# When I'm 64 (or Thereabouts): Changes in Income from Middle Age to Old Age

Peter J. Brady
Steven Bass
Investment Company Institute*
1401 H Street N.W.
Washington, DC 20005
pbrady@ici.org

**Draft: May 10, 2023**

**Abstract**

This study uses administrative tax data to build a unique panel dataset that follows the 1945 birth-year cohort from 2000 (when aged 55) through 2017 (when aged 72). These data allow us to observe changes in the amount and composition of individuals' income from before they are eligible to claim Social Security retirement benefits until after they are eligible for maximum Social Security benefits and generally must begin taking distributions from their IRAs and DC plans. We examine changes with age in the inflation-adjusted amount of total and spendable income, as well as changes in the composition of income as labor income declines and Social Security benefits and retirement income (IRA distributions and income from pensions and annuities) increase. We find that the typical individual maintained more than 90 percent of their age 55-59 spendable income—that is, the income available to spend after paying taxes and saving for retirement—through age 72. Those with lower age 55-59 income typically had higher spendable-income replacement rates. We find much higher incidence of retirement income than is typically reported in household survey data. By age 72, 75 percent received retirement income directly or through a spouse, with incidence higher than 80 percent for the top 60 percent of the age 55-59 income distribution. The median share of income from Social Security was 47 percent at age 72. Reflecting the design of the US Social Security system, those with lower age 55-59 income tended to rely more on Social Security benefits in retirement while those with higher age 55-59 income tended to rely more on retirement plan distributions.

* This research was conducted as part of the Statistics of Income Joint Research Program. Views presented are those of the authors and do not necessarily represent the views of the Internal Revenue Service or the views of the Investment Company Institute or its members. We thank Kevin Pierce for his assistance with this project.

## 1. Introduction

This study uses administrative tax data to answer two questions about retirement in America. First, how does spendable income change as workers transition into retirement? Second, how does the composition of income change during this transition as workers move from relying primarily on earnings from labor to relying primarily on Social Security benefits, retirement plan distributions, and other income? In addition, we investigate how the answers to these questions differ based on income.

The motivation for trying to answer these questions is that proposals to overhaul the US Social Security system and the taxation of retirement plans are ubiquitous. We think such proposals to change the current system should be based on an accurate assessment of how the current system is performing.

Many proposals are motivated by a belief that the current system provides inadequate resources to retirees and that the voluntary component of our retirement system—employer-sponsored defined benefit (DB) and defined contribution (DC) plans and individual retirement arrangements (IRAs)—is primarily responsible for that failing.[1] The belief that the US retirement system produces inadequate retirement resources is based largely on research projecting that most Americans will not accumulate enough resources for retirement (see, for example, Munnell, Chen, and Siliciano 2021 and VanDerhei 2019). The belief that employer plans and IRAs are not doing enough to help workers prepare for retirement is based largely on analyses of household survey data that claim too few workers have access to retirement plans (see, for example, Munnell and Bleckman 2014) and too few retirees receive income from employer plans (see, for example, Social Security Administration 2016).

There is other research, however, that challenges these beliefs. Both Scholz, Sheshadri, and Khitatrakun (2006) and Hurd and Rohwedder (2015) conclude that most—though not all—American households appear to be adequately preparing for retirement. Further, studies which

[1] See, for example, a series of editorials in *Bloomberg News* in early 2022 (*Bloomberg News*. America's Retirement Crisis Is a Financial Crisis Too, March 28, 2022; Saving for Retirement Is Harder Than It Needs to Be, April 4, 2022; Piecemeal Reform Won't Solve the U.S. Retirement Crisis, April 11, 2022; and How to Fix the Broken U.S. Retirement-Savings System, April 18, 2022).

compare tax data to household survey data (Brady and Pierce 2012; Bee and Mitchell 2017; and Brady and Bass 2021) show that household surveys undercount (non-Social Security) retirement income—that is, distributions from employer-sponsored DB and DC retirement plans, IRAs, and annuities. These studies indicate that many more workers accumulate resources from employer plans and IRAs during their working career and many more retirees receive income from retirement plans than is indicated in household surveys.

We take a novel approach to assess the US retirement system using unique panel data that we developed from administrative tax data. Rather than analyzing cross-sectional data on individuals approaching retirement and assessing the adequacy of the resources they have accumulated to date, we follow a cohort of individuals through the transition into retirement and analyze changes in the amount and composition of their income. Specifically, we begin with a representative sample of the US population aged 55 at year-end 2000 and follow all who survived through year-end 2017 (when they would have been aged 72).

The administrative tax data allow us to track the same individuals for 18 years and analyze changes in income on an annual basis for a large representative sample of the US population—something not possible with existing household survey data. Despite focusing solely on individuals aged 55 at year-end 2000, our panel sample includes well over 100,000 individuals. In addition, unlike household survey data, attrition from the sample is not an issue. Individuals remain in our panel regardless of whether they file a tax return, change filing status, or report any income to the IRS.

Administrative tax data also measures income more accurately than household surveys. There is an extensive literature documenting the underreporting of income in household surveys.[2] Although this study is not focused on directly comparing the two data sources, consistent with previous studies that are, we find considerably more income from IRAs, DB and DC retirement plans, and annuities than is typically reported in household survey data.[3]

[2] See, for example, Rector, Johnson, and Youssef (1999) and Meyer, Mok, and Sullivan (2009). For a wider discussion of the literature comparing household surveys to other data sources, see Brady and Bass (2021).

[3] For studies directly comparing tax and household survey data on retiree income, see Schieber (1995), Brady and Pierce (2012); Bee and Mitchell (2017), and Brady and Bass (2021).

Our study builds on the method developed by Brady et al. (2017). That study followed individuals aged 55 to 61 at year-end 1999 through 2010 and examined changes in the amount and composition of income from one year prior to claiming Social Security through three years after claiming Social Security. Whereas that study included only working individuals who filed a tax return in 1999 and who were not yet receiving Social Security benefits, this study includes all individuals identified in the tax data, regardless of whether they worked or filed a return in 2000. And whereas that study focused on those who claimed Social Security benefits by 2007 and only examined changes in income over a five-year period, we examine income changes for the full population over an 18 year period. This allows us to follow individuals from age 55, before they are eligible to claim Social Security retirement benefits and when retirement plan distributions are generally subject to an early withdrawal penalty, until age 72, after the ages at which delaying Social Security claiming no longer increases monthly benefits and required minimum distributions (RMDs) from IRAs and employer plans begin. We know of no other studies that have taken this approach to the topic.

