Auerbach, Kotlikoff, and Koehler, Online Appendix

The Fiscal Analyzer

The Fiscal Analyzer (TFA) is a detailed life-cycle consumption-smoothing program that incorporates borrowing constraints, lifespan uncertainty and all major federal and state tax and transfer programs. All state-specific provisions of federal benefit programs are incorporated for all 51 (including D.C.) states. TFA treats all taxes, whether nominally levied on businesses (e.g., federal corporate income taxes and employer FICA contributions) or nominally collected as premiums (i.e., the Medicare Part B premium) as taxes paid by households. It also incorporates in-kind as well as in-cash benefit programs. In-kind benefits, such as Medicaid and Medicare, are treated as consumed in the year received. The TFA can be run under various assumptions about benefit-tax up rates. This is particularly important in the case of Section-8 housing benefits, whose vouchers are rationed.

The program's federal tax calculations are based on the 2017 Tax Cuts and Jobs Act, which is assumed to remain in place beyond its 2025 expiration date. TFA's Social Security benefits are calculated based on the latest (2015) changes to Social Security benefit provisions. State income taxes, state sales taxes, state benefit provisions, state-specific provisions of federal benefit provisions are updated annually.

TFA calculates for different resource groups within specific cohorts remaining lifetime net taxes and remaining lifetime spending along all survival trajectories and then forms their expected present values. The program can be used to analyze inequality in remaining lifetime spending within and across cohorts, fiscal progressivity, effective marginal net taxation on working, effective marginal net taxation on saving, the adequacy of saving, the adequacy of life insurance, state differences in taxation, marriage taxation, the progressivity and revenue impacts of different tax reforms, the incentive to enter the work force, the prevalence and importance of borrowing constraints, and a host of other economic issues.

All TFA results are presented in end-of-year dollars. But before conversion to real dollars, all TFA tax and benefit calculations are made in nominal terms in accord with federal and state tax/benefit programs, which are not fully indexed for inflation.

Computation Engine and Use by Academics and Research Organizations

TFA's core computation engine was developed by Economic Security Planning, Inc. (ESP, Inc.) for use in two commercial products – *Economic Security Planner* and *MaxiFi Planner*. The former download program was replaced by the later online program. TFA is a proprietary research tool that Economic Security licenses. TFA is available for strictly academic research based on the researcher's funding sources and consulting arrangements as well as the signing of an appropriate non-disclosure agreement. Please contact the company by emailing its President, Laurence Kotlikoff, at kotlikoff@gmail.com. Depending on the researcher's requirements, purely academic researchers will be provided access to an appropriately modified executable and, if needed, shown relevant parts of the TFA code, most of which is written in Fortran and the rest

in Python and R. TFA is available to research organizations, including think tanks, based on mutually agreed licensing arrangements.

Commercial, Non-Profit, Government, Academic, and Other Funding Underlying the Development of TFA

Economic Security Planning, Inc. was founded in 1993. Over the years, it has received funding from many sources, including the sales of its software tools to the general public and to financial planners. The company has also received funding from Boston University, in the form of equity investment, the National Institutes of Health (specifically, the National Institute of Aging), the Federal Reserve Bank of Atlanta, the Sloan Foundation, the Searle Family Trust, the National Center of Policy Analysis, and The Goodman Institute.

Inputs

The lifetime consumption smoothing procedure begins with household demographics, including marital status, birth dates of spouse/partners, maximum ages of life of spouse/partners, birth dates of children, ages at which children will leave the household, and economic data, including past Social Security covered labor earnings, current labor earnings and projected future labor earnings, regular (non-retirement-account) assets, 401(k) and other deductible retirement account assets, Roth retirement account assets, current and projected future contributions to each type of retirement account, retirement-account withdraw choices (start and end dates, annuitization and order of withdraws as between Roth and 401(k)-type accounts), Social Security benefit collection choices, defined benefit pensions, information on retirement income from non-Social Security-covered employment (this triggers Social Security WEP and GPO provisions), assumed inflation and separate, as desired, rates of return on regular and retirement account assets, household debts (whose streams of payoffs are entered as special receipts), special receipts and their tax statuses, special expenditures and their tax statuses, current primary home data (rent, mortgage amounts, mortgage lengths, mortgage payments, property taxes, condo fees, homeowners insurance, maintenance, etc.), and up to two future changes in the primary home, symmetric data on the current vacation home and up to two changes in the vacation home, other real estate properties and their financial features, preferences about the desired degree of consumption smoothing (i.e., the preferred age-living standard path), funeral expenses, desired bequests, current life insurance (face and cash values), preferences about maintaining living standards of survivors, contingent plans (e.g., what survivors will earn and how they will change their housing), maximum amount the household can borrow, degree and timing of future changes in Social Security benefits, federal taxes, state taxes, as well as payroll taxes, and other key inputs. Unless explicitly indicated, the TFA assumes no change in Social Security or tax policies. In particular, we assume, as seems most likely, that certain provisions of the Tax Cut and Jobs Act that are scheduled to revert to prior law are, instead, retained.

