff
Federal Income Tax	1,088	4,808	3,720	20,150	70,517	50,366
State Income Tax	610	1,721	1,111	7,858	21,712	13,853
FICA Tax	4,565	8,778	4,213	57,520	108,552	51,032
Other Taxes	385	768	383	29,344	38,840	9,496
Total Taxes	6,647	16,075	9,428	114,873	239,620	124,747
SNAP	789	134	-655	9,679	2,510	-7,169
TANF	35	10	-25	112	29	-83
Section 8	214	76	-137	3,916	2,012	-1,904
CCDF	354	195	-159	1,595	869	-726
Social Security	0	-31	-31	132,024	150,270	18,246
SSI	126	-142	-267	8,370	1,733	-6,637
Medicare	226	-11	-237	95,963	90,232	-5,731
Medicaid	1,463	256	-1,207	20,914	6,790	-14,124
ACA	871	450	-421	13,254	8,897	-4,357
Other Transfers	285	22	-263	6,437	2,757	-3,681
Total Transfer Payments	4,363	959	-3,403	292,264	266,099	-26,165
Net Taxes	2,285	15,116	12,831	-177,391	-26,479	150,912
Added Income	0	30,000	30,000	0	372,387	372,387

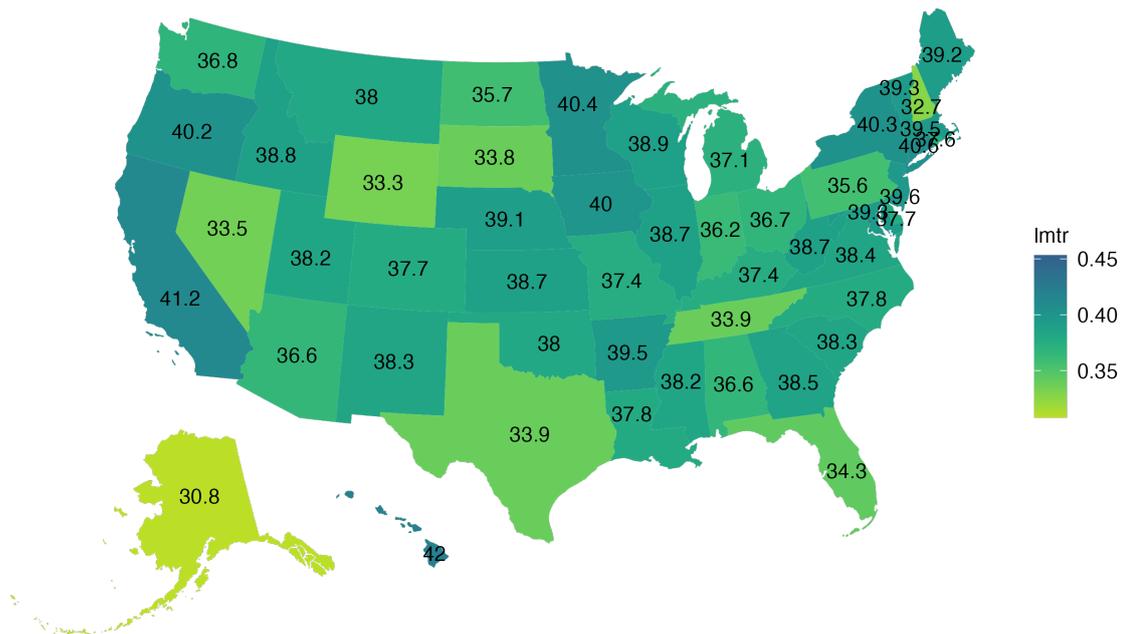
Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

10 Cross-State Variation

This section describes the variation in lifetime marginal tax rates across U.S. states. In an earlier study, [Fleck et al. \(2021\)](#) characterize cross-state effective marginal tax rates, inclusive of transfers. Their focus is on state-by-state progressivity, which they derive from an estimated parametric tax function. Their estimation methodology differs from ours in that our approach is to calculate the actual distribution of marginal rates, and their approach differs from ours in other important aspects. For example, they do not adjust for data issues related to transfer program take-up in ASEC data, and they focus only on CMTRs. Nonetheless, they conclude that there is significant cross-state variation in marginal tax rates, as do we.

To illustrate how LMTRs vary by state, we calculate the median LMTR 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 7](#) shows the cross-state variation in median lifetime marginal tax rates. [Figure A13](#) in the Appendix provides similar information for the current-year marginal tax rates.

Figure 7: Cross-State Variation in Median LMTRs (Age 30-39, Lowest Resource Quintile)



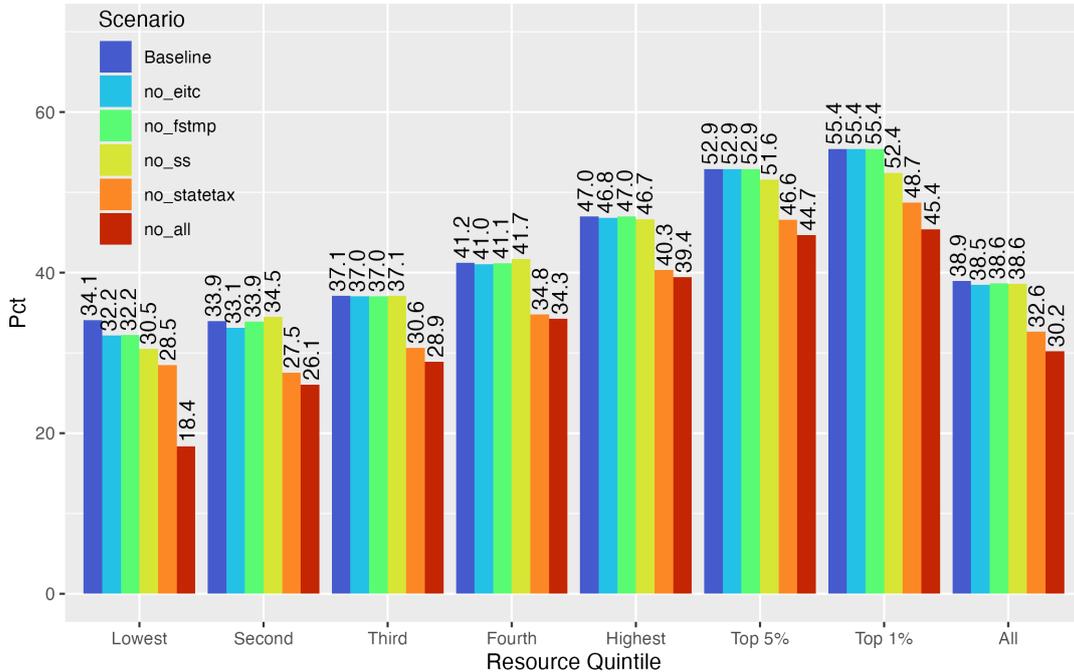
[Figure 7](#) reveals significant state-level variation in *median* LMTRs for this subset of the population. The age-resource group’s median rate varies between a low of 30.8% in Alaska and a high of 41.2% in California. Clearly, where people live matters to their incentives to work.

11 Decomposing LMTRs by Fiscal Program

Here we consider the importance of specific individual fiscal policies or groups of policies to median LMTRs and CMTRs. Specifically, we show how the medians would change in the absence

of a) the Earned Income Tax Credit (EITC), the Child Care Development Fund (CCDF), and the Child Tax Credit (CTC), denoted in figures 8 and A14 as no_{eitc} , b) SNAP and Section-8 housing, denoted as no_{fstmp} , c) Social Security, both the System’s FICA tax and benefits, denoted no_{ss} , and d) state income taxes, denoted $no_{statetax}$. We also show median LMTR and CMTRs with these four sets of programs turned off simultaenously, denoted as no_{all} .

Figure 8: Median LMTR By Fiscal Program Elimination, Ages 20-69



Interestingly, eliminating these combinations of programs or individual programs doesn’t matter much to median values of LMTR – with one exception, state income taxes. For example, eliminating only the EITC, CCDF, and CTC reduces the overall median LMTR from 38.9% to 38.5%. Eliminating just SNAP food assistance and Section-8 housing reduces it to 38.6%. Eliminating Social Security cuts it to 38.6%. But eliminating state taxes has a bigger effect, reducing the median LMTR to 32.6%.

Part of the reason the combinations of benefit programs don’t substantially alter the median LMTR is partial plan participation. A second reason is that these programs individually account for only a fraction of the LMTRs. But their impacts add up. Take the bottom quintile, for which the sum of impacts of separately eliminating the four sets of programs explains 12.9 percentage points of their 34.1% median LMTR. There are, of course, other fiscal policies that contribute significantly to both LMTR and CMTR even in the absence of the policies considered. These include the personal and corporate federal income taxes, state sales taxes, federal excise taxes, Medicare taxes, and the potential loss of SSI.

In addition, eliminating particular programs can activate the work disincentives of others. For example, eliminating Social Security benefits means that many low-income elderly will qualify for SSI with its severe income and asset tests. When social security benefits are eliminated, households in the first resource quintile receive, on average, an additional \$26,554 in present-value SSI, Food Stamps, and Section 8 benefits. This difference reflects the increasing reliance on welfare programs in the absence of social security benefits. It also increases their LMTRs, all else equal, by placing more households in a position to lose benefits from additional income. When we turn off the four selected sets of taxes and welfare programs are turned off in unison, the bottom quintile’s LMTR falls to only 18.4%.

Turning to median CMTRs, the most important stand-alone factor is turning off Social Security. Doing so reduces the overall median CMTR by 10.6 percentage points – to 22.6%. The reason is simple. The CMTR includes only current-year taxes and benefits: For working households, it includes the current FICA tax, but not future Social Security benefits.

12 Excess Burden Arising from Marginal Tax Rate Dispersion

As stressed above, the current U.S. fiscal system imposes not only high LMTRs and CMTRs, but also considerable variation in rates among those of similar ages with similar levels of resources. Such dispersion can compound the distortions of high average marginal tax rates. Our final extension considers the deadweight loss (DWL) of this dispersion, contrasting the current fiscal system with one that would levy the same net tax on everyone with a given level of resources and within a given age cohort. Our focus is limited to the distortions arising with respect to current-year labor supply. We estimate DWL utilizing a standard second-order approximation along with simplifying assumptions laid out in the Appendix.³⁸ Because of these simplifications, our results should be viewed as illustrative of the magnitude of potential distortions resulting from tax-rate dispersion, rather than as precise estimates.

We estimate DWL for two scenarios, assuming, respectively, realistic and full welfare-program participation.³⁹ Results are presented in tables 9 and 10. For each table, we present results weighting households by income and weighting them by their population weights in the SCF. As discussed in the Appendix, these two weights should provide lower and upper bounds for DWL, given an assumed degree of behavioral response. We also consider three possible degrees of behavioral response, assumed to be uniform across households, as represented by the Frisch elasticity of labor supply. Following the review by Reichling and Whalen (2012), we consider low, mid-range, and high values of the Frisch elasticity of 0.27, 0.4, and 0.53.

Table 9: Percent Deadweight Loss By Resource Group, Imputed Welfare Participation

Res. Group	Population Weighting			Income Weighting		
	Low	Mid	High	Low	Mid	High
Bottom	6.7	9.9	13.1	4.5	6.7	8.9
Second	1.6	2.3	3.1	1.0	1.5	2.0
Third	0.5	0.7	0.9	0.3	0.5	0.7
Fourth	0.9	1.3	1.7	0.9	1.3	1.8
Highest	2.1	3.1	4.1	2.6	3.8	5.1
All	2.3	3.5	4.6	1.8	2.7	3.6

Table 9 shows that the deadweight loss caused by dispersion of marginal tax rates on current labor income are, in the aggregate, nontrivial. At the midpoint value for the Frisch elasticity, the overall deadweight loss lies between 2.7% and 3.5% of labor income. However, this overall result masks sharp differences by income. Consistent with the much higher variation in marginal tax rates at the bottom of the resource distribution, the deadweight loss for those in the lowest quintile ranges from 4.5% to 13.1% of labor income.

³⁸We use the LMTR to estimate deadweight loss, rather than the CMTR, consistent with our reasoning that it is the LMTR that should influence labor supply decisions.

³⁹As we assume a constant elasticity of labor supply, we remove outliers to prevent results from being dominated by individual households with extraordinary marginal rates. Specifically, we remove any household with an LMTR greater than 500% or less than -500%.

This range would be substantially higher if there were full take-up of benefits, as shown in table 10. Even if we assume a low estimate for the Frisch elasticity, the DWL for those in the bottom quintile ranges between 16.0% and 20.1%. For the second quintile, it is between 3.3% and 4.9%, and ranges as high as 9.7% assuming a high Frisch elasticity estimate. In summary, in addition to the deadweight loss normally associated with the distortion of labor supply by the tax and transfer system, there is considerable additional loss coming from the dispersion of marginal tax rates, even when one takes account of the partial take-up of government-provided benefits.