We find that the typical individual maintained more than 90 percent of their age 55-59 spendable income through age 72, with 25 percent having age 72 spendable income replacement rates of 125 percent or more and 25 percent having replacement rates of 67 percent or less. Spendable income is the income available to spend after paying taxes and saving for retirement.

Non-Social-Security retirement income—that is, distributions from IRAs, employer-sponsored DB and DC plans, and annuities—was much more common than reported in household surveys. At age 72, 75 percent of the panel received retirement income either directly or through a spouse, with a median amount of $15,300 per individual.

Most retirees relied on both Social Security and retirement plan distributions. Considering both income received directly or through a spouse, 97 percent of the panel received Social Security income and 75 percent received retirement income at age 72, with 74 percent receiving both. The median share of income from Social Security was 47 percent at age 72, with 25 percent of the panel getting 75 percent or more of their income from Social Security, and 25 percent getting 29 percent or less.

When individuals are ranked by their age 55 through age 59 income, we observe substantial differences by income. Higher-income individuals were more likely to delay claiming Social Security and were more likely to continue working at older ages. Social Security benefits represented a higher share of total income at age 72 for those with lower age 55-59 income while retirement plan distributions represented a higher share of total income at age 72 for those with moderate to moderately high age 55-59 income.

Despite the fact that those with lower age 55-59 income typically claimed Social Security earlier, were less likely to work at age 72, and got a higher share of their income from Social Security at age 72, they typically replaced a higher share of their age 55-59 spendable income. At age 72, the median spendable income replacement rate was greater than 100 percent for the bottom 25 percent, between 90 and 95 percent near the middle, and less than 80 percent for only the top 10 percent of the age 55-59 income distribution.

The paper is organized as follows. Section 2 describes the data we use in our analysis. Section 3 examines changes in income by age and spendable income replacement rates. Section 4 analyzes changes in the composition of income with age. Section 5 concludes the analysis.

## 2. Description of Data

This study uses US Internal Revenue Service (IRS) administrative tax data from tax years 2000 through 2017. These data include information from both federal individual income tax returns filed by taxpayers and information returns issued by third parties and sent to both taxpayers and the IRS. Information returns are used to report income (such as Form W-2, which reports wages), expenses (such as Form 1098, which reports mortgage interest expense), and other tax-relevant information (such as Form 1099-Q, which reports distributions from qualified education savings plans).[4] We also incorporate Social Security Administration (SSA) data on gender, date of birth, and date of death (if applicable).

[4] For a full listing of information returns used in this study and their description, see Appendix Table A.1.

Our overall population of interest is US citizens and resident aliens[5] who—provided their gross income exceeded the filing thresholds—would have been required to file a 2000 Form 1040 (inclusive of Form 1040, Form 1040A, and Form 1040EZ), excluding residents of US territories.[6] This includes US citizens and resident aliens living in a state (inclusive of the 50 states and the District of Columbia), living outside the US, or living overseas as a member of the US armed forces. We exclude residents of US territories because bona fide residents of US territories generally do not file a Form 1040 with the IRS.[7]

To examine changes in annual income as individuals transition into retirement, we create a unique panel dataset that follows individuals from an age when most income is from labor (age 55) to an age when Social Security benefits and retirement plan distributions are the primary sources of income (age 72). The data allow us to observe individuals for seven years before they turn age 62 (when they are first eligible to claim Social Security retirement benefits). The data also allow us to observe the same individuals after they turn age 70 (when further delays in claiming Social Security benefits no longer increase monthly benefits), and after they turn age 70-½ (when they are generally required to begin taking minimum distributions from their employer plans and IRAs).

### *2.1 Construction of the Balanced Panel*

We derive our representative sample by sampling individuals rather than tax returns or households. We use the individual as our unit of analysis because the focus of our research is measuring income changes during the transition into retirement, and the composition of an individual's tax return or household may change from year to year. We include multiple

[5] Resident aliens include individuals with a green card or who had a "substantial presence" in the US—inclusive of the 50 US states and the District of Columbia. For more information on US income tax treatment of both resident and nonresident aliens, see Internal Revenue Service (2018a).

[6] For more information on filing requirements, see Internal Revenue Service (2017a) and Internal Revenue Service (2017b).

[7] US citizens and resident aliens who are bona fide residents of Guam, the US Virgin Islands, and the Northern Mariana Islands are not required to file a Form 1040 with the IRS. US citizens and resident aliens who are bona fide residents of American Samoa and Puerto Rico are only required to file a Form 1040 if they received income from a source outside of the territory. For the definition of a bona fide resident and more information on filing requirements for individuals with income from US possessions, see Internal Revenue Service (2018c).

individuals from a single tax return in the sample only if they independently meet our sampling criterion.

To build our panel dataset, we first create a representative sample of the US population in 2000 by combining three separate subsamples: one for filers (primary or secondary taxpayers listed on a return), inclusive of both non-dependent and dependent filers; one for dependent nonfilers; and one for non-dependent nonfilers.[8] Tax returns allow us to identify filers and the dependents they claim. Information returns allow us to identify non-dependent nonfilers.[9]

We then select from the tax-year 2000 sample all individuals who were born in 1945 (who would have been aged 55 by the end of the year). This group consists of roughly 136,000 observations representing 2.7 million individuals. We follow these individuals through the earlier of 2017 or the year in which they die.[10]

Finally, we include in the balanced panel used for our analysis only those alive at the end of 2017, when they would be 72 years old. Of the 2.7 million individuals born in 1945 and alive at the beginning of 2000, 2.2 million (or 81 percent) were alive at the end of 2017 (Figure 1).

As illustrated by their share of our balanced panel, the inclusion of nonfilers in the sample is critical for measuring the income of the elderly (Figure 2). The nonfiler share of the 1945 birth-year cohort—inclusive of both dependent nonfilers and non-dependent nonfilers—generally increases with age, from 6 percent of individuals aged 55 in 2000 to 24 percent of individuals aged 72 in 2017. The lone exception is 2007 when, because individuals had to file a 2007 tax return to receive a 2008 stimulus payment, only 5 percent of the sample did not file a return.

### *2.2 Assigning Marital Status to Nonfilers*

In every year, all members of the panel are categorized as either *joint* or *non-joint*. For individuals who file a return in a given year, married individuals filing a joint return are

[8] Brady and Bass (2023) describes the method used to build a representative sample of the population in detail.

[9] For a list of the information returns used to identify nonfilers, see Table A.1 in the appendix. One group of individuals that may not be captured by the tax data is individuals solely dependent on public assistance. This is because benefit payments from such programs as Temporary Assistance to Needy Families (TANF), Supplemental Security Income (SSI), and Veteran Affairs (VA) are not reported to the IRS—neither on tax returns nor on information returns.