The program's default assumption is that the household seeks to have the same living standard per household member through time. But it can accommodate any specified desired pattern of

future living standard to the extent possible without violating the household's borrowing constraint. Living standard is defined as household discretionary spending per equivalent adult with adjustment for economies in shared living.

TFA's Consumption-Smoothing Dynamic Program

TFA uses dynamic program to smooth each household's living standard per equivalent adults subject to borrowing constraints. The program simultaneously calculates not just the household's smoothest living standard path, but also its time-varying demands for life insurance (and, thus, the living insurance premiums it will pay each year) and each of the above-referenced taxes and transfer payments. The precise algorithm is proprietary to Economic Security Planning, Inc., which uses it in its commercial lifetime financial planning tool, maxifi.com.

TFA's output confirms that it's working properly for all households it processes. It shows that the household's living standard per equivalent adult is perfectly stable, in real dollars, through time except when the household is no longer borrowing constrained. In the year this occurs, the living standard jumps up to a new smooth level through the subsequent, if any, period of being borrowing constrained. Moreover, assets brought into a period with a higher living standard are zero as theory implies. Second, the household's regular assets never go negative. Third, apart from covering terminal bequests net of terminal housing and real estate equity and inputted funeral expenses, each household's net wealth, if household heads and spouse/partners reach their maximum ages of life, is precisely zero.

The problem TFA solves is computationally challenging for three reasons. First, there are tens of thousands of state variables. These include not just the levels of regular, head, and spouse/partner-specific retirement account assets in each future years when both spouses survive, but also in each future year when one spouse is deceased and the other alive. Take, for example, a 40 year-old couple that could live to 100. There are over 200,000 survivor contingent regular and retirement account state-contingent asset variables. Second, annual taxes, annual transfer payments, annual discretionary spending, and annual life insurance holdings must be determined simultaneously since taxes and life insurance premiums constrain what can be spent. But what is spent, through time, determines the path of asset income, which helps determine the path of taxes. Third, the program needs to run in finite time to be useful for research.

Overcoming the Curse of Dimensionality and Handling Simultaneity Problems

TFA uses a proprietary iterative technique to overcome both the curse of dimensionality inherent in large numbers of state variables as well as simultaneity problems. The later problems reflect the fact that one can't determine consumption-smoothing behavior without knowing a household's future net taxes (taxes paid less benefit received) as well as its requisite life insurance premium payments. But net taxes depend on the course of consumption and life-insurance premium outlays, which influence asset accumulation as well as taxes levied on asset

income and benefits dependent on asset tests. In addition, non-negative term life insurance needs and, thus premium outlay requirements, depend on what living standard needs to be insured to ensure that all surviving household members are able to afford at least the living standard they would have experienced had neither the household head nor their spouse/partner survived. ESP, Inc. received U.S. Patent #US6611807B1 for its development of iterative dynamic programming. Finally, MaxiFi Planner and, thus, TFA incorporate proprietary spare grid algorithms that simultaneously overcome the curse of dimensionality as well as eliminate interpolation error arising from borrow-constraints inducing kinks in policy functions.

There are three dynamic programs underlying the computation engine (CE). One does consumption smoothing subject to borrowing constraints, one calculates net taxes, and one determines requisite life insurance holdings. Each program takes the outputs of the other programs as given. The program can process typical households within a half second. This is an extraordinary achievement given the complex calculations being made in each iteration and the fact that hundreds of iterations may be required, depending on the case, to reach convergence. The algorithm is highly precise as indicated by the program's lifetime budget balancing, which equates the present values of resources and outlays, generally to the dollar and occasionally within two dollars.

Accommodating Uncertain Lifetimes

In running TFA, we take 100 to be the uniform maximum age of life for all household heads and, if married, spouses. In so doing, we pin down each household's year-specific tax payments and benefit receipts.