Table 10: Pct. Deadweight Loss By Resource Group, Full Welfare Participation

Res. Group	Population Weighting			Income Weighting		
	Low	Mid	High	Low	Mid	High
Bottom	20.1	29.7	39.4	16.0	23.7	31.4
Second	4.9	7.3	9.7	3.3	4.9	6.5
Third	1.0	1.5	1.9	0.7	1.1	1.4
Fourth	1.3	1.9	2.5	1.3	1.9	2.5
Highest	1.7	2.6	3.4	1.8	2.7	3.6
All	5.7	8.5	11.3	2.3	3.5	4.6

Tables A13 and A14 repeat the exercise in tables 9 and 10, except eliminating within-state variation by assigning the within-group mean net tax rate to everyone within a given resource cohort, age group, and state. Eliminating within-state dispersion in this manner reduces the overall deadweight loss to between 0.7 and 1.9 percent under imputed welfare participation, and between 1.8 to 9.5 percent under full participation. But a substantial deadweight loss from tax rate variation across states remains.

13 Conclusion

A fundamental aspect of every nation’s fiscal policy is the degree to which it encourages or discourages labor supply. This paper provides the most comprehensive-to-date analysis of this fundamental aspect of U.S. fiscal policy. It does so by computing marginal lifetime net tax rates (LMTRs) – the additional present value of taxes less the additional present expected value of benefits associated with additional earnings, where expectations are over a household’s future survivor paths. Our analysis focuses strictly on measuring the fiscal system’s net work disincentives, not reactions to those disincentives. We control for preferences by assuming exogenous labor earnings and consumption smoothing.

Our study incorporates all major federal and state fiscal policies, benefit-program take up, and forming lifetime measures, not just those for the current year. A lifetime focus is critical. Our fiscal system is intertemporally intertwined. Social Security is a prime example. Paying more FICA taxes now generally means more benefits in the future. In some cases, the system’s extra benefits can exceed, on an expected present value basis, its extra taxes. Hence, current-year marginal net taxes (CMTRs), which ignore future benefits, can’t accurately capture current-year work disincentives.

Our study applies the Fiscal Analyzer (TFA) – a life-cycle consumption smoothing tool – to the 2019 Survey of Consumer Finances to study the marginal net taxation of Americans’ labor supply. We calculate how much each household is able to spend on an expected (average) present-value basis, where averages are formed over the household’s spending (discretionary plus non-discretionary, including housing costs and in-kind Medicare and Medicaid healthcare

transfers) over each of its potential survival paths. We then compare this remaining expected lifetime spending with the corresponding amount the household can expect to spend were it to earn more on a temporary (current year) basis. Dividing the difference in present value spending by the present value change in human wealth delivers the household's remaining lifetime marginal net tax rate (LMTR). Given lifetime budget balance along each survivor path, the LMTR also equals the expected present value increase of a household's net taxes divided by the posited increment to the present value of labor earnings.

Our findings are striking. Even accounting for partial benefit-program take up, American households typically face very high LMTRs. Among all households headed by respondents aged 20-69, the median LMTR is 38.9%. For the lowest lifetime-resource quintile, the median rate is 34.1%. For the top quintile, it is 47.0%. And for the top 1%, it's 55.4%. LMTRs steadily increases with household resources. However, were all Americans to participate in all benefit programs for which they are eligible, the marginal tax-rate versus resource pattern would, instead, be U-shaped. Another key finding is the great importance of double net taxation. The median LMTR across our entire sample of 38.9% is close to one-fifth higher than the corresponding current-year marginal net tax rate of 33.2%.

We find a major dispersion in work disincentives across households with essentially identical levels of remaining lifetime resources. The greatest dispersion occurs among bottom-quintile households. Consider the poorest fifth of those 30-39 years-old. Their 25th, 50th, and 75th lifetime marginal net tax rate percentile values are 26.2%, 37.1%, and 45.3%. For this age cohort, the standard deviation in the LMTRs is almost fifty times larger for the bottom quintile than for the top quintile.

Work disincentives are extraordinarily high for a significant fraction of low-wage workers. One in ten face lifetime marginal tax rates rates above 65%, effectively locking them out of the labor force. This poverty lock would be much worse if all the poor participated in all benefit programs for which they are eligible. For those not working, the marginal tax on working part-time or full-time for the rest of one's life is also very high, reaching close to 50% for those in the bottom quintile contemplating full-time work. We find that considerable dispersion in work disincentives arises due to variation across states in benefit-program provisions. Our simplified excess burden calculation produces efficiency for bottom-quintile workers ranging to 13% of their labor earnings under partial welfare participation, and as high as 40% under full participation.

In sum, an analysis of the U.S. fiscal system that fully accounts for all major federal and state fiscal policies reveals major work disincentives, a significant poverty lock, huge horizontal differences in work disincentives potentially producing major efficiency costs, extreme differences across state lines in such disincentives, the importance of considering a lifetime rather than a current-year perspective, and, most importantly, the need for policy coordination that rationalizes an extremely balkanized fiscal system.

Our results raise an issue considered in the literature reviewed extensively in [Kaplow \(2024\)](#), that workers may confuse marginal and average tax rates. This confusion may extend to focusing on gross rather than net marginal rates and to current-year rather than lifetime marginal net taxation. What tax rates are salient to actual labor-supply decisions is a subject for ours and others' future work. But one surely needs comprehensive, accurate measures of lifetime, current-year average, and marginal gross (excluding transfers) and net (including transfers) tax rates to improve such behavioral analyzes. Moreover, as indicated in [Brumm et al. \(2024\)](#), economics may rapidly reach a point where it can elicit the preferences of a household and suggest optimal behavior. Advances like this could themselves promote more informed decisions on the part of households.

A final word on policy formation. Benefit programs, in particular, appear designed to target transfers to specific populations. Conditioning participation on labor earnings, total income,

and, in some cases, assets seemingly permits paying higher benefits per participant by limiting participation. In addition, reducing one's own program's benefits based on the size of other programs' benefits enhances one's own program's importance. But imposing major fiscal work and, indeed, saving disincentives can undermine these goals. They can swell, not reduce, the number of program participants by severely penalizing economic independence. In any case, integrated fiscal reforms, including radical tax/benefit-program simplification, merit careful study. They can, potentially, deliver major economic and welfare gains, particularly for low-wage workers.

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Online Appendix

A1 TFA's Solution Method

TFA's problem is to jointly determine survivor-specific realized paths of discretionary spending. Each such path must satisfy the household's realized lifetime budget, respect cash flow constraints, and provide the same (when life insurance is required) or higher (when life insurance is not required) living standard path for survivors as they would experience in the max-longevity case. The program must also simultaneously calculate annual net taxes along each survivor path as well as non-negative values of life insurance that the household purchases at each age along its max-longevity path. When positive, these life insurance amounts suffice to provide survivors with sufficient resources to sustain the max-longevity living standard path through the household's last possible year.

This problem is computationally daunting for four reasons. First, there is the curse of dimensionality arising from the tens of thousands of survivor-path-specific state assets. These are the levels of regular as well as head- and spouse/partner-specific tax-deferred and Roth retirement accounts in each survivor state.⁴⁰ Second, taxes and benefit payments, discretionary spending, and life insurance holdings must be separately determined for all years along all potential survivor paths. Third, spending, insurance amounts, and net taxes are interdependent along any given survivor path as well as across survivor paths. Hence, one needs a simultaneous equations solution. Fourth, the presence of cash-flow constraints introduces major interpolation error to the standard consumption-smoothing dynamic program. Consumption (living standard) functions become non-differentiable with interpolation error compounding as one programs backwards.

TFA's algorithm iterates between three dynamic programs. The first smooths the household's living standard along its maximum longevity path. The second determines annual life insurance needs for each possible death date of the household head and, if present, spouse/partner, while jointly calculating future annual net taxes along all potential survivor paths. The third determines annual net taxes along the max-longevity path.

The max-longevity, living standard-smoothing program takes the household's future labor earnings, annual life insurance premiums, housing and other special expenses, and net taxes (along this survival path) as given.⁴¹ It then formulates, via backward induction, living standard functions of the state vector – household regular assets plus Roth and non-Roth retirement accounts of the head and, for non-singles, spouse/partner.⁴² The induction equalizes the household's living standard across years subject to annual cash-flow constraints.

Given the household's computed year-specific discretionary spending functions, we project the household's living-standard path forward based on current-year initial asset holdings. The second dynamic program takes the household's max-longevity projected living-standard path and calculates the household head- and spouse/partner-specific term life insurance amounts needed to provide all survivors with the same living standard as they would experience in the max-

⁴⁰Consider a 40 year-old couple that could live to 100. They have 200,000 survivor contingent regular and retirement account state variables, such as the regular, tax-deferred and Roth retirement account assets of a 69 year-old widow if her husband dies at age 51.

⁴¹Property taxes are treated as payment for local amenities, not a work disincentive. Current housing choices are assumed to remain fixed through time. Hence, homeowners bequeath their homes when the last survivor passes. Special expenses include alimony payments, repayments of car loans and personal debts.

⁴²The retirement account elements of the state vector along each survivor path are predetermined given initial conditions, our projection of contributions, and the assumption that married/partnered decedents bequeath their accounts to their spouse/partner.

longevity scenario. This routine incorporates the need to sustain the living standards of children through age 19 and disabled children through the household’s last potential year of survival.⁴³ It also calculates the annual net taxes survivors will pay.⁴⁴

The third program takes the first program’s discretionary spending and associated asset and asset-income paths, which, indirectly, depend on the max-longevity life insurance premium path, as given and calculates annual net taxes along the maximum longevity path. To be clear, this outer-loop routine calculates each year’s federal and, if relevant, state income taxes, FICA taxes, and IRMAA premiums as well as available benefits based on all relevant tax and benefit eligibility provisions and schedules.⁴⁵ Thus, each program, either directly or indirectly, takes the output of the other programs as inputs with the iteration proceeding to convergence. Convergence entails lifetime present-value budget balance within one dollar. TFA overcomes the aforementioned non-differentiability/interpolation error problem using a sparse grid method.

A1.1 The Max-Longevity Dynamic Program

This section formally describes the first of TFA’s three routines. Consider the simplest case of a single worker in year 0 who will live, at most, to year T . The worker saves and invests in regular (non-retirement-account) assets and has no off-the-top expenses. By assumption, the agent smooths her annual living standard – consumption – across all future years to which she might survive subject to annual cash-flow constraints. Consumption in T satisfies

$$C_T = A_T(1 + R) + E_T - X_T, \quad (18)$$

where A_T is beginning of time- T regular assets, R is the pre-tax real return, E_T is the agent’s labor earnings, and X_T is time- T net taxes. For year $t < T$, set

$$C_{t-1} = C_t(A_t) \quad \text{if} \quad A_t > 0, \quad (19)$$

where $A_t = A_{t-1}(1 + R) - C_{t-1} + E_{t-1} - X_{t-1}$. Otherwise, set

$$C_{t-1} = A_{t-1}(1 + R) + E_{t-1} - X_{t-1}. \quad (20)$$

Next, suppose the household is married with children. In this case, our consumption-smoothing routine equalizes c_t , the household’s living standard per equivalent adult, across time subject to annual cash flow constraints.⁴⁶ The relationship between C_t and c_t is given above.

⁴³There is also an inner loop determining how much life insurance surviving spouses/partners need to protect young or adult disabled children. The premium that will be paid by such survivors helps determine how much life insurance the potential decedent spouse/partner needs to purchase. I.e., TFA accounts for the simultaneity between the life insurance needs of a potential decedant and those of a surviving spouse/partner.

⁴⁴TFA assumes that survivors are not subject to cash flow constraints. But, after convergence, it runs separate dynamic programs for all potential survivor households, which impose cash flow constraints, grid shrinking, and outer-loop updating of net tax paths. These post-processing runs incorporate the life insurance survivors will receive as determined in the main routine.

⁴⁵The alternative to this outer-loop method is time-consuming, grid-point-specific inner loop calls to the TFA’s net tax subroutine in the max-longevity dynamic program.

⁴⁶TFA can, as here, be run assuming zero borrowing or with an arbitrarily permitted level of borrowing. Our algorithm is modified to limit asset tests in the case that saving in year t would lead to less cash on hand because more benefits are lost by saving. In these cases we assume that such workers either hide their saving, by, for example, parking it with a relative or simply increase their immediate spending on, for example, durables.

A1.2 Validating TFA’s Solutions

Although TFA’s internal workings are complex, its algorithm can be confirmed in six ways. First, the realized present-value lifetime budget constraints of each household are satisfied to many decimal places along all survival paths. These constraints take into account spending in the form of terminal bequests of both regular and retirement account assets less estate taxes and funeral expenses. Second, each unconstrained household’s living standard is smoothed to the real dollar across all future years. Third, for households that are constrained for one or more years, the living standard is smoothed within each constrained interval. Furthermore, the living standard is always higher in constrained intervals that occur later in time. Fourth, regular assets in the year before a borrowing constraint is lifted (via, for example, mortgage payoffs) are zero.⁴⁷ Fifth, if a spouse/partner dies having purchased, the year before, TFA’s recommended term life insurance, the living standard path of survivors through their maximum ages of life (in the case of spouse/partners) and through their leaving the household (in the case of children) is, to the dollar, identical to what they would otherwise had both the head and spouse/partner lived to their maximum ages of life. Sixth, the household’s regular assets are less than TFA is told the household can borrow.

A2 Additional Benchmarking, Imputation, and Adjustment Details

A2.1 Benchmarking the 2019 SCF to National Aggregates

We follow the approach outlined in Appendices A and B in [Dettling et al. \(2015\)](#) to benchmark the 2019 SCF to national aggregates. Specifically, we set SCF benchmark factors to ensure that SCF-weighted aggregates coincide with conceptually equivalent NIPA and FA aggregates. We used FA2018 Q4 aggregates for wages, self-employment income, and assets.

