

**ESTIMATING CHANGES IN THE
FEDERAL INDIVIDUAL INCOME TAX:
DESCRIPTION OF THE INDIVIDUAL TAX MODEL**

Prepared by the Staff
of the
JOINT COMMITTEE ON TAXATION



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I. OVERVIEW

One of the responsibilities of the staff of the Joint Committee on Taxation (“Joint Committee staff”) is providing the Congress with estimates of the budgetary impacts of proposed tax legislation. Providing the Congress with the estimated revenue effect of proposed tax legislation starts with an economic analysis of the proposed legislation.

This document¹ describes the economic modeling that the Joint Committee staff undertakes in analyzing proposed changes to the individual income tax.² The Federal individual income tax is complex and has many interacting features such as exclusions, deductions, and credits. This makes analyzing the effects of proposed changes in the tax law a difficult task. The analysis of a proposed change in the tax law must take into account the behavioral changes taxpayers will make and must answer questions such as how tax receipts will change in future years and how the change is likely to affect the distribution of tax burdens.

The core tool used by the Joint Committee staff to evaluate and estimate proposals to modify the Federal individual income tax is the Individual Tax Model (“ITM”).³ The ITM is a microsimulation model. That is, the ITM simulates economic outcomes for a large number of microeconomic agents, in this case, individuals and families that are, or could be, required to file individual income tax returns. Broadly speaking, the ITM is composed of two fundamental components: a database including tax return and other data relating to individuals; and a tax calculator that uses that data to compute tax liability under present law and under proposed changes to the law. The underlying data and the tax calculator are the primary tools deployed to model changes in taxpayer behavior that may be expected to occur in response to changes in tax policy.

Database

The first component of the Joint Committee staff’s current ITM is data from an income-stratified random sample of approximately 333,000 Federal individual income tax returns filed with the Internal Revenue Service (“IRS”) in calendar year 2012. For the most part these data

¹ This document may be cited as follows: Joint Committee on Taxation, *Estimating Changes in the Federal Individual Income Tax: Description of the Individual Tax Model* (JCX-75-15), April 23, 2015. This document is also available on the Joint Committee on Taxation website at www.jct.gov.

² The staff of the Joint Committee on Taxation welcomes comments from interested readers who have studied modeling of the Federal individual income tax. Direct comments to Chief of Staff, Thomas A. Barthold, and Deputy Chief of Staff, Bernard A. Schmitt, Joint Committee on Taxation, 1625 Longworth House Office Building, Washington, D.C. 20515-6453.

³ This document describes the ITM as developed and used by the Joint Committee staff for 2014. All references to the ITM in this document refer to the 2014 edition of the ITM. With the advent of the first session of the 114th Congress, the Joint Committee staff has updated the ITM with new data, where such data are appropriate and available, made model improvements based upon experience with the 2014 edition of the ITM and its predecessors, and has targeted the 2015 ITM to the Congressional Budget Office baseline for 2015 through 2025.

represent tax year 2011 information.⁴ The tax return data are augmented by numerous other data sources. For example, each return in the sample is matched to various information returns filed with IRS. The most important information return is the Form W-2 (Wage and Tax Statement).

Many times, the analysis of a proposed change in tax law requires data not found on tax returns. For example, because health benefits provided by employers to employees are generally not included in taxable income, historically they have not been reported to the IRS. A proposal to change the tax treatment of employer-provided health benefits would require information on the value of such benefits provided to individuals. Often such information is imputed statistically to the ITM's sample of individual tax returns.

In addition, for a comprehensive analysis of the Federal tax system, such as in a tax burden analysis, the model needs to include the entire U.S. population, not just the population that files an income tax return. Consequently, the ITM requires information about the nonfiling population. The Joint Committee staff imputes the size, demographic composition, and economic characteristics of the nonfiling population.

Projecting data for the budget period

Congress generally uses a 10-year period for budget planning and fiscal analysis. For tax analysis, this means that the Joint Committee staff must assess how the present-law tax system or a proposed future tax system relates to the Congressional Budget Office's ("CBO") macroeconomic forecast for the next 10 years. The ITM's underlying data must be consistent with the CBO forecast. To accomplish this, it is necessary to develop a set of methods that "ages" or extrapolates the ITM's base year data (2011) to future years (2014 through 2024 for the 2014 edition of the ITM).

The ITM's tax calculator

The second fundamental component of the ITM is the computer program that estimates, for each return in the sample, Federal tax liabilities under current law and under one or several alternative scenarios. The ITM applies this computer program to the data, which are statistically weighted to represent the U.S. population, to produce estimates of tax liability under current law and the alternative scenarios for the entire U.S. population for each year of the Congressional budget planning period. The tax calculator also provides detailed information about sources of changes in liability for subgroups of the population. The output of the tax calculator is the starting point for incorporating an analysis of taxpayer behavior into reported revenue estimates. To analyze specific proposals, computer subroutines with relevant behavioral response calculators often supplement the basic calculator.

⁴ This sample is also used to prepare the tabulations published in the *Statistics of Income: Individual Income Tax Returns 2011*, an annual publication produced by the Statistics of Income Division of the IRS.

Uses of the ITM

The Joint Committee staff's use of the ITM dates to the 1960s. The ITM is updated annually by new data and modeling innovations. Over the years, the Joint Committee staff has used the ITM to analyze and estimate tens of thousands of proposed changes to the Internal Revenue Code (the "Code"). The ITM is used to analyze:

- Effects of a single tax provision or a set of provisions;
- Separate effects of the components of a set of multiple provisions;
- Interaction among provisions;
- Sensitivity of the tax system to certain features of the Code;
- Marginal and average tax rates and changes in marginal and average tax rates;
- Economic and demographic descriptions or cross-tabulations of the U.S. population or subgroups of the population;
- Effects of taxpayer's behavioral responses to proposed changes in the Code;
- Distributional effects of proposed tax changes;
- Federal taxes other than individual income taxes (*e.g.*, Social Security taxes); and
- The effects of proposed tax changes on individual taxpayers over time.

This document describes the breadth of the data that serves as the basis of the ITM (Part II). This document discusses the imputations that the Joint Committee staff must make to augment the ITM's base data (Part III). The document explains how the base data are projected into all the future years of the Congressional budget periods (Part IV) and describes the ITM's tax calculator (Part V). This document also provides examples of how the Joint Committee staff uses the ITM to estimate proposed changes in tax policy (Part VI).

II. THE ITM'S BASE DATA

A. Base Data from Tax Returns

The Statistics of Income (“SOI”) file

The starting point in constructing the current ITM’s base data is the IRS Statistics of Income Division’s stratified random sample of 332,822 individual income tax returns filed with the IRS in calendar year 2012, which represents the tax year 2011 filing population.⁵ The information obtained from a single return combined with supplementary information for that same filer comprises a single record in the data base. Each record contains the information entered on each line of the return’s Form 1040 U.S. Individual Income Tax Return (or alternatively the 1040A U.S. Individual Income Tax Return or the 1040EZ Income Tax Return for Single and Joint Filers with No Dependents) and from the auxiliary forms and schedules attached to the return. Further, SOI adds certain demographic information to each record by matching each record to databases gathered by the Social Security Administration. In particular, SOI is able to add year of birth, year of death (if deceased), and gender to nearly every person (taxpayer, spouse, and dependents) contained in the sample. In total, the file contains nearly 3,000 dollar-denominated data fields and over 500 non-dollar denominated pieces of descriptive information such as those provided by the Social Security Administration.

The data base provided by the SOI is carefully constructed to provide a statistically reliable picture of the entire tax filing population with the 332,822 subset of all returns filed. Random selection of the returns to be included in the file is an important component of this statistical reliability. The SOI sample generally is stratified by the amount of positive or negative income reported. “Stratifying” a sample is a strategy to reduce the total number of returns necessary to represent the population, while providing full information about small, but important subsets of filers. Each return within a given subgroup is assigned a “weight” that represents the number of taxpayers expected to have very similar returns. Because many of the more complex tax positions and a relatively large portion of receipts collected are associated with returns of very high income filers, high income (and high loss) returns are “oversampled” relative to returns reporting lower income (or fewer losses). For example, a return with positive income (or loss) in excess of \$7.3 million would be sampled at a 100-percent rate, meaning every return that meets that description would be included in the sample; such a return would have a sampling weight of 1.0. On the other extreme, a return with under \$40,000 of income would be

⁵ *Statistics of Income –2011 Individual Income Tax Returns*, Publication 1304, Internal Revenue Service, Washington, DC. The sample contains a small number of prior year returns. These are returns filed in 2012 but containing information relating to a tax year prior to 2011 (usually tax year 2010). SOI’s long-standing assumption is that these prior-year returns are a fair representation of those 2011 tax year returns that similarly were not received and processed by SOI by the end of 2012.

sampled at an approximately 0.1-percent rate; such a return would have a sampling weight of approximately 1,000.⁶

B. Base Data from Information Returns

The Joint Committee staff has augmented the tax return data with additional data sources available from the IRS. In particular, a number of information returns received by the IRS are matched to returns in the base sample. The following information returns are linked to tax returns in the base sample:⁷

- Form 1098, Mortgage Interest Statement;
- Form 1098-E, Student Loan Interest Statement;
- Form 1098-T, Tuition Statement;
- Form 1099-Div, Dividends and Distributions;
- Form 1099-G, Certain Government Payments;
- Form 1099-Int, Interest Income;
- Form 1099-Misc, Miscellaneous Income;
- Form 1099-R, Distributions from Pensions, Annuities *etc.*;
- Form SSA-1099, Social Security;
- Form RRB-1099, Payments by the Railroad Retirement Board;
- Form 5498, IRA Contribution Information; and
- Form W-2, Wage and Tax Statement.

The most important information return document linked to returns in the ITM is the Form W-2 Wage and Tax Statement. Using Form W-2 information, total wages on joint returns are split into wages earned by the primary taxpayer (the taxpayer identifying himself or herself as such on the return) and wages earned by the taxpayer's spouse. In addition, the Joint Committee staff obtains the wage amounts for each dependent claimed by the taxpayer. Each Form W-2 contains the earnings base (*e.g.*, wages, salaries, and

How is Data Matched?

The simplest way to match data from two different sources is to use specific identifying information that is reported in the two data sources. Potential information that could be used to accomplish a match includes names, addresses, or, as is available with information reported to the IRS, the taxpayer identification number. The SOI starts with the taxpayer identification number on the tax return in the underlying SOI sample and looks for all information returns with the same taxpayer identification number. Because the taxpayer identification number is unique to each individual, such a match is sometimes called an "exact" match to distinguish it from the process of "statistical" matching, which is explained in Part III.C, below.

⁶ For a more complete description of the sampling methods, see *Statistics of Income –2011 Individual Income Tax Returns*, Publication 1304.

⁷ Other information returns are added on an as-needed basis.

tips) and withholding for Social Security taxes and Medicare taxes. Thus, the ITM can be used to simulate proposed changes to payroll taxes.

Each Form W-2 contains the employer identification number of the worker's employer. Using this information, each Form W-2 in the sample is matched to an enhanced Form 941 (Employer's Quarterly Tax Return) data file. Employers file Form 941 quarterly to report the number of employees, total taxable wages, and amounts withheld for income, Social Security, and Medicare taxes. In addition, the enhanced Form 941 data include each employer's North American Industry Classification System ("NAICS") code which identifies the employer's primary business category.⁸ This information is very helpful for analyzing proposals that provide for special treatment of employees based on the size or type of business industry of their employer. It can also be useful for proposals related to specialized treatment of certain types of employers.

Other important information derived from Form W-2 data includes contributions to section 401(k)-type retirement plans, participation in employer-sponsored retirement plans, receipt of combat pay by members of the armed forces, employer-paid dependent care benefits, income from stock options, and withheld income tax.

C. Data Related to Income Tax of Estates and Trusts

The ITM includes data that fiduciaries of estates and trusts report on Form 1041, U.S. Income Tax Return for Estates and Trusts. For the current ITM, the Joint Committee staff has selected a stratified random sample of 12,106 Form 1041 returns most of which were filed for tax year 2011.⁹ The sample represents the approximately three million Form 1041s filed. The file contains the income and deductions of estates and trusts, their income tax liabilities, as well as their distributions to beneficiaries.

The sampling strata used to create the fiduciary file are based on the level of income tax liability attributed to the estate or trust. As in the SOI income tax sample, the Joint Committee staff sampled more high liability returns than returns with lower liabilities. A 100-percent rate sampling applies to returns reporting an income tax liability of over \$2 million. Some trusts and estates receive large amounts of income, but have no income tax liability because they distribute all of the income to beneficiaries. Separate sampling strata based on income apply for trusts and estates with no tax liability.

⁸ The enhanced Form 941 file used by Joint Committee staff includes employer information reported on Form 943 (Employer's Annual Federal Tax Return for Agricultural Employees) and Form 944 (Employer's Annual Federal Tax Return). The ITM also incorporates some NAICS code information from the Census Bureau.

⁹ The SOI Division provides the Joint Committee staff with the complete data file of all Form 1041s filed, from which the Joint Committee staff creates this sample.

D. Summary

The ITM's base data is a large sample of actual tax returns augmented by the many information returns that are related to each taxpayer in the sample and his or her employer.¹⁰ For the 2014 calendar year, the Joint Committee staff relied on a sample of tax returns and information returns relating to individuals' 2011 tax year. Generally, the Joint Committee staff has updated the sample year for the ITM every two years. However, the Joint Committee staff may deviate from this two-year cycle if the economic situation or the tax filings for a particular year make the data less suitable as a description of the relevant economic situation.¹¹ For example, the returns filed for a year in the trough of a recession may prove to be an unsuitable base for describing a budget period for which economic growth is forecast.

¹⁰ The IRS's SOI Division makes a substantial amount of taxpayer return data available to the public. A number of academic economists create individual tax models based upon these public use data. The base data of the Joint Committee's ITM is generally more recent, more exact, and provides a broader set of variables than do the public use data.

The public use files are released after data files are made available to the Joint Committee. For example, the SOI released the public use file of individual tax return data for tax year 2008 in September 2014. As noted in the text, the 2014 edition of the ITM is based upon 2011 data. To protect taxpayer confidentiality, public use files are constructed with a smaller sample size. In addition, data fields are rounded to four significant digits, certain data fields are "top coded" (*i.e.*, values above certain levels are reported as equal to the "top code") and data are "blurred" (see Peter Sailer, Michael Weber, and William Wong, "Disclosure-Proofing The 1996 Individual Tax Return Public Use File," Proceedings of the American Statistical Association: 2001, American Statistical Association). To further protect taxpayer confidentiality, the public use data do not contain as many data fields and indicators as do the ITM's base data. In addition, unlike the ITM's base data, the public use data generally do not contain matched information returns.

¹¹ See Part IV, below, for a discussion of how the ITM must match the Congressional budget period.

Why is 2011 Data the Base for the 2014 ITM?

One might initially surmise that 2011 data could be considered out of date for use in 2014, but these data were nevertheless the most current complete data available for the 2014 edition of the ITM.

Most taxpayers filed their 2011 tax return by April 15, 2012. However, a significant number of taxpayers take an automatic extension, with a filing deadline of October 15, 2012. IRS continued to receive 2011 returns after this date, especially from taxpayers with large incomes or complex tax situations.

Once the return is received, IRS enters information from the return into its computer systems and performs a number of consistency checks including identifying math errors. Once the return is accepted, the data from the return is posted to a master file.

SOI selected its individual sample from those tax returns posted to the master file during the 2012 calendar year. Then returns selected for the sample received additional data editing and consistency checks at SOI, including obtaining additional data items not included initially.

The Joint Committee staff received the final 2011 sample in July 2013 and received the information returns data files in September 2013. Construction of the ITM took place over the July to December time period. The extrapolation process to project the data for each year in the Congressional budget period occurred in January 2014.

