The Fiscal Analyzer – Documentation

Overview

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. 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, the progressivity and revenue impacts of different tax reforms, the incentive to enter the work force, and a host of other economic issues.

The program's federal tax calculations are based on the 2017 Tax Cuts and Jobs Act, the 2015 changes to Social Security benefit provisions, and the latest state income and sales tax provisions.

Inputs

The lifetime consumption smoothing procedure begins with the Computation Engine (CE) reading in household demographic, including marital status, birth dates of each spouse/partner, 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 assets, current and projected future contributions to each type of retirement account, retirement-account withdraw choices (start and end date, 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 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 data and up to two changes in the vacation home, other real estate properties, 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 (default value is 100), degree and timing of future changes in Social Security benefits, federal taxes, state taxes, and payroll taxes, as well as other key inputs.

The program's default assumption is that the household seeks to have the same living standard per household member through time. Hence, the program's default values of the standard of living index are 100 for all future years. The current year's index value can't be changed from 100. But the program can accommodate any desired pattern of future living standard by simply setting index values for years after the current year at values different from 100. The program obeys the specified desired standard of living profile to the extent possible without violating the household's borrowing constraint.

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 tools. But its details are available to academic researchers upon receipt of a request emailed to www.kotilkoff@gmail.com subject to the signing of a non-disclosure agreement.

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 and spouse-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 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.

TFA's algorithm handles these complexities in a highly efficient manner. Indeed, it solves the typical SCF observation's consumption-smoothing, net taxation, and life-insurance needs problem within a half second and does so with precision below $1. The easy way to verify that TFA is making such quick and accurate calculations and that the calculations a) satisfy the household's budget constraint and borrowing constraints and b) smooth the household's living standard is to go to basic.esplanner.com and run the free, online version of Economic Security Planning,

Inc.'s financial planning tool, ESPlanner (Economic Security Planner). By running a hypothetical case, one can quickly verify the program's speed, accuracy, and respect for the household's budget constraint. In each run, the household's balance sheet shows that the household never goes into debt, dies with precisely zero assets, and has zero assets in the year before its borrowing constraint is relieved.

TFA's Alternative Household Data Sets

- The 2016 Survey of Consumer Finances
- The 2013 Survey of Consumer Finances
- The 2014 Health and Retirement Study
- Prospective: IRA Public Use Data

Taxes Included in TFA

- Federal corporate income tax
- Federal personal income tax
- Federal estate tax
- State personal income taxes
- State sales taxes
- Medicare Part B premiums

Transfer Programs Included in TFA

- Social Security
- Medicare
- Medicaid (state specific)
- TNAF (state specific)
- SNAP (state specific)
- SSI
- SSDI
- Affordable Care Act (ACA)
- Section 8 housing choice vouchers
- Low Income Home Energy Assistance Program (LIHEAP) (Florida only)
- Child care assistance (Florida only)

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 primarily 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 Produce 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.

---

[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

Monetary Amounts

The SCF indicates that some monetary amounts are 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 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.

Labor Income

The SCF does not include past earnings records. Our methodology requires, for each individual, a trajectory of labor earnings; past earnings are needed to calculate Social Security covered earnings, and future earnings are needed to calculate the value of human wealth, *H*, a component of remaining lifetime resources. We use the CPS to statistically match SCF households for this purpose. In particular, we define cells in each wave of the CPS by age, sex, and education, and use successive waves to estimate annual earnings growth rates by age and year for individuals in each sex and education cell.

In cases where cells have fewer than 25 observations, we merge cells for adjoining ages and assume that average growth rates for these merged cells hold for all included ages. These cell growth rates are used to "back cast" each individual's earnings history. We also project future earnings for each particular cell defined by age and demographic group, until age 67 (when we assume individuals claim retirement benefits) by using average historical growth rates by age, net of average overall earnings growth and plus an assumed future annual general real growth rate of 1 percent.