Benchmarking assets and net worth reported in the SCF requires several adjustments to the Financial Accounts values. Using the approach described in [Dettling et al. \(2015\)](#), our first asset adjustment is to reduce SCF-reported home market value by 7.3% to match the 2018 Q4 Federal Reserve Financial Accounts measure. Second, we increase the SCF-reported equity in non-corporate businesses by 33.3% to match the 2019 Q3 Federal Reserve Financial Accounts estimate. Third, we increase reported retirement account assets by 11.3% to match the total reported for 2018 Q4 in the Federal Reserve’s Financial Accounts.

Table [A1](#) details aggregate values, their sources, and our benchmark adjustments. We inflate all SCF-reported wage income by 22.3% to match the NIPA 2018 measure of employee compensation, and deflate all SCF-reported self-employment income by 28.4% to match the NIPA 2018 proprietorship and partnership income total.⁴⁸

⁴⁷This 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.

⁴⁸The fact that we need to inflate wage income and significantly deflate self-employment income to match national aggregates may reflect, in part, a tendency of SCF respondents to report wage earnings as self-employment income. There is also evidence that non-corporate business income is overstated for other reasons, including the underreporting of business losses. See [Bhandari et al. \(2020\)](#).

Table A1: SCF Benchmarking Adjustments and Targets

	SCF Unadjusted	Benchmarking Coefficient	SCF Adjusted	Target	% Diff
Wages	7,382 ⁴⁹	1.22	9,027	9,027	0.0
Self Employment Income	2,237	0.72	1,601	1,601	0.0
Market Val. of Homes	28,048	0.93	25,992	25,877	0.4
Non-Corp. Business Equity	9,795	1.33	13,055	13,055	0.0
Regular Assets	50,904	0.69	35,373	35,374	0.0
Retirement Accounts	14,307	1.11	15,923	15,824	0.6

A2.2 Imputing State Residency

The public-use SCF does not provide state identifiers. The non-public-use SCF data does include state identifiers, but its household weights are national, i.e., not state-specific. They are, therefore, of no value for our purposes of appropriately allocating SCF households by state. Consequently, we impute state residency based on a statistical match to the 2019 American Community Survey (ACS). Having done so, we calculate the distribution across states of ACS households with specific cell characteristics. Next, we assign each SCF household to each of the 51 states in appropriate proportion such that the sum of each household’s state-specific weights equals its original SCF weight.

Specifically, we partition households into distinct cells based on the household head’s age, race/ethnicity, marital status, educational attainment, as well as home ownership status, total household income in 2018, and the number of children in the household under 17 years of age.⁵⁰ For households in a given cell, we create the household’s weight for each state by multiplying their SCF sample weight by the weighted fraction of the cell’s households in the 2019 ACS that reside in that state. If a cell is represented by an SCF household but is entirely un-represented in a given state in the ACS data, we impute a minimum weight of 1 and re-normalize.⁵¹ Thus, the sum of all state weights for each state will always precisely equal the population of that state. We then run TFA 51 times, once for each state plus D.C., incorporating, in the process, each state’s specific tax and transfer policies.

Note that the categorization of rich and poor by resources is done at the national level. So, for example, California has a higher weighted fraction of its households (11.8%) in the top 10% of lifetime resources than does Mississippi (5.0%), and has significantly more residents. Thus, resource-rich households in the U.S. are much more likely to be located in California than in Mississippi (13.6% of the top 10 percentile of households are in California versus 0.5% in Mississippi).

⁴⁹All values are presented in billions of Q4 2018 U.S. dollars.

⁵⁰We partition age groups into four bins: 10-34, 35-49, 50-64, and 65 and older. The choice of larger, 15-year bins instead of 10-year bins is to reduce the number of unmatched bins between ACS and SCF data due to partitioning on too many characteristics. We bin race/ethnicity groups to three bins: white, blacks, and hispanics/other. We group education to three bins: high school diploma or less, some college, college diploma. Marital status is grouped into two bins: one for married and co-living couples, and the second for never married, divorced, separated, or widowed individuals. Income groups are designated using total income quartiles. Home ownerships is group by home owners and non-owners. The number of under-17 children is top coded at 2. This process produces 1,152 unique cells.

⁵¹In other words, we assume that every SCF-represented cell represents at least 1 real household in every state. This imputation is to prevent particularly low-weight households with outlier characteristics (e.g. extremely high earnings) from being concentrated in one particular state.

A2.3 Earnings Imputations

To impute past and future 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.⁵² 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 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 i.i.d. 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 $a\sigma_p^2 + \sigma_e^2$. 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 , $\hat{y}_{i,j}^a$,

$$\hat{y}_{i,j}^a = \bar{y}_i^a + (a\sigma_p^2/(a\sigma_p^2 + \sigma_e^2))(y_{i,j}^a - \bar{y}_i^a) = (a\sigma_p^2/(a\sigma_p^2 + \sigma_e^2))y_{i,j}^a + (\sigma_e^2/(a\sigma_p^2 + \sigma_e^2))\bar{y}_i^a \quad (21)$$

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 (Meghir and Pistaferri 2011; Moffitt and Gottschalk 1995). Then, (11) reduces to:

$$\hat{y}_{i,j}^a = (a/(a+1))y_{i,j}^a + (1/(a+1))\bar{y}_i^a \quad (22)$$

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

$$\bar{y}_i^{(a-t)} + ((a-t)/a)(\hat{y}_{i,j}^a - \bar{y}_i^a)(\bar{y}_i^{(a-t)}/\bar{y}_i^a) = (t/a)\bar{y}_i^{(a-t)} + ((a-t)/a)\hat{y}_{i,j}^a(\bar{y}_i^{(a-t)}/\bar{y}_i^a) \quad (23)$$

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.

A2.4 Using the American Community Survey to Impute Retirement Probabilities

As discussed in Altig et al. (2022), SCF respondents are asked about their expected ages of retirement. Not all respond and those that do may be overly optimistic about how long they will

⁵²These forecasts assume zero real growth rate in economy-wide earnings.

continue to work.⁵³ This squares with the tendency of workers in general to overestimate how long they will work (Center for a Secure Retirement 2019). As an alternative, we use the 2000 through 2020 waves of the ACS to impute retirement age based on two questions in the survey. The ACS asks respondents the number of weeks that they worked last year and the number of hours they are currently working in a typical week. We define a person as having "retired" when that person worked more than 26 weeks in the previous year and works less than 21 hours a week this year.⁵⁴ We segregate ACS working respondents by year of birth, age, gender, marital status, and education, assuming no retirement prior to age 50. This lets us calculate, for each cohort and combination of cell attributes, sample retirement probabilities over the twenty ACS surveys.

We smooth these values and use the resultant smoothed function to determine retirement probabilities. For cohorts retiring after 2020, we linearly project retirement hazards at each age based on 2000-2020 trends through 2040, and assume constant hazards thereafter. These cohort- and characteristics-specific retirement hazards are used to randomly assign retirement ages for each SCF respondent under age 80. We assume that all households retire at 80 if they haven't yet been probabilistically retired.⁵⁵

The predicted age-specific fraction of ACS respondents working after 55 increases over time. The drivers here include higher educational achievement among successive cohorts and a rise in the fraction of working women. Consequently, within each cohort we project some, but rather limited, increases in retirement ages through 2040, with married 50 year-old men with four-year college degrees or more retiring at 65.9, approximately 0.6 years later than their 2020 counterparts.

Figure A1 plots our cohort-specific smoothed retirement hazard functions – the likelihood of working "full time" (more than half time) at different ages – for alternative birth cohorts. Two things are immediately clear. First, regardless of year of birth, the probability of working "full time" declines dramatically starting at age 50. Second, recent cohorts are more likely to work after age 60, but the differences are small and decrease with age.

⁵³Among 45 to 62 year-old 2019 SCF male respondents, the average age of expected full retirement is 70.3 years old, calculated using sample weights. For females, the weighted self-reported full retirement age is 68.9 years old. In 2018, the Social Security administration (2019) reported an average retirement benefit claiming age of 64.8 among men and 64.7 among women.

⁵⁴We include 20 hours as retired because many ACS respondents report exactly 20 hours. These respondents are likely earning less than the SS Earnings Test threshold and hence are likely taking SS retirement benefits.

⁵⁵Summaries of average retirement ages and conditional probabilities of working at age 65 and 70 for 50 year-old workers in 2020 are summarized in tables A2 and A3.

Figure A1: Fraction of Respondents Working More than 20 Hours Per Week, ACS 2000-2020

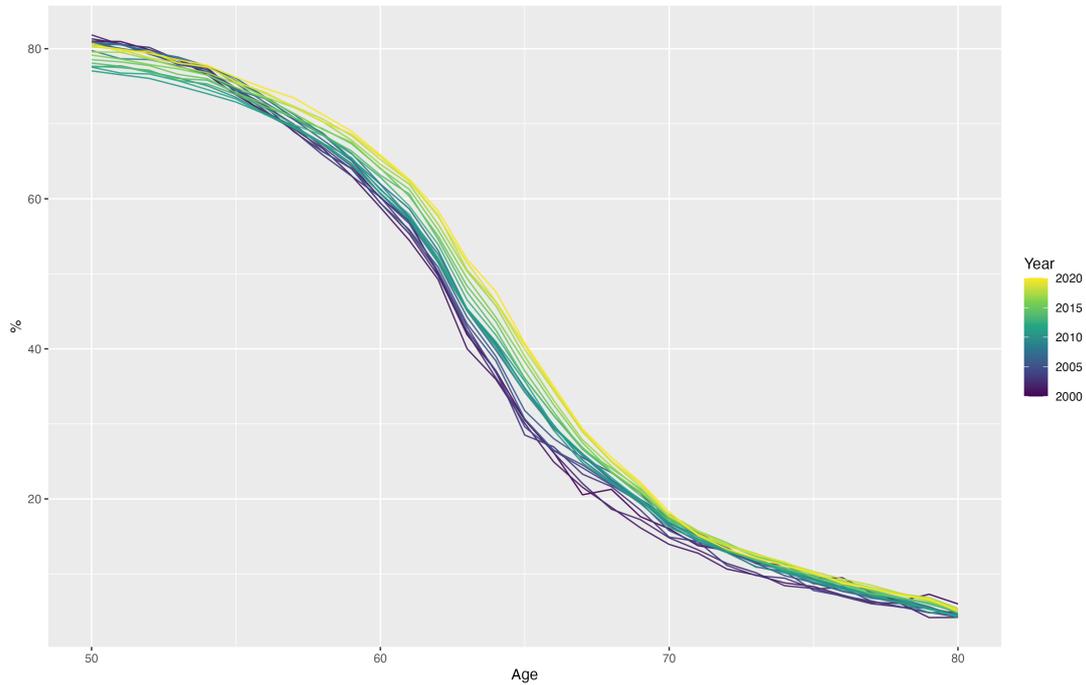


Table A2 shows projected average retirement ages for workers age 50 in 2020 and 2040, respectively. Results are broken down by marital status and education. First, predicted average retirement ages are only slightly higher for future than for current age-50 workers. Second, single females with college educations are projected to "retire" roughly two years later, on average, than those with a high-school diploma or less. Third, for males, education makes little difference in average "retirement" ages holding fixed marital status. Fourth, married males "retire," on average, roughly two years later than single males across all levels of education. Fifth, males "retire" later than females with the difference in average ages falling from roughly four years to roughly two years as one moves from lower to higher levels of education.

Table A2: Projected Average Retirement Age

Marital Stat.	Education	Age 50 Workers in 2020		Age 50 Workers in 2040	
		Male	Female	Male	Female
Single	High School or Less	63.0	59.4	63.1	59.0
	Some College	62.9	61.0	62.7	60.8
	4 yr. College or More	63.2	61.5	63.3	61.7
Married	High School or Less	64.9	58.1	65.4	58.4
	Some College	64.9	58.5	65.1	58.9
	4 yr. College or More	65.3	58.3	65.9	58.5

Table A3 reports the probability of working "full time" at ages 65 and 70 for 50 year-old workers in 2020. The table is quite revealing. First, holding education and marital status fixed, the chances of working "full time" are substantially higher at age 65 than at age 70. Take, for example, married males with some college education. Their chances of being "fully employed" are 56.0% at age 65 and 25.1% at age 70. Second, females are substantially less likely than males to work "full time." Third, married males are more likely to keep working "full time" than single

males. And fourth, education significantly raises the likelihood of single, but not of married females working "full time."

Table A3: Probability of Working More than 20 Hours, Age 50 Workers in 2020

Marital Stat.	Education	Prob. of working more than 20 hours at age 65		Prob. of working more than 20 hours at age 70	
		Male	Female	Male	Female
Single	High School or Less	44.2	24.5	20.0	6.9
	Some College	43.2	34.0	17.3	11.0
	4 yr. College or More	45.3	35.9	18.4	10.5
Married	High School or Less	56.5	17.9	26.6	3.9
	Some College	56.0	20.3	25.1	4.7
	4 yr. College or More	58.6	18.9	26.5	3.9

A2.5 Adjusting for Benefit-Program Take-Up

As is well known, not all households file for all, or indeed any, welfare benefits for which they are eligible (Chien 2015; Giannarelli 2019). We make a variety of adjustments, imputations, and assumptions to assign take-up of each benefit to our SCF respondents. As we show, failure to address take-up can dramatically overstate marginal net tax rates, particularly among those with low incomes.