Planning for possibly living to 100 and actually reaching age 100 are, of course, two very different things. Our goal is describing the average fiscal treatment of households with different resources. Hence, we need to form our lifetime net tax rates taking into account each household's chances of living long enough to receive a given future year's benefits and pay that year's taxes. Stated differently, we need to actuarially discount future net tax payments. By the same reasoning, we need to actuarially discount the component of each household's resources that is survival contingent, namely future labor income. But switching from simple to actuarial present values does not invalidate equation (2), namely the household's remaining lifetime budget constraint. This constraint holds in expectation because it holds along any survival path, provided a) bequests are included as part of lifetime spending, S, b) R, remaining lifetime resources includes the present value of human wealth realized up to the point of each household member's date of death, and c) T, remaining lifetime net taxes, includes estate taxes.

To see this, take the simplest setting in which an agent lives for at most two periods. The agent has initial wealth, W, earns E_y when young and E_o in the second period when old, if she lives. Assume the agent receives a net transfer of H_y when young, H_{oa} when old, if she lives, and H_{od} when old if she dies after one period. If these terms are negative, they represent net taxes. Also

note that H_{od} includes any estate tax payments. Let P stand for the probability of dying before the second period. Assume the agent consumes C_y when young.

In (A1), the left-hand-side of the equation references the present expected value of spending, S. C_y is current spending and $(W + E_y + H_y - C_y)$ represents either the agent's bequest if she dies young or her old age consumption if she doesn't. The right-hand-side references, via the first three terms, the present expected value of resources, R, plus, in the last two terms, the present expected value of net transfers, T. Inspection shows the two sides are equal.

(A1) $C_y + P[(W+E_y+H_y-C_y)(1+R) + H_{od}]/(1+R) + (1-P)[(W+E_y+H_y-C_y)(1+R) + E_o + H_{oa}]/(1+R) = W + E_y + (1-P)\,E_o/(1+R) + H_y + PH_{oa}/(1+R) + PH_{od}/(1+R)$

But the equality is not just in expectation. Along each survivor path the simple present value of realized spending (including terminal bequests) equals the simple present value of realized resources. Intuitively, under any survival outcome, a household will spend, either on itself, on others, via gifts, or on its survivors, via bequests, all its resources. Stated differently, the realized present value of spending under any survival outcome must equal the realized present value of resources less net taxes.

For example, in the two cases the individual lives for two periods, we have

(A2) $C_y + [(W+E_y+H_y-C_y)(1+R) + E_o + H_{oa}]/(1+R) = W + E_y + E_o/(1+R) + H_y + H_{oa}/(1+R)$,

and in the case she dies young, we have

(A3) $C_y + [(W+E_y+H_y-C_y)(1+R) + H_{od}]/(1+R) = W + E_y + H_y + H_{od}/(1+R)$.

Equations (A2) and (A3) are basic budget constraints that must hold and multiplying (A2) by $(1-P)$ and (A3) by P and adding them together gives (A1).

Note also that our measures of S, R, and T are, in this context

(A4) $S = C_y + P(W+E_y+H_y-C_y) + (1-P)C_o/(1+R)$,

(A5) $R = [W+E_y] + (1-P)E_o/(1+R)$,

and

(A6) $T = H_y + PH_{oa}/(1+R) + PH_{od}/(1+R)$.

To summarize, the exact way to calculate the expected present values of spending, resources, and net taxes is simply to calculate annual spending (including bequests), initial wealth and annual earnings, and annual net taxes along each survival path and then a) discounting and

b) multiplying these discounted values by the probability of the scenario before adding these products together.

The following provide list of the taxes, transfer programs, specific Social Security benefits, and specific Social Security provisions included in TFA.

Taxes Included in TFA

- Federal corporate income tax
- Federal personal income tax
- Federal employer plus employee FICA taxes
- Federal estate tax
- Federal excise taxes
- State personal income taxes
- State sales taxes
- Medicare Part B premiums

Transfer Programs Included in TFA

- Social Security
- Medicare
- Medicaid (child and adult, state-specific)
- TNAF (state-specific)
- SNAP (state-specific)
- Section-8 Housing (state-specific)
- SSI
- SSDI
- Affordable Care Act (ACA) (state-specific)
- Childcare Assistance (state-specific)
- Energy Assistance (state-specific)

Social Security Benefits

- Retirement benefits
- Spousal benefits
- Divorced spousal benefits
- Disability benefits
- Child-in-care spousal benefits
- Widow(er)s benefits
- Divorced widow(er)s benefits
- Child benefits
- Disabled child benefits
- Surviving child benefits
- Father and mother benefits

Social Security Provisions

- 2015 Social Security law including grandfathering provisions
- Early benefit reductions for all benefit types
- Delayed retirement credits
- Earnings test (monthly and annual)
- Adjustment of the reduction factor
- Re-computation of benefits
- Family benefit maximum
- Combined family benefit maximum
- Disable family benefit maximum
- Widow(er) benefit formulas for spouses who do/don't die before 62
- RIB-LIM special widow(er) benefit formula
- Windfall Elimination Provisions
- Government pension offset
- Restricted application and deeming rules
- File, spend, and restart

The 2016 SCF

The Federal Reserve's Survey of Consumer Finances (SCF) is a cross-section survey that collects data from some 6,500 American households. The survey includes data on assets, liabilities, income, demographics and a host of other socio-economic variables. The public data set provides five implicates for each household. These implicates vary for a household when data is missing or incomplete. More information on the SCF and the imputation process is available here. TFA always uses the first implicate for each household.