[10] Until the year of their death, individuals remain in the data even in years where no tax information is available for them. In these years, they would be counted as an observation but would have no income.

categorized as joint and all other filers (single, head of household, qualified widow[er], and married filing separately) are categorized as non-joint. For individuals who do not file in a given year, we assign marital/filing status based on returns filed in other years. We first look to the most recent prior year a return was filed. If the individual has not filed a return in any past year, we look to future years. If a nonfiler's most recent prior or closest future return was a joint return and the individual's spouse is alive in the nonfiling year, we classify them as joint. We classify nonfilers as non-joint if: (1) their most recent prior return was a joint return and the individual's spouse is dead in the nonfiling year; (2) the most recent prior or closest future return was a non-joint return; or (3) they have never filed a return.

Over two-thirds (69 percent) of individuals are joint at the start of the panel but the share declines with age, to 63 percent at age 72 (Figure 3).

### *2.3 Income and Tax Measures*

We derive our total income measure from tax data, but it differs from the tax code's definition of income because we are primarily focused on measuring income available to spend after paying taxes and saving for retirement. As such, we include some types of income excluded from taxable income—such as tax-exempt interest and the nontaxable portion of Social Security benefits. To the extent possible, we exclude from income all retirement plan contributions and include in income all retirement plan distributions—regardless of whether contributions were from an employer or an employee, and regardless of their tax treatment. This means we exclude from income not only tax-deferred employee contributions to employer plans and IRAs, but also Roth contributions and non-Roth after-tax contributions. It also means we include in income not only taxable non-Roth distributions, but also Roth distributions and the portion of non-Roth distributions that represents basis. Finally, because our spendable income measure does not account for state income taxes, we exclude from income taxable state income tax refunds.

The income and taxes of filers are primarily derived from tax returns while the income and taxes of nonfilers are derived solely from information returns. For a nonfiler with non-joint marital status, we use the information returns of the individual. For a nonfiler with joint marital

status, we use the information returns of both the individual and the spouse. Appendix Table A.2 describes in detail how we calculate our income and tax measures for both filers and nonfilers.

Our measure of **total income** is the sum of six types of income: **labor** (wage and salary, self-employment earnings, unemployment compensation), **Social Security** (disability benefits and retirement benefits), **retirement** (IRA distributions and income from pensions and annuities), **investment** (taxable interest, tax-exempt interest, dividends, gains/losses), **business/farm/rents/royalties** (business and farm income in excess of self-employment earnings; income from rents, royalties, partnerships, S-corps, and trusts), and **other** (net alimony [alimony received less alimony paid] and other income).[11]

Our measure of **spendable income** is total income less **total federal taxes**. Total federal taxes are comprised of **federal income taxes** and the employee share of **payroll taxes**. For filers, federal income taxes are taken from Form 1040 and payroll taxes are based on a combination of amounts withheld on information returns and Form 1040. For nonfilers, both federal income and payroll taxes are the amount withheld on information returns. We do not attempt to estimate state and local taxes. We also do not impute federal excise or corporate income tax burdens.

The primary measure of income we use to analyze the incidence and amount of income, in total and by type, is ***per capita income***, which allocates the joint income of married couples equally to each spouse. For a primary or secondary taxpayer on a joint return, per capita income is the income derived from the tax return divided by two. For a nonfiler with a joint marital status, per capita income is the sum of the individual's income and the spouse's income derived from information returns divided by two. For a primary taxpayer on a non-joint tax return, per capita income is simply the income derived from the tax return. Similarly, for nonfilers with a non-joint marital status, per capita income is simply the income derived from the individual's information returns.

[11] Our income measure does not include public assistance income because benefit payments from such programs as Temporary Assistance to Needy Families (TANF), Supplemental Security Income (SSI), and Veteran Affairs (VA) are not reported to the IRS—neither on tax returns nor on information returns.

In addition to per capita income, we also report ***own income*** for labor, Social Security, and retirement income. For individuals with joint marital status, we use information returns to allocate income to the spouse who received the income. For individuals with a non-joint filing status, there is no difference between own income and per capita income.

Importantly, neither per capita income nor own income adjusts for family or household size. All income reported on a tax return is allocated to filers—the primary taxpayer in the case of non-joint returns and the primary and secondary taxpayers in the case of joint returns. The number of dependents claimed on a tax return has no impact on either measure, as no filer income is allocated to dependents. Dependents have income only if they file their own return or have income reported on information returns.

### *2.4 Tax Rates*

For individuals who have income in a given year, we calculate effective tax rates. We categorize individuals as having income if they have nonzero per capita total income in any of our six broad income categories (labor, Social Security, retirement, investment, business/farm/rents/royalties, and other) or in any of the components of investment income (taxable interest, tax-exempt interest, dividends, and gains/losses). An individual's average effective tax rate is calculated as taxes paid divided by total income, with both taxes and income measured on a per capita basis.[12] Effective tax rates are reported for federal income taxes, payroll taxes, and total federal taxes.

### *2.5 Medians and Percentile Measures*

The medians presented in this study are approximate, as true medians could represent disclosure of an individual's tax data. To calculate approximate medians, we average the 48th, 49th, 50th, 51st, and 52nd percentile values and then round that average (to the nearest dollar for amounts less than $100, the nearest $10 for amounts from $100 to less than $10,000, the nearest $100 for amounts of $10,000 or more, and two decimal places for percentages). We then

[12] For individuals with positive taxes and negative total income, we set the effective tax rate to 100 percent. For individuals with negative total income and either zero or negative taxes, we set the effective tax rate to zero.

only report these approximate medians for groups with 100 or more observations. We use the same method to report other percentile measures.[13]

## 3. Changes in Total and Spendable Income with Age

In this section, we examine changes in income from the 2000 tax year, when individuals in our data were aged 55 at year end, through the 2017 tax year, when individuals in our data were aged 72 at year end. In addition to individuals getting older, their income may also be affected by the business cycle. Over this period, recessions occurred from March through November of 2001 (the 2001 recession) and from December 2007 through June 2009 (the great recession), as indicated by the gray shading in the figures (see, for example, Figure 4).[14]

Although we report changes in total income, we are primarily focused on changes in spendable income—that is, income available to spend after paying taxes and saving for retirement. Economic theory predicts that—rather than maintaining income in retirement—individuals wish to maintain consumption in retirement.[15] We cannot measure consumption or spending with the tax data, but we can measure income available to spend.

Because we focus on spendable income, our replacement rate measure differs from traditional replacement rate measures. Traditional replacement rates measure total income—before accounting for taxes or savings—in the first year of retirement relative to total income in the year, or years, immediately before they retired.[16] The replacement rate measures used in this

[13] Others who wish to use this measure for their own research may cite this article for authority or simply refer to the measure as the Brady-Bass Adjusted Median (BBAM).