III. IMPUTATIONS TO THE ITM

The Joint Committee staff supplements the tax return data with additional data from a variety of sources. The data on each tax return constitutes a “record” of that tax filer within the ITM. The supplementary data is added to relevant records through a variety of methods, depending on the source of the data, which are described in detail in this section. Collectively, these data additions are referred to here as “imputations.” Some imputations included in the ITM are necessary to reflect provisions of current law enacted or modified subsequent to the 2011 base year. Others relate to missing data in the underlying data files. Still others relate to analysis of proposals that require information about people or types of income and expenses that are not reported on tax returns because the people or income are not taxed nor the expenses deducted under current law.

A. Constructing the Nonfiling Population

Many proposed changes to the tax law affect individuals who do not file Federal income tax returns under current law. Further, the Joint Committee staff sometimes is asked to produce analyses of the entire U.S. population. Consequently, it is necessary for the ITM to represent the population of nonfilers as well as filers. Table 1 shows the methodology for estimating the number of nonfilers that need to be added to the ITM. In general, the size of the nonfiling population is the difference between the U.S. resident population and the U.S. population represented on non-dependent individual income tax returns.

Table 1.—Determining the Size of the 2011 Nonfiling Population

	Population (millions)
Census Bureau estimates	
End-of-year 2011 U.S. resident population^[1]	312.7
Total deaths in 2011 ^[2]	2.5
Total resident population alive at any time in 2011	315.3
Persons represented on tax returns	
Number of exemptions claimed on individual tax returns for 2011^[3]	289.3
Less population on tax returns of taxpayers living overseas	-1.2
Less adjustments for excess exemptions claimed ^[4]	-4.8
Total resident population represented on tax returns	283.3
Implied nonfiling resident population	32.0

[1] The Census Bureau estimates the U.S. resident population on July 1, for 2011 and 2012 to be 311.6 and 313.9 million persons, respectively. Using the midpoint between these two values and adding 2.5 million for residents who died in 2011 gives the estimate of 315.3 million U.S. residents who were alive sometime in 2011. See

www.census.gov/popest/data/national/asrh/2012/.

[2] The National Center for Health Statistics, www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf.

[3] Tabulations from the 2011 Statistics of Income INSOLE file. “INSOLE” is the SOI’s name for a file of individual and sole proprietorship returns. Population consists of non-dependent filers, spouses on joint returns, and any person claimed as a dependent.

[4] The number of children aged two to 15 claimed as dependents well exceeds the U.S. resident population of children aged two to 15. The adjustments are explained in Part III.G. of this report.

Data about the nonfiling population are derived from information returns filed with the IRS that are not associated with any filed individual income tax return.¹² SOI collects individual tax returns and information returns for its Continuous Work History Sample (“CWHS”). The CWHS is comprised of all individuals whose Social Security number (“SSN”) ends in one of 10 unique four-digit numbers.¹³

The Joint Committee staff adds records to the ITM representing the nonfiling population. These records are constructed primarily from information returns filed for individuals in the CWHS who have an SSN that does not appear on a filed individual income tax return, either as a primary taxpayer, a spouse on a joint return, or a dependent.¹⁴ The size of the nonfiling population identified from information returns, by detailed age cohort, is slightly smaller than the size of the implied target nonfiling population estimated by subtracting the U.S. population represented on non-dependent tax returns from the U.S. Census’s residential population as in Table 1. The shortfall in the population occurs for young adults aged 16 to 23 and for adults aged 51 to 64. These shortfall age cohorts require imputation of

Logit Regression Equation

A logit regression is a statistical model often used to study the relationship between an individual’s decision (the dependent variable) and a set of independent variables (such as income and demographic characteristics of the individual). The Joint Committee staff uses a logit regression to estimate, among other things, the probability that a person is married as a function of independent variables such as the person’s age and income. In the logit model, the underlying probability distribution of the dependent variable (married status in this example) is assumed to be the logistic (*i.e.*, log normal) distribution.

¹² For a description of the process of creating the nonfiling population, see James Cilke, Jacob Mortenson, Michael Udell, and Jon Zytneck, “Attaching the Left Tail: A New Profile of Income for Persons Who Do Not Appear on Federal Income Tax Returns,” *NTA Proceedings, 2009 102nd Annual Conference* available at <http://www.ntanet.org/images/stories/pdf/proceedings/09/011.pdf>. In previous versions of the ITM, the nonfiling population was derived as a by-product of a statistical match between SOI’s annual sample of individual tax returns and the Current Population Survey (“CPS”) produced by the Census Bureau.

¹³ The last four digits of an SSN is a random number. Thus, for example, each person in the United States has an approximately one in 1,000 chance of being selected for the CWHS. In cases where the taxpayer does not have an SSN, an alternative Individual Taxpayer Identification Number (“ITIN”) is used.

¹⁴ The information returns used here are for tax year 2010 and have an SSN (or ITIN) that does not appear on a tax year 2010 individual tax return filed with the IRS through approximately December of 2012.

The use of 2010 information returns in constructing the nonfiling population seemingly puts these data out of sync with that of the base data on tax return information for calendar year 2011. The use of 2010 for this part of the ITM arises from the need to produce the ITM in a timely manner to serve the needs of the Congress. The Joint Committee staff builds its nonfiling population from individuals who will not file a tax return in 2010. In practice, as many as four percent of total returns filed for the 2011 tax year are not filed until 2013 or beyond. In addition, the IRS receives information returns for persons who have died, but this information is not rapidly noted data relating to information returns. Backing up one year and comparing 2010 information returns to tax returns filed in 2011 and 2012 for the 2010 tax year enables the isolation of information returns that relate to true living nonfilers. The implicit assumption in relying on 2010 data to define the nonfiling population is that nonfilers in 2011 are identical statistically to nonfilers in 2010.

additional records to the file. Of the targeted 32.0 million nonfilers, 1.7 million came from such imputed records.

For analytical work, it is insufficient to identify individuals as nonfilers in the CWHS. The Joint Committee staff must create tax filing units – that is, they must assign a tax filing status, such as “single,” “joint,” “head of household,” or dependent to each person, and aggregate those who are not identified as “single, non-dependent” nonfilers into nonfiling households. For the 2014 edition of the ITM, the Joint Committee staff first created joint returns by linking three million weighted male CWHS nonfilers to three million weighted female nonfilers to form married couples. With these assignments, the number of married persons with a U.S. address on the ITM is very close to estimates of the total number of married persons in the U.S. resident population. The Joint Committee staff chose the records to be married based on a series of logit regression equations.¹⁵

Next, the Joint Committee staff designated any nonfiler aged 16 and under, as well as a subset of persons aged 17 to 18, to be a dependent of another nonfiling person. The procedure also designated as dependents a subset of persons aged 17 to 24 who also received a Form 1098-T information return for tuition expenses, with the likelihood of being designated as a dependent declining with age. The Joint Committee staff assigned these nonfiling dependent children to nonfiling parents. Some of the children were linked to the just-created married couples and the remainder to unmarried records. The age of the potential parents is between 24 and 60 years of age.

In the construction of the ITM, a nonfiling parent record can be linked to a maximum of three different dependent children. Based on tabulations from low income single parent filers, approximately 70 percent of such returns have one dependent child, approximately 25 percent have two dependent children, and approximately five percent have three or more dependent children. The distribution of nonfiling parent records is guided by this distribution to provide that in the ITM 70 percent of the nonfiling parent records are linked to only one dependent child. Similarly, 25 percent of such parental records contain information on two dependent children and five percent contain information on three dependent children.

Having created a nonfiling population, the Joint Committee staff created hypothetical tax returns to fit this population into the tax filing structure of the ITM. The staff assigned joint filing status to the created married couples, head-of-household filing status to unmarried records that were linked to a nonfiler child, and single filing status to all other records.¹⁶ For these hypothetical tax returns, the various information returns provide data on sources of income and deductions. Wages come from Form W-2, Social Security benefits from Form SSA-1099,

¹⁵ In this instance logit estimation was chosen for its relative computational simplicity. Probit estimation, described in Part III.D, below, is an alternative estimation technique that the Joint Committee staff is exploring for future use in modeling the nonfiling population.

¹⁶ The percentage of taxpayers filing “married filing separately” returns is sufficiently small that the Joint Committee staff has not included such return filing units in its constructed nonfiling population.

unemployment benefits from Form 1099-G, retirement income distributions from Form 1099-R, gambling winnings from Form W-2G, home mortgage interest expenses from Form 1098, tuition expenses from Form 1098-T, interest on student loans from Form 1098-E, and IRA contributions from Form 5498. Other information returns were also used. Investment income such as interest, dividends, capital gains, rents, and royalties came from the following information returns: Form 1099-B; Form 1099-INT; Form 1099-DIV; Form 1099-MISC; Form K1-1065; Form K1-1041; and Form K1-1120S. Income and above-the-line deduction amounts are combined to create an estimated adjusted gross income (“AGI”) value.

B. Missing Age Data and Missing Death Status Indicators

SOI is able to identify, with some exceptions described below, the year of birth, year of death when relevant, and gender of every individual on the tax file using an exact match to Social Security Administration data. In some cases, the year of birth is missing. For example, a match is not available for the small number of people who use an Individual Taxpayer Identification Number (“ITIN”) as an identification number rather than a SSN.¹⁷ Further, some people on the tax file, especially dependents, have missing SSNs. The most common reason for a missing SSN is that the individual is a newborn. The Joint Committee staff imputes ages for those cases where age information is missing. The imputations are calculated such that the age distribution of individuals in the ITM, when weighted to reflect the entire population, conforms to the age distribution of the population of the United States. For this purpose, the ITM imputations employ age value boundaries. While the Census Bureau reports some cases of individuals living beyond age 108 and individuals aged less than 15 years living independently of their parents or guardians, statistically these cases are rare. Certain high and low ages that are reported by the SOI are considered errors and a corrected age is imputed. These corrections apply in the rare cases in the base data of a taxpayer reported as older than 108 years and a non-dependent primary taxpayer or spouse reported as less than 15 years.

In addition, the Joint Committee staff has found that the number of deaths based on the link to Social Security Administration records is somewhat lower than the total number of deaths in the U.S. resident population as reported by the Centers for Disease Control. The likely explanation is that the Social Security Administration’s data files, at the time they are matched to tax records, have not yet been fully updated to account for recent deaths. An imputed death status indicator applies to people in the sample such that the number of deaths in the sample, when weighted to reflect the entire population, equals the number of deaths in the United States

¹⁷ Briefly, an ITIN is a nine-digit number assigned to individuals (*e.g.*, foreign nationals with U.S. income) who need to file an individual tax return but do not have, and are ineligible to receive, an SSN from the Social Security Administration. See “Individual Taxpayer Identification Number (ITIN),” online at www.irs.gov/individuals/article/0,,id=96287,00.html.

in 2011.¹⁸ Selection for this death status indicator correlates to mortality probabilities from the Social Security Administration.¹⁹

C. Statistical Matches

Information reported on tax returns and information returns does not cover all of the data needs of the ITM. Tax forms only gather information that is necessary to administer the current tax laws properly. In cases where policy makers ask for analysis of a proposed tax law change that requires information not currently reported on tax returns, the Joint Committee staff frequently must impute that relevant data to tax records.

The Statistical Match of the Current Population Survey (“CPS”) to the ITM

One set of data that contains additional information about the U.S. population is the Current Population Survey (“CPS”) produced by the Census Bureau. The CPS is an on-going monthly survey of U.S. non-institutional households living in the United States.²⁰ As part of the ITM building process, the Joint Committee staff statistically matches records from the CPS with the tax records. Currently, statistically matching²¹ CPS records to tax return data results in the addition of the following information to the ITM:

- Educational attainment status;
- Source of educational assistance;
- Value of educational assistance benefits received;
- Disability status;
- Source of disability benefits;

¹⁸ The National Center for Health Statistics, www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf.

¹⁹ Social Security Administration, *Annual Statistical Supplement, 2012*, Table 4.C6, “Period life table, 2007,” available at <http://www.ssa.gov/policy/docs/statcomps/supplement/2012/supplement12.pdf>.

²⁰ In the text, references to the CPS generally are to the Annual Social and Economic Supplement, which is often referred to as the March Supplement. Among persons excluded from this survey are persons residing in nursing homes, long-term care hospitals, mental institutions, active duty military personnel housed on ships or in barracks, and incarcerated individuals.

²¹ For a more detailed discussion of statistical matching, see Nancy Ruggles, Richard Ruggles, and Edward N. Wolff, “Merging Microdata: Rationale, Practice and Testing,” *Annals of Economic Measurement*, vol. 6, no. 4, Fall 1977, pp. 407-428; Willard L. Rodgers, “An Evaluation of Statistical Matching,” *Journal of Business & Economics Statistics*, vol. 2, no. 1, January 1984, pp. 99-102; James Cilke, *A Microsimulation Model for Tax Policy Analysis*, unpublished doctoral dissertation, University of New Mexico, 1985; Wagner A. Kamakura and Michel Wedel, “Statistical Data Fusion for Cross-Tabulation,” *Journal of Marketing Research*, vol. 34, no. 4, November 1997, pp. 485-498; and Marcello D’Orazio, Marco Di Zio, and Mauro Scanu, *Statistical Matching: Theory and Practice*, John Wiley & Sons, Ltd., 2006.

- Value of disability benefits received;
- Value of child support payments received;
- Supplemental Security Income (“SSI”) benefits received;
- Workers’ compensation benefits received;
- Other public assistance cash benefits received; and
- Immigration status.²²

²² Immigration status is obtained from an imputation to the CPS by the Urban Institute.

Statistical Matches

The appropriate methodology for imputing missing information depends on the underlying data used to impute the missing values and how the imputed data are intended to be used. Statistical matching is a method that uses the existence of known variables, common to two or more data sets, to impute other characteristics to the combined data sets. A principal reason for using a statistical match is that the mathematical relationships (*e.g.*, correlations and covariances) among the set of imputed variables are largely maintained after the data sets are merged, which improves the reliability of statistical analysis using the imputed variables. In using a statistical match, the Joint Committee staff cannot say with certainty that each individual taxpayer's imputed characteristics will be correct. The process creates a fictional taxpayer. However, statistical matching is a well-established method of imputing characteristics for the population as a whole and for subsets of the population based on selected merge criteria.

Consider the process of imputing information on characteristics such as educational attainment and disability status to individuals in the ITM's underlying SOI data (which does not contain this information). A statistical match between the underlying SOI data and CPS data consists of finding a CPS family that is "similar" to a tax record and then carrying over the information on that CPS record to the tax record. First, tax-filing units (*i.e.*, returns) are formed out of CPS person records.* For example, married couples are linked together to form a joint return. Children are linked with their parents and appear as dependents on their parents' return. Next, returns in both the SOI data (filers and nonfilers) and the CPS merging dataset are placed into cells based on the set of merge characteristics. These characteristics include factors such as filing status, presence of dependents, age, employment status, and presence of certain types of income. Returns in the SOI data file are matched only with returns in the CPS dataset that share this common set of characteristics and thus are in the same cell.

In cases where more observations exist in an SOI cell than in the CPS merge dataset cell, the CPS observations are duplicated. In cases where there are fewer observations in an SOI cell than a CPS cell, some CPS observations are randomly removed. In both the SOI and CPS merging dataset, returns are then sorted within cells based on income. That is, within a matching cell, high income returns from the SOI are paired with high income returns from the CPS dataset and low income returns in the SOI are paired with low income returns in the CPS dataset.