The adjustments include benchmarking each program's take-up rate to accord with the program's national take-up rate as reported by relevant government agencies. These are summarized in table A4. Our analysis relies, in part, on benefit-participation data reported in the the Annual Social and Economic Supplement (ASEC) to the Current Population Survey. The ASEC includes participation data on the following programs whose participation is not fully recorded by the SCF: SNAP, Section 8 Housing, the Affordable Care Act, the EITC, Adult and Child Medicaid, and the Child Tax Credit.⁵⁶

As for the SCF, it records household Medicaid participation, although it does not report whether participants are children, adults, or both. The SCF also indicates if the household is receiving benefits from one or more of TANF, Food Stamps, SSI, or other programs. However, it does not report the exact program, and the total amount is often unreported.

The ASEC is also problematic for inferring take-up. It generally under-reports participation rates relative to official figures. For example, in the ASEC 40.0% of eligible households participate in SNAP while the official take-up rate is 67.6%. Hence, using the ASEC to predict SNAP take-up among SCF respondents requires first benchmarking SNAP participation in the ASEC to the official figure.

We do so by assigning participation to a set of ASEC respondents who did not report participating in SNAP. The set of reassigned respondents was determined based on a logit regression relating reported SNAP participation in the ASEC against respondent characteristics. The reassigned respondents are those non-SNAP participants with highest predicted SNAP participation probabilities. Thus, if we need X more ASEC respondents to participate in SNAP to equate the ASEC SNAP participation rate with the national rate, we reassign the top X ASEC non-participants, where "top" references participation probability ranking.

Next we estimate a second ASEC logit model using covariates that are common to the ASEC

⁵⁶The referenced calculation of the Child Tax Credit take-up rate may be biased based on reasons discussed in Meyer et al. (2020), Jones and O'Hara (2016), and Imboden et al. (2023).

and SCF, specifically marital status, household size, income, education, and the amount they would receive if participating. Then, we assign SNAP program participation to SCF households based on their regression-based ranking of predicted program participation.⁵⁷ The cutoff for SCF SNAP participation is set to achieve the national rate. We follow this procedure for benchmarking each of the other benefits whose participation is solicited in the ASEC.

Table A4: Estimated Participation and Take Up of Public Assistance Programs

	Number of Participating Individuals ('000)	Number of Eligible Individuals ('000)	Take Up Rate (%)
SNAP	40,776	60,334	67.6
Housing Choice Voucher	5,249	46,559	11.3
Medicaid for Adults*	18,040	24,096	79.9
Medicaid for Children/CHIP**	35,953	38,370	93.7
ACA Subsidy	9,593	112,942	8.5
EITC	N/A	N/A	78.1
CTC	48,962	58,081	84.3
TANF	1,213	4,869	24.9
CCDF Childcare Subsidy	2,099	8,417	24.9

* Excluding dual Medicaid-Medicare enrollees and non-elderly adults with disabilities

** Excluding children with special needs care

Sources: Number of eligible individuals for each program are computed using the Policy Rules Database (Ilin and Terry 2021) applied to the 2019 Annual Social and Economic Supplement of the Current Population Survey. SNAP enrollment numbers are from SNAP Data Tables, Food and Nutrition Service, U.S. Department of Agriculture. Section 8 Housing Voucher enrollment data is from 2019 Picture of Subsidized Households, United States Department of Housing and Urban Development. Enrollment in Medicaid and CHIP is from Open Data, Center for Medicare and Medicaid Services; ACA Premium Subsidy enrollment is from 2019 Marketplace Open Enrollment Period Use Files, Center for Medicare and Medicaid Services. Estimates of the EITC take up is taken directly from the Internal Revenue Services. Number of tax returns with CTC is from Estimates of Federal Tax Expenditures for Fiscal Year 2019-2023, Joint Committee on Taxation. Data on the number of participating and eligible units for TANF is taken from Giannarelli (2019). Data on the number of participating and eligible units for CCDF is taken from Chien (2019).

We also impute take-up in the SCF for several programs not included in ASEC. In the case of SSI and Energy Assistance, we assume full take-up by eligible SCF households. As for CCDF, we randomly assign participation to eligible SCF households. For the remaining programs, we take the following approach. We know if a household is receiving benefits from either SNAP, TANF or SSI, but we do not have information on the specific program(s) from which the benefits are received. If an SCF household (1) reports receiving benefits from any of the three programs, (2) is not eligible for SSI, and (3) is eligible for SNAP, we assume that they are receiving SNAP benefits only, as very few households receive TANF. This produces close to 30% participation. We impute the remainder using the logit regression approach outlined above.

Child Medicaid has a very high participation rate – 93.7%. If an SCF household reports receiving Medicaid, is eligible for Child Medicaid, and has children younger than 18, we assume that they participate in Child Medicaid. If they report receiving Medicaid, are childless, and are eligible for Adult Medicaid, we assume that they participate in Adult Medicaid. As for adults otherwise unassigned to Adult Medicaid, but who are eligible, we use our logit-based assignment method. Finally, we randomly assign TANF to those who are eligible to reach our benchmark for the program.

Table A5 summarizes the results of our imputation for the programs for which we have

⁵⁷For SNAP and other programs, we randomly assign participation status using the same respective take-up rates as those who are eligible. This process is needed because some households may become eligible later in life, or through the additional income we assign to estimate marginal tax rates.

aggregate participation rates. As shown, the procedure matches weighted participation rates for SCF respondents to within 0.2 percentage points of estimated national take-up rates.

Table A5: Summary Statistics for Welfare Program Participation Imputation

	Total Eligible	Total Assigned	Unweighted Participation Rate (%)	Weighted Participation Rate (%)	Takeup Rate Target	Diff
SNAP	905	631	69.7	67.7	67.6	0.1
Section 8	646	72	11.1	11.3	11.3	0.0
Medicaid Adult	706	579	82.0	80.1	79.9	0.2
Medicaid Child	420	392	93.3	93.8	93.7	0.1
ACA	1657	126	15.4	8.6	8.5	0.1
EITC	572	459	80.2	78.1	78.1	0.1
CTC	1351	1062	78.6	84.3	84.3	0.0
TANF	74	19	25.7	24.9	24.9	0.0
CCDF	338	85	25.1	25.1	24.9	0.2

A2.6 Measuring the Real Return on National Wealth

TFA requires, as inputs, a pre-tax real rate of return on assets and an assumed annual inflation rate. There are several options available for estimating this rate. The first option, following the method detailed in [Auerbach et al. \(2023\)](#), is to set the real rate of before-tax return based on the average return on national wealth between 1948 and 2018. This is inferred using data from the National Income and Product (NIPA) accounts and the Federal Reserve’s Flow of Funds database. Specifically, the return rate is calculated as the real return on national wealth reported in year t to produce year- t national saving consistent with reported year- $t + 1$ national wealth. National saving is total all labor plus asset income (year t national wealth times the inferred year t average real return on this wealth) less total household plus government consumption. In this analysis, we assume, as in [Kotlikoff and Summers \(1981\)](#), that the share of proprietorship and partnership income comprising labor earnings equals the share of national labor income to national income, an approach broadly consistent with the approach taken by [Smith et al. \(2019\)](#), who assume a labor share of 75%.⁵⁸ We define national wealth as a sum of total household-sector net wealth and net financial wealth of federal, state, and local governments. This calculation results in a real rate of return of 6.49%.

However, the average return on wealth is heavily influenced by equity markets, and this rate may not be accessible or relevant to individuals who do not participate in equity markets. To establish a risk-free rate of return, we estimate the implied annual return rate on 30-year TIPS between 2010, the first year that 30-year TIPS were issued on a permanent basis, and 2018.⁵⁹ We estimate this rate to be 1.08%. In order to utilize a common rate of return across households to isolate the fiscal system’s impact, we assume, in our base case, a simple average of these two real rates of return of 3.785%. We present a sensitivity analysis of impact of assuming either of the other two rates of return in section 8. We further assume an inflation rate of 2%.

A2.7 Taxation of Asset Income

To maintain our focus on the fiscal system as opposed to its induced behavioral responses, we assume all households earn the same pre-all-tax real rate of return – the 1.08, 3.79, and 6.49 percent values considered above. We then reduce this nominal return by 8.13 percent, the average corporate income tax rate, to arrive at the pre-tax nominal return payable to households. Next,

⁵⁸We define national income at producer prices, not consumer prices as is the NIPA practice.

⁵⁹30-year TIPS were first issued in 1998; from 2001 through 2009 new issues were suspended.

we determine the share of this household return received in the form of municipal bond income – income which is exempt from federal and state taxation.⁶⁰ The remaining household asset return is divided into two components -interest income, taxed at ordinary rates, and realized capital gains and dividends, taxed at preferential rates. Each household’s holdings of munis, bonds and other fixed-income assets, and equities determine the assumed time-invariant shares used to allocate the household’s asset income into these three components. Let N stand for the household’s maximum remaining years. Each period a share equal to $1/N$ th of the household’s accumulated equity income is assumed to be realized, either in the form of capital gains or dividends, and subject to taxation.

A2.8 Imputation of Charitable Contributions

Charitable giving levels were imputed using “Tax Benefits of the Deduction for Charitable Contributions” data from the Tax Policy Center. (See here.) First, we used the income ranges for each quintile and calculated a midpoint for each range. Next, we used the average tax benefit (in dollars) and the average federal tax rate for each quintile to calculate the dollar contribution that would yield the tax benefit. Finally, we divided the contribution by the income midpoint giving the average contribution rate for the quintile. We use the income level for each household to find the associated charitable contribution rate and impute an amount given to charity each year.

A2.9 Survival-Path Probabilities

As discussed in [Auerbach et al. \(2023\)](#), our survival-path probabilities are constructed from underlying mortality rates estimated by the [Committee on the Long-Run Macroeconomic Effects of the Aging US Population \(2015\)](#). This study sorts Health and Retirement Study (HRS) respondents between 1992 and 2010 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 procedure, except we sort SCF respondents based on average wage-indexed earnings from age 25 through age 60.

A2.10 Inflation Indexation

Not all elements of the U.S. fiscal system are indexed for inflation, and those that are adjusted experience different delays and are based on different inflation measures. Where available, 2018 values of fiscal-system components are taken as published. There are nuances to each part of the fiscal system for indexing beyond 2018, however. In describing the indexation in detail below, the specified inflation rate (set to 2%) in simulated years is referred to as $X\%$.

Federal income tax brackets in 2018 equal the official values in that year. 2019 federal income tax brackets are calculated by growing the 2018 brackets by one third times the inflation rate in 2019 ($X\%$) plus two thirds times the Chained Consumer Price Index for All Urban Consumers (C-CPI-U) from the data in 2018.⁶¹ 2020 brackets cannot be calculated using $X\%$ and the 2019 C-CPI-U from the data, however. This is because given that the TFA takes the most recent year

⁶⁰Since states may exempt only income on their own state-issued munis, we effectively assume households hold only their own state’s munis.

⁶¹The IRS began indexing federal income tax brackets by the C-CPI-U starting in 2018 with the implementation of the Tax Cuts and Jobs Act (TCJA).

of data to be 2018, then, any values of the C-CPI-U from 2019 and onwards do not exist, from the point of view of the TFA. Instead, 2020 brackets are calculated as the 2019 brackets grown by one third times the inflation rate in 2020 ($X\%$) plus two thirds times an imputed C-CPI-U rate for 2019. The imputed C-CPI-U rate for 2019 is calculated by extending the C-CPI-U from 2018 (from the data) by $X\%$, subtracting off a factor, and converting this number to a rate. The factor is constructed such that it maintains the historical difference that has been present between the C-CPI-U and the Consumer Price Index for All Urban Consumers (CPI-U).⁶² Tax brackets for $t \geq 2021$ are calculated in the same way: by extending $t - 1$ tax brackets by one third times $X\%$ plus two thirds times the imputed C-CPI-U rate for $t - 1$. These mechanisms capture indexing lags.

State income-tax brackets for 2018 are also taken as published. Starting in 2019, these brackets are adjusted in the same manner as the federal tax brackets – based on $X\%$ inflation and the same composition of lags. The only difference is that the CPI-U is used in all calculations instead of the C-CPI-U and the subtraction of the factor mentioned in the previous paragraph is unnecessary. The Federal Insurance Contributions Act (FICA) cap and property taxes grow by the specified inflation rate of $X\%$ starting in 2019 with no lag applied.

Indexing Social Security benefits is more complex. These benefits are adjusted using COLAs calculated based on changes to the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). Published COLAs from the Social Security Administration are used prior to 2018 to determine benefits. Benefits in subsequent years are based on a sequence of imputed CPI-W numbers. To determine this sequence, the following procedure is followed. Calculate the 2018 imputed CPI-W as the 2017 CPI-W from the data, extended by three quarters times the inflation rate in 2017 (the CPI-U in 2017 from the data) plus one quarter times the inflation rate in 2016 (the CPI-U in 2016 from the data). The 2019 imputed CPI-W is calculated by extending the 2018 imputed CPI-W by three quarters times the inflation rate in 2018 ($X\%$) plus one quarter times the inflation rate in 2017 (the CPI-U in 2017 from the data). Iterating this formula forward, the 2020 imputed CPI-W is equal to the 2019 imputed CPI-W, grown by this lagged sum of inflation rates from 2019 and 2018, which are both $X\%$. Thus, from 2020 onwards, the imputed CPI-W is equal to the prior year’s imputed CPI-W, extended by $X\%$. Now, given this sequence of imputed CPI-W’s, the differences between each of these numbers forms the annual COLA adjustment used to determine Social Security benefits.