[14] The National Bureau of Economic Research determines the official dating for US business cycle expansions and contractions. See https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions.

[15] Optimization over the life cycle generally requires that the marginal utility of consumption be equal in each time period. If certain other conditions are met, this would also imply that an individual would prefer to smooth consumption over time. See Engen, Gale, and Uccello (2005) and Scholz, Seshadri, and Khitatrakun (2006) for a more formal description of life-cycle models and for a discussion of retirement savings adequacy. To the extent that some spending—such as a portion of spending on clothing and travel—are properly characterized as a cost of working rather than consumption, and to the extent retirees substitute home production for market production—for example, preparing lunch at home versus purchasing lunch at a fast food establishment or cafeteria, consumption can be maintained even if spending declines. See Hurst (2008) for a discussion of consumption changes in retirement. In addition, retired people may maintain their marginal utility by diminishing their consumption and increasing their time devoted to leisure. So, a constant marginal utility across the life cycle can be maintained even if consumption declines.

[16] See Brady (2010) for a discussion of the origins of the traditional replacement rate measure and its shortcomings.

study are based on those developed in Brady (2010) and measure replacement at older ages of the inflation-adjusted spendable income—after accounting for federal taxes and retirement plan contributions—that individuals had in their late 50s.

There are two reasons why it is important to focus on changes in spendable income rather than changes in total income. First, spendable income generally falls by less than total income in retirement because taxes fall more than proportionately with income.[17] Second, how much taxes fall in retirement will vary depending on an individual's pre-retirement income, so rule-of-thumb replacement rates of total income will not be appropriate across the income distribution. Specifically, we find that those in the middle of the age 55-59 income distribution typically experienced the largest declines in average effective tax rates in retirement.

Through age 72, we find that the typical individual maintained more than 90 percent of their age 55-59 spendable income, with those with lower age 55-59 income typically having higher replacement rates. At age 72, the median replacement rate was greater than 100 percent for the bottom 25 percent of the age 55-59 income distribution, between 90 and 95 percent near the middle, and less than 80 percent for the top 10 percent.

All dollar amounts in the paper are adjusted for inflation and reported in constant 2017 dollars. For ease of exposition, dollar amounts reported in the text are generally rounded to two significant digits. The values plotted in the figures are available in an accompanying Excel spreadsheet.

### *3.1 Incidence and Amounts of Income*

In every year of the panel, most individuals had income (Figure 4).[18] There was a slight decline in the share of the population with income from 99.1 percent at age 55 (2000) to 97.7 percent at age 61 (2006), with most of the decline occurring by age 57 (during and

[17] Our measure of total income already excludes (pre-tax and after-tax) retirement plan contributions. For studies that measure income prior to both taxes and savings, another reason less income is needed after retirement is that individuals no longer need to save for retirement.

[18] Individuals are categorized as having income if they have nonzero per capita income in any of our six broad income categories (*labor*, *Social Security*, *retirement*, *investment*, *business/farm/rents/royalties*, and *other)* or in any of the components of *investment* income (taxable interest, tax-exempt interest, dividends, and gains/losses). For the derivation of these income measures, see Table A.2 in the appendix.

immediately after the 2001 recession). The share then increased and averaged 98.5 percent from age 62 (2007) through age 72 (2017), with the great recession appearing to have little impact on the share of the population with income.

Among those with income, median inflation-adjusted total income fell by over 20 percent from age 55 (2000) to age 72 (2017), with most of the decline occurring around the two recessions (Figure 5). Over the entire period, median per capita total income fell $9,300, from just over $44,000 at age 55 to just under $35,000 at age 72. Median income fell $4,100 between age 55 (2000) and age 59 (2004) and then remained fairly stable through age 62 (2007) before falling an additional $3,300 between age 62 (2007) and age 65 (2010).

In contrast, median spendable income fell by less than 10 percent from age 55 to age 72, as taxes fell more than proportionately with income (Figure 5). Median per capita total federal taxes fell by $6,100, from a bit more than $7,100 at age 55 to a bit less than $1,100 at age 72. As a result, median per capita spendable income fell by only $3,400, from just under $37,000 at age 55 to just over $33,000 at age 72.

The median total federal tax rate fell substantially between age 55 and age 72, with the typical individual paying much lower income taxes and paying no payroll taxes—either directly or through a spouse (Figure 6).[19] As a percentage of total income, median federal income tax rates fell from 10.5 percent at age 55 to 2.1 percent at age 72. Median payroll tax rates declined from 6.6 percent of total income at age 55 to zero by age 68.

Only a relatively small portion of the reduction in taxes we observed was caused by tax law changes. Legislation cut taxes over this period, especially around the time of the two recessions, but some of these changes were temporary and had either expired or been partially offset by other change by 2017. We estimate that, all else equal, tax law changes would have reduced 2017 effective federal income tax rates by less than 3.0 percentage points relative to 2000 and would have had no impact on 2017 payroll tax rates.[20]

[19] For an explanation of the tax rate measures, see Section 2.4.

[20] See the appendix for an explanation of our estimates and a review of major tax law changes from 2000 through 2017.

Taxes fell more than proportionately with income primarily because of changes in the amount and composition of income with age.[21] Income taxes typically decline relative to income over these ages because (1) total income generally declines with age, and (2) only a portion of Social Security benefits are included in taxable income.[22] In combination, these two changes reduce the share of total income subject to income tax and reduce the share of taxable income subject to higher marginal tax rates. Payroll taxes typically decline relative to income over these ages because labor income falls as a share of total income.

### *3.1.1 Ranking Individuals by Age 55 to 59 Income*

To examine how changes in spendable income differ by the amount of income individuals had when we first observe them, we rank all individuals alive at the end of 2004 (when they would have been age 59) by their average age 55 to age 59 per capita total income. We then split those with positive age 55-59 total income into **ventiles** (20 equally sized groups), with ventile 1 having the lowest income and ventile 20 having the highest income. Those without positive age 55-59 total income, representing 1.1 percent of the population aged 59 at year-end 2004, are included in our tabulations for the entire sample but are not reported separately in the ventile tabulations.

Note that not all who are alive at age 59 and who are ranked by income survive to age 72, so the ventiles do not represent an equal share of the balanced panel (Figure 7). Overall, 84 percent of those alive at age 59 survived to age 72. Survival rates varied by age 55-59 income,

[21] For an illustration of how both payroll and income taxes change over the lifecycle with constant tax laws, see Brady (2016).