* The CPS contains three types of records: person records; household records; and family

Statistical Match of the Household Component of the Medical Expenditure Panel Survey (“MEPS”) to the ITM

In estimates relating to the Affordable Care Act (“ACA”),²³ the Joint Committee staff needs to identify the health insurance status of taxpayers. On currently available tax databases, taxpayers were not asked to report such information.²⁴ To simulate many of the health reform proposals, the ITM needs imputed information about the health insurance status of taxpayers and their dependents. The imputation of various health-related pieces of information to individuals appearing on the ITM relies on a statistical match between the SOI file and the Medical Expenditure Panel Survey (“MEPS”) file maintained by the Agency for Healthcare Research and Quality of the Department of Health and Human Services. MEPS is an on-going survey of medical expenditures by individuals. The household component of the survey collects information on “demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income, and employment.”²⁵

The following information is obtained from this statistical match:

- Employer-provided health insurance coverage:
 - For active employees;
 - For retired employees;
 - For former employees receiving COBRA²⁶ coverage;
- TRICARE²⁷ coverage;

²³ As used herein, the Affordable Care Act refers to the Patient Protection and Affordable Care Act as modified by the Health Care and Education Reconciliation Act of 2010.

²⁴ Beginning with Forms W-2 issued for 2012 (issued in early 2013), employers are required to report the value of health coverage provided to employees as an informational item in Box 12. However, various exceptions apply until the IRS issues further guidance. For example, employers that issue fewer than 250 Forms W-2 generally are not required to include this information until further guidance is issued. Beginning with calendar year 2015 (on information returns issued in early 2016), insurers, employers, and governmental entities that provide minimum essential coverage to individuals are required to report to the IRS, and to the individuals, certain information regarding coverage. In addition, beginning with calendar year 2015 (on information returns issued in early 2016), employers with 50 or more full-time employees must report to the IRS, and to employees, certain information regarding minimum essential coverage that the employer offers its employees.

²⁵ The Medical Expenditure Panel Survey is available at <http://meps.ahrq.gov/mepsweb>.

²⁶ Employer sponsored health plans are generally required to offer an employee, spouse or dependent child covered by the plan the opportunity to continue coverage under the plan for some period after the occurrence of certain events that otherwise would have terminated the coverage, such as termination of employment. This coverage is often referred to as “COBRA coverage” because these requirements were enacted in the Consolidated Omnibus Budget Reconciliation act of 1985.

- Individual market private insurance;
- Medicare coverage;
- Medicaid coverage;
- Other health insurance coverage;
- Out-of-pocket medical expenses; and
- Health status and conditions.

The MEPS file used in the match consists of the combined 2008-2011 records from the MEPS household survey files.²⁸ A single year of a MEPS survey file contains data for approximately 13,000 households. Combining the files gives a more robust sample of the survey population. The dollar values, including reported income, from the pre-2011 surveys are indexed to 2011 levels using the Consumer Price Index.

Observations in both the tax data file and the MEPS file are sorted into matching cells based on the set of merge characteristics. These characteristics include factors such as marital status, filing status, presence of dependents, age, employment status, size of employer, and the presence of certain types of income.

D. Calculating Itemized Deductions for Non-Itemizers

Itemized deductions for non-itemizers

Some proposals that the Joint Committee staff analyzes would expand the scope of various itemized deductions or decrease the standard deduction. Under these proposals, more taxpayers might be expected to claim itemized deductions than would claim the standard deduction. To analyze these proposals, the ITM needs an estimate of each return's potential itemized deductions, even if the taxpayer claimed the standard deduction on his or her actual, filed tax return.

To estimate potential itemized deductions, the following expenses are imputed to non-itemizing returns:

- Home mortgage interest expenses;
- Private mortgage insurance premiums;

²⁷ TRICARE is the health care program for members of the military and their families. More information about TRICARE is available at <http://www.tricare.mil/Welcome.aspx>.

²⁸ In the MEPS survey, respondents are asked several tax-related questions. In particular, the survey asks whether the respondent filed a tax return, as well as the filing status used on the return. The MEPS overstates the married population filing separately and understates the number of head of households, compared to the base data received from the SOI.

- Investment interest expenses;
- State and local income taxes;
- State and local sales taxes;
- State and local real property taxes;
- State and local personal property taxes;
- Cash and non-cash charitable contributions;
- Miscellaneous expenses (subject to the two-percent AGI floor); and
- Medical expenses.

Itemized deductions for non-itemizers are imputed in the order listed above. The Joint Committee staff starts with those items for which IRS information is available. For example, mortgage lenders provide individuals with Form 1098 information returns on home mortgage interest expenses and private mortgage insurance premiums. In addition, non-itemizers report their allowed investment interest expenses on Form 4952, “Investment Interest Expense Deduction.” Such information permits the potential itemized deduction to be attached to the non-itemizing taxpayer’s return in the ITM.

State and local taxes.—State and local income taxes are imputed using State income tax calculators. These calculators use the return’s reported income and demographic information including State of residence.²⁹ In addition, using the same calculators, the Joint Committee staff imputes State and local income taxes to itemizers who claimed a State and local sales tax deduction instead of an income tax deduction. Imputed State and local sales tax deductions are largely derived from the lookup tables provided by the IRS,³⁰ but adjusted upward because analysis of data indicates that taxpayers, on average, claim sales tax deductions greater than the amount listed in the IRS’s lookup tables.

The starting point for imputing State and local real estate taxes to taxpayers who do not itemize is to identify taxpayers who are homeowners, as the American Housing Survey³¹ calculates that approximately 96 percent of homeowners pay some amount of real estate tax. Non-itemizers who are homeowners include those who still have a mortgage outstanding and those who have no mortgage debt on their home. As explained above, it is possible to identify those non-itemizers with mortgage debt because they receive the Form 1098 reporting the amount of interest they paid.

²⁹ The Joint Committee staff has modified State income tax calculators that were first developed by Jon Bakija. See Jon Bakija, “Documentation for a Comprehensive Historical U.S. Federal and State Income Tax Calculator Program,” unpublished Williams College, working paper, August 2009.

³⁰ The lookup tables may be found with the instructions to Schedule A of Form 1040.

³¹ The American Housing Survey is sponsored by the Department of Housing and Urban Development and Conducted by the U.S. Census Bureau. See www.huduser.org/portal/datasets/ahs.html for more information.

To complete the identification of non-itemizing taxpayers with real estate tax expense, the Joint Committee staff subtracts the number of taxpayers who itemize a real estate expense and the number of non-itemizers who are identified as homeowners by reason of Form 1098 reporting from the total number of homeowners nationwide who incur real estate tax expenses as reported in the American Housing Survey. The result provides an estimate of the total number of homeowners with real estate tax expense who do not itemize allowable deductions and who incur no mortgage interest expense. A calculation is made of the probability that an itemizer has a real estate tax expense by age, income, and marital status. The staff selects non-itemizers to receive an imputed real estate tax expense based on these probabilities, scaled such that the total number of tax filing units on the ITM with an actual, or imputed, real estate tax expense equals the total number of homeowners with a real estate tax expense as reported in the American Housing Survey.

The imputation of a dollar value of real estate taxes paid by non-itemizing taxpayers depends upon the distribution of low levels of real estate taxes paid by itemizing taxpayers, and upon the income of the taxpayers. For this analysis, a low level of real estate tax expense is a real estate tax expense that is less than the standard deduction. This distribution of low level real estate tax expense forms the basis for the imputation of real estate taxes paid by non-itemizing taxpayers, conditional upon the additional constraint that the sum of all imputed potential itemized deductions for any non-itemizing taxpayer must remain less than the value of the standard deduction applicable to the taxpayer or else the taxpayer would be expected to itemize allowable deductions.

By examining State and local personal property taxes paid by itemizers, the Joint Committee staff has found that States tended to cluster into one of four groups, States in which:

- Zero or nearly zero personal property taxes are imposed;
- Approximately 12 percent of itemizers claim a deduction;
- Approximately 25 percent of itemizers claim a deduction; and
- Approximately 75 percent of itemizers claim a deduction.

The imputation of personal property taxes is achieved using a series of probit regression equations. A separate probit regression equation is used for each of the three groups of States with nonzero personal property taxes to estimate the likelihood that a taxpayer has a personal property tax expense. The independent variables in the equations include income, age, and

Probit Regression Equation

A probit regression is a statistical model often used to study the relationship between an individual's decision (the dependent variable) and a set of known independent variables (such as characteristics of the individual). The Joint Committee staff uses a probit regression to estimate, among other things, the probability that an itemizing taxpayer pays a State and local personal property tax as a function of independent variables such as the taxpayer's age and income. In the probit model, the underlying probability distribution of the dependent variable is assumed to be the normal distribution.

marital status. The dollar value imputed follows the observed distribution of deductions for itemizers for each of the four groups of States.

Contributions to charity.—To impute charitable gifts to non-itemizers, the Joint Committee staff starts from the descriptive premise that, conditional on income, age, and marital status, the probability that a non-itemizing taxpayer makes a charitable contribution (of any value greater than zero) is equal to the probability that an itemizing taxpayer makes a charitable contribution that is less in value than the standard deduction. The estimated dollar level of giving from this process is scaled back such that the average contribution by non-itemizers is lower than the average by itemizers. The scale-back factor is chosen such that the total dollar value of charitable giving imputed to non-itemizers is at a level such that the total charitable giving in the ITM (including both itemizers and non-itemizers) is consistent with data on total giving in the United States.³² Charitable giving by itemizers consists of cash gifts and non-cash gifts. Likewise, the charitable giving of non-itemizers is split into cash and non-cash gifts, using the observed distribution of cash gifts as a percentage of the total value of all charitable gifts by those itemizing taxpayers whose total charitable deduction was less than the allowable standard deduction.

Miscellaneous itemized deductions.—The Joint Committee staff uses a probit regression equation to determine whether a non-itemizer has deductible miscellaneous expenses above the two percent of AGI floor. Data used for the probit regression equation are itemizers with a zero or small level of miscellaneous itemized deductions. In this context, small means less than one half of the standard deduction. Independent variables used in the equation include marital status, income, age, presence of Schedules C, D, E, or F,³³ presence of alternative minimum tax preference items, whether the taxpayer used a paid preparer, retirement income as a percentage of adjusted gross income, and investment income as a percentage of adjusted gross income. The dollar amounts estimated for the non-itemizers reflect the distribution for itemizers with small levels of miscellaneous itemized deductions. However, these estimated dollar amounts are scaled back so that the average deduction taken by the non-itemizing population is less than the average deduction taken by those taxpayers who itemize.

Medical expenses.—An imputation for medical expenses in excess of 7.5 percent of AGI³⁴ for non-itemizers was developed from MEPS data. The number of returns in the ITM among

³² Targets of charitable giving for the 2011 base year were derived from information provided by the Giving USA Foundation. See *Giving USA 2012: The Annual Report on Philanthropy for the Year 2011*, available at http://www.jjco.com/resources/pdf/2012_Giving_USA_Report.pdf.

³³ These schedules are: Schedule C, Profit or Loss from Business (Sole Proprietorship); Schedule D, Capital Gains and Losses; Schedule E, Supplemental Income and Loss; and Schedule F, Profit or Loss from Farming.

³⁴ Prior to 2013 taxpayers were permitted an itemized deduction for medical and health care expenses incurred in excess of 7.5 percent of AGI. The ACA increased this threshold to 10 percent of AGI for taxpayers under age 65 effective for calendar year 2013. For taxpayers 65 years of age or older the threshold remains 7.5 percent of AGI for calendar years 2013 through 2016, after which the 10 percent threshold applies to all taxpayers.

filers and non-filers with out-of-pocket medical expenses above 7.5-percent of AGI on the tax file is assumed to be approximately equal to the number of such individuals or families derived from the MEPS survey. The Joint Committee staff put families in the MEPS data into cells which varied by age, marital status, family size, and whether out-of-pocket medical expenses were above or below 7.5-percent of income as reported in the MEPS survey. The next steps were to subtract the number of itemizing returns within each cell, and then to calculate (using the remaining MEPS observations) the distribution of out-of-pocket medical expenses relating to non-itemizers. Based on this distribution, it was possible to assign a total out-of-pocket expense amount to non-itemizers.³⁵

Table 2, below, summarizes the number of returns and dollar values of imputations of potential itemized deductions included in the ITM.

Table 2.—Number of Tax Filing Units and Amounts of Imputed Itemized Deductions for Non-Itemizers, 2011

	Number of Returns (Millions)	Dollar Amount (Billions of Dollars)
Home Mortgage Interest Expense	16.7	57.0
Private Mortgage Insurance Expense	1.8	1.5
Investment Interest Expense	[1]	[2]
State and Local Income Taxes	51.4	58.5
State and Local Real Property Taxes	28.4	36.2
State and Local Personal Property Taxes	34.7	10.0
State and Local Sales Taxes	113.2	69.6
Cash Charitable Contributions	63.0	27.7
Non-Cash Charitable Contributions	31.5	15.6
Miscellaneous Expenses (Above 2% of AGI)	16.2	18.6
Medical Expenses (Above 7.5% of AGI)	5.5	20.4

[1] - Fewer than 50,000 returns.

[2] - Less than \$50 million.

Because the threshold remains at 7.5 percent of AGI for certain taxpayers, the Joint Committee staff imputes medical expenses above this level for the non-itemizing taxpayers in the base data.

³⁵ At present the ITM does not include an imputation for medical expenses to itemizers or nonitemizers below 7.5 percent of AGI. An imputation from the MEPS data as described above could be made should the need for such analysis arise.

E. Imputations for Items Subject to Limitations Related to the Taxpayer's Income or Amount of Expense

Some provisions of the Code limit allowable deductions or credits depending upon the taxpayer's income. Other provisions of the Code limit the amount of expense allowable for deduction or credit. Taxpayers not eligible for such deductions or credits do not routinely report their expenditures that might otherwise be eligible for deduction or credit. Congress sometimes considers modifying income limitations or the expenditure limitations applicable to these deductions or credits. To assess the revenue effects of such proposals using the ITM, the Joint Committee staff imputes information about potentially qualifying expenditures of taxpayers who do not report such information in the base data file. The discussion below provides a non-exhaustive overview of provisions of the Code for which the Joint Committee staff imputes information on possible qualifying expenditures when the taxpayer in the base data reported a maximum allowable expense amount or when the taxpayer in the base data reported no expense because his or her income disqualified him or her from claiming the deduction or credit.³⁶

Tuition expenses.—To qualify for the deduction for qualified tuition expenses in 2011, a taxpayer needed to have a modified AGI below \$80,000 (\$160,000 for joint returns). The maximum deduction in 2011 was \$4,000. Taxpayers with an income above the threshold generally did not report their otherwise qualified tuition expenses. To assess possible alternative policies, expenses must be imputed to returns with incomes above the specified thresholds.³⁷ To identify students with tuition expenses, the Joint Committee staff uses information from Form 1099-T information returns (exactly matched to returns in the ITM's sample).

Interest on student loans.—To qualify for the deduction for interest on student loans in 2011, the taxpayer's modified AGI needed to be below \$75,000 (\$155,000 for joint returns). The maximum deduction in 2011 was \$2,500. Taxpayers with income above the threshold did not report their student loan interest payments, and taxpayers would not report an amount above the maximum deduction amount. The Joint Committee staff uses information from Form 1099-E information returns (exactly matched to returns in the ITM's sample) to impute student loan interest expenses to returns with income above the thresholds. The staff imputes additional expenses to those returns claiming the maximum amount.

Private mortgage insurance.—To qualify for the deduction for mortgage insurance premiums in 2011, the taxpayer's AGI needed to be below \$109,000 (\$54,500 for married taxpayers filing separately). Information from Form 1098 information returns permits the Joint Committee staff to impute a mortgage insurance premium to returns with an AGI above the threshold.

³⁶ The Joint Committee staff imputes amounts to returns on a case-by-case basis when proposals by Members of Congress create the need for such information.

³⁷ In the ITM's tax calculator, the appropriate income or expense thresholds would still be applied.