Benchmarking the 2016 SCF

In the SCF data, household-weighted totals of various economic and fiscal aggregates may not have direct counterparts in the National Income and Product Account (NIPA) or Federal Reserve Financial Accounts (FA). Thus, we decided to follow the approach outlined in Appendix A and B in Dettling, et al. (2015), namely benchmarking the 2016 SCF based on "conceptually equivalent" values. Specifically, we set SCF benchmark factors to ensure that SCF-weighted aggregates coincide with conceptually comparable NIPA and FA aggregates. For wages and self-employment income (reported for 2015 in the 2016 SCF) we use 2015 NIPA aggregates. For assets, we use FA-2016 Q3 aggregates.

Table 1a details the overall values, their sources, and our benchmark adjustments. First, we inflate all SCF-reported wage income by 12.3 percent to match the NIPA 2015 measure of employee compensation. Second, we deflate all SCF-reported self-employment income by 29.3 percent to match the NIPA 2015 proprietorship and partnership income total. The 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. Third, we inflate all wage and self-employment income amounts reported in the 2016 SCF by nominal average wage growth through 2017.[1]

Benchmarking assets and net worth reported in the SCF requires several adjustments to the Financial Accounts values. Using the approach outlined in Appendix B of Dettling, et. al. (2015), we first created a net worth breakdown as detailed in Table 1b. We then adjusted the corresponding TFA components to align with the particular FA aggregate producing the table 1c's reported net worth. The difference in net worth is almost entirely due to differences in liabilities. Our liabilities are 17.2 percent lower than in the FA. We chose not to benchmark our liabilities as we weren't clear how to do so on a component-by-component basis, e.g., whether to adjust mortgage debt by the same percentage as student loans. Furthermore, TFA doesn't used liability values per se. It uses repayment values, such as monthly mortgage payments, in its calculations. We believe that respondents have far more accurate knowledge of what they need to repay every month with respect to their mortgages, car loans, student loans, etc. than of the remaining balance on these liabilities.

Our first asset adjustment was to reduce SCF-reported home market value by 11.6 percent to match the 2016 Q3 Federal Reserve Financial Accounts measure. Second, we reduce the SCF-reported equity in non-corporate businesses by 38.0 percent to match the 2016 Q3 Federal Reserve Financial Accounts estimate. Fourth, we increased reported retirement account assets by 4.4 percent to match the total reported for 2016 Q3 Federal Reserve Financial Accounts. Finally, we inflate all financial and non-financial assets by the growth rate implied by the change in total assets between 2016 and 2017 in the Financial Accounts.[2]

Imputations Used and Assumptions Made in Processing the 2016 SCF

Demographics

- The TFA includes a household if the respondent is age 20 to 79 at the time of the survey.
- One additional adult may be included if they are a spouse or partner.
- Children are included if financially dependent on one or both of the adults present.

Monetary Amounts

The SCF indicates that some monetary amounts are reported as of the end of the year prior to the survey, whereas other amounts are current as of the time of the survey. Based on this, the TFA will grow amounts as appropriate to the current year. The growth factor used is tied to

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1 https://www.ssa.gov/oact/cola/AWI.html#Series reports Social Security's average wage index series through 2016. We assume the same growth rate for 2017 as that reported for 2016.

2 Federal Reserve Z.1-Financial Accounts, B.101, Line 1, 2016-2017

amount's fiscal category. Financial and property asset amounts use a growth factor derived from the Federal Reserve Financial Accounts, B.101 Households and nonprofit organizations; total assets, Line 1 available here. Remaining amounts, like wages and debt, are adjusted using the National Average Wage Index.

State of Residence

The SCF does not include state of residence in the public dataset. The Federal Reserve's dataset does include state identifiers, but does not include state-specific weights. I.e., the SCF sample was chosen to be representative of the entire country, but not necessarily of any given state. To handle this shortcoming, TFA runs each observation through each state (including the District of Columbia). I.e., TFA runs 51 times and aggregates results. For each state, each household is given a weight based on a statistical match of all SCF households with households in the state that are surveyed as part of the Census' American Community Survey or ACS. The ACS is an annual survey of over 1.3 million households covering 1 percent of the U.S. population that collects nearly the same information on demographic, economic and other characteristics of persons and households that was formerly collected by the 5 percent "long form" sample of the decennial census. Since its full implementation in 2005, the ACS has covered all 3141 counties in the U.S. as well as the District of Columbia and Puerto Rico. Households and persons in the ACS are assigned weights to account for differential sample rates across geographic areas.