[22] The percentage of Social Security benefit payments included in gross income is based on a taxpayer's modified adjusted gross income (MAGI), which includes half of Social Security benefit payments plus other income included in gross income. For single, head of household, and qualifying widow(er) returns: if MAGI is $25,000 or less, no Social Security benefit payments are included in gross income; if MAGI is between $25,000 and $34,000, the lesser of 50 percent of Social Security benefit payments or 50 percent of MAGI in excess of $25,000 is included in gross income; if MAGI is in excess of $34,000, the lesser of 85 percent of Social Security benefit payments or 85 percent of MAGI in excess of $34,000 plus $4,500 [=50%*($34,000-$25,000)] is included in gross income. For joint returns, the MAGI thresholds are $32,000 and $44,000, respectively. These thresholds are not indexed for inflation. For more information on the taxation of Social Security benefits, see Internal Revenue Service (2018b).

however, ranging from 72 percent for ventile 2 to 93 percent for ventile 20. As a result, the share of the balanced panel varies from 4.3 percent for ventile 2 to 5.5 percent for ventile 20.[23]

Median total income is plotted for each ventile in each year in Figure 8. By construction, average age 55-59 total income increases with ventile, from less than $4,000 for ventile 1 to more than $200,000 for ventile 20. Income after age 59 has no impact on an individual's income ventile, but the ventiles maintained their median total income rank through age 72.

### *3.1.2 Changes in Income and Taxes by Income Ventile*

Higher income ventiles experienced the largest declines in median total income between age 55 and age 72 (Figure 8). Median total income fell 42 percent between age 55 and age 72 for ventile 20 and fell 30 percent for ventile 19. Declines were smaller over these ages for lower income ventiles, with median total income falling 20 percent for ventiles 10 and 11 and falling 9 percent for ventile 5. Median total income actually increased for the lowest two ventiles, with median per capita total income of ventile 1 more than doubling from $4,400 at age 55 to $9,500 at age 72.

As a percentage of total income, total federal taxes declined the most for the middle income ventiles (Figure 9a). Median total federal tax rates fell by more than 14 percentage points from age 55 to age 72 for ventiles 7 through 11. Ventile 9 experienced the largest decline, falling 15.1 percentage points, from 16.5 percent at age 55 to 1.4 percent at age 72. Ventiles 1 through 6 experienced smaller declines in tax rates despite having zero median total federal taxes when aged 72 because their median tax rates were lower at age 55. Higher income ventiles had higher tax rates both at age 55 and at age 72 and experienced less of a decline in tax rates than the middle income ventiles.

Both income and payroll tax rates fell the most for the middle income ventiles. Median income tax rates fell more for the middle income ventiles than for the lower income ventiles because they had higher income tax rates at age 55 and, thus, the rates had farther to fall (Figure 9b). The income tax rates of the middle income ventiles fell more than those of the

[23] Those without positive age 55-59 total income have a survival rate of 82 percent and represent 1.0 percent of the population aged 72 at year-end 2017.

higher income ventiles for two reasons. First, they experienced larger declines in taxable income as a share of total income because Social Security benefits were a higher share of their total income and—because the portion of Social Security benefits included in taxable income increases with income—they included a smaller portion of those benefits in taxable income. Second, declines in taxable income typically translate into larger tax changes for those with lower income because tax rate brackets are narrower and have larger discrete rate jumps for those with low and moderate income.[24]

Although median payroll tax rates were zero for all ventiles at age 72, the middle income ventiles experienced the largest rate reductions because their payroll tax rates were the highest at age 55 (Figure 9c). At 7.4 percent of total income, median payroll tax rates at age 55 were highest for ventiles 6 through 12. Payroll tax rates at 55 were lower for lower income ventiles because non-labor income (Social Security, retirement, and other income) typically makes up a larger share of their income. Payroll tax rates at 55 were lower for higher income ventiles both because non-labor income also makes up a larger share of their income and because only labor earnings up to the Social Security maximum taxable earnings ($127,200 for an individual in 2017) are subject to the top payroll tax rate.[25]

Taxes had little impact on spendable income for the lowest income ventiles but falling taxes moderated the decline in spendable income for the other income ventiles (Figure 10). The largest moderating effects were for ventiles 6 through 14, with the decline in median spendable income from age 55 to age 72 less than half the decline in median total income. For example, inflation-adjusted median spendable income of ventiles 10 and 11 fell by 8 percent from age 55 to age 72, compared with 20 percent declines in median total income.

[24] In 2017, for example, the marginal tax rates and taxable income ranges for the lowest five income tax brackets for single individuals were: 10 percent (less than $9,325); 15 percent ($9,325 to $37,950); 25 percent ($37,950 to $91,900); 28 percent ($91,900 to $191,650); and 33 percent ($191,650 to $416,700).

[25] All labor earnings (wage and salary earnings and self-employment earnings) are subject to the 1.45 percent Medicare or Hospital Insurance (HI) tax, but only labor earnings up to the maximum taxable amount are subject to the 6.2 percent Social Security or Old-Age, Survivors, and Disability Insurance (OASDI) tax. Note that we count the additional Medicare tax and the net investment income tax, which are used to finance Medicare, as income taxes rather than payroll taxes. See Table A.2 in the appendix for an explanation of our payroll tax calculation.

Reflecting changes in both total income and taxes with age, the largest declines in spendable income were experienced by the highest income ventiles (Figure 10). Between age 55 and age 72, median spendable income fell 33 percent for the highest income ventile and fell 21 percent for ventile 19. Lower income ventiles experienced smaller declines with age, with median spendable income at age 72 the same or higher than it was at age 55 for ventiles 1 through 5, down less than 10 percent for ventiles 6 through 12, and down by less than 15 percent for ventiles 13 through 18.

### *3.2 Spendable Income Replacement Rates*

The replacement rate measures used in this study are intended to measure replacement of inflation-adjusted spendable income. Our replacement rates differ from traditional replacement rate measures in two ways. First, we measure replacement of spendable income rather than replacement of total income. Second, we compare age 55-59 income to (inflation-adjusted) income through age 72 rather than attempting to identify a single point in time when retirement occurs.

For each individual with positive age 55-59 spendable income, spendable income replacement rates are calculated as the ratio of inflation-indexed spendable income at a given age to average inflation-indexed spendable income from age 55 (in 2000) through age 59 (in 2004).