IRA contributions.—In 2011, single and head-of-household taxpayers with an employer-sponsored retirement plan could generally take a deduction for a full contribution to a traditional individual retirement account (“IRA”) only if their modified AGI was not in excess of \$56,000. The ceiling for a full deductible contribution for a spouse with an employer-sponsored plan for a joint return was \$90,000. If only one of the spouses for a joint return was eligible for an employer-sponsored plan, the ceiling for a full deductible contribution for the other spouse was \$169,000. In general, in 2011, the maximum IRA contribution and deduction, for an individual was \$5,000 (\$6,000 if aged 50 or over). The limit for deductible IRA contributions to a traditional IRA for taxpayers with an employer sponsored plan is phased out over a \$10,000 range (except that the limit for a spouse with an employer sponsored plan for a joint return is phased out over a \$20,000 range.) A person without an employer-sponsored retirement plan or a spouse with an employer-sponsored plan could make a deductible contribution to a traditional IRA up to the prescribed maximum regardless of income.

The maximum contribution to a Roth IRA in 2011 was the same as to a traditional IRA. However, the income ceilings for a Roth IRA contribution, which apply without regard to participation in by an employer-sponsored plan, were higher than those for a deductible traditional IRA. A single or head-of-household filer could fully contribute to a Roth IRA with a modified AGI up to \$107,000; the ceiling for joint returns was \$169,000. The limit on Roth IRA contributions is phased out over a \$15,000 range for single and heads-of-household returns, and \$10,000 for joint returns.

Policy makers may inquire about the revenue consequences of changing these contribution limitations. Consequently, the Joint Committee staff makes a prediction of what contributions taxpayers would make if they were not subject to the limitations. The process uses the differential income ceilings between deductible traditional and Roth IRAs to impute two desired IRA contribution amounts. The first is a desired deductible IRA contribution amount and the second is a “desired” Roth IRA contribution amount. Conceptually, these amounts are what the taxpayer would contribute to a traditional and/or Roth IRA plan in the absence of contribution and income limitations.

Form 5498 information returns report IRA contributions. When exactly matched to taxpayers in the ITM’s tax sample, Form 5498 identifies taxpayers who make a contribution to an IRA. The Joint Committee staff creates an extract of tax returns with modified AGI above the threshold for making a deductible traditional IRA contribution but below the threshold for making a full Roth IRA contribution. Excluded from the extract are returns without earnings, returns where the taxpayers are over 70 years of age, returns taking an IRA distribution, returns with zero taxable income, and returns where taxpayers have made a Keogh, SIMPLE, or SEP retirement contribution. In short, the extract contains returns of taxpayers who could make a full Roth IRA contribution or, provided the taxpayers do not have an employer-sponsored retirement plan, a full deductible traditional IRA contribution. Using these extracted returns, a probit model predicts whether a return reports an IRA contribution (and the type of IRA to which the contribution is made). Independent variables in the probit model include filing status, age cohort, an itemized deduction indicator, presence of dependents, presence of an employer-sponsored retirement plan, presence of a contribution to a section 401(k)-type retirement plan, and the presence of a significant amount of dividends or interest income. Using the probit

model, the Joint Committee staff selects returns of taxpayers who would make a Roth or deductible traditional IRA contribution if there were no income restrictions.

For returns selected to reflect a contribution, the next step is to impute a desired contribution level. To impute the desired contribution level (*i.e.*, unconstrained by the limitations of present law) the Joint Committee staff draws on the data of similarly situated self-employed taxpayers who may make contributions to a Keogh, SIMPLE IRA, or SEP retirement plan. Although contributions under these plans also are constrained under present law, the maximum contributions under these plans are higher than the maximum IRA limits. The Joint Committee staff calculates the desired contribution by applying a probit equation for returns claiming a Keogh, SIMPLE IRA, or SEP deduction. The equation estimates the probability a taxpayer contributes to the plan in one of several different contribution amount categories, (*e.g.* \$501 to \$1,000).

The Joint Committee staff also imputes a desired IRA contribution amount to all returns claiming the maximum contribution. Form 5498 information returns are used to identify taxpayers contributing the maximum amount to a Roth IRA. Experience has shown that many taxpayers making the maximum contribution would contribute more if allowed. The imputation method is to draw on the saving choices of similarly situated self-employed taxpayers and to estimate a probit equation for imputing a contribution level, conditional on the contribution being greater than the maximum IRA contribution amount.

Finally, the Joint Committee staff must split the combined desired IRA contribution into a desired deductible traditional IRA contribution and a desired Roth IRA contribution. For returns with a deductible traditional IRA contribution or Roth IRA contribution below the maximum and with either a modified AGI below the deductible traditional IRA ceiling or no employer-sponsored retirement plan, the desired deductible traditional IRA and Roth IRA contributions are equal to the actual deductible traditional IRA or Roth IRA contributions. Three possible outcomes apply to returns with a modified AGI above the deductible traditional IRA ceiling and below the ceiling for making a full Roth IRA contribution. If the taxpayer does not include an actual Roth contribution, the assumption is that, for most taxpayers, the entire desired IRA contribution is a desired deductible traditional IRA contribution. However, if the taxpayer included a contribution to a Roth IRA, some portion of these taxpayers presumably switch to a deductible traditional IRA contribution. For the remaining taxpayers, the desired IRA contribution is assumed to be a Roth IRA contribution. For a portion of the taxpayers excluded from a Roth IRA because the taxpayer's modified AGI is above the ceiling, the desired IRA contribution is a desired deductible traditional IRA contribution; for the remaining portion of such taxpayers, the desired IRA contribution is assumed to be a Roth IRA contribution.

F. Income Imputed For Inclusion In The Joint Committee Staff's Expanded Income Measure

For distributional analyses, the Joint Committee staff classifies returns by an expanded income measure that includes certain income sources not reported on filed income tax returns or on information returns.³⁸ In particular, the measure includes imputed amounts for workers' compensation, tax-favored employer and employee contributions to health and life insurance plans, the insurance value of Medicare benefits, and the incidence of the corporate tax on the taxpayer.

Workers' compensation.—Imputed income attributable to workers' compensation is obtained from the statistical match to the CPS described in Part III. C, above.

Value of Medicare benefits.—The insurance value of Medicare benefits is obtained from a two-step process. First, the Joint Committee staff imputes three Medicare enrollment status markers to individuals on the ITM. The three status markers correspond to enrollment in Medicare Part A, Medicare Part B, and Medicare Part D. Second, the average dollar value of Medicare benefits is imputed to the enrollees based on information received annually from the CBO.

The ITM's target for the number of Medicare enrollees comes from the annual Medicare Trustees' Report, as well as statistics provided by the Center for Medicare and Medicaid Services.³⁹ Nearly everyone aged 65 and over is enrolled in Medicare Part A. The Joint Committee staff assumes everyone aged 65 and over receiving Social Security benefits is enrolled in Medicare Part A. To match the target number of individuals age 65 and over enrolled in Medicare Part A, the Joint Committee staff randomly assigns Medicare Part A enrollment status to those individuals age 65 and over not receiving Social Security benefits.

Disabled people under the age of 65 who are receiving Social Security disability benefits may qualify for Medicare Part A, but generally only after a two-year waiting period. A link to Form SSA-1099 information returns identifies people receiving Social Security disability benefits. To match the target number of disabled persons under age 65 enrolled in Medicare Part A, the Joint Committee staff randomly assigns Medicare Part A enrollment status to individuals from age 25 through age 64 who are receiving Social Security disability benefits.

³⁸ For more information on the expanded income definition used by the Joint Committee staff, see Joint Committee on Taxation, *Overview of the Definition of Income Used by the Staff of the Joint Committee on Taxation in Distributional Analyses* (JCX-15-12), February 8, 2012, and Joint Committee on Taxation, *Modeling the Distribution of Taxes on Business Income* (JCX-14-13), October 16, 2013.

³⁹ See www.cms.gov/Research-Statistics-Data-and-Systems/Research-Statistics-Data-and-Systems. The ITM's targets are based on the number of Medicare enrollees living in the United States plus a small increase for overseas filers.

Approximately 93 percent of people enrolled in Medicare Part A are also enrolled in Medicare Part B and approximately 350,000 people receive Part B but not Part A. To match these figures, the Joint Committee staff randomly selects approximately 93 percent of the individuals enrolled in Medicare Part A in the ITM to also be enrolled in Medicare Part B, and randomly assigns Medicare Part B enrollment status to the pool of individuals age 65 and over who are not enrolled in Medicare Part A.

Of the population enrolled in Medicare Part A or Part B, approximately 73 percent are also enrolled in Medicare Part D. (Only individuals enrolled in Medicare Part A or Medicare Part B, or both, are allowed to enroll in Medicare Part D.) The Joint Committee staff assigns Medicare Part D enrollment status to individuals in the ITM based on a probit model estimated with MEPS data. Independent variables in the model include filing status, presence of dependents, presence of earnings, presence of pension income, presence of dividend or interest income, and the dollar amount of family income.

Once the Medicare enrollment status markers are imputed to individuals in the ITM, the next step is to impute the dollar value of benefits. Each year, the CBO provides estimates of the average value of the benefits of each of the three Medicare types for each year in the Congressional budget period. All Medicare enrollees are imputed the same benefit amount, regardless of health status. However, Medicare Part B and Part D enrollees are required to pay a premium for participating in the program. The Center for Medicare and Medicaid Services provides estimates of the standard premium amounts for both Part B and Part D for most years in the Congressional budget period.⁴⁰ The premium increases for people with higher incomes. The Joint Committee staff follows Medicare's formulas and calculates each person's premium amount.⁴¹ The value of Medicare benefits included in expanded income is net of these premium amounts.

Employer Contributions to life insurance.—In general, employers can provide their employees with an annual life insurance policy of up to \$50,000, the premium value of which is excluded from income. The Joint Committee staff makes separate imputations of the excluded premium value for taxpayers in the civilian workforce and taxpayers in the military.

The imputation for employer contributions to life insurance is based on participation rates observed in the Bureau of Labor Statistics' Employer Costs and Employee Compensation Survey.⁴² According to the survey, 0.2 percent of total compensation paid to all civilian workers

⁴⁰ Estimates for the last two years of the budget period are not available. The Joint Committee staff imputes the premium amounts for these years by extrapolating from the last available premium amount and using a medical cost deflator.

⁴¹ Certain Medicaid and other low-income enrollees of Medicare may be eligible for a low-income subsidy to offset the premium requirement. At present the ITM does not account for those subsidies. In addition, in 2011 and 2012 some Medicare Part B and Part D enrollees paid less than others due to regulatory actions. The ITM adjusts premiums for those enrollees affected by these regulatory actions.

⁴² See www.bls.gov/news.release/ebs2.t05.htm, and www.bls.gov/news.release/ecec.t01.htm.

consists of life insurance benefits. The Joint Committee staff uses this percentage to target the overall amount of premiums excluded. As explained above, data are available on a worker's firm size and industry by linking Form W-2 returns to Form 941 data. The Joint Committee staff randomly assigns life insurance benefits to employees based on these participation rates.

For firms that do provide life insurance benefits, a common practice is to provide a policy the death benefit of which is approximately equal to the employee's wages. The excluded premiums an employee's employer-provided life insurance policy imputed to the ITM is capped at the premium cost of a life insurance policy equal to his or her total wages or \$50,000, whichever is less. To measure the employer's contribution, the Joint Committee staff uses the premium cost of \$50,000 of group term life insurance coverage offered by the U.S. Department of Veterans Affairs.⁴³ The price varies by five-year age classes. For example, the employer's contribution toward an employee's \$50,000 policy would be \$48 per year for a 27-year old employee and \$402 per year for a 57-year old employee.

The Joint Committee staff uses a different methodology to impute life insurance premium costs to military personnel. Form W-2 information in the ITM identifies military personnel. A member of the armed services can purchase up to a \$400,000 life insurance policy using the subsidized rate of 6.5 cents per \$1,000 of coverage per month. Active duty military personnel currently serving in a war zone do not contribute anything towards the policy. Each year, the military services request an appropriation from Congress to make up the shortfall between the insurance premiums received and death benefits paid. This appropriation is, economically, the total value of life insurance benefits given to all military personnel for that year. The long-term average appropriation has exceeded \$300 million per year. The Joint Committee staff calculates the net premium cost of life insurance using the same price per \$50,000 used for civilians and assumes all military personnel purchase the full \$400,000 policy and pay a premium at the subsidized rate. These values are reduced proportionally such that the total value of the imputed subsidy equals the appropriated subsidy.

Employer contributions to health plans.—Information on employees receiving employer-sponsored health coverage is obtained through a statistical match between the ITM's tax data and the MEPS data as explained in Part III. C, above. The Joint Committee staff has worked with the Department of Health and Human Services to obtain tabulations providing the distributions of health premium expenses for several categories of insurance. The health premium expenses are broken out by excludable amounts paid by the employer, excludable amounts paid by the employee, and after-tax amounts paid by the employee.

Incidence of corporate taxes and passthrough taxes.—As used by the Joint Committee staff, the concept of expanded income is a current-year, pre-tax and transfer income concept, expressed in nominal dollars.⁴⁴ In the absence of business taxes, capital owners receive higher

⁴³ See www.benefits.va.gov/insurance/vgli_rates_new.asp.

⁴⁴ Joint Committee on Taxation, *Overview of the Definition of Income Used by the Staff of the Joint Committee on Taxation in Distributional Analysis* (JCX-15-12), February 8, 2012.

incomes than they report on their individual tax returns and wage earners receive higher wages. Therefore, the pre-tax and transfer income concept suggests there should be an increase in the income shown on the tax return by the amount of corporate income taxes that are effectively borne by individuals.

Expanded income is further adjusted to reflect the Joint Committee staff's incidence analysis with respect to business income of passthrough entities and sole proprietorships. Because passthrough owners report the passthrough income on their individual tax returns and then pay the tax with their personal income taxes, this treatment accurately reflects a pre-tax and transfer income concept of the tax burden were borne entirely by the passthrough owner. However, because the Joint Committee staff estimates that five percent of the pass through tax is actually borne by workers rather than owners, the income reported by passthrough owners on their individual tax returns actually exceeds that in a pre-tax environment. Thus, taxes attributable to business activities of passthrough entities are accounted for in expanded income by reducing the expanded income of passthrough owners by five percent of the amount of taxes attributable to their passthrough entities and increasing the expanded income of workers by that same amount. The same is true for income received by owners of sole proprietorships.

The description of the imputations for the incidence of corporate taxes and taxes on the income of businesses organized as passthrough entities is described in JCX-14-13, *Modeling the Distribution of Taxes on Business Income* (October 16, 2013).

G. Other Imputations to the ITM

The ITM contains a wide assortment of other imputations, which are briefly summarized here.

Roth retirement savings.—Participants in employer-sponsored retirement savings plans (e.g., section 401(k) plans) may make Roth contributions to the plan. That is, the contributions to the plan are made in after-tax dollars. Any Roth funds in the plan, including any earnings on contributions to the plan, generally may be distributed tax-free. A section 401(k) plan must elect to offer Roth features as part of the plan. If it does, the participants have a choice to continue making traditional tax deferred contributions, switch to making Roth type contributions, or do some combination of the two. Even though the ability to make Roth contributions to tax-deferred accounts occurred several years ago, evidence suggests the adoption of Roth section 401(k) accounts is accelerating. For the purposes of modeling Roth contributions on the ITM, the Joint Committee staff randomly selected taxpayers with section 401(k) type accounts to switch to Roth contributions to hit a forecast target for total Roth contributions, with a growing number of people switching over the budget period. In addition, the Joint Committee staff has imputed a reduction in taxable retirement plan distributions, with increasing reductions over the budget period.

Dependent care expenses.—Many employers offer a cafeteria plan under which an employee may contribute pre-tax amounts to a flexible spending account for qualified dependent care expenses. Such contributions are reported on Form W-2, and the cap on contributions per return is generally \$5,000. Alternatively, taxpayers with qualified dependent care expenses may qualify for a credit for their expenses of up to \$3,000 for taxpayers with one qualifying

dependent or \$6,000 for taxpayers with two or more qualifying dependents. These limits are reduced by any contributions to dependent care flexible spending accounts.