Medicare Part-B brackets are taken as published from 2018 data. Since the top bracket (which determines if the household must pay the Income-Related Monthly Adjustment Amount, or IRMAA) does not adjust with inflation, the associated income threshold is fixed at \$500,000 and \$750,000 for single and joint married filers, respectively. The lower brackets are equal to the 2018 brackets, extended each year by the corresponding year-value in the imputed CPI-W series described above. Therefore, all Medicare Part-B brackets except the top one grow by $X\%$ each year starting in 2020.

Finally, Medicare and Medicaid benefits are indexed. Since these amounts are typically only available for one year, which may not be 2018, the 2018 value is imputed where applicable. This indexing is done using CPI-U data. From 2019 onwards, $X\%$ is used to index benefits. Thus, these benefits are indexed in perfect synchronization with inflation. All other federal and state benefits are also imputed to the 2018 value where applicable by the CPI-U. Starting in 2019, they are extended by $X\%$.

⁶²The factor is the average difference of geometric means of the C-CPI-U and CPI-U in years of data they have in common. Subtracting this factor in calculating the imputed C-CPI-U maintains the historical difference between the C-CPI-U and the CPI-U; the C-CPI-U moves in a lower trajectory than the CPI-U.

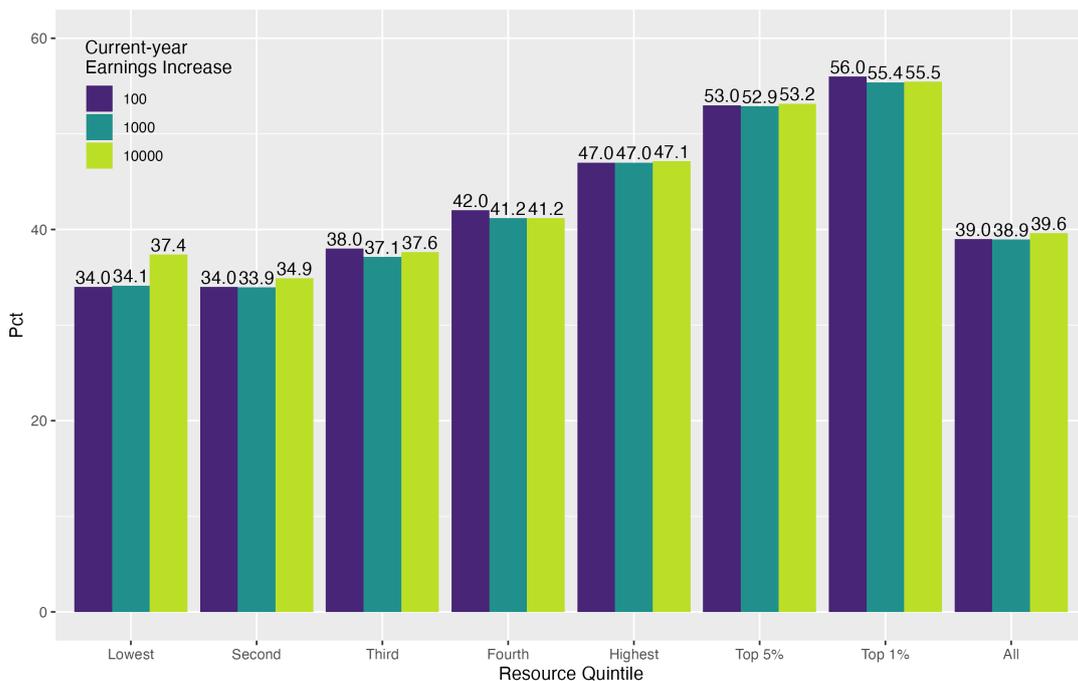
A3 Sensitivity to Amount of Added Income

We next consider whether our LMTR and CMTR measures depend importantly on the size of the posited increase in earnings. To that end, we considered additional earnings of both \$100 and \$10,000. Figures A2 and A3 compare median LMTRs and CMTRs for the baseline (with \$1,000 in additional earnings) and the two alternative experiments.

A quick glance indicates that our median findings are quite robust to the magnitude of the earnings increment. In the \$1,000 baseline case, the overall median LMTR is 38.9%. It's 39.0% if we increase earnings by \$100, and 39.6% if we increase earnings by \$10,000. The corresponding CMTRs are 33.0% and 34.1% with a baseline of 33.2%.

The higher LMTRs when earnings increase by \$10,000 reflects reflects two things. First, some additional low-resource households lose benefit-program eligibility with a larger earnings increase. Second, some high-resource households find themselves in higher federal tax brackets. For bottom quintile households, the LMTRs from increasing earnings by \$100, \$1,000, and \$10,000 are 34.0%, 34.1%, and 37.4% respectively. For the top 1%, LMTRs are 56.0%, 55.4%, and 55.5%, respectively.

Figure A2: Median LMTR by Amount of Added Income, Ages 20-69

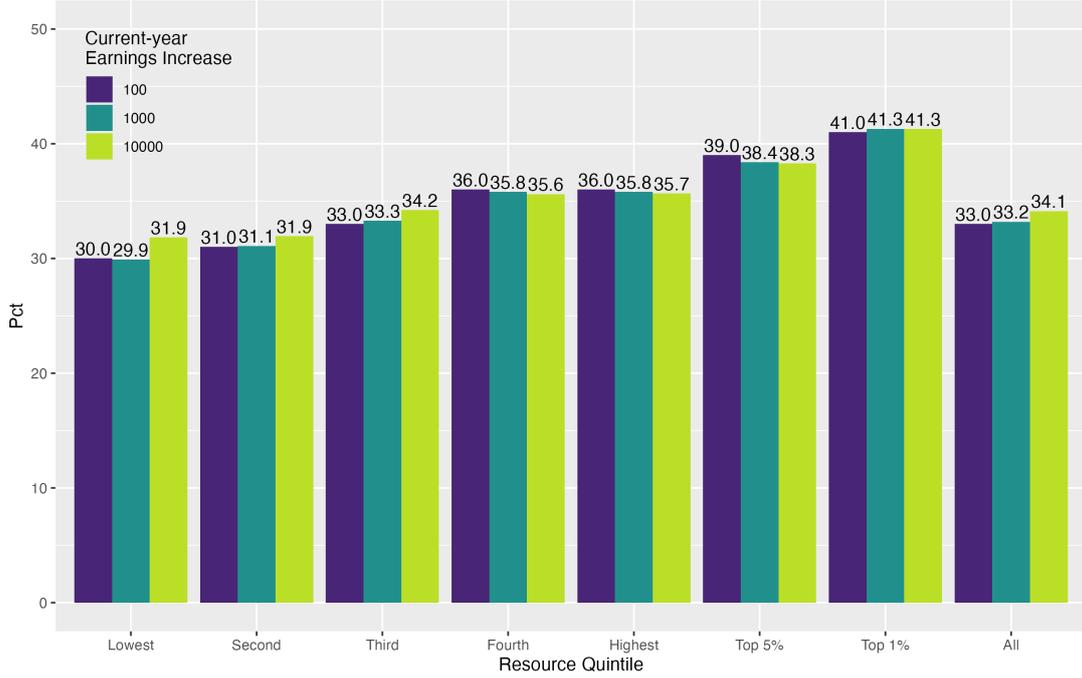


A4 Derivation of Expression for Excess Burden Arising from Marginal Tax Rate Dispersion

Let x be labor supply, t the marginal tax rate, and p the after-tax wage, defined as the gross wage multiplied by one minus the marginal tax rate. After-tax labor earnings is, thus, px . Consider the standard second-order approximation of DWL.

$$DWL \approx -\left(t\Delta x + \frac{1}{2}\Delta t\Delta x\right). \tag{24}$$

Figure A3: Median CMTR by Amount of Added Income, Ages 20-69



The first term in (24) is captured by $-t\Delta x \approx -t\frac{dx}{dp}(-\Delta t) = \frac{t}{p}\left(\frac{dx}{dp}\frac{p}{x}\right)x\Delta t$, where $\left(\frac{dx}{dp}\frac{p}{x}\right)$ is the price elasticity of x . Assuming that all households in a particular age-resource cohort have the same price elasticity, the sum of this expression over households in a given cohort i is

$$\left(\frac{dx}{dp}\frac{p}{x}\right)\sum_i\frac{t_i}{p_i}x_i\Delta t_i. \quad (25)$$

Further, suppose that variations in tax rates are revenue compensating such that the static revenue is unchanged. Then, $\sum_i x_i\Delta t_i = 0$. In general, the first-order term in (25) is non-zero unless the tax rate terms $\frac{t_i}{p_i}$ are uncorrelated with the terms $x_i\Delta t_i$. However, if we group households within a cohort such that they have the same initial tax rate and the wage rate, expression (25) becomes

$$\frac{t}{p}\left(\frac{dx}{dp}\frac{p}{x}\right)\sum_i x_i\Delta t_i \quad (25^*)$$

which equals 0 by the assumption that the static revenue remains unchanged. Then, equation (24) simplifies to $-\frac{1}{2}\sum_i \Delta t_i\Delta x_i$, which we approximate by

$$\begin{aligned} -\frac{1}{2}\sum_i \Delta t_i\frac{dx}{dp}(-\Delta t_i) &= \frac{1}{2}\sum_i \left(\frac{dx}{dp}\frac{p}{x}\right)p_ix_i\left(\frac{\Delta t_i}{p_i}\right)^2 \\ &= \frac{1}{2}\left(\frac{dx}{dp}\frac{p}{x}\right)\sum_i p_ix_i\left(\frac{\Delta t_i}{p}\right)^2. \end{aligned} \quad (26)$$

Expressing DWL as a fraction of cohort net income, $D = \sum_i p_ix_i$, (26) becomes

$$\frac{1}{2}\left(\frac{dx}{dp}\frac{p}{x}\right)\sum_i \frac{p_ix_i}{D}\left(\frac{\Delta t_i}{p}\right)^2. \quad (26^*)$$

Additionally, recall that we assume $\sum_i x_i \Delta t_i = 0 \rightarrow \sum_i \frac{p_i x_i}{D} \frac{\Delta t_i}{p_i} = 0$. Hence, (26) can be rewritten as:

$$\frac{1}{2} \left(\frac{dx}{dp} \frac{p}{x} \right) \sum_i \left(\frac{p_i x_i}{D} \left(\frac{\Delta t_i}{p} \right)^2 - \left(\sum_i \frac{p_i x_i}{D} \frac{\Delta t_i}{p_i} \right)^2 \right). \quad (27)$$

In principle, $p_i x_i$ is the after-tax income for household i in the initial equilibrium with no tax rate variation within their cohort. This is not observed, nor can it be imputed without significant error.⁶³ Therefore, we treat all households in the labor force (i.e. all who are included in the calculation, excluding those where all main respondents are fully retired or disabled) within each cell as having not only the same value of the after-tax wage, p_i , but also the same initial after-tax labor income $\bar{p}x$. Under this assumption, $\frac{p_i x_i}{D} = \frac{1}{N}$, where N is the population-weighted number of households in this cell. This allows us to further simplify (27) to

$$\frac{1}{2} \left(\frac{dx}{dp} \frac{p}{x} \right) \frac{1}{N} \sum_i \left(\left(\frac{\Delta t_i}{p} \right)^2 - \left(\sum_i \frac{\Delta t_i}{p} \right)^2 \right) = \frac{1}{2} \left(\frac{dx}{dp} \frac{p}{x} \right) wvar \left(\frac{\Delta t_i}{p} \right), \quad (27^*)$$

where the variance accounts for either our imputed household weights or each household's weighted observed labor income share of the cohort.⁶⁴ The former would bias our calculation upward as it assigns equal contribution to DWL of those with lower income. The latter would bias downward, to the extent that those with high marginal tax rates actually work less than those with lower marginal tax rates.

To calculate $\bar{p}x$ for a particular age-resource cohort, we utilize the fact that the observed after-tax wage for household i is $p_i = w_i(1 - \theta_i)$, where w_i is the pre-tax wage and θ_i is the household's LMTR. The household's labor income is, consequently, $w_i(1 - \theta_i)x_i$. The average MTR for the cohort $\bar{\theta}$ equals the average of θ_i weighted by observed before-tax income $w_i x_i$. The cohort's average after-tax income $\bar{p}x$ equals $1 - \bar{\theta}$ multiplied by average before-tax income. Using the same notation, $\Delta t_i = w_i(\theta_i - \bar{\theta})$. Therefore,

$$\frac{\Delta t_i}{p} = \frac{\theta_i - \bar{\theta}}{1 - \bar{\theta}} \quad (28)$$

⁶³For example, individuals who are driven not to work by their actual marginal tax rates might work at a lower marginal tax rate, but might still choose not to work. Also, it is hard to interpret the positive labor supply observed for individuals for whom we calculate marginal tax rates above 100%.

⁶⁴Note that income weights should account for the cohort's income share represented by a given household. In other words, each household's weight is its labor income multiplied by the household population weight.