More formally, spendable income replacement rates are calculated as:

$$R_{\alpha}^{i} = \frac{Y_{\alpha}^{i}}{\frac{1}{5}\sum_{\alpha=55}^{59} Y_{\alpha}^{i}}$$

Where $R$ = spendable income replacement rate
$Y$ = inflation-adjusted per capita spendable income
$i$ indexes individuals
$\alpha$ indexes year-end age, ranging from age 55 (in 2000) to age 72 (in 2017)

At every age through age 72, the typical individual maintained more than 90 percent of the average spendable income they had in their late 50s. Among all individuals with positive age 55-59 spendable income, the median spendable income replacement rate was close to 100

percent through age 62 and then fell slowly—to 97 percent at age 67, 94 percent at age 70, and 92 percent at age 72 (Figure 11, orange line). Replacement rates varied across individuals, with 25 percent having age 72 replacement rates of 125 percent or more and 25 percent having age 72 replacement rates of 67 percent or less (Figure 11, blue lines).

Those with lower age 55-59 total income tended to maintain a higher percentage of their spendable income at older ages (Figure 12).[26] Spendable income typically increased after age 61 for the lowest income ventiles, with median replacement rates (orange lines) for ventiles 1 through 5 still greater than 100 percent at age 72.

At age 72, median replacement rates fell with age 55-59 income, remaining above 90 percent through ventile 12 and above 85 percent through ventile 17 (Figure 13). The sharpest declines in spendable income were experienced by those with the highest age 55-59 income, with the median replacement rate 78 percent for ventile 19 and 62 percent for ventile 20 at age 72.

A similar pattern by ventile is seen throughout the replacement rate distribution. At the 75th percentile (top blue line), replacement rates at age 72 were well above 100 percent for the lower-income ventiles and only dropped below 100 percent for the highest-income ventile (Figure 13). At the 25th percentile (bottom blue line), the relationship between replacement rates and age 55-59 income was less pronounced, with ventiles 4 through 16 all around 70 percent at age 72.

### *3.3 Discussion of Replacement Rate Results*

Although the replacement rate measures used in this study are based on those developed in Brady (2010), the measures used in this study likely understate the true replacement of spendable income in retirement because the data do not allow us to measure all taxes and all savings. Our spendable income measure accounts for federal income and payroll taxes, but state income taxes are also likely to decline as a share of total income in retirement.[27] Our total and

[26] In Figure 12, note that the x-axis ranges in the charts for ventiles 1, 2, 3, and 20 differ from that of the other income ventiles.

[27] See discussion and simulation results in Brady (2010) and Brady (2016).

spendable income measures account for savings accomplished through IRAs and employer-sponsored DB and DC plans (by excluding employer and employee contributions from income and by including distributions in income) but they do not account for other savings. Accounting for other savings would reduce pre-retirement spendable income and—to the extent that non-retirement-plan assets were drawn down in retirement—boost spendable income in retirement.[28]

Even if the true spendable income replacement rate could be measured, it would still leave open the question of what would represent retirement resource adequacy. The assumption that retirees would want to replace 100 percent of their pre-retirement spendable income is a reasonable starting point, but there are reasons the optimal replacement rate would be lower than 100 percent.[29] For example, there are certain work-related expenses – such as commuting expenses, purchases of lunch and coffee, and buying work clothes – that need not be incurred when an individual no longer works. Perhaps most importantly, if workers raised children prior to retirement, necessary expenses presumably would be lower if these individuals or couples were no longer supporting minor children in retirement.[30]

### *3.4 Summary*

Despite median total income declining 21 percent from age 55 to age 72, median spendable income fell by only 9 percent. The difference was attributable to a drop in taxes in retirement, with the typical individual paying much lower income taxes and paying no payroll taxes.

Effective tax rates typically fell the most for individuals in the middle of the age 55-59 income distribution. Median effective total federal tax rates were generally quite low at age 72—zero for the lowest 30 percent and below 5.0 percent for the lowest 60 percent of the age 55-59 income distribution. Those in the middle of the income distribution typically experienced the

[28] For many, their most important asset is their home. For a discussion of how accounting for owner-occupied housing would affect replacement rate measures, see Brady (2010).

[29] See discussion in note 15.

[30] For example, Scholz and Seshadri (2007) find that, controlling for lifetime earnings, children are an important determinant of household wealth.

largest drop in tax rates, however, because taxes were already low at age 55 for the lowest income ventiles.

Those with lower age 55-59 income typically maintained more of their spendable income at older ages. At age 72, the median replacement rate was greater than 90 percent for the lowest 12 income ventiles (that is, the bottom 60 percent of the age 55-59 income distribution). Substantial drops in total and spendable income were typical only for those with the highest age 55-59 income, with the median spendable income replacement rate 62 percent for the highest income ventile at age 72.

## 4. Composition of Income

This section of the paper investigates how the composition of income changes as the panel ages and how the composition of income varies with age 55-59 income. The primary focus of this section will be on the three sources of income on which most individuals rely for nearly all of their income over the period of the study: labor (wage and salary, self-employment earnings, and unemployment compensation), Social Security (disability benefits and retirement benefits), and retirement (IRA distributions and income from pensions and annuities) income.

For labor, Social Security, and retirement income, we examine both own and per capita income. Measures of own income allow us to analyze individual decisions about working, claiming Social Security benefits, and taking distributions from retirement plans. Measures of per capita income provide a fuller picture of the resources of married individuals.

Our analysis suggests that retirement is better thought of as a period of transition rather than a single point in time. Most individuals did not move directly from having only labor income to having only Social Security and retirement income, and married couples were even less likely to do so. The share of the population that stopped working between age 61 and age 67 was about one-third of the share of the population who claimed Social Security benefits from age 62 through age 66.

The most common ages at which we first observe individuals receiving their own Social Security income were age 62 and age 66. Age 62 is the earliest age at which individuals can

claim their own retirement benefits. Age 66 is the full benefit retirement age for the 1945 birth-year cohort. The age of first own Social Security income tends to increase with age 55-59 income.

By age 72, most individuals received both Social Security income and retirement income. At age 72, 67 percent directly received distributions from IRAs, pensions, and annuities and 75 percent received them directly or through a spouse. Social Security benefits were received by nearly all individuals and represented about half of per capita total income for the typical 72 year-old.

Reflecting the design of the US Social Security system, those with lower age 55-59 income tended to rely more on Social Security benefits in retirement while those with higher age 55-59 income tended to rely more on retirement plan distributions.

### *4.1 Incidence and Amounts*

For analysis, we separate income into two broad categories. The first category includes the three sources of income that most of the population rely on throughout their lives: labor, Social Security, and retirement income. The second category includes all other sources of income: investment (taxable interest, tax-exempt interest, dividends, gains/losses), business/farm/rents/royalties (business and farm income in excess of self-employment earnings; income from rents, royalties, partnerships, S-corps, and trusts), and other (net alimony [alimony received less alimony paid] and other income). For ease of exposition, we will refer to the first category as **Labor+SS+Retire** income and we will refer to the second category as **non-Labor+SS+Retire** income.