A number of taxpayers with dependent care benefits under a cafeteria plan do not file Form 2441 Child and Dependent Care Expenses with their return. The presumption is that the contributions to the cafeteria plan fully cover any dependent care expenses up to the credit limitations. The Joint Committee staff imputes the otherwise missing pieces of information necessary to calculate a dependent care credit if the taxpayer did not have access to a cafeteria plan. In particular, the imputations include the number of qualifying children and the amount of qualifying dependent care expenses.

Imputations to provide detail to information reported to the IRS.—For some policy analysis it is important to have detail beyond that available in information reported to the IRS. For example, the American Recovery and Reinvestment Act of 2009 (“ARRA”)⁴⁵ transformed the Hope Scholarship Credit into the American Opportunity Tax Credit. Under ARRA, the definition of qualified tuition expenses was expanded to include course materials. Taxpayers do not have to report their qualifying expenses separately, but policy analysis may require such detail. The course material expenses are imputed to the ITM. The average expenses for books and supplies reported by the College Board in “Trends in College Pricing” are used to impute course material expenses for each student with tuition on the ITM.⁴⁶

Imputations to Form W-2.—In general, a successful Form W-2 match for a return occurs when the sum of the wages, salaries, and tips on the Form W-2 linked to the primary and secondary taxpayers on the return equals the reported amount of wages on Form 1040. Not all returns in the ITM’s data have successful Form W-2 matches.

Cases exist in which the sum of the Form W-2 wages is less than reported wages. In the case of joint returns, the wages for which no Form W-2 exists must be allocated to either the primary taxpayer or the spouse. If the return also included a Schedule SE, Self-Employment Tax, the earnings reported on Schedule SE can determine which spouse had earned the wages. If the return reported a nonqualified stock option as a margin entry on Form 1040, the Joint Committee staff assumes the wages belong to the spouse with the greatest wages as measured by the existing Form W-2 match. If the shortage of Form W-2 wages is less than \$25,000, the Joint Committee staff assumes the return is missing one Form W-2, and allocates the wages to the spouse currently without wages. If both spouses have a Form W-2 link, the wages for which there is no Form W-2 are assigned to the primary taxpayer. If the shortage is greater than \$25,000, the probability that the missing Form W-2 came from the primary taxpayer is based on data from joint returns in which the link to Forms W-2 was completely successful.

In addition to allocating wages for which there is no Form W-2 to the primary taxpayer or spouse, the Joint Committee staff imputes deferred compensation amounts and a retirement plan

⁴⁵ Pub. L. No. 111-5.

⁴⁶ College Board, *Trends in College Pricing*, <http://trends.collegeboard.org/college-pricing>.

participation marker in such cases of defective Form W-2 matches. These imputations are based on the probability the missing Form W-2 would have shown a value for deferred compensation or a positive indicator for a retirement plan.

In cases where the sum of the Form W-2 wages is greater than reported wages, the Joint Committee staff tries to find the one or several Forms W-2 that account for the overage. While one cannot discount the possibility that the taxpayer is non-compliant and under-reporting his or her wages, it is possible that the taxpayer was issued a corrected (or duplicate) Form W-2 which was not identified by the IRS in the data provided.

Identification of military personnel.—Some tax legislative proposals have required the Joint Committee staff to identify those taxpayers on the ITM who are members of the armed services. Armed service members can be divided into active duty and National Guard/reservists. The payor identification number on the taxpayer’s Form W-2 identifies the taxpayer as a member of one of the armed services.

Nonresident exemptions.—The ITM’s base data includes both domestically filed tax returns, that is those returns that report a U.S. address, and tax returns filed by U.S. persons resident overseas. As noted above, the number of children between the ages of two and 15 claimed as personal exemptions exceeds the U.S. resident population for that same age cohort. The Joint Committee staff estimates the excess to be 4.2 million exemptions. Some of the gap is likely due to non-compliant reporting. However, some taxpayers legitimately claim personal exemptions for children not living in the United States. In addition, the number of adults between the ages of 27 and 40 for filers and non-filers, as measured by personal exemptions, is greater than the United States resident population by approximately 0.6 million. One likely explanation for this is a misidentification of overseas filers.⁴⁷

To address these differences, the Joint Committee staff imputes a nonresident exemption marker to exemptions reported on domestically filed returns. The marker indicates that the personal exemption does not represent a U.S resident, regardless of the reason. In the case of dependent children, the probability of selection varies by the age of the dependent and whether the child’s taxpayer identification number is an ITIN or SSN. In the case of adults aged 27 to 40, the Joint Committee staff randomly draws from returns of single filers with a reported ITIN or spouses on joint returns with a reported ITIN.

⁴⁷ A U.S. person resident abroad may report a U.S. address on his or her return even if he or she has not been resident in the United States for a long time. For example, an individual posted abroad by his or her employer, but who has retained his or her U.S. residence, may report that residence’s address on his or her return even though he or she spent no time resident in the United States for the year. Estimates of the number of U.S. citizens living abroad vary widely and abound with uncertainty. See Joe Costanzo and Amanda von Koppenfels, “Counting the Uncountable: Overseas Americans,” Migration Policy Institute, 2013, available at <http://migrationpolicy.org/article/counting-uncountable-overseas-americans>. Further, a tabulation from the Joint Committee’s 2011-based ITM shows 228,000 returns with a foreign earned income exclusion and a domestic address. In addition, 181,000 domestically filed returns received a Form W-2 issued to an overseas address.

Nursing home residents.—Nursing home residents are included in the U.S. resident population but are usually outside the scope of national surveys. For example, nursing home residents are not part of the coverage of the CPS and the MEPS. Yet many nursing home residents file tax returns. Noting such persons in the microdata is an important factor when comparing the ITM’s population to non-tax data sources. For policy analysis it may be important to distinguish taxpayers who are resident in nursing homes. Consequently the Joint Committee staff identifies the records of some taxpayers in the base data with a variable denoting their status as a nursing home resident. This status marker is achieved through an imputation to the ITM.

Prisoners.—The population covered by the ITM includes people living in prisons, most of whom do not file tax returns. Prisoners are ineligible for or do not make use of certain tax benefits. For example, prisoners generally receive their health care through the prison system and therefore would not utilize tax preferences related to health care. Because of this special treatment of prisoners, the Joint Committee staff imputes a status marker for people living in prisons. In addition, prisoners are included in the U.S. resident population but are usually outside the scope of many national surveys such as the CPS and the MEPS. The presence of prisoners in the Joint Committee’s microdata files is another reason why the CPS population differs from the population represented by the ITM.

IV. PROJECTING DATA FOR THE BUDGET PERIOD

To forecast the effects of proposed changes to the Internal Revenue Code accurately, the ITM must be “aged” or extrapolated to the future years that policy makers view as relevant. Generally, the Joint Committee staff generates an extrapolated database for each of the years between the tax year from which the data is collected until the end of the 10-year budget period. For the 2014 edition of the ITM, the extrapolated database ran from years 2012 through 2024.

Typically, the Joint Committee staff receives new economic assumptions from the CBO for the upcoming budget period in late December or early January of each year. In particular, the CBO provides forecasted estimates of National Income and Product Account (“NIPA”) variables for each year in the budget period. The CBO forecast includes projections of individual income tax and payroll tax receipts. These macroeconomic and receipts forecasts provide the basis for the baseline projections that the Joint Committee staff uses to derive the growth of the many specific components of the ITM. In some cases, specific CBO forecasted variables serve as components in the ITM. For example, the CBO forecast provides year-by-year estimates of the consumer price index, personal interest income, and net positive capital gain income. Further, the CBO provides estimates of the number of individuals receiving employer-provided healthcare benefits and health insurance policy holders, by detailed insurance type, as well as the number of uninsured individuals in the United States. In addition to demographic and economic forecasts from the CBO, the Joint Committee staff also obtains population estimates from the Census Bureau. In a typical year, by the end of January, the extrapolation process is complete and the ITM is ready for use in policy analysis.

The Joint Committee staff uses the CBO’s economic assumptions to generate new growth rates and targets for key variables on the ITM. The ITM is forecast to cover the 10-year budget period. That is, the CBO’s forecast provides a macroeconomic picture of the economy year-by-year for each year of the budget period. The Joint Committee staff adjusts the microeconomic picture of taxpayers represented by the base data in the ITM such that the year-by-year microeconomic picture is consistent with the CBO’s macroeconomic picture. This process is called extrapolation, the mathematics of which is explained in more detail in the Appendix. The extrapolation process is designed to produce a sample file of tax returns that one would expect to see in any of the future years in the budget period.

The Joint Committee staff has devoted a considerable amount of time and resources developing models that can explain, in a statistical sense, the changes in the distributions of incomes. Goals of the extrapolation process include matching estimate totals for various sources of income in the aggregate, as well as matching estimated totals of wages, dividends, and capital gains by income class. In 2012, the Joint Committee staff engaged in a major effort to re-examine the methodology used to estimate expected changes in the distributions of these income sources. This effort resulted in the development of econometric equations that predict the share of each income source within several modified total income classes. Previous individual income tax samples produced by SOI provide the data used for estimating shares of modified total income.

For the analysis of shares of modified total income, the Joint Committee staff defines modified total income as total income appearing on a tax return less capital gains and Social

Security benefits included in AGI. Modified total income starts with gross income before any of the statutory adjustments permitted to determine AGI. As a group, the adjustments made in determining AGI have not been stable over time. Since the enactment of the Tax Reform Act of 1986,⁴⁸ Congress has modified AGI to make adjustments for educator expenses, student loan interest, tuition and fees for higher education, moving expenses, health savings accounts, one half of self-employment taxes, and domestic production activities, among other changes.⁴⁹ Because these adjustments have changed over time, they are excluded from modified total income. Likewise, the Joint Committee staff excludes capital gains from modified total income because gains vary greatly from year to year. Further, the timing of capital gains realizations is under the control of the owners more than any other income source. Social Security benefits and Tier I Railroad Retirement benefits are also excluded from the income share analysis because the percentage of such benefits being included in AGI has been rising over time.⁵⁰ As part of the process of extrapolating the base data for the budget period to be consistent with the CBO macroeconomic baseline, the Joint Committee staff attempts to match estimated future values of the different components of income, by income quantile, as follows:

- Taxpayers reporting negative incomes;
- Taxpayers reporting no income up to those taxpayers in the 10th income percentile;
- 10th percentile up to the 20th percentile;
- 20th percentile up to the 40th percentile;
- 40th percentile up to the 60th percentile;
- 60th percentile up to the 80th percentile;
- 80th percentile up to the 90th percentile;
- 90th percentile up to the 95th percentile;
- 95th percentile up to the 99th percentile;
- 99th percentile up to the 99.5th percentile;

⁴⁸ Pub. L. No. 99-514.

⁴⁹ Ideally, for an income share analysis, the analyst would like a “constant law” measure of income. It is also true that the tax rules for reporting items included in total income have not remained constant since 1986. However, the effects of changes in reporting requirements are difficult to measure.

⁵⁰ Social Security and Tier I Railroad Retirement benefits became taxable beginning in 1984. However, benefits are only partially included in AGI and, generally, only for taxpayers with modified AGI above \$25,000 (\$32,000 for joint returns). Under the original 1984 provision, not more than 50 percent of benefits received is included in income. In 1993, Congress increased the amount of inclusion (up to 85 percent of benefits received) for taxpayers with modified AGI above \$34,000 (\$44,000 for joint returns). These thresholds are not indexed for inflation. As nominal incomes rise because of inflation and real economic growth, more and more benefits are included in AGI. Further, taxpayers with incomes below the thresholds are generally not required to report the benefits they receive on their Federal income tax returns.

- 99.5th percentile up to the 99.9th percentile;
- 99.9th percentile and above; and
- Dependent taxpayers regardless of income.

The extrapolation process is a two-step procedure. In the first step, each of the dollar variables in the underlying base data file is adjusted by the expected average per-capita growth of that variable. For example, if under the CBO forecast, the average dividend income for a return is expected to grow by four percent annually from the base period's value, then each return's dividend income value is adjusted upward by four percent annually. Separate growth factors are applied to different income sources or deductions. Overall, the Joint Committee staff has developed 29 separate growth factors for the variables in the base data. Generally the same growth factor specified for a variable is applied to all returns in the base data. The growth factor for wages is an exception to this general procedure. By examining the growth in wages over time, the Joint Committee staff has learned that the rate of growth of wage income for returns with low wages is frequently different from that of returns with high wages. Separate growth factors apply for several different wage classes.

What are Sample Weights?

Most microdata sets are obtained by drawing a sample of records from the population. A sample weight is the inverse of the probability of being selected into the sample. For example, if an observation has a one-in-thousand chance of being selected, the sample weight for that selected observation is 1,000.

The second step is to adjust the sample weights of returns in the ITM to match each of the annual specific estimated future values for baseline variables. Here, the Joint Committee staff employs a non-linear optimization algorithm. The estimated future values for the baseline variables serve as targets for the optimization algorithm. The algorithm defines a penalty function. The penalty function assigns a numerical value to the degree to which the sample weights must be modified for the projections to achieve each and every target. The objective is to minimize the penalty function subject to the constraint that all targets are simultaneously achieved. That is, projections deviate from the original sample weights as little as possible. For example, in extrapolating to a year with a forecasted weaker economy, weights on returns with high wages or capital gains might be reduced, while weights on returns with unemployment insurance would likely be increased.

The Joint Committee staff currently attempts to match estimated future values (targets for the optimization algorithm) of approximately 100 economic and demographic variables for each year from the base year through the end of the budget period. For the 2014 edition of the ITM, this meant the Joint Committee staff established estimated future values for baseline variables for each year for 2012 through 2024. These estimated future values are generally not specific components of the CBO baseline economic forecast, but rather they are values of baseline variables in the ITM that are consistent with the CBO's economic forecasts. Estimated future values of variables that the Joint Committee staff matches through this extrapolation process for the ITM include demographic variables, the number of tax filing units with certain dollar-valued

variables, and the dollar value of certain variables. Baseline variables matched through this extrapolation process include:

- U.S. resident population, by detailed age cohorts;
- The number of tax filing units, by filing status;
- The number of personal exemptions claimed for dependents;
- The number of tax filing units claiming an earned income tax credit, by number of children;
- The number of tax filing units claiming a dependent care credit;
- The number of itemizers claiming a mortgage interest expense deduction;
- The number of tax filing units with unemployment compensation;
- The number of tax filing units with a capital loss included in AGI;
- The number of tax filing units with a student loan interest deduction;
- The number of tax filing units with employer-provided health care benefits or health insurance policy holders by detailed health insurance types;
- The number of individuals under age 65 without health insurance;⁵¹
- The dollar value of wages by detailed income classes of tax filing units;
- The dollar value of interest income;⁵²
- The dollar value of dividends by detailed income classes of tax filing units;
- The dollar value of positive capital gains included in AGI by detailed income classes of tax filing units;
- The dollar value of Social Security and Tier I Railroad Retirement benefits received;
- The dollar value of business income and business losses by sole proprietors;
- The dollar value of business income and business losses reported on Schedule E;
- The dollar value of IRA deductions;
- The dollar value of home mortgage interest expenses claimed by itemizers; and
- The dollar value of charitable giving by itemizers, as well as non-itemizers.

⁵¹ The estimated future values for health insurance status and for the uninsured population are full-year equivalents. For example, consider a person who is covered by a single non-group health insurance plan for nine months of a year as a policy holder and is uninsured for the remaining three months. In this instance, three fourths of this person's weight would count towards the estimated future value for single non-group health insurance and one fourth of his weight would count towards the estimated future value for the uninsured population.

⁵² In prior editions of the ITM, the Joint Committee staff attempted to match estimated future values of interest income by detailed income classes of filers. With the low interest rates of recent years the estimated equations for projecting interest income by income class lost significant statistical predictive power. Consequently, the Joint Committee staff currently only matches estimated future values of aggregate interest income.