To assign state weights to the SCF, we partition records of U.S. household heads ages 20 to 79 years in the 2016 ACS into 1536 distinct cells using the categories in the table below.

Age HH head	Education HH head	Race/ethnicity HH head	Total HH income in 2015	Value of primary residence	Presence/absence of children	Marital status
20 to 34	Less than high school diploma	Non-hispanic white	HHinc < $30k	Not homeowner	No children under 17 years	Single
35 to 49	HS diploma with less than 4 years of collage	Other	$30k ≤ HHinc < $75k	Home value ≤ $175k	At least one child under 17 years old	Married
50 to 64	At least 4 years of college		$75k ≤ HHinc < $150k	$175k < Home value ≤ $400k		
65 to 79			$150k ≤ Hhinc	$400k < Home value		

Total number of cells 4 x 3 x 2 x 4 x 4 x 2 x 2 = 1536

After determining SCF household *h*'s cell *c* using the same cell divisions as the above table for the ACS, we estimate $p_{h,s}$, the probability that SCF household *h* lives in state *s*, as the sum of the ACS household weights of cell *c* households that reside in state *s* divided by the sum of the household weights of all cell *c* U.S. households in the ACS. Household *h*'s SCF weight for state *s* is assigned as the product of their SCF sample weight and $p_{h,s}$. Hence, by construction, the sum of a household's state weights adds up to its SCF weight.

Retirement Ages

TFA uses the retirement age reported by respondents in determining when respondents' earnings will end. If the respondent indicates he or she will not retire, we set the retirement age to 70 or the respondent's current age, whichever is greater.

Social Security Benefit Collection Dates
If a respondent has already started collecting Social Security benefits, the SCF provides a reported starting age and we use this. If a respondent has not started benefits, the start age is set to the maximum of the respondent's age at retirement and age 62. If the respondent indicates an intent to work beyond age 70, we assume that Social Security benefits commence at age 70.

Retirement Account Contributions
Employer and employee retirement account contributions to tax-deferred (e.g., 401(k)) and Roth accounts) are reported in the SCF. We assume that the 2016 observed employee and employer contribution rates to Roth and non-Roth accounts hold in each future year the respondent is projected to have labor income.

Initial Retirement Account Withdrawal Dates
Retirement account withdrawals begin in the year of retirement or at age 60, whichever is later. If retirement age is set beyond age 70, mandatory distributions are taken as required to avoid penalty.

Our Use of the Current Population Survey (CPS)

The TFA relies on backcasted and forecasted respondent earnings. Our projected future wage growth and past wage declination are based on all available March CPS data sets starting in 1967 and continuing through 2014. The sample sizes for these surveys range from 28,924 to 99,986 households. For each year we selected households with a) a minimum of $3,000 in total annual income and b) household members age 20 through 79 who reported labor earnings (including self-employment income) of at least $2 per year. Next, we segmented the households into age groups (3, 2, and 1 year spans), sex, education, and year cells and calculated population-weighted mean values of labor income, including self-employment income within each cell. There are three education categories: Did not complete high school or receive a GED, completed high school and may have completed some part of college, but has not graduated from college, and has a college or higher degree.

We used the mean value for a cell from the narrowest span age group having at least 25 observations. For example, if a cell in the 1-year age group had too few observations, the value from the cell having the same sex, education, and year criteria in the 2-year age group was used. And if the 2-year group's cell had too few observations, the value from the 3-year age group was used. All cells in the 3-year age group set had at least 25 observations.

For backcasting, we used our three-year age groupings. For example, if someone is age 34 in the 2016 data and one of our age groupings is 33, 34, and 35, we'd give that person the annual past wage growth (in backcasting) for the age 33-35, sex, and education group between 2012 and 2016 and do the same between 2011 and 2012. But for 2011 to 2012, we'd use the growth rate for those 30-32 with that same sex and education.

Our backcasting is nominal; i.e., we project backwards what a respondent's nominal wage was in past years. Nominal past wages are used by TFA to determine nominal past wages covered by Social Security. Earnings prior to age-60 are, in accordance with Social Security benefit provisions, indexed to economy-wide annual growth in nominal average earnings. Earnings beyond age 60 enter nominally in determining a worker's highest 35 years of covered earning and thus their AIME -average indexed monthly earnings, which determines the respondent's primary insurance amount.