Figure A4: Median Current-Year MTR by Welfare Program Participation Assumption, Ages 20-69

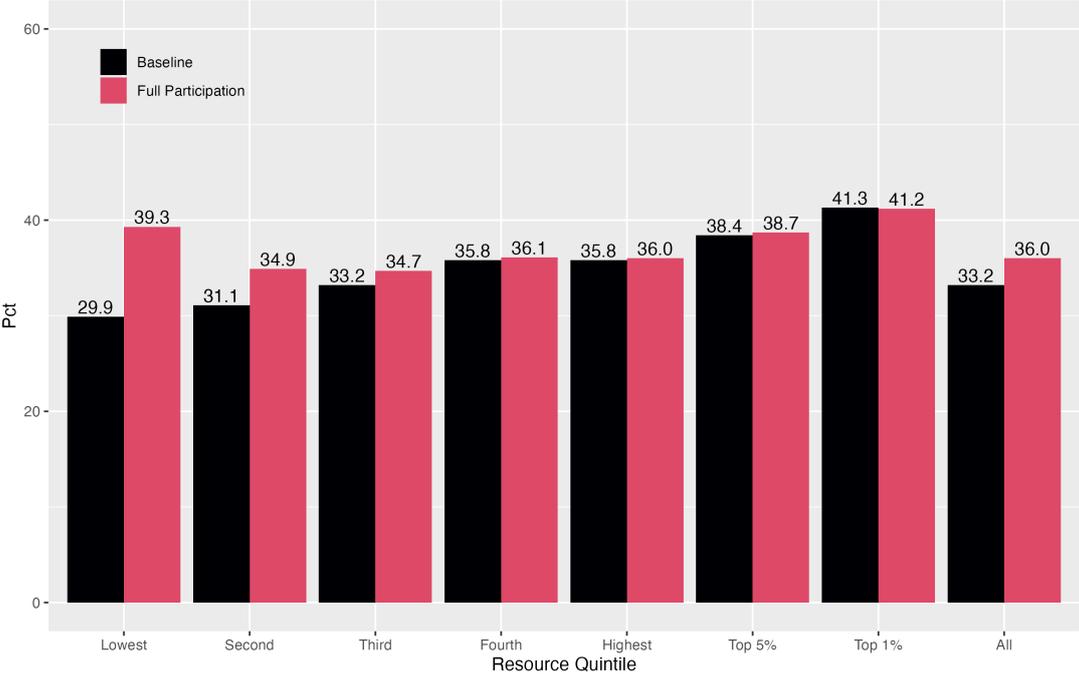


Figure A5: Median Lifetime and Current-Year MTR, Ages 20-29

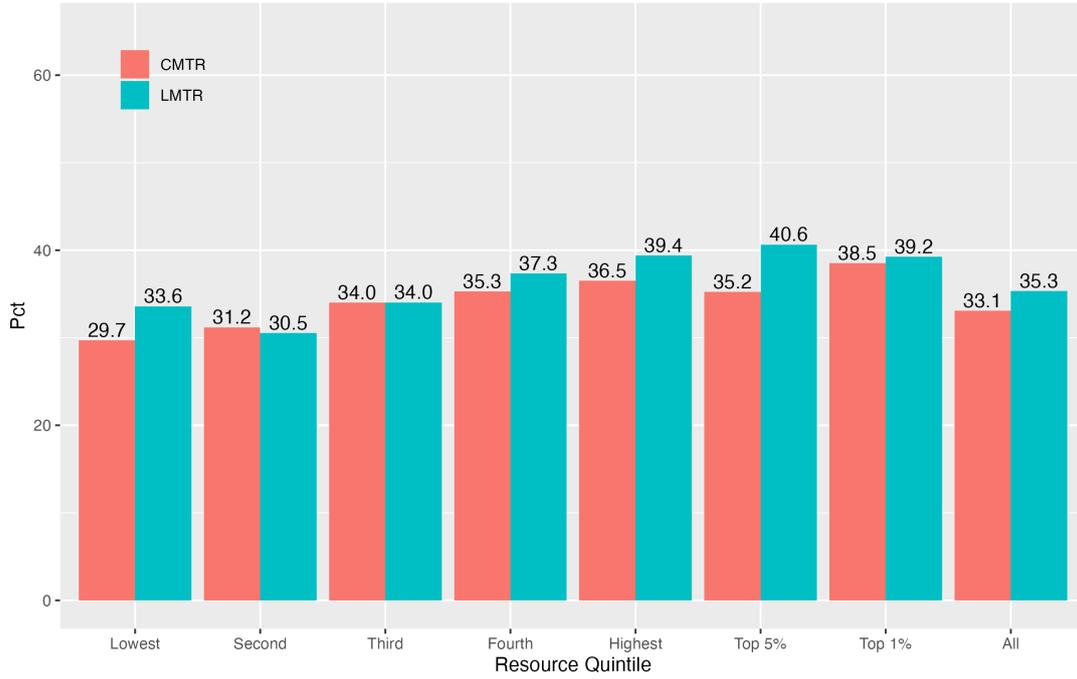


Figure A6: Median Lifetime and Current-Year MTR, Ages 30-39

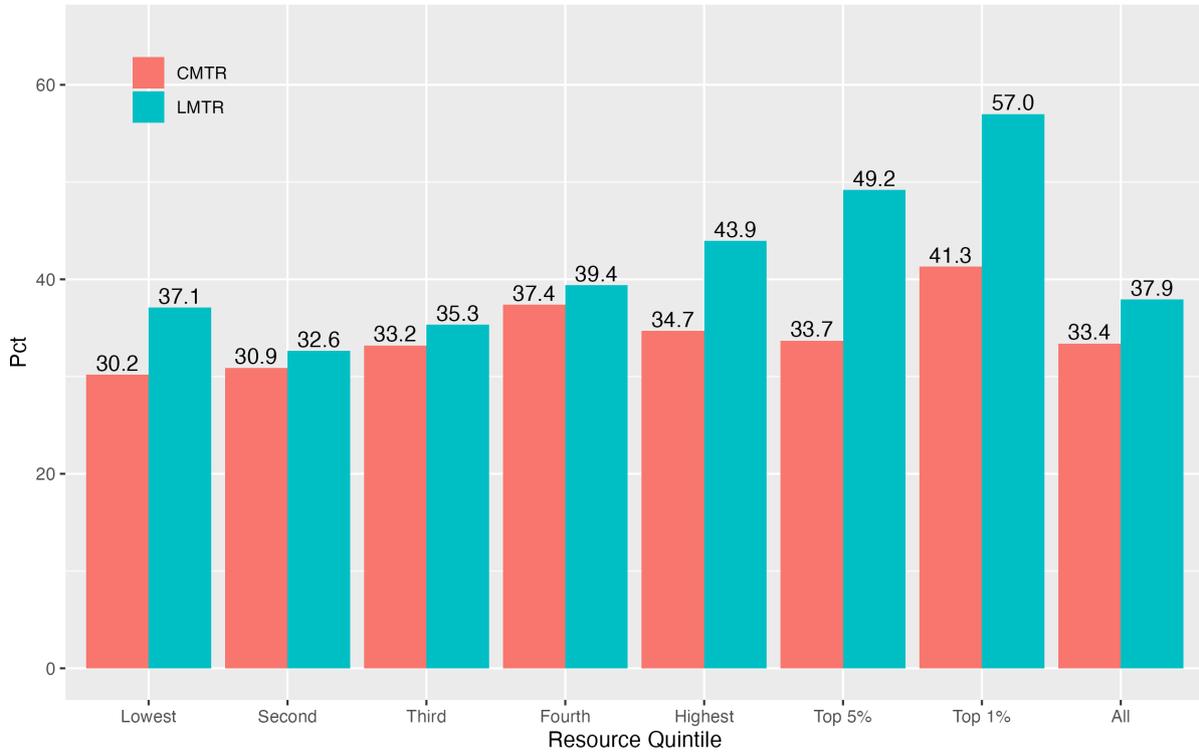


Figure A7: Median Lifetime and Current-Year MTR, Ages 40-49

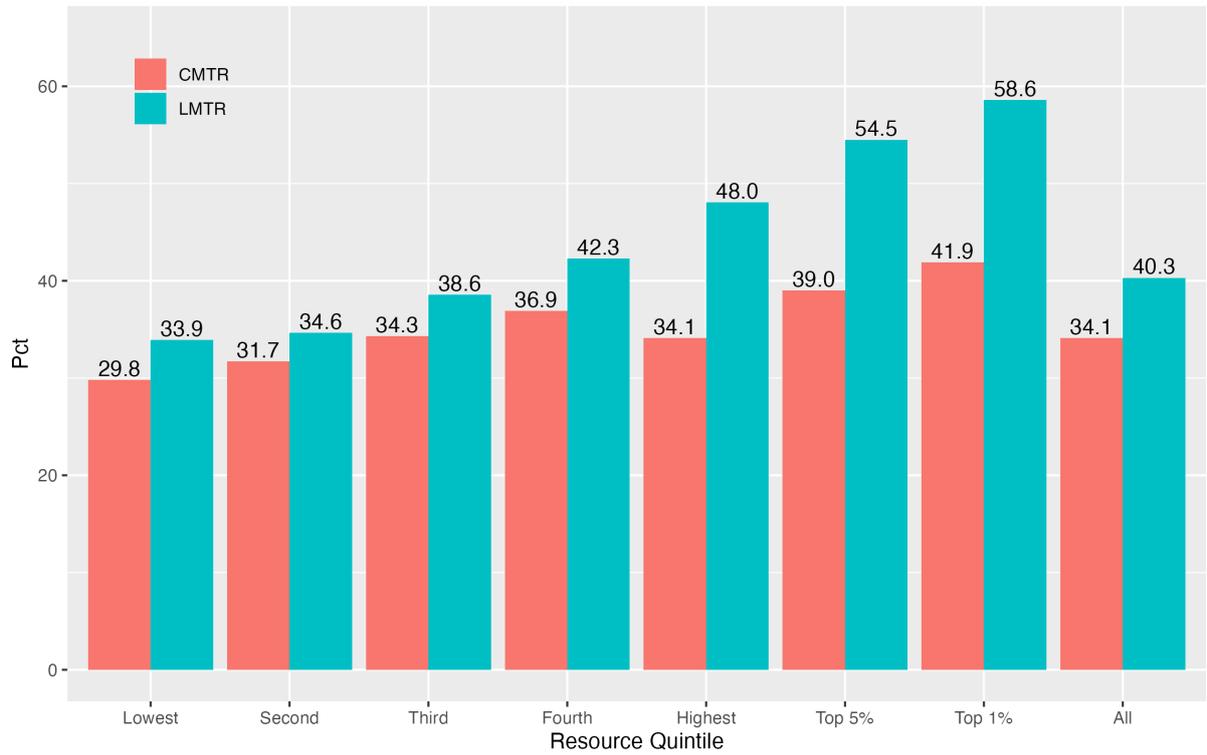


Figure A8: Median Lifetime and Current-Year MTR, Ages 50-59

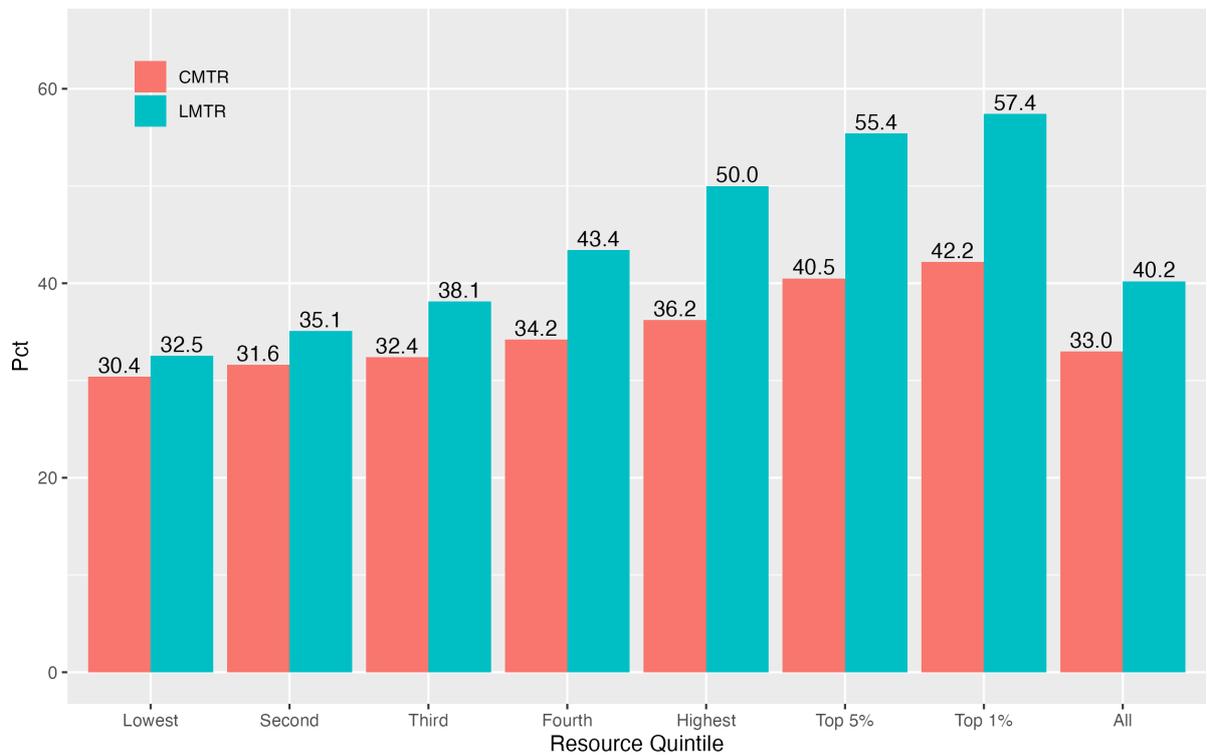


Figure A9: Median Lifetime and Current-Year MTR, Ages 60-69