V. THE ITM'S TAX CALCULATORS

The tax calculators

The tax calculators are the heart of the ITM. One calculator calculates baseline Federal individual income tax liabilities. A second calculator calculates liabilities under a proposed law. In addition, the ITM contains two corresponding calculators for fiduciary returns. The tax calculators are integral as the starting point for the analysis of taxpayer behavioral change in response to a proposed change in tax law. The tax calculator that calculates baseline Federal income tax liabilities provides the revenue baseline against which estimated changes in liabilities are reported to Members of Congress as revenue estimates of proposed legislation.

Each calculator takes the information from each potential tax filing unit in the base data file, and using a set of tax parameters, calculates that tax filing unit's Federal individual income tax liability under the appropriate tax plan. The tax calculator also computes the values of several variables that affect tax liability. In essence, the tax calculator replicates the steps found on Form 1040 (or Form 1041) and the accompanying forms, schedules, and worksheets.

The tax calculator chooses those tax options that minimize each tax filing unit's tax liability. For example, for each tax filing unit, the calculator determines the level of itemized deductions, as well as the standard deduction, and generally gives that tax filing unit the higher of the two. Note that, because of the AMT, in some circumstances, a taxpayer will be better off claiming itemized deductions instead of the standard deduction, even though the taxpayer's total itemized deductions are less than the standard deduction amount. As another example, some taxpayers with tuition expenses for higher education can use those expenses as an adjustment to AGI or for an education tax credit, but not both. The tax calculator chooses the method that produces the lowest tax liability.

The tax calculator can trace through most of the interactions between any income source and the various provisions of the tax code. However, it does have its limitations. The calculator does not simulate the effects of a change in tax law on a number of important provisions in the Code. For example, the calculator does not automatically capture changes to depreciation rules, changes to rules affecting intertemporal variables such as carry-forwards, changes to information reporting requirements, changes to rules about withholding, or changes to rules about estimated tax payments. The Joint Committee staff computes the effects of changes to such provisions using additional procedures outside of the framework of the ITM.

What Does a Revenue Estimate Measure?

A common misunderstanding that arises in reporting revenue estimates to policy makers is the distinction between a revenue estimate and a receipts forecast. Generally, when the economy is growing, the CBO forecast of baseline receipts is growing. A negative revenue estimate of a tax proposal does not mean that the Joint Committee staff is predicting receipts will fall from current year levels. It means that receipts are predicted to grow more slowly if the proposal is enacted than they are projected to grow under present law in the baseline receipts forecast. Receipts would only decline if the revenue estimate were for a loss in revenues that was greater than the underlying growth in baseline receipts.

Pre-data processing

Before any of the tax records are read, the ITM first computes or determines the values for the tax rate schedules and the many other tax parameters used by the calculator. The ITM contains over 230 tax parameters. The rate brackets, as well as many of the parameters, are adjusted for inflation. Further, many tax parameters change from year to year to reflect the phase-ins and phase-outs of many tax provisions. The Joint Committee staff sets the parameters according to the rules specified in the Code, and in the case of indexed parameters, consistently with the CBO macroeconomic forecast for inflation.

VI. USING THE ITM TO ESTIMATE THE REVENUE EFFECTS OF PROPOSED CHANGES IN TAX POLICY

A. Overview

The Joint Committee staff considers taxpayers' behavioral responses to proposed changes to the tax laws. However, the tax calculators in the ITM generally do not model behavioral responses of individuals to changes in disposable income or tax rates. For example, the ITM does not model changes in charitable giving due to changes in tax rates or income. Such behavioral effects are usually accounted for "off-model." However, in some cases, behavioral responses can be incorporated in the ITM. For example, the ITM often can be programmed to capture expected changes of capital gains realizations in response to changes to the marginal tax rate on capital gains. Because the tax calculator in the ITM is complex by itself, adding behavioral response equations inside the ITM can sometimes slow down its operation, or make it more difficult to error-check simulations. However, in some cases, the added information to be gained by assigning behavioral responses to each individual affected within the ITM, rather than treat all such individuals in aggregate, outweighs these disadvantages. One determinant of whether such responses are imbedded inside the ITM calculator is the level of detail measured in empirical research relating to taxpayer behavior.

Another limitation of the ITM is that the calculator can only simulate the effects of proposed tax changes using the data it currently has. That is, the calculator uses information reported on filed tax returns, reported on linked information returns, or information created through imputations. Thus, for example, the calculator would have trouble with a proposal to limit (or enhance) the tax preference for charitable giving made to a specific class of organizations such as natural disaster relief organizations. When reporting charitable giving, taxpayers do not distinguish their giving to different types of organizations. The Joint Committee staff could develop an imputation of giving by type of organization and undertake the estimate on model. However, time constraints might make this approach impractical. As a result, such a proposal would likely be estimated off-model. Even if an off-model estimate is used, the ITM can be informative. For example, the ITM could estimate effective marginal tax rates that are appropriate to taxpayers affected by the proposal.

What Does "On Model" Mean?

What Does "Off Model" Mean?

Estimates of individual tax policy changes that are completed almost entirely using the ITM are often referred to as "on-model" estimates. Estimates completed using some other model, such as a custom-built calculator applied to a specialized data source, or a set of spreadsheet calculations built around tabulations coming from the ITM or another data source, are referred to as "off-model." Frequently, estimates of changes to the individual income tax begin with initial results determined by the ITM's tax calculator - the "on-model" part of the estimate - and are completed on a spreadsheet that applies appropriate behavioral responses to the calculator results, *i.e.*, the "off-model" portion. Estimates that require data not available on the ITM are primarily done "off-model."

B. Revenue Estimates Using the ITM: Illustration Based on a Proposal to Increase All Individual Income Tax Rates on Ordinary Income by One Percentage Point

A proposal to change statutory individual income tax rates is the type of proposal for which the ITM is crucial. The following example is from work done to provide estimates for a recently published CBO publication. Under present law, the regular individual income tax has seven statutory marginal income tax rates ranging from 10 percent to a top rate of 39.6 percent.⁵³ Special preferential rates apply to capital gains and dividend income. In one option the CBO considered increasing all tax rates on ordinary income for the regular individual income tax by one percentage point.⁵⁴ The rates for the individual AMT would be unchanged. For the 10-fiscal-year budget period 2015 through 2024, the Joint Committee staff estimated that this option would increase revenues by \$689.3 billion.

To estimate this proposal, the Joint Committee staff used the ITM to make an initial calculation of the change in revenue assuming no behavioral responses.⁵⁵ For tax year 2015, the ITM calculated that an increase in all the tax rates on ordinary income by one percentage point would increase the regular income tax liability (before credits) by a total of \$65.6 billion dollars.

Individuals pay the greater of their tax liability under the regular tax or the tentative minimum tax.⁵⁶ An increase in regular income tax rates with no change in the tax rates for the AMT will reduce or eliminate the AMT liability for some taxpayers. From the ITM, the Joint Committee staff estimated that a one percentage point increase in the regular income tax

Reported Estimates

The Joint Committee staff generally provides the revenue estimates for all changes to the Internal Revenue Code, as well as estimates for off-Code revenue provisions, whether these estimates are reported by the Joint Committee staff or are reported by the Congressional Budget Office.

⁵³ For tax year 2015, the 10-percent rate applies to taxable income under \$9,225 for single filers and \$18,450 for married couples filing a joint return. The 39.6 percent rate applies to taxable income above \$413,200 for single filers and \$464,850 for married couples filing a joint return. The seven statutory marginal income tax rates for the regular individual income tax are: 10 percent, 15 percent, 25 percent, 28 percent, 33 percent, 35 percent, and 39.6 percent. The individual AMT has two statutory rates: 26 percent and 28 percent.

⁵⁴ This proposal was reported recently by the CBO in Congressional Budget Office, *Options for Reducing the Deficit: 2015 to 2024*, November 2014, “Option 46,” p. 29, available at http://www.cbo.gov/sites/default/files/cbofiles/attachments/49638-Budget_Options.pdf.

⁵⁵ As reported in Part V, the ITM does incorporate some taxpayer optimization calculations. For example, the model determines a taxpayer’s optimal choice between the standard deduction and itemizing deductions, including the effect of the alternative minimum tax on this decision. This taxpayer optimization relative to the choice to claim the standard deduction is not considered a behavioral response for the purpose of this initial step of the estimates.

⁵⁶ A taxpayer’s AMT liability is the excess (if any) of the taxpayer’s tentative minimum tax liability over the taxpayer’s regular tax liability.

rates would reduce AMT liabilities by approximately \$7.3 billion in tax year 2015. The increase in the regular tax rates would reduce the number of taxpayers affected by the AMT in 2015 by 1.3 million taxpayers. (Another 1.1 million taxpayers would see their AMT liability decrease, but remain positive, as their regular tax liability rises). Due to the rise in tax liability, some taxpayers would be able to further utilize non-refundable tax credits. Under the proposal, the ITM projected that an additional \$0.3 billion in non-refundable credits would be claimed by taxpayers in tax year 2015. The net result of the initial simulation from the ITM for the proposed one percentage point increase in all regular income tax rates, assuming no behavioral changes by taxpayers, is an increase in revenues of \$58.1 billion for tax year 2015. Obtaining this result was the first step in this estimate. However, the final estimate included a behavioral response to the rate change.

In providing conventional estimates, the Joint Committee staff (consistent with analysts at the CBO and the Office of Tax Analysis of the Department of Treasury) follows the long-standing scorekeeping convention that a proposal does not change total income. Within this modeling framework, the Joint Committee staff holds Gross National Product (“GNP”) fixed.⁵⁷ Even though GNP is held constant, shifts in economic activity across sectors and changes in timing of activity in response to proposed tax changes are included in the conventional estimates. In response to changes in marginal income tax rates, behavior changes such as those that lead to tax avoidance or tax evasion are included in the estimates. For example, an ordinary income tax rate increase may result in an increased use of deferred compensation or an attempt to convert ordinary income into capital gain income. That is, taxpayers alter the timing and composition of the taxable income they report in response to changes in marginal tax rates. Economists estimate the magnitude of this behavioral response and refer to it as the elasticity of taxable income.⁵⁸

⁵⁷ Conventional estimates are measured relative to the CBO’s macroeconomic baseline forecast for the 10-year budget period. Changing total income would change one of the macroeconomic aggregates in the budget baseline. From the 108th Congress through the 113th Congress, House Rule XIII has required the Joint Committee staff to provide macroeconomic analysis of legislation reported by the House Committee on Ways and Means. In a macroeconomic analysis, the Joint Committee staff projects how macroeconomic aggregates such as labor supply, total investment, total consumption, and total income may change as a result of the proposed legislation. The House of Representatives has modified House Rule XIII for the 114th Congress. Under the rules as modified, for certain legislation, the Joint Committee staff will report estimated changes in Federal receipts that result from changes in these macroeconomic aggregates. For a summary of the macroeconomic models used by the Joint Committee staff, see: Joint Committee on Taxation, *Summary of Economic Models and Estimating Practices of the Staff of the Joint Committee on Taxation* (JCX-46-11), September 19, 2011. The Joint Committee staff provided a macroeconomic analysis of the “Tax Reform Act of 2014,” See, Joint Committee on Taxation, *Macroeconomic Analysis of the Tax Reform Act of 2014* (JCX-22-14), February 26, 2014.

⁵⁸ There are numerous studies that have attempted to estimate the elasticity of taxable income. Emmanuel Saez, Joel Slemrod, and Seth H. Giertz, “The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review,” *Journal of Economic Literature*, 50 (1): 3-50, 2012, provide an extensive summary of the literature on taxable income elasticity estimates and discuss the many difficulties that arise in the estimation of the taxable income elasticity. Relating to estimates of long-run taxable income elasticity in the United States, they state, “[a]ttracting even more attention was the fact that the early empirical literature, focusing on the U.S. tax cuts of 1981 and particularly 1986, produced elasticity estimates large enough to suggest that, not only was the marginal efficiency cost of tax rates high, but that the United States might be on the wrong side of the Laffer curve. Subsequent research generated considerably lower estimates, in part because of better data and improved

To analyze the behavioral response of taxpayers to a one percentage point increase in regular income tax rates, it is appropriate to assess the behavioral response only of the taxpayers affected by the proposal. This means the Joint Committee staff excludes the taxpayers paying the AMT under the proposal, because their marginal tax rates remain unchanged. The Joint Committee staff uses a series of taxable income elasticities that vary by income groups. Research suggests taxable income elasticities are lower for lower income taxpayers than for higher income taxpayers. Consequently, the series of taxable income elasticities employed by the Joint Committee staff rises with income. The Joint Committee staff estimates that a one percentage point increase in the regular income tax rates will result in a decrease in taxable income of approximately \$5 billion for tax year 2015. This decrease in taxable income results in a decline in income tax revenues of approximately \$1.9 billion for tax year 2015. Combining the results from the initial calculation from the ITM with the revenue effect of the behavioral response from the tax increase, the Joint Committee staff estimates that the one percentage point increase in regular income tax rates would result in an increase in revenue for tax year 2015 of \$56.2 billion.⁵⁹

C. Revenue Estimates Using the ITM: Illustration Based on Proposal to Raise the Tax Rates on Long-Term Capital Gains and Qualified Dividends by Two Percentage Points

Under present law, long-term capital gains and qualifying dividends are taxed under a preferential tax regime with the following rates: zero percent for taxpayers otherwise taxable in the 10-percent or 15-percent tax brackets; 15 percent for taxpayers otherwise taxable in the 25-

methodology, but also because the variety of tax rate changes after 1986 facilitated separating out the impact of tax rate changes from non-tax-related changes in the inequality of pretax income. While there are no truly convincing estimates of the long-run elasticity, the best available estimates range from 0.12 to 0.40.” *Ibid.*, section 5.1, “What We Have Learned,” pages 41-42.

Henrik Jacobsen Kleven and Esben Anton Schultz, “Estimating Taxable Income Responses Using Danish Tax Reforms,” *American Economic Journal: Economic Policy*, 6(4): 271-301, 2014, provide a recent study that looks at income tax reforms in Denmark from 1984-2005. They found small behavioral responses by Danish tax filers to tax rate changes, with the estimated elasticities generally around 0.1. They suggest the modest elasticity estimates may result from the broad tax base and limited deductions under the Danish system, which provides few opportunities for tax avoidance and tax evasion.

Caroline Weber, “Obtaining a Consistent Estimate of the Elasticity of Taxable Income Using Difference-in-Differences” *Journal of Public Economics*, 117: 90-103, 2014, revisits elasticity estimates for the United States following the Tax Reform Act of 1986. She obtains estimates of the elasticity of taxable income generally between 0.8 to 1.0.

⁵⁹ The estimate of \$39 billion on page 29 of CBO, *Options for Reducing the Deficit: 2015 to 2024*, is for fiscal year 2015 (October 2014-September 2015), not tax year 2015. In the presentation of revenue estimates the Joint Committee staff adjusts the tax year estimates to fiscal year estimates in compliance with the Congressional Budget Act. To make those adjustments the Joint Committee staff studies the patterns of taxpayer wage withholding, taxpayer quarterly estimated tax payments, and backup withholding payments, in addition to taxpayer payments (or refunds received) pursuant to individual taxpayer’s annual filings of their individual tax return. A proposed change in the tax law may have a differential effect on each of these cash flows.

percent through the 35-percent tax brackets; and 20 percent for taxpayers otherwise in the 39.6-percent tax bracket.