Most individuals had both types of income throughout the period studied, but between age 55 (in 2000) and age 72 (in 2017) the incidence of Labor+SS+Retire income increased by 3 percentage points while the incidence of non-Labor+SS+Retire income decreased by 14 percentage points (Figure 14). At age 55, 77 percent of the population had both types of income, 18 percent had only Labor+SS+Retire income, and 5 percent had only non-Labor+SS+Retire income. At age 72, reflecting the combination of a higher incidence of Labor+SS+Retire income and a lower incidence of other income, the share of the population with both types of income

fell to 66 percent, the share with only Labor+SS+Retire income rose to 32 percent, and the share with only non-Labor+SS+Retire income was close to zero.

Although most had both types of income, Labor+SS+Retire income made up the bulk of the typical individual's total income throughout the period studied. Among those with non-Labor+SS+Retire income, the median amount peaked at just over $1,000 in 2007 (at age 62).

### *4.1.1 Labor, Social Security, and Retirement Income*

The share of the population who derive a portion of their income from labor—either directly or through a spouse—declined markedly from 90 percent at age 55 in 2000 to 34 percent at age 72 in 2017 (Figure 15, top left panel). At age 55, 78 percent of individuals received labor income directly and another 12 percent of individuals had no labor income but had a spouse who did. The share of the population with their own labor income fell by about 2.0 percentage points a year between age 55 and age 60. Declines then accelerated, peaking above 5.0 percentage points per year between age 65 and age 67. By age 72, only 23 percent of the population had their own labor income. The share of the population with labor income either directly or through a spouse fell by a similar amount, although it declined more slowly at younger ages. The share of the population who had no labor income but who had a spouse who did increased after age 55, peaked at around 15 percent between age 63 and 67, and then decreased to 11 percent by age 72.

In addition to fewer individuals having labor income, the median income of those who continue to work declined at older ages (Figure 15, top right panel). Adjusted for inflation, median own labor income fell by about two-thirds, from $44,000 at age 55 to $14,000 at age 72, with more than half of the decline occurring between age 61 and age 67. Among those with labor income either directly or through a spouse, there was a similar decline in median per capita labor income, from $40,000 at age 55 to $11,000 at age 72.

As the share with labor income declined, the share with Social Security income and retirement income increased.

By age 72, 96 percent of the population received their own Social Security income (Figure 15, middle left panel).[31] At age 55, 4.6 percent of the population already received their own Social Security income.[32] This share increased with age, with the increase accelerating when survivor benefits became available at age 60 and again at age 62—the early claiming age for own or spousal retirement benefits. The two largest increases in the share of the population receiving their own Social Security income were at the early claiming age of 62 (when it increased from 11 percent to 39 percent) and at the full benefit retirement age of 66 (when it increased from 67 percent to 87 percent).

After age 70, only 1.2 percent of the population did not receive their own Social Security income but had a spouse who did. At age 55, 5.7 percent of the population had only spousal Social Security income—either because the spouse received disability benefits or because the spouse was older and had claimed retirement benefits. This share increased to 18 percent of the population by age 61 but then declined sharply.

By age 72 (in 2017), median own Social Security income was $17,200 and median per capita income was $16,400 (Figure 15, middle right panel). Median inflation-indexed Social Security benefits generally increased with age through age 70 and then remained about unchanged from age 70 through age 72. Median own income was reduced in years when there was a large amount of claiming—most notable from age 62 through age 66—as many individuals received benefits for less than a full year. This effect was less notable for median per capita income because the share of married couples with both spouses receiving Social Security income increased with age—which, in turn, increased median per capita income relative to median own income.

[31] In this paper, own Social Security income refers to any benefits sent directly to an individual and which would be reported as being sent to the individual on Form SSA-1099. These would include an individual's own benefit—that is, disability and retirement benefits to which the individual is entitled based on their own work history. It would also include spousal or survivor benefits to which an individual is entitled based on the work history of a spouse.

[32] Social Security income includes both disability benefits and retirement benefits. Before age 60, when individuals may become eligible for survivor benefits (which are considered retirement benefits), nearly all own Social Security income is in the form of disability benefits. Beginning at age 66—the full benefit retirement age for individuals born in 1945—nearly all own Social Security income is in the form of retirement benefits (inclusive of own, spousal, and survivor benefits).

Although less prevalent than Social Security income at age 72, retirement income was more prevalent at age 55. By age 72, 75 percent of the population received retirement income (IRA distributions plus pension and annuity income) either directly or through a spouse (Figure 15, lower left panel). The share of the population who received their own retirement income increased from 17 percent at age 55 to 67 percent at age 72. At age 55, another 9.5 percent of the population did not have their own retirement income but had a spouse who did. The share with only spousal retirement income increased to 14 percent of the population by age 69 but then declined to 8.2 percent at age 72.

The share of the population with their own retirement income increased throughout the period, but it increased more quickly at certain ages related to pension rules. The share increased by 6.0 percentage points at age 60, presumably related to retirement distributions no longer being subject to a 10-percent early withdrawal penalty after age 59½. There was also a 5.4 percentage point increase at age 65, the normal retirement age for many DB pension plans. The most rapid increase, however, was the 13 percentage point increase from age 69 to age 71, presumably related to distributions generally being required from IRAs and DC retirement plans after age 70½.

By age 72 (in 2017), median own retirement income was $16,200 and median per capita income was $15,300 (Figure 15, bottom right panel). Although median own retirement income peaked at age 61, median per capita retirement income peaked at age 72.

The peak in median own retirement income at age 61 could be related to certain beneficiaries of government and private-sector DB pension plans. Some with retirement income at younger ages may have received benefits from a DB pension plan with an early retirement supplement that ends when Social Security benefits become available at age 62—such as former federal government workers covered by the Federal Employee Retirement System (FERS)[33] or former private-sector workers covered by certain DB pension plans. It may also have been related to changes in the composition of those receiving retirement income with age. For example, it may be the case that those with retirement income at younger ages were more likely

[33] See Office of Personnel Management (2011).

to have been government workers not covered by Social Security—such as former federal government workers covered by the Civil Service Retirement System (CSRS) and certain former state and local government workers—who typically have more generous pension benefits as a result.

### *4.1.2 Labor+SS+Retire Income*

When the incidence and amounts of labor, Social Security, and retirement income are examined separately, it may be difficult to make sense of the results. When we examine what individuals get from the combination of these three income sources, a more coherent picture emerges about the transition individuals make from working to retirement.