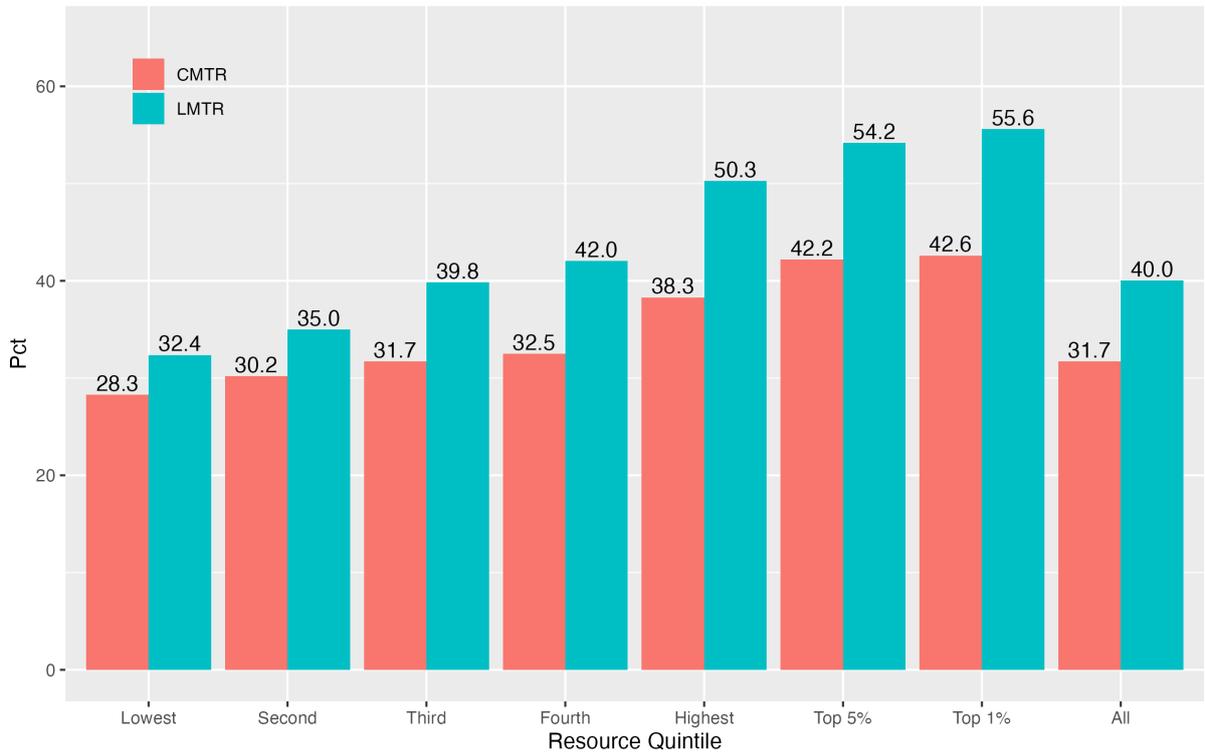


Figure A10: Current-Year Marginal Tax Rates from \$1,000 Earnings Increase in Current Year, Ages 20-69

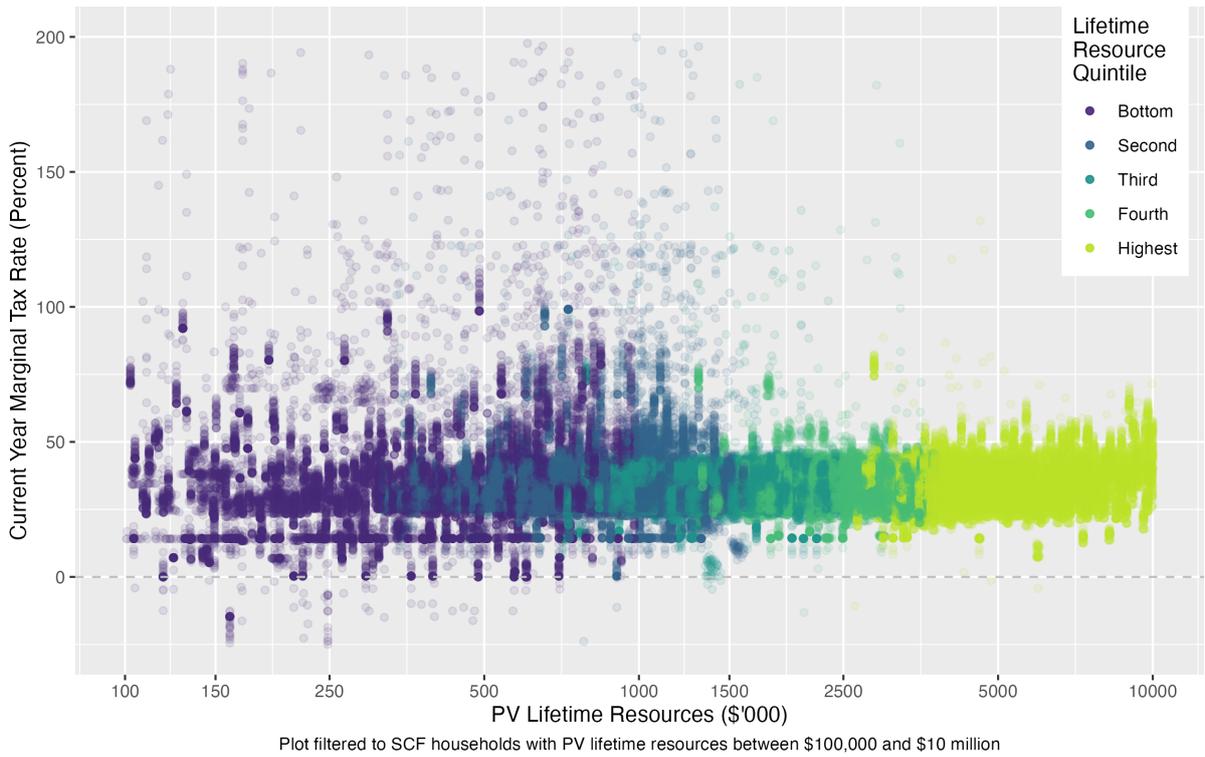


Figure A11: Lifetime Marginal Tax Rates from \$1,000 Earnings Increase in Current Year, Ages 20-69, Full Welfare Participation

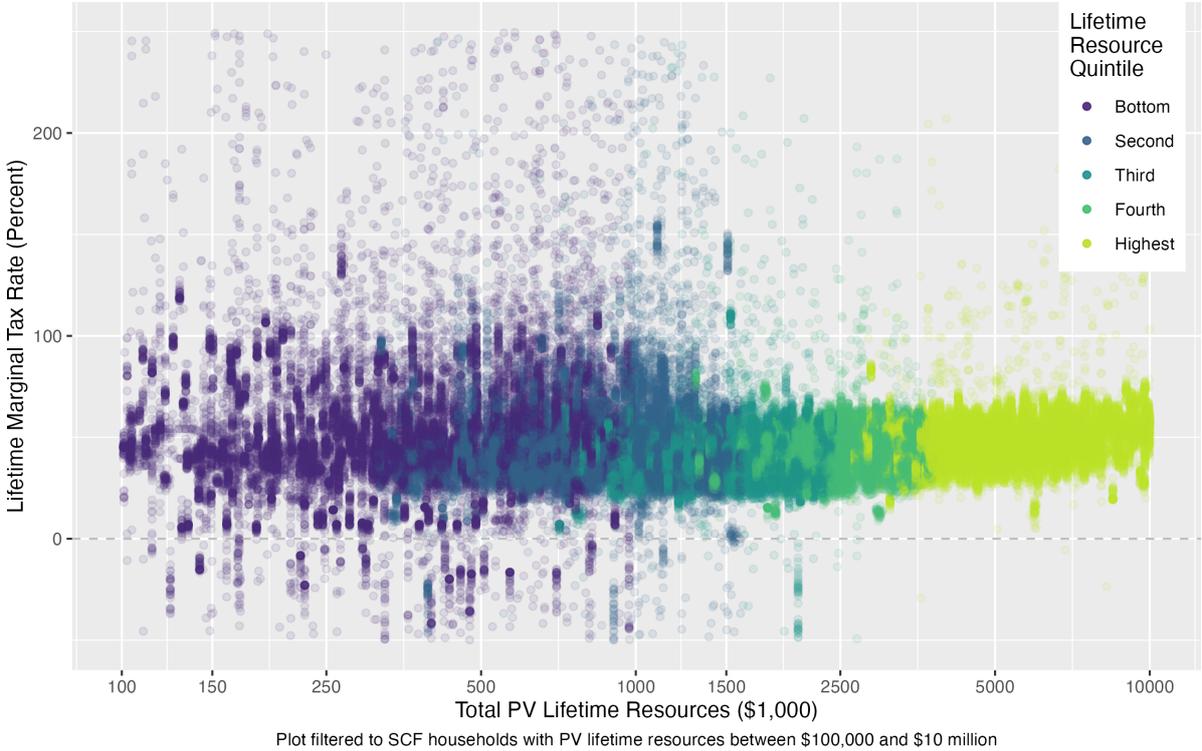


Figure A12: Current-Year Marginal Tax Rates from \$1,000 Earnings Increase in Current Year, Ages 20-69, Full Welfare Participation

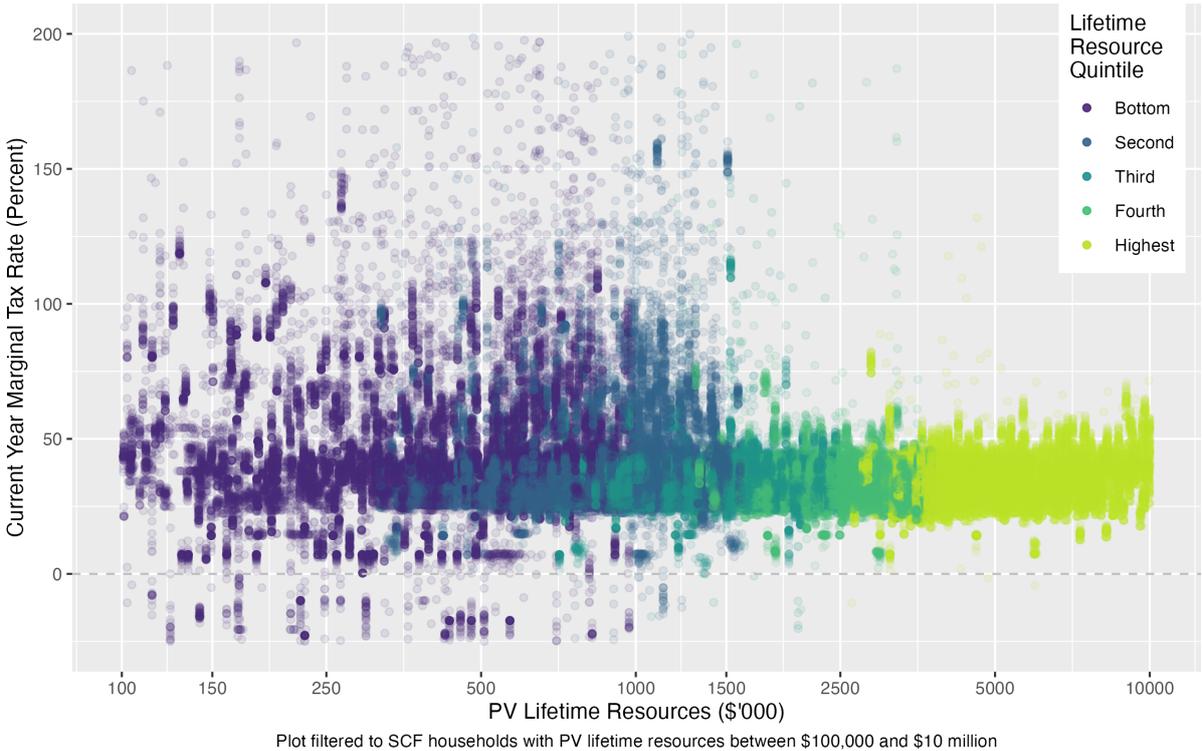
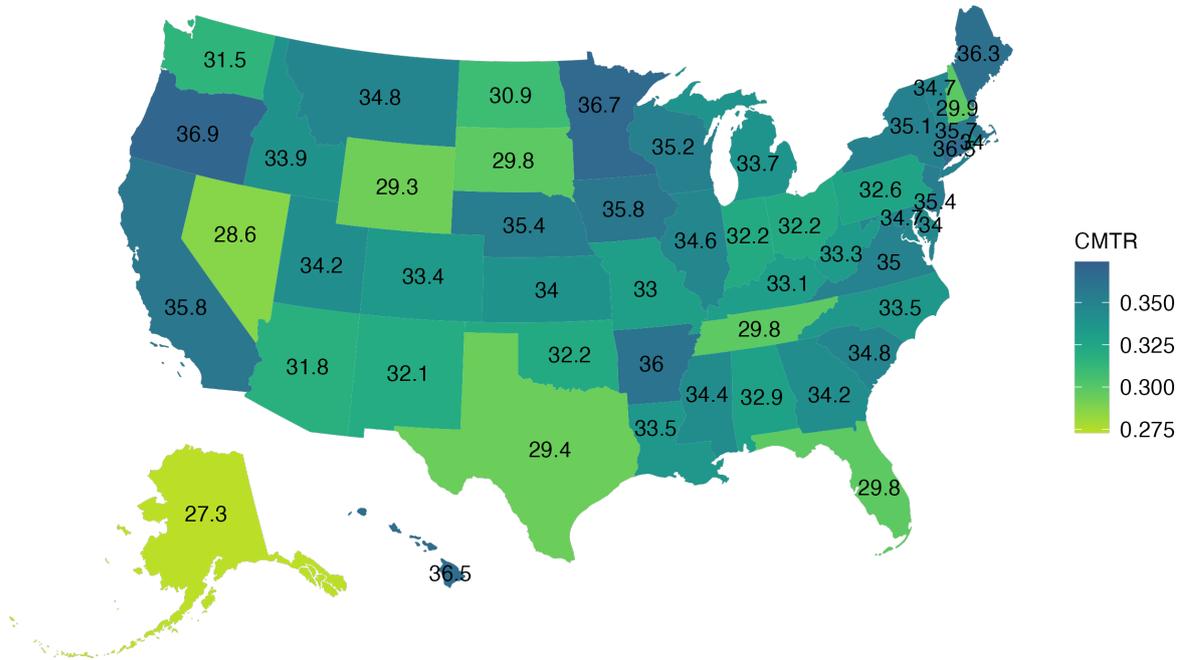