For forecasting, we used 3-, 2-, or single-year age groupings to form/impute annual real growth rates by single age, sex, education, and year cells going back in time. We then subtracted mean growth rates in a given year across all single age, sex, and education growth rates for that year from that year's single age, sex, education, and year growth rates. Next, we averaged across all year-demeaned single age, sex, and education cells to form growth rates by single-age, sex, and education for use in forecasting. Each of these growth rates was increased by our assumed 1 percent real growth rate.

The backcasted nominal earnings histories and forecasted real future earnings are used by TFA's Social Security benefit calculator to determine future Social Security benefits as well as smooth each household's consumption.

Calculation of Federal Income Taxes

TFA follows the TCJA tax reform in calculating federal personal income taxes for 2018 and all future years for TFA-included households. The program treats wages reported by respondents as net of any employer-paid compensation made on the worker's behalf, including the employer share of FICA taxes and employer-paid health insurance premiums.

For tax purposes, the TFA determines asset income by calculating an average share for taxable, non-taxable, and dividend income from assets across all SCF households. Amounts for the three income types reported in the SCF from the household's IRS 1040 are summed and divided by their respective reported total assets. The TFA multiplies these average shares by the household's associated asset balance in each year giving the income subject to tax.

Calculation of State Income Taxes

We use tax forms published by the states and summary information published by Tax Materials, Inc. (www.thetaxbook.com) to program state income taxes in TFA. The state tax calculations are based on TFA current and projected labor and self-employment earnings as well as TFA-generated interest, capital gains, dividends and real estate income amounts. State tax codes contain a wide variety of provisions. TFA ignores tax provisions that can't be incorporated due to lack of data in the SCF or other data bases in use. An example here is Wisconsin's Farmland

Preservation Credit. Since we don't have data on respondent households' eligibility for this tax credit, we simply leave it out of the code. On the other hand, we are, for example, able to incorporate the "Renter's School Property Tax Credit."

TFA assumes that for tax purposes respondents reside full time in their actual or assigned state of residency. For example, projected earnings are expected to be taxable only in the state of residence and 529 contributions are assumed to be made to the state's own 529 program. TFA also assumes that flat dollar values listed in state tax codes (e.g., standard deduction amounts and tax bracket boundaries) will be increased in accordance with projected economy-wide nominal wage growth.

Imputations Used and Assumptions Made in Including State-Specific Medicaid Programs

TFA uses income eligibility data published by the Henry J. Kaiser Family Foundation (children: link, adults: link). Note: These sources have several notes about data collection and sources. Certain groups (e.g., pregnant women, children in foster care) have special eligibility rules. TFA does not take such special rules into account. To estimate Medicaid benefits, TFA uses Medicaid spending per enrollee, which is listed by state by the Henry J. Kaiser Family Foundation here.

Imputations Used and Assumptions Made in Including State-Specific TANF

TFA uses eligibility and benefit data compiled by the Urban Institute in the Welfare Rules Database (link). In addition to cash distributions, states offer a variety of program under their TANF systems. TFA only considers basic cash benefits, i.e., it does not estimate the value of other programs (e.g., child care, counseling, vehicle purchase, relocation, etc.) or cash incentives (e.g., for retaining a job). States have various rules for eligibility. TFA assumes that individuals pass basic eligibility checks. For example, the program assumes that respondents haven't been convicted of a drug felony, are not on strike, and haven't fraudulently claimed TANF benefits. Additionally, TFA assumes that individuals are fulfilling their work or training obligations as defined by their state. However, TFA assumes that individuals do not qualify for hardship extensions to states' lifetime benefit limits.

Imputations Used and Assumptions Made in Including State-Specific SNAP

TFA uses eligibility and benefit data published by the US Department of Agriculture. (Eligibility information, Benefit information). TFA assumes that individuals are fulfilling the work requirements defined by the USDA. TFA also assumes that individuals are not homeless for the calculation of their SNAP allotments.

Imputations Used and Assumptions Made in Including ACA benefits

Families that have employer paid health coverage do not receive benefits under the ACA. Additionally, any family members who receive Medicaid or CHIP benefits do not receive benefits under the ACA.

TFA includes two types of benefits under the ACA: premium tax credits and cost sharing reductions. Premium tax credits are calculated based on IRS Form 8962. A critical component of Form 8962 is the value of the 'second lowest cost silver plan' (SLCSP). Health care plans are generally made available at a county level. Since TFA only knows the household's state, TFA includes an estimate of the SLCSP for the state, which is calculated as a weighted average of the state's zip codes' population and the SLCSP in each zip code. SLCSP data by zip code and logic for scaling SLCSP to household membership is here. Population by zip code (ZCTA) is available here. Mappings for zip code to state is from the IRS: here. TFA also assumes that the household will maximize their benefits by choosing a healthcare plan at least as expensive as the SLCSP.