These past and future growth rate estimates are for cell aggregates and do not account for 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 *iid* temporary component, *e*. Then, at age a (normalized so that age 0 is the first year of labor force participation), the within-group variance will be $a\sigma_p^2 + \sigma_e^2$. Hence, our estimate of the fraction of the observed deviation of individual earnings from group earnings, $\left(y_{ij}^a - \acute{y}_i^a\right)$, that is

permanent is $\frac{a\sigma_p^2}{a\sigma_p^2+\sigma_e^2}$. This share grows with age, as permanent shocks accumulate. Using this estimate, we form the permanent component of current earnings for individual *j*, $\acute{y}_{ij}^a$,

$$(4) \qquad \acute{y}_{ij}^a = \acute{y}_i^a + \frac{a\sigma_p^2}{a\sigma_p^2+\sigma_e^2}\left(y_{ij}^a - \acute{y}_i^a\right) = \frac{a\sigma_p^2}{a\sigma_p^2+\sigma_e^2} y_{ij}^a + \frac{\sigma_e^2}{a\sigma_p^2+\sigma_e^2}\acute{y}_i^a$$

and assume that future earnings grow at the group average growth rate. Because we ignore earnings uncertainty in our calculations, we set all future permanent and temporary shocks to zero. Further, we make the simplifying assumption that the permanent and temporary earnings shocks have the same variance, a reasonable one based on the literature (e.g., Gottschalk and Moffitt, 1995, and Meghir and Pistaferri, 2011), so that (4) reduces to:

$$(4') \qquad \acute{y}_{ij}^a = \frac{a}{a+1} y_{ij}^a + \frac{1}{a+1}\acute{y}_i^a$$

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:

$$(5) \qquad \acute{y}_i^{a-t} + \frac{a-t}{a}\left(\acute{y}_{ij}^a - \acute{y}_i^a\right)\frac{\acute{y}_i^{a-t}}{\acute{y}_i^a} = \frac{t}{a}\acute{y}_i^{a-t} + \frac{a-t}{a}\acute{y}_{ij}^a\frac{\acute{y}_i^{a-t}}{\acute{y}_i^a}$$

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.

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.

Imputations Used and Assumptions Made in Processing the 2014 HRS

The University of Michigan Health and Retirement Study (HRS) surveys 18,747 Americans over the age of 50 every two years, belonging to 12,746 households. The survey is focused on the physical health, labor supply decisions, family and government support systems, financial health and financial decision making of the elderly. We use the most recent available data, the HRS 2014 Final Release (Core).

Unless there are different data available in the HRS, we treat the data in the same manner as we treat data in the SCF. We have access through the University of Michigan Survey Research Center to the HRS RDA (restricted data), which contains information (state codes) on the location of each household. Consequently, imputation of state residency is not needed. The HRS RDA data also contain Social Security covered earning histories. Hence, there is no need to backcast earnings, although we still need to project future earnings.

In addition, there are a few differences between SCF and HRS datasets that require additional assumptions for processing the later: First, there is no information on APR (annual percentage rate) for loans of different type. Therefore, we use a default rate for home, other, auto and credit card loans. Second, the HRS data are not as detailed as is the SCF when it comes to types of assets, real estate, loans and income.

Where detailed information is not available, we use the HRS aggregates. For example, the HRS tells us about the household's total real estate holdings, but not individual holdings. Another example is loans. The HRS combines student, auto and other loans are aggregated into "Other Loans" and combines all credit card balances into "Bank Credit Card Balance".

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 rate 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 rates 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 project 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 (eg, 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.

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 (eg, PHA must provide 75% of its vouchers to applicants whose incomes do not exceed 30% 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% of the family's monthly adjusted income or the gross rent for the unit minus 30% 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% of the median income for the family size). State level VLIL values are taken from

https://www.huduser.gov/portal/datasets/il.html#2018_query and adjusted for inflation.

Imputations Used and Assumptions Made in Including Low Income Home Energy Assistance Program (LIHEAP) benefits

LIHEAP benefits are only calculated for residents of Florida.

Local LIHEAP providers have a limited pool of funds to distribute to families that qualify. We assume that this system wide limitation does not constrain aid given to any particular family.