The Joint Committee staff has used the ITM to estimate a proposal to increase the preferential tax rates on long-term capital gains and qualifying dividends by two percentage points.⁶⁰ The Joint Committee staff estimated that this option would raise \$52.9 billion over the 10-year budget window. The estimate includes the first-order effect of changing the taxation of capital gains and dividends, which is calculated using the individual tax model. This first-order effect is often called the “static effect.” However, central to the estimate is an assessment of a significant amount of behavioral change on the part of individuals in determining when to realize a capital gain and how to allocate their portfolios, and on the part of corporations in determining how to distribute earnings to shareholders.

The following describes the two estimates for increasing the tax rates on dividends and capital gains by two percentage points. To get the total effect of the proposal, which is comprised of two components (an increased tax rate on qualifying dividends and an increased tax rate on long-term capital gains), there are two approaches. Under one approach when there are two or more components the estimates could be “stacked” with one part estimated before the next component, and the next component estimated before a third component, and so on. That is, the first component is estimated ignoring any additional components. Then a second component is estimated assuming the first component has been enacted, but ignoring any other components. Alternatively, each provision can be estimated on a standalone basis with an interaction effect that is calculated separately, and included as an additional amount.

Dividend estimate

For proposals that include concurrent changes to the taxation of dividends and capital gains, the Joint Committee staff generally stacks the dividend provisions before those regarding capital gains.⁶¹ The first step in the estimate is to use the ITM as a tax calculator assuming no change in taxpayer behavior. In this example, the three tax rates that apply to qualified dividends (zero, 15, and 20 percent) are each increased by two percentage points. The difference in aggregate tax liability between this calculation and the estimated baseline receipts attributable to qualified dividend income is the first-order effect of the tax rate increase on qualified dividends, before factoring in the responses of individuals and firms.

⁶⁰ The Joint Committee staff’s revenue estimate of this proposal was reported recently by the CBO in Congressional Budget Office, *Options for Reducing the Deficit: 2015 to 2024*, November 2014, “Option 48,” p. 30, available at <http://www.cbo.gov/sites/default/files/cbofiles/attachments/49638-BudgetOptions.pdf>.

⁶¹ Proposed changes in the taxation of income from capital gains is one instance in which the Joint Committee staff adds behavioral response equations inside the ITM. That is, behavioral responses are assigned to each individual affected within the ITM. This more detailed behavioral modeling motivates the decision to stack the analysis of the capital gains component after that of the dividend component in this estimate.

The Joint Committee staff estimates that approximately \$180 billion in qualified dividends will be reported by individuals on income tax returns in tax year 2015. The first-order estimate for the tax rate increase on dividends for that year is an increase in tax liability of \$3.4 billion. In the next step of the estimate, the ITM calculates the effective marginal tax rates faced by taxpayers on qualified dividend income under both present law and the proposal. The change in effective marginal tax rates, combined with elasticities of expected taxpayer responses, allows an estimate of the magnitude of a number of behavioral responses that are estimated to occur as a result of the tax rate increase.

There is considerable research on the effects of investor-level taxes on portfolio composition and firm-level decisions on dividend payments.⁶² Evidence suggests that firms will respond to an increase in taxes on dividends by reducing dividend payouts, leading to a smaller revenue gain than implied by the first-order estimate of \$3.4 billion. Some firms will retain more earnings, some will instead reduce outstanding debt, while others may continue to distribute earnings to shareholders but alter the form by engaging in share repurchases. Each of these responses has revenue implications as well. Increased retained earnings may produce higher future capital gains tax liabilities, while share

What is an “Effective Marginal Tax Rate”?

The Internal Revenue Code specifies statutory marginal tax rates. For example, the Code specifies that in 2015, a taxpayer whose filing status is single owes 25 percent of each additional, or marginal, dollar of taxable income for taxable income greater than \$37,450 and less than or equal to \$90,750. Likewise, the Code specifies statutory preferential tax rates applicable to income from qualified dividends and long-term capital gains.

Under other provisions of the Code, otherwise allowable deductions or credits may be limited or made available to taxpayers as their income changes. As a result, an increase in a taxpayer’s gross income may cause his or her taxable income to increase by more or less than a dollar. Consequently, a taxpayer who reports an additional dollar of income may see his or her tax liability change by more than or less than the statutory marginal tax rate applied to that dollar. This incremental change in the tax liability is called the “effective marginal tax rate.”

For a detailed discussion and calculation of effective marginal tax rates in an historic context, see, Joint Committee on Taxation, *Present Law and Analysis Relating to Individual Effective Marginal Tax Rates* (JCS-3-98), February 3, 1998.

⁶² The work of James M. Poterba and Andrew A. Samwick, “Taxation and Household Portfolio Composition: U.S. Evidence from the 1980s and 1990s,” *Journal of Public Economics*, vol. 87, no. 1, January 2003, pp. 5-38, and Alan Sule, Kadir Atalay, Thomas F. Crossley, and Sung-Hee Jeon, “New Evidence on Taxes and Portfolio Choice,” *Journal of Public Economics*, vol. 94, no. 11-12, December 2010, pp. 813-823, describes individual taxpayer portfolio choice in response to different tax rates applicable to different types of investment income.

Research by Raj Chetty and Emmanuel Saez, “Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut,” *Quarterly Journal of Economics*, vol. 120, no. 3, August 2005, pp. 791-833, and Jesse Edgerton, “Four Facts About Dividend Payouts and the 2003 Tax Cut,” *International Tax and Public Finance*, vol. 20, no. 5, October 2013, pp. 796-784, estimate how U.S. domestic corporations altered their dividend payout policies in response to the enactment of lower taxes on qualified dividend income.

buybacks may lead to an increase in current capital gains tax liabilities. Lower corporate debt may reduce future taxable interest.⁶³

An increase in taxes on qualified dividends also lowers the after-tax return on such dividends held in taxable accounts. Individuals are expected to react to the tax increase by altering the mix of assets they hold and the type of account in which they hold them in order to reduce their overall tax burden. Lower after-tax yields may cause individuals to shift some dividend-paying equities to tax-preferred accounts and instead hold growth stocks (taking advantage of the tax deferral for accrued capital gains) or other types of assets, such as tax-exempt bonds.

Overall, the Joint Committee staff estimates that, between lower aggregate dividend payments by corporations and the reallocation of assets by individuals, taxable qualified dividends would fall by \$2.8 billion in response to the tax rate increase. The revenue consequences of this drop combined with changes in liability associated with share repurchases, corporate debt payments, and portfolio adjustments are estimated to reduce the first-order estimate by about \$0.5 billion. Thus, after factoring in these behavioral responses, a two percentage point increase in the tax rates on qualified dividends would increase aggregate liability by \$2.9 billion for 2015.⁶⁴

Capital gains estimate

Mechanically, stacking the capital gain provision after the dividend provision means that the Joint Committee staff effectively treats the increase in tax rates applicable to dividend income as part of baseline law for the purpose of analyzing the proposed tax increase on income for capital gains. As with the estimate of the proposed increase in tax rates on qualified dividend income, the first step in the estimate of that part of the proposal that would increase the tax rate on income from realized capital gains is to use the ITM as a tax calculator assuming no change in taxpayer behavior. That is, an increase is made to the tax rates applicable to the currently projected level of realizations (baseline capital gains realizations). At the time this estimate was made, the Joint Committee staff's baseline estimate was that there would be approximately \$660 billion of positive long-term capital gains realizations for tax year 2015. The first-order estimate for the two percentage point increase in capital gains tax rates is an increase in liability in 2015 of \$10.8 billion.

⁶³ In addition to the estimated effect on individual income tax liabilities, the Joint Committee staff's estimate of this proposal includes estimated changes in corporate tax liabilities that arise from corporations having more or less retained earnings and financing investments with more or less debt.

⁶⁴ This descriptive estimating example assumes that the proposal would be introduced, enacted, and effective on January 1, 2015. The discussion in the text ignores any potential anticipatory effects. Normally, tax law changes are prospective for a future year. The prospective nature of tax changes can have substantial impacts on taxpayer behavior. An estimate of a similar proposal that was introduced and enacted sufficiently in advance of its effective date would include anticipatory effects, such as the initiation of special dividends prior to a tax increase or a shifting of regular dividends.

However, as for estimates of the ordinary income tax rate increase proposal and the dividend proposal, the Joint Committee staff estimate incorporates taxpayer behavior with respect to the timing and composition of capital gains realizations by taxpayers in response to an increase in tax rates on long-term capital gains. Researchers have found substantial changes in realization behavior by taxpayers in response to changes in the capital gains tax rate.⁶⁵ The modeling of these types of anticipated taxpayer behavior is done on the ITM in the following series of steps:

1. Calculate effective marginal tax rates on capital gains on a taxpayer-by-taxpayer basis under present law rates;
2. Calculate effective marginal tax rates on capital gains on a taxpayer-by-taxpayer basis under the proposal;
3. Apply estimated tax elasticity of capital gain realizations to each taxpayer on the ITM's file using the calculated effective marginal tax rates from the baseline and proposal as described in steps (1) and (2) above;
4. Generate the implied new level of capital gains realizations for each taxpayer resulting from changes in the taxpayer's effective marginal capital gains tax rate;
5. Generate the change in revenues from the change in capital gains resulting from the behavior for each taxpayer;
6. Add the behavioral effects calculated in step (5) to the first-order estimate.

After calculating each of these steps, the Joint Committee staff estimates that the increase in taxes for 2015 would be \$1.6 billion instead of the first-order estimate of \$10.8 billion.

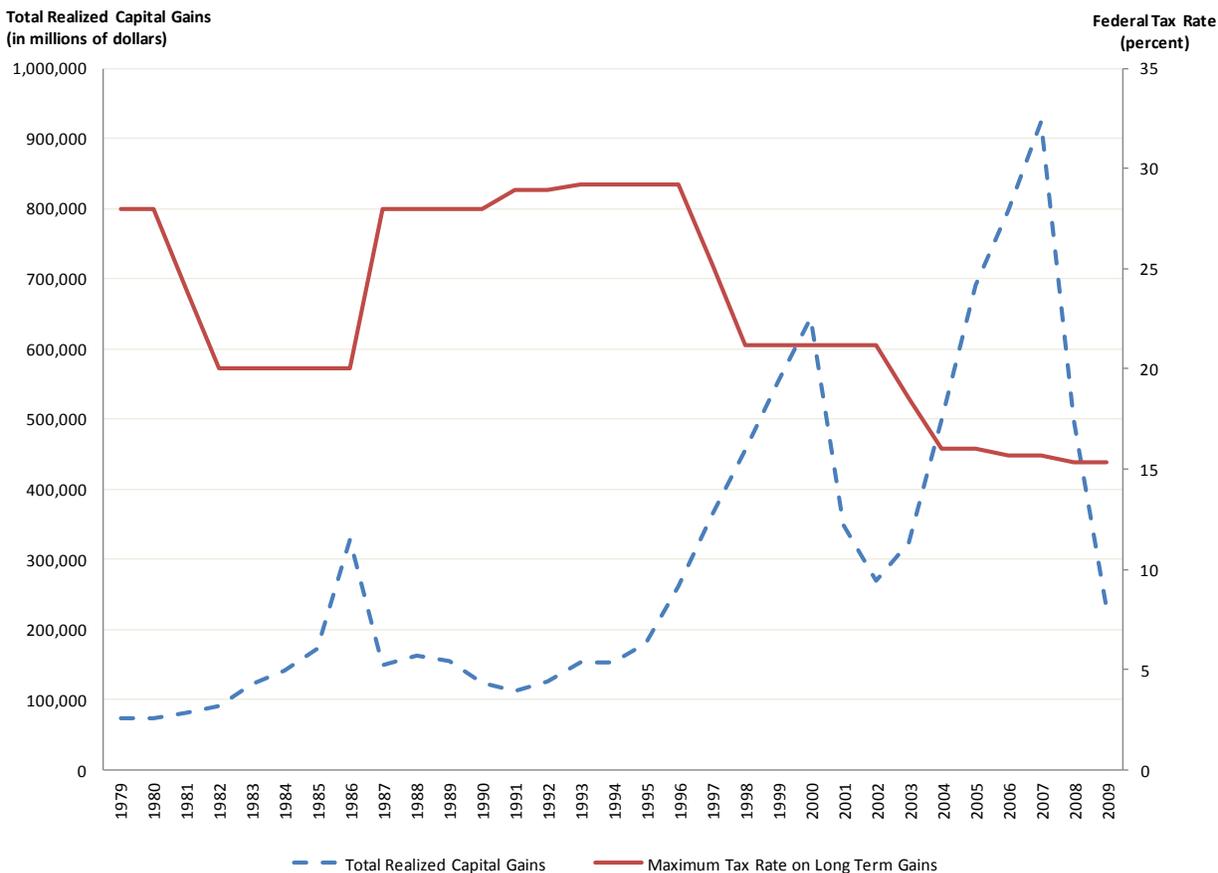
There are no anticipatory effects factored into this estimate in the preceding example. The prospective nature of a tax change can have substantial impacts on capital gain realizations. Figure 1, below, shows the aggregate capital gains realizations for the years 1979 to 2009. Prior to 1987, taxpayers excluded 60 percent of long-term gain from taxable income with the result being that taxpayers in the highest statutory tax bracket had an effective marginal tax rate on long-term capital gains of 20 percent. The Tax Reform Act of 1986 fully included long-term capital gains in taxable income, but lowered the highest statutory tax rate to 28 percent.⁶⁶ Figure 1 clearly shows that in anticipation of the 1987 increase in the capital gains tax rate, taxpayers

⁶⁵ See, Joint Committee on Taxation, *New Evidence on the Tax Elasticity of Capital Gains: A Joint Working Paper of the Staff of the Joint Committee on Taxation and the Congressional Budget Office (JCX-56-12)*, June 15, 2012 for a recent example of the empirical literature on this effect, or Joint Committee on Taxation, *Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income From Capital Gains (JCS-12-90)*, March 27, 1990 for an early discussion of the issues.

⁶⁶ The Tax Reform Act of 1986 also provided that 28 percent would be the maximum rate of tax applicable to income from long-term capital gains if the rate on ordinary income was increased.

increased their realizations in 1986. When tax law changes are enacted with a sufficiently lagged effective date, the Joint Committee staff includes an additional behavioral effect to take account of these types of anticipatory effects.

Figure 1.—Capital Gain Realizations and the Maximum Tax Rate on Long-Term Capital Gains, 1979 - 2009



Source: Joint Committee on Taxation, *Present Law and Background Information Related to the Taxation of Capital Gains (JCX-72-12)*, September 14, 2012, and Joint Committee on Taxation staff calculations.

D. Further Applications of the ITM in Joint Committee Staff Estimating and Policy Analysis

Many policy proposals that the Joint Committee staff is asked to estimate change the effective marginal tax rates and the average tax rates of some portion of individual taxpayers. Economic theory and empirical economic analysis document the importance of identifying changes in effective marginal tax rates and average tax rates in analyzing how taxpayer behavior may change in response to a tax policy change. Consequently, the ITM’s determination of effective marginal tax rates and average tax rates is a key component to many of the revenue estimates that the Joint Committee staff prepares for Members of Congress. The descriptions below briefly sketch some of the many uses of the ITM in the work of the Joint Committee staff.

Tax-free distributions from IRAs to public charities

The Joint Committee staff recently estimated the revenue effects of a proposal to permanently permit tax-free distributions from IRAs to certain public charities by individuals age 70½ and older.⁶⁷ Under the provision, a qualified charitable distribution could be excluded from gross income. A qualified charitable IRA distribution is a distribution directly from the IRA trustee to certain charitable organizations. Taxpayers taking advantage of the exclusion from income for a qualified charitable distribution may not take a charitable deduction for the amount of the distribution. The exclusion may not exceed \$100,000 per taxpayer per year. An IRA owner generally must begin to take minimum required distributions from a traditional IRA by April 1 of the calendar year following the year in which the owner attains age 70½. A qualified charitable distribution counts toward satisfying the minimum required distribution.