Cost sharing reductions (CSRs) are calculated by finding the difference between the estimated out of pocket expenses for the household and the maximum out of pocket expenses for the household. For the maximum out of pocket expenses, TFA uses the values from "Table 13—Reductions in Maximum Annual Limitation on Cost Sharing for 2018" available here .

To estimate the out of pocket expenses for the household, TFA starts with data from Centers for Medicare and Medicaid Services (CMS), Age and Gender Tables - table 7 OOP. Those values are scaled by state using data from CMS, "National Health Expenditures by type of service and source of funds, CY 1960-2016" values for "Personal health expenses," available here. To scale the OOP expense data from 2012 to 2016, TFA uses CMS data for OOP expenses by year located here. For Medicaid, we consider eligibility for Medicaid beyond the start of Medicare (age 65), but we treat it as supplemental to Medicare. So, if the total benefit from Medicaid is higher than Medicare in a given year, the Medicare value is reported and the difference between Medicare and Medicaid is reported as Medicaid.

Imputations Used and Assumptions Made in Including Section 8 housing choice voucher benefits

Everyone eligible applies and receives the benefits - thus ignoring the 'lottery' aspect of the program and any constraints on the Local Public Housing Agency (PHA) as a whole (e.g., PHA must provide 75 percent of its vouchers to applicants whose incomes do not exceed 30 percent of the area median income.)

To receive a benefit, the household must be paying rent or expecting to pay rent during the year in question.

HUD defines the benefit calculation as "generally the lesser of the payment standard minus 30 percent of the family's monthly adjusted income or the gross rent for the unit minus 30 percent of monthly adjusted income". Using the payment standard would require that we have additional information about the household's residence: the number of bedrooms and type of dwelling. Therefore, we are only using the latter half of the formula.

In determining the monthly adjusted income, we are assuming the following deduction values, all adjusted for inflation (see 24 CFR § 5.611): (1) $480 for each dependent, (2) $400 for any elderly family or disabled family, (3) $500 per year allowance of unreimbursed medical expenses or child care expenses, (4) $500 per year allowance for any additional deductions that might be allowed by the PHA.

We are assuming a $500 per year utility allowance, adjusted for inflation.

We consider a family to qualify for Section 8 housing choice vouchers if the adjusted income is less than the state's VLIL (50 percent of the median income for the family size). State level VLIL values are taken from HUD and adjusted for inflation.

Determining the Average Corporate Income Tax Rate

Our baseline corporate tax rate (prior to enactment of the TCJA) is derived relative to all capital income, based on the traditional Harberger analysis that attributes the incidence of corporate taxes to all capital income, whether corporate or non-corporate. To make this calculation we use 2017 national income less indirect business taxes as reported in the 2017 NIPA. We then calculate the ratio of employee compensation to net national income less proprietorship income to find the portion of national income attributed to capital. Finally, we divide total corporate taxes less taxes on Federal Reserve profits by capital income giving an overall corporate tax rate of 9.3 percent.

All values used to derive our corporate tax rate are from NIPA 2017. Net National Income (NNI) equals Table 1.7.5 Line 16 minus Line 18. Capital Income (CI) equals (1 minus Table 2.1 Line 2 divided by (NNI minus Table 2.1 Line 9)) times NNI. Corporate Tax Rate equals (Table 3.1 Line 5 minus Table 3.2 Line 8) divided by CI.

In modeling the TCJA, we reduced our corporate tax rate, by 12.4 percent. This is the average, over the next five years, due to TCJA, in the Joint Committee on Taxation's static projected corporate tax revenue loss divided by the 2017 NIPA estimate of corporate tax revenue.

(see https://www.jct.gov/publications.html?func=startdown&id=5053)

Imputing Corporate Income Taxes to Household Respondents

The TFA imputes corporate tax for each household taking the total regular and retirement asset balances for each year and multiplying by the pre-all-tax return rate giving the income subject to corporate tax. This amount is then multiplied by the corporate tax rate (described above) giving the corporate tax paid by the household in a given year.