For a given income level, there is a range of benefit amount (eg, <75% of Federal Poverty level, the benefit is from $300 to $475). We assume that the benefit received is the average of the lower and upper end of the range. Additional benefits are available if the family contains an elderly member ($50), disabled member ($50) or child age 5 or younger ($75)

We assume that households are able to receive the given benefit amount twice per year.

Imputations Used and Assumptions Made in Including Child care assistance (Florida only) benefits

Child care benefits are only calculated for residents of Florida.

We assume there are two types of child care benefits available: Early Head Start and Child Care and Development Fund programs ("School Readiness" in Florida). Early Head Start is available free of charge for children in households at or below 100% of the Federal Poverty Level. Children can be initially enrolled in the School Readiness program if the family gross income is at or below 150% of the Federal Poverty Level. To enrollment in the School Readiness program, family gross income must be less than 85% of the state median income.

We assume that child care benefits are $594/month for full time care and $345/month for part time care, adjusted for inflation. (http://www.nccp.org/tools/frs/index.php). We assume that full time care will be used for children 3 and under, while children 4-12 will be in school so receive part time care.

Copays for School Readiness are calculated using the Miami-Dade's sliding scale: https://www.elcmdm.org/Content/Uploads/elcmdm.org/files/eligibility/2018%20Sliding%20Fee%20Scale%20Model%20Final.MiamiDade.pdf

Determining the Average Corporate Income Tax Rate

Our baseline corporate tax rate 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.

Comparison with JCT Results

One useful check of our benchmarking procedure is to compare our results to those of the Joint Committee on Taxation, which are based on tax return data. Table 2 shows average current-year tax rates under old law, under the TCJA, and the change between the two, from JCT (2017a) and according to our calculations, where we adhere as closely as possible to JCT's income classification and income and tax definitions.

We are unable to include certain components of JCT's expanded income measure, including worker's compensation, alternate minimum tax preference items, individual share of business taxes, and excluded income of U.S. citizens living abroad. The JCT is also using 2013 IRS data, which is the latest such data available, whereas our SCF data reference either 2015 or 2016. Our approach and the JCT's (at

least with respect to table 2) both assume that the incidence of the corporate income tax falls 100 percent on owners of capital. The JCT also assumes that nearly 10 percent of corporate income accrues to foreign owners, whose burden is excluded from their calculation (JCT, 2013). We make no adjustment in our analysis for foreign ownership.

As the table shows, our measures are very close to the JCT's. Indeed, the correlation coefficient between our static TCJA average rates and the JCT's across the income categories in table 2 is 96.0 percent. Moreover, like JCT, we find an increase in percentage tax cuts as income increases, although this upward trend is less pronounced in our analysis.

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**

Table 2. Distributional Effects of the TCJA, 2019

	TFA Estimates			JCT (2017a) Estimates		
Income Category	Avg. Tax Rate Under Present Law	Avg. Tax Rate Under TJCA	Change	Avg. Tax Rate Under Present Law	Avg. Tax Rate Under TJCA	Change
Less than 10,000	11.82%	10.96%	-0.86%	9.10%	8.60%	-0.50%
10,000 to 20,000	3.17%	2.43%	-0.74%	-0.70%	-1.20%	-0.50%
20,000 to 30,000	2.34%	1.26%	-1.08%	3.90%	3.40%	-0.50%
30,000 to 40,000	6.85%	5.72%	-1.13%	7.90%	7.00%	-0.90%
40,000 to 50,000	10.36%	9.13%	-1.23%	10.90%	9.90%	-1.00%
50,000 to 75,000	11.54%	10.21%	-1.34%	14.80%	13.50%	-1.30%
75,000 to 100,000	14.07%	12.58%	-1.49%	17.00%	15.60%	-1.40%
100,000 to 200,000	18.53%	16.82%	-1.71%	20.90%	19.40%	-1.50%
200,000 to 500,000	25.64%	23.52%	-2.12%	26.40%	23.90%	-2.50%
500,000 to 1,000,000	33.97%	31.82%	-2.14%	30.90%	27.80%	-3.10%
1,000,000 and over	38.05%	37.08%	-0.97%	32.50%	30.20%	-2.30%