The ITM's base data file identifies taxpayers who take IRA distributions or hold assets in an IRA, taxpayers' charitable contributions regardless of whether they itemize contributions or claim the standard deduction, and taxpayers' ages. The ITM was used to identify which qualified taxpayers would benefit if they were to receive an exclusion from income for a qualified charitable distribution instead of including the IRA distribution in income and taking a charitable deduction.

The exclusion benefits certain taxpayers relative to the otherwise allowable itemized deduction because the exclusion reduces a taxpayer's AGI. AGI is used in determining, for example, the amount of taxable Social Security income and the phase-out of several tax deductions and credits, such as the overall limitation on itemized deductions and the phase out of personal exemptions. Also, taxpayers who make charitable contributions, but who take the standard deduction, would benefit by making a qualified charitable distribution. Certain individuals whose total deductible contributions to public charities, private operating foundations, and certain types of private nonoperating foundations exceed 50 percent of the taxpayer's AGI would benefit from the income exclusion of a qualified charitable distribution. For all such taxpayers, the exclusion lowers the cost of donating to charity and may affect their decision to make donations.⁶⁸

Not all qualified taxpayers who would benefit from making a qualified charitable distribution will elect to make such a distribution. For many taxpayers, the reduction in tax liability would be rather small. Others may not be aware of the provision or may have other

⁶⁷ Joint Committee on Taxation, *Estimated Revenue Effects of H.R. 644, the "America Gives More Act of 2015," Scheduled for Consideration by the House of Representatives on February 12, 2015*, (JCX -45-15), February 12, 2015, and Joint Committee on Taxation, *Estimated Revenue Effects of H.R. 5806, the "Supporting America's Charities Act," Scheduled for Consideration by the House of Representatives on December 10, 2014* (JCX-109-14), December 10, 2014. H.R. 644 (114th Congress) was estimated using the 2015 edition of the ITM. H.R. 5806 (113th Congress) was estimated using the 2014 edition of the ITM.

⁶⁸ For a brief discussion of the "cost of donating," see Joint Committee on Taxation, *Present Law and Background Relating to the Federal Tax Treatment of Charitable Contributions* (JCX-4-13), February 11, 2013. The ITM permits a calculation of the change in the cost of donating.

reasons for not taking advantage of the tax-free distribution. Behavioral adjustments, based upon the experience with short-term extensions of the provision, were made to the results from the ITM to account for these factors.

Analysis of proposals related to tax-exempt bond and tax credit bond finance

The Joint Committee staff estimated an Administration proposal to permit State and local governments to issue tax credit bonds for certain State and local financing needs.⁶⁹ As described elsewhere,⁷⁰ the Joint Committee staff models the revenue effects within a portfolio model, in which taxpayers who choose to acquire the new financial instrument may reduce holdings of other instruments. However, these other financial instruments will be held by other persons. The portfolio model relies heavily on input from the ITM. In the specific estimate of the tax credit bond proposal, the economics of the proposal were such that generally only investors with marginal income tax rates exceeding 28 percent would be willing to continue to hold tax-exempt bonds and accept lower interest rates that would be competitive with after-credit direct-pay bond interest rates under the proposal. The ITM was used to identify taxpayers who would have effective marginal tax rates in excess of 28 percent, and to identify the composition of financial portfolios held under the baseline by taxpayers above and below that demarcation. The ITM was used to calculate the average marginal tax rate on interest income of those investors that would have held tax-exempt debt in the baseline that would be issued as direct-pay bonds under the proposal. Similarly, as other taxpayers altered their portfolios in response to the proposal, the ITM was used to calculate the marginal tax rates at which their portfolio's earnings would be taxed.

Analysis of proposals related to passthrough income

The Joint Committee staff has estimated several proposals that would have significant impacts on the amount of income passed to individual taxpayers through passthrough entities, or on the calculation of the passthrough owner's tax liability for that income. To guide an estimate of ultimate tax liability change, it is useful to match the owners of interests in passthrough income on the ITM with the entities in which they hold interests. This match is created by building on a methodology developed by the Joint Committee staff and by Treasury staff.⁷¹ This methodology starts with a data set consisting of tax returns from the population of all existing partnerships and S corporations, as well as the information returns that these passthrough entities

⁶⁹ See, Joint Committee on Taxation, *Description of Revenue Provisions Contained in the President's Fiscal Year 2012 Budget Proposals* (JCS-3-11), June 2011.

⁷⁰ Joint Committee on Taxation, *The Federal Revenue Effects of Tax-Exempt and Direct-Pay Tax Credit Bond Provisions* (JCX-60-12), July 16, 2012.

⁷¹ See Nicholas Bull, Susan Nelson, and Robin Fisher, "Characteristics of Business Ownership: Overview for Pass-through Entities and Evidence on S Corporate Ownership from Linked Data," *National Tax Association Proceedings*, One-Hundred-Second Annual Conference 2009, pp. 37-49; and Matthew Knittel, Susan Nelson, Jason DeBacker, John Kitchen, James Pearce and Richard Prisinzano "Methodology to Identify Small Businesses and Their Owners," Office of Tax Analysis, Department of the Treasury, Technical Paper 4, August 2011.

issue to their owners.⁷² The population data set is then matched to passthrough owners in the ITM who are liable for Federal tax on passthrough income. The resulting matched data set makes available considerable detail on the tax characteristics of passthrough entity owners in the ITM, as well as considerable detail on the entities in which they hold interests.

Thus, if a proposal changes the way that income is calculated at the entity level — for example, allowing expensing instead of requiring assets to be depreciated — then the resulting entity income changes can be traced through to the passthrough owners in the ITM, where changes in liability can be directly calculated. In addition, the effect on marginal tax rates can be observed for the purpose of estimating behavioral responses. Alternatively, a proposal might change the way that tax liability is calculated for owners of passthrough entities engaged in certain types of business activities. For instance, a proposal might impose self-employment tax on limited partners or S corporation shareholders who are materially participating in a service business conducted by the partnership or S corporation. The matched data provided in the ITM allows the Joint Committee staff to ascertain the passthrough entities engaged in service businesses and connect them with their owners who materially participate. Again, taxpayer-specific information such as marginal rates can be used to develop the necessary estimates of behavioral responses.

Distributional analysis

A Joint Committee staff distributional table reports average tax rates by income class. As described elsewhere,⁷³ economic incidence assumptions drawn from the economics literature are applied to the conventional revenue estimates of proposed changes in the individual income tax, in payroll taxes, in the corporate income tax, and in excise taxes to compute a total Federal tax liability for each taxpayer on the ITM. The staff uses the ITM to compute the average tax rate by income class.⁷⁴

Macroeconomic analysis

As explained in more detail in other Joint Committee staff publications,⁷⁵ the starting point for macroeconomic analyses of tax legislation is the conventional estimate of the proposed

⁷² Respectively, Form 1065 (U.S. Return of Partnership Income) Form 1120-S (U.S. Income Tax Return for an S Corporation) and Schedule K-1 for the information returns issued by both types of entities to their owners.

⁷³ Joint Committee on Taxation, *Modeling the Distribution of Taxes on Business Income* (JCX-14-13), October 16, 2013.

⁷⁴ Part III.F, above, explains the imputations made to the ITM to facilitate computation of the expanded income measure.

⁷⁵ See Joint Committee on Taxation, *Macroeconomic Analysis at the Joint Committee on Taxation and the Mechanics of Its Implementation* (JCX-3-15), January 26, 2015; Joint Committee on Taxation, *Summary of Economic Models and Estimating Practices of the Staff of the Joint Committee on Taxation* (JCX-46-11), September 19, 2011; and Joint Committee on Taxation, *Exploring Issue in the Development of Macroeconomic Models for Use in Tax Policy Analysis* (JCX-19-06), June 16, 2006.

tax changes. The ITM is used to calculate parameters for the macroeconomic models that provide analyses of the macroeconomic effects of tax proposals. Individual tax rates are separately calculated for wages, interest, rents, dividends, capital gains, sole proprietors' income, other individual income, and corporate income. Average tax rates for individual taxpayers are aggregated into average tax rates for each source of income. Effective marginal tax rates are separately calculated for each of the individual income groups. Effective marginal tax rates on income from capital are included in the cost-of-capital equations, thus affecting the level of investment. Effective marginal tax rates on wages are included in the labor supply equations and therefore affect labor force participation and unemployment. Average tax rates are used to calculate receipts from each of the various types of taxable income.

APPENDIX: THE JOINT COMMITTEE'S ITM TARGETING OPTIMIZATION ALGORITHM

As explained in Part IV, to estimate the effects of proposed changes to the Internal Revenue Code over the budget period, all of the data in the ITM must be extrapolated to the years of the budget period. This extrapolation must be consistent with the macroeconomic forecast of the CBO. The Joint Committee staff must adjust the microeconomic picture of the taxpayers represented by the base data in the ITM such that the year-by-year microeconomic picture for each year in the budget period is consistent with the CBO's year-by-year macroeconomic forecast. This extrapolation determines the baseline of economic activity against which the effects of all policy changes are measured. The Joint Committee staff generally makes this extrapolation once per Congressional session, soon after the CBO releases its macroeconomic forecast. Because the baseline of economic activity is a key part of any estimate, this appendix describes in some detail the Joint Committee staff's extrapolation methodology.

The extrapolation algorithm

A desirable feature of any extrapolation methodology is maintaining the complex relationships among variables observed in the original sample to the greatest extent possible. To accomplish this objective, the Joint Committee staff uses a non-linear optimization algorithm to adjust the ITM's sample weights.⁷⁶ Defining a penalty function for deviations from the original sample statistics, the objective of the algorithm is to minimize relative changes in sample weights subject to the constraint that all of the projection targets are achieved.

In 2012, Joint Committee staff engaged in a major project to overhaul the optimization algorithm of the ITM. With the assistance of mathematical consultants, the Joint Committee staff modified and expanded the objective function.⁷⁷ The objective function currently used is as follows.

⁷⁶ The procedure is known as the Newton-Raphson optimization methodology. Kendall E. Atkinson, *An Introduction to Numerical Analysis*, John Wiley & Sons, Inc., 1989.

⁷⁷ In addition, the consultants were able to modernize the computer programming code's convergence algorithm. The computer programming code previously used was originally written in the early 1980s.

Targeting Objective Function

$$\begin{aligned} & \text{minimize } \sum_i^N K_i S_i [\alpha(x_{b,i}^4 + x_{b,i}^{-4} - 2) + \beta(x_{c,i}^4 + x_{c,i}^{-4} - 2) + \dots \gamma(\dots)] \\ & \text{subject to: } \sum_i^N K_i (wt_{*,i} * v_{i,j}) + (1 - K_i) * (Z_* * wt_{b,i} * v_{i,j}) = T_j \end{aligned}$$

for all targets ($j = 1, \dots, J$)

Where:

i = tax return i , ($i = 1, \dots, N$)

j = target j , ($j = 1, \dots, J$)

K_i = a optional 0,1 flag for whether the i^{th} return contributes to the solution.

S_i = an optional share operator, indicating the relative amount return i contributes to a target or set of targets.

$wt_{b,i}$ = return weight of record i in the base year b .

$wt_{c,i}$ = an optional return weight of record i from a previously extrapolated year c .

$wt_{*,i}$ = the final, optimal, extrapolated weight for record i .

$x_{b,i}$ = the ratio of the extrapolated weight $wt_{*,i}$ over the original weight $wt_{b,i}$ in the base year b .

$x_{c,i}$ = the ratio of the extrapolated weight $wt_{*,i}$ over the weight $wt_{c,i}$ from a previously extrapolated year c .

α = the relative importance of minimizing the change in weights from the base year a .

β = the relative importance of minimizing the change in weights from a previously extrapolated year c .

γ = the relative importance of minimizing the change in weights from a second previously extrapolated year.

$v_{i,j}$ = the value of target j for return i .

T_j = the value of target j .

Z_* = a weight adjustment factor for those returns excluded from the solution.

The extrapolation algorithm is designed to simultaneously adjust return weights to hit a set of targets. The Joint Committee staff sets as its objective the minimization of changes in sample weights. To accomplish this, the Joint Committee staff uses a penalty function defined by calculating the ratio and inverse ratio of the extrapolated weight to the original weight; raising both values to the fourth power, and then subtracting two. This produces a U-shaped penalty function. Increasing a weight by 10 percent gives the same penalty as decreasing a weight by 10 percent. Further, the penalty grows exponentially with larger percentage changes in weights.

One issue to consider in targeting is whether the weights on very unusual returns should have large weight changes. Frequently, such returns have an initial sample weight of 1.0. The Joint Committee staff can remove such returns from the optimization problem by using the K_i flag in the objective function. When this flag is set to zero, the return is removed from the optimization problem. However, the return will still count towards the targets. For example, Joint Committee staff routinely set K_i equal to zero for all returns with an original sample weight below 2.0. The Z_* factor for these returns is set equal to the overall rate of growth in the number of returns relative to the base year.

A second issue to consider in the choice of the basic penalty function is that the function will favor observations with large values of targeted items. In some circumstances, this may not be a desirable result. For example, to hit a target such as the total number of dependents, the objective function will generate greater weight changes for returns with several dependents compared to returns with the same weight but with only one dependent. To address this issue, the Joint Committee staff can invoke the share operator, S_i . In this example, S_i will be greater for returns with several dependents compared to returns with fewer dependents but the same weight. The larger S_i value increases the penalty for adjusting the weights on these returns.⁷⁸

Chain extrapolations

In addition to minimizing weight changes relative to the weights in the original sample, in certain circumstances, the Joint Committee staff believes it is important to have small weight changes relative to the previous extrapolation year. This would be particularly true in a budget period where there is a hump or trough in one or more of the extrapolation targets. For example, if the economic forecast predicted a recession followed by a sharp recovery in the middle of budget window, one would expect business income targets to fall and then rise. Defining the objective function to minimize changes in sample weights from the base years to year one and then minimizing changes in sample weights from year two to year one, rather than compare year two weights to the base year, is called “chaining” the extrapolation solution. Chaining the extrapolation solutions may cause the ITM to produce a smoother pattern, especially in non-targeted variables. This is an area of research the Joint Committee staff economists continue to explore.

The objective function’s equation allows for the chaining of extrapolation solutions. By setting a value for β , the extrapolation solution will use the weights from a previous year’s extrapolation. Typically, α and β would sum to 1.0. However, the algorithm does not require such a constraint. In addition, the algorithm does not restrict the ability to chain to a single prior year. If desired, the Joint Committee staff could chain to any number of prior years, being limited only by the number of solutions from previous years. Here, the user would specify values for α , β , and γ . The Joint Committee staff added the ability to chain extrapolation solutions in the objective function in 2012.

The values for α and β used in the Joint Committee staff’s 2014 extrapolation are shown in the Table A-1 below, and reflect a greater emphasis on minimizing the change in weights relative to the base year in years close to the 2011 base year. However, in the view of the Joint Committee staff, in years further removed from the base year, this goal is less important relative to having smoother extrapolation series.

⁷⁸ This feature was added to the objective function in 2012. The Joint Committee staff is exploring the ramifications of using the new feature. For ITM estimates in 2014, $S_i = 1$ for all returns.

Table A.1.—Extrapolation Chaining Parameters

Year	α original year's weight	β previous year's weight
2012	1.0	0.0
2013	1.0	0.0
2014	1.0	0.0
2015	0.9	0.1
2016	0.8	0.2
2017	0.7	0.3
2018	0.6	0.4
2019	0.5	0.5
2020	0.4	0.6
2021	0.3	0.7
2022	0.2	0.8
2023	0.2	0.8
2024	0.2	0.8

Income tax returns of estates and trusts

The Joint Committee staff does not use the optimization procedure when extrapolating the ITM's fiduciary (estates and trusts) data. The dollar variables are adjusted by the same growth factors used for individual taxpayers. For example, dividend income on fiduciary returns is grown by the same per-capita growth factor used for dividends on individual returns. Weights on fiduciary returns are adjusted by a general population growth factor.