Adjusting for an Effective Federal Capital Gains Tax Rate

To calculate and effective capital gains, we separate capital asset income into two parts, capital gains and dividends. The dividend yield, based on the average of the last four years' data from the Federal Reserve's flow of funds accounts for nonfinancial corporations, is 3.1 percent. So, the first 3.1 percent of stock asset income we treat as dividends, the remainder is treated as capital gains. The dividend portion is taxed at the applicable statutory capital gains rate. The capital gains portion is handled differently. Based on previous analysis (Auerbach, 1989), we set the effective gains rate to 25 percent of the statutory rate to account for deferred realization of capital gains and the basis step-up at death.

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.

Reference

Dettling, Lisa J., Sebastian Devlin-Foltz, Jacob Krimmel, Sarah J. Pack, and Jeffrey P. Thompson. 2015. "Comparing Micro and Macro Sources for Household Accounts in the United States: Evidence from the Survey of Consumer Finances," Federal Reserve Board, Finance and Economics Discussion Series, 2015-86. (June)

Table 1a Benchmarking TFA

Line	Variable	Data (Billions)	Benchmarked TFA Estimate Value (Billions)	Benchmark Factor	Data Source
1	Wages	7,858.9	7,858.8	1.1227	NIPA data - Table 2.1. Personal Income and Its Disposition - Line 2 – 2015
2	Self-employment Income	1,318.8	1,318.7	0.7067	NIPA data - Table 2.1. Personal Income and Its Disposition - Line 9 – 2015
3	Home Market Value, owner-occupied	22,588.8	22,589.1	0.8836	Financial Accounts – Z.1, B.101, Line 4
4	Equity in Non-corporate business	11,156.5	11,156.0	0.6202	Financial Accounts – Z.1, B.101, Line 28
5	Regular Assets	32,506.7	32,505.1	0.9936	Conceptually Equivalent Financial Assets FA (Table 1b) minus Retirement Accounts (Table 1a Line 6)
6	Retirement Accounts	14,407.8	14.408.5	1.0444	Financial Accounts – Z.1, L.117, Line 26 & 27

Sources: National Income and Produce Account (NIPA) 2015; Financial Accounts of the United States – Z.1, March, 2017 Release

Table 1b FA Values that Are Conceptually Equivalent to SCF Aggregates

($Billions)

Published Net Worth FA		**90,762.1**	**Source**
Published Nonfinancial Assets FA		31,827.2	B.101 - Line 2
(-)	Identifiable Nonprofit Net Worth		
	Real Estate	3,382.4	B.101 - Line 5
	Equipment	336.6	B.101 - Line 6
	Intellectual Property	145.2	B.101 - Line 7
(-)	Consumer Durable Goods	5,374.1	B.101 - Line 8
(+)	Equity in Non-corporate Business	11,156.5	B.101 - Line 28
Conceptually Equivalent (to SCF) FA Nonfinancial Assets		**33,745.4**	
Published Financial Assets FA		73,889.5	B.101 - Line 9
(-)	Identifiable Nonprofit Net Worth		
	Open Market Paper		
	Consumer Credit (Student Loans)	39.9	B.101 - Line 22
(-)	Life Insurance Reserves	1,356.6	B.101 - Line 26
(-)	Misc. Assets	983.8	B.101 - Line 29
(-)	Other loans and Advances	862.3	B.101 - Line 20
(-)	Mortgages	112.9	B.101 - Line 21
(-)	Pension Entitlements	22,078.2	B.101 - Line 27
(-)	Equity in Non-Corporate Business	11,156.5	B.101 - Line 28
(+)	Pension Entitlements		
	DC Pensions	6,640.8	L.117 - Line 26
	Annuities in IRAs at Life Ins Co.	2,974.4	L.227 - Line 2
Conceptually Equivalent (to SCF) FA Financial Assets		**46,914.5**	
Published Liabilities FA		14,954.6	B.101 - Line 40
(-)	Identifiable Nonprofit Net Worth		
	Municipal Securities	219.6	B.101 - Line 31
	Commercial Loans and Advances	238.5	B.101 - Line 37
	Trade Payables	314.2	B.101 - Line 38
(-)	Depository Institution loans n.e.c.	319.2	B.101 - Line 35
(-)	Other loans and Advances	448.0	B.101 - Line 36
(-)	Deferred and Unpaid Life Insurance Premiums	32.7	B.101 - Line 39
Conceptually Equivalent (to SCF) FA Liabilities		**13,382.4**	
Conceptually Equivalent (to SCF) FA Net Worth		**67,277.5**	

Table 1c Benchmarking TFA Net Worth to Financial Accounts

(Billions)	**FA Conceptually Equivalent Value**	**Benchmarked TFA Estimate using SCF**
Non-financial Assets:	33,745.4	33,746.3
Financial Assets:	46,914.5	46,913.6
Liabilities:	13,382.4	11,084.3
Net Worth:	**67,277.5**	**69,575.5**