Figure A13: Cross-State Variation in Median CMTRs, Age 30-39, Lowest Resource Quintile



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

Figure A14: Median CMTR by Fiscal Program Elimination, Ages 20-69

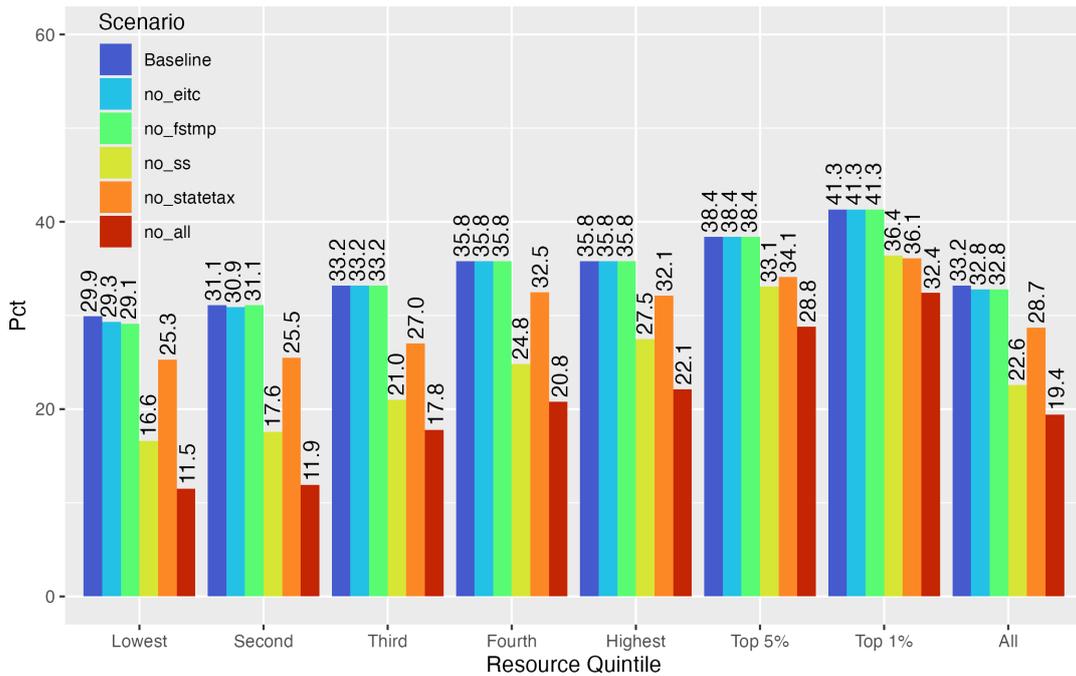


Table A6: Summary Statistics for Marginal Tax Rates, Age 20-69, Full Participation

Lifetime Marginal Tax Rates

Resource Group	q25	median	mean	q75	q90	std.dev
Bottom	30.8	43.9	40.5	58.2	86.9	632.1
Second	31.5	38.3	37.0	45.5	54.8	224.1
Third	32.1	38.6	47.8	45.3	51.6	121.4
Fourth	36.4	41.5	41.9	48.0	54.0	42.3
Highest	40.1	47.2	47.7	55.0	60.9	100.1
Top 5%	43.0	53.1	51.3	59.7	64.9	136.0
Top 1%	44.0	55.3	52.5	61.1	65.8	182.7
All	34.5	41.6	42.9	50.1	59.5	282.8

Current-Year Marginal Tax Rates

Resource Group	q25	median	mean	q75	q90	std.dev
Bottom	28.7	39.3	37.3	49.5	73.8	129.6
Second	29.6	34.9	33.3	40.7	47.4	100.7
Third	29.8	34.7	42.9	39.1	41.6	121.0
Fourth	30.8	36.1	35.2	39.6	41.9	31.9
Highest	29.8	36.0	35.5	40.6	44.0	8.6
Top 5%	32.8	38.7	38.0	43.0	46.9	8.1
Top 1%	37.3	41.2	40.2	44.1	48.8	8.6
All	29.8	36.0	36.8	40.7	46.5	82.7

Table A7: Median LMTRs by Resource Group and No. of Children

No. of Children	Bottom	Second	Third	Fourth	Highest	Top 5%	Top 1%	All
0	34.5	36.4	40.4	44.2	52.8	55.4	56.0	42.9
1	38.2	31.3	33.7	40.5	50.4	54.5	55.9	40.9
2	31.5	30.0	32.0	38.9	50.9	57.0	58.4	41.1
3+	32.3	28.5	29.6	37.1	51.6	57.0	58.7	39.2

All children included are age 17 or less as of 2018. Unless otherwise specified by policy (e.g. children under age 22 living with parents count toward the parents' SNAP eligibility), we assume that children leave home and stop being dependents at age 19.

Table A8: Breakdown of LMTR and CMTR sources, Second Resource Quintile

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	4,459	4,595	136	72,371	72,533	162
State Income Tax	1,687	1,721	35	22,054	22,094	40
FICA Tax	9,432	9,572	139	125,152	125,291	139
Other Taxes	1,237	1,243	6	56,656	56,694	39
Total Taxes	16,815	17,131	316	276,233	276,613	380
SNAP	42	40	-2	202	200	-2
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	69	62	-7	311	300	-10
Social Security	1,024	1,023	-1	239,218	239,266	48
SSI	0	0	0	645	642	-2
Medicare	526	526	0	139,212	139,212	0
Medicaid	304	253	-51	1,927	1,875	-52
ACA	397	393	-3	5,223	5,219	-4
Other Transfers	52	49	-4	1,436	1,432	-4
Total Transfer Payments	2,414	2,346	-68	388,173	388,147	-26
Net Taxes	14,401	14,785	384	-111,940	-111,534	406

Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

Table A9: Breakdown of LMTR and CMTR sources, Third Resource Quintile

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	8,640	8,790	150	151,643	151,832	189
State Income Tax	2,848	2,886	38	40,430	40,475	45
FICA Tax	13,574	13,710	136	188,934	189,070	136
Other Taxes	2,395	2,403	8	91,340	91,385	45
Total Taxes	27,457	27,789	332	472,347	472,763	415
SNAP	22	19	-3	92	89	-3
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	1	1	-0	4	4	-0
Social Security	828	827	-1	336,227	336,270	43
SSI	0	0	0	83	83	-0
Medicare	560	560	0	171,284	171,284	0
Medicaid	31	31	-0	106	106	-0
ACA	241	240	-1	2,165	2,163	-2
Other Transfers	12	11	-1	496	495	-2
Total Transfer Payments	1,695	1,689	-6	510,458	510,494	36
Net Taxes	25,762	26,100	338	-38,111	-37,732	379

Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

Table A10: Breakdown of LMTR and CMTR sources, Fourth Resource Quintile

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	16,633	16,815	182	301,275	301,506	231
State Income Tax	4,777	4,817	40	71,255	71,304	49
FICA Tax	19,324	19,443	119	281,346	281,465	119
Other Taxes	4,159	4,166	6	141,932	141,975	43
Total Taxes	44,893	45,240	348	795,809	796,251	442
SNAP	4	4	-0	7	7	-0
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	0	0	-0	0	0	-0
Social Security	760	759	-1	425,664	425,697	33
SSI	0	0	0	70	70	-0
Medicare	382	382	0	194,486	194,486	0
Medicaid	5	5	0	16	16	0
ACA	30	30	0	83	83	0
Other Transfers	5	4	-1	201	199	-1
Total Transfer Payments	1,185	1,184	-2	620,526	620,558	31
Net Taxes	43,707	44,057	349	175,282	175,693	410

Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

Table A11: Breakdown of LMTR and CMTR sources, Highest Resource Quintile

	C Baseline	C Marginal	C Diff	L Baseline	L Marginal	L Diff
Federal Income Tax	79,435	79,661	226	1,297,947	1,298,249	303
State Income Tax	15,744	15,788	44	240,635	240,691	56
FICA Tax	30,138	30,216	78	465,242	465,320	78
Other Taxes	17,156	17,161	5	447,393	447,444	51
Total Taxes	142,473	142,826	352	2,451,216	2,451,705	488
SNAP	0	0	0	0	0	0
TANF	0	0	0	0	0	0
Section 8	0	0	0	0	0	0
CCDF	0	0	0	0	0	0
Social Security	477	477	-0	537,616	537,628	12
SSI	0	0	0	7	7	0
Medicare	312	312	0	216,701	216,701	0
Medicaid	0	0	0	0	0	0
ACA	0	0	0	0	0	0
Other Transfers	3	2	-1	58	57	-1
Total Transfer Payments	791	790	-1	754,382	754,393	11
Net Taxes	141,682	142,035	353	1,696,834	1,697,311	477

Note: All numbers are calculated based on a \$1,000 increase in current-year earnings. Weighted Mean values are presented.

Table A12: Breakdown of LMTR and CMTR sources from Part-time Labor Force Entry, Pre-Retirement Age, Bottom Resource Quintile, Non-working SCF Households

	C Baseline	C Marg.	C Diff	L Baseline	L Marg.	L Diff
Federal Income Tax	1,088	2,721	1,633	20,150	41,948	21,797
State Income Tax	610	1,122	512	7,858	14,260	6,402
FICA Tax	4,565	6,671	2,107	57,520	83,036	25,516
Other Taxes	385	588	204	29,344	33,984	4,639
Total Taxes	6,647	11,103	4,455	114,873	173,227	58,355
SNAP	789	369	-420	9,679	4,971	-4,708
TANF	35	14	-21	112	42	-70
Section 8	214	152	-61	3,916	2,955	-962
CCDF	354	279	-75	1,595	1,274	-320
Social Security	0	-0	-0	132,024	141,049	9,026
SSI	126	-52	-178	8,370	4,254	-4,116
Medicare	226	193	-33	95,963	93,686	-2,278
Medicaid	1,463	777	-686	20,914	13,793	-7,121
ACA	871	735	-136	13,254	11,949	-1,305
Other Transfers	285	144	-142	6,437	4,512	-1,925
Total Transfer Payments	4,363	2,609	-1,753	292,264	278,485	-13,779
Net Taxes	2,285	8,493	6,209	-177,391	-105,257	72,134
Added Income	0	15,000	15,000	0	186,193	186,193

Table A13: Percent Deadweight Loss By Resource Group, Imputed Welfare Participation, With Only Cross-State Dispersion

Res. Group	Population Weighting			Income Weighting		
	Low	Mid	High	Low	Mid	High
Bottom	2.5	3.7	4.9	1.5	2.2	2.9
Second	0.5	0.8	1.0	0.4	0.6	0.8
Third	0.4	0.6	0.7	0.3	0.5	0.6
Fourth	0.5	0.8	1.0	0.5	0.7	1.0
Highest	0.8	1.2	1.6	0.8	1.2	1.6
All	1.0	1.4	1.9	0.7	1.0	1.3

Table A14: Percent Deadweight Loss By Resource Group, Full Welfare Participation, With Only Cross-State Dispersion

Res. Group	Population Weighting			Income Weighting		
	Low	Mid	High	Low	Mid	High
Bottom	16.9	25.1	33.2	11.6	17.2	22.8
Second	3.6	5.3	7.0	2.6	3.8	5.0
Third	1.5	2.2	2.9	1.0	1.5	2.0
Fourth	0.9	1.3	1.7	0.8	1.2	1.6
Highest	1.3	1.9	2.6	1.3	2.0	2.6
All	4.9	7.2	9.5	1.8	2.6	3.5