From age 55 to age 72, we observe a decline in the incidence of labor income and an increase in the incidence of both Social Security and retirement income, but annual changes were not highly correlated (Figure 16, top left panel). For example, the incidence of own Social Security income increased 40 percentage points between age 61 and 63, from 11 percent to 51 percent of the population. Over these same ages, the incidence of own labor income declined by only 8 percentage points, from 65 percent to 57 percent of the population.

One reason the annual incidence changes were not highly correlated is that some individuals may not have had their own labor income in the year (or years) before they first received their own Social Security income. Indeed, the increased share of the population who received their own Labor+SS+Retire income after age 61 indicates that some individuals had neither their own labor income nor their own retirement income prior to claiming Social Security benefits.

Another reason the annual incidence changes were not highly correlated is that some individuals may have continued to work after claiming Social Security or after beginning to receive retirement income (Figure 16, bottom left panel). For example, of those aged 66 who received Social Security, 42 percent also received their own labor income. That share remained above 30 percent until age 70. Of those aged 55 with their own retirement income, 79 percent had their own labor income. That share remained above 50 percent until age 65 and above 30 percent until age 69.

By age 72—and focusing on income received directly or through a spouse—few relied on a single source of Labor+SS+Retire income (Figure 16, bottom right panel). The most common combination, at 48 percent of the population, was having both Social Security benefits and income from pensions, annuities, and IRAs. Another 26 percent of the population had these two sources of income plus labor income. Only 16 percent of the population had Social Security income alone.

These patterns suggest that retirement is better thought of as a transitional period rather than a single point in time. Focusing on how any single source of income changes with age may provide a misleading picture, as many do not move instantaneously from being fully dependent on labor income to being fully dependent on Social Security benefits and retirement plan distributions. Some stop working well before claiming Social Security and some continue to work several years after claiming. Some begin to receive retirement income well before claiming Social Security and while they continue to work, while others delay drawing down their retirement assets until sometime after they claim Social Security or stop working.

A more consistent, and perhaps more understandable, pattern emerges by looking at the share of the population with income from at least one of these three sources (Figure 17, left panel). Looking at those with their own Labor+SS+Retire income, incidence was relatively flat from age 55 through age 61. Associated with claiming of Social Security benefits, this share increased 14 percentage points between age 61 and age 66, from 83 percent to 97 percent. The share of the population who received Labor+SS+Retire income either directly or through a spouse was more stable over the entire period, as it increased only 4 percentage points between age 61 and age 66, from 94 percent to 98 percent.

The differences between own incidence and own or spouse incidence indicates that most of the increase in own Labor+SS+Retire income incidence over these ages came from married individuals who, prior to age 62, did not have their own income but had a spouse who did. On average from age 55 through age 61, 83 percent of the population received their own Labor+SS+Retire income and another 11 percent did not but had a spouse who did. On average from age 70 through age 72, the share of the population with their own Labor+SS+Retire income

increased to 98 percent while the share with only spousal Labor+SS+Retire income declined to 0.3 percent.

Conditional on having the income, median Labor+SS+Retire income declined by less measured on a per capita basis then on an own basis (Figure 17, right panel). Median own Labor+SS+Retire income fell 33 percent, from $44,000 at age 55 to $30,000 at age 72. Median per capita Labor+SS+Retire income decreased by only 24 percent over these same ages, from $43,000 to $32,000. Per capita income fell by less because fewer individuals had only spousal Labor+SS+Retire income at age 72. All else equal, an individual who changes from having no own income to having a small amount will reduce the conditional own median. That same individual would increase the conditional per capita median, however, if they have a spouse with sufficiently high income.[34]

In addition to declining by less, the per capita conditional median was higher than the own conditional median of Labor+SS+Retire income after age 61 (Figure 17, right panel). When looking at the components of Labor+SS+Retire income individually, median own labor and retirement income were higher than their per capita equivalents at all ages, and median own Social Security income was higher than its per capita measure at all ages other than age 62. When looking at the combination of the three types of income, we also see that median own Labor+SS+Retire income was higher than its per capita measure from age 55 through age 61. Beginning at age 62, however, median per capita Labor+SS+Retire income was higher.

The reason that median per capita was higher than median own Labor+SS+Retire income after age 61 was that married individuals with low own income often had a spouse with high own income. For the components of Labor+SS+Retire income, the fact that the same amount of income was spread across more individuals lowered the per capita median relative to the own median and nearly always dominated other factors that might offset this effect. This was also true for the combination of the three types of income from age 55 through age 61. As the share with only spousal Labor+SS+Retire income declined after age 61, however, the effect of spousal

[34] All else equal, a married individual who went from having no own income to having own income equal to $\varepsilon$ would increase conditional median per capita income provided their spouse had own income greater than $\bar{y} - \frac{\varepsilon}{2}$, where $\bar{y}$ equals the conditional median per capita income when the married individual had no own income.

sorting began to dominate the relationship between own and per capita income. That is, for those aged 62 or older, median per capita income exceeded median own income because a sufficient number of married individuals with lower than median own income had a spouse with higher than median own income. And the effect of this sorting was enough to outweigh the impact on the per capita median of spreading the same amount of income over more individuals.

### *4.1.3 Labor, Social Security, and Retirement Income by Income Ventile*

Patterns of work, Social Security claiming, and retirement plan distributions differ based on income. Those with higher age 55-59 income generally were more likely to work at older ages and were more likely to delay claiming Social Security benefits. For those who continued to work, however, median labor income typically fell more with age for higher income ventiles. By age 72, nearly all received Social Security benefits across the income distribution, whereas the share who received retirement income generally increased with age 55-59 income. Conditional on having the income, median Social Security income varies less across income ventiles than either median labor income or median retirement income.

#### Incidence

At age 55, the probability of having own labor income generally increased with income, peaking for the fourth highest ventile (Figure 18, top left panel). Incidence increased from 44 percent for ventile 1 to 89 percent for ventile 17 before declining to 78 percent for ventile 20.

The share with own labor income fell with age across ventiles but tended to fall more slowly for those with the highest age 55-59 income and, as a result, the top three income ventiles were the most likely to have their own labor income by age 67. Of the total decline in own labor income incidence between age 55 and 72, nearly 60 percent of the decline had occurred by age 61 for the lowest income ventile. In contrast, only about 20 to 25 percent of the decline had occurred by age 61 for the top 16 income ventiles (that is, the top 80 percent of the age 55-59 income distribution). After age 61, the decrease in incidence was about evenly split between ages 61 to 66 and ages 66 to 72, with, generally, a bit more of the decline occurring at younger

ages for the lower income ventiles and a bit more of the decline occurring at older ages for the higher income ventiles.

By age 72, those with the highest age 55-59 income were much more likely to have their own labor income. Incidence of own labor income at age 72 was below 20 percent for the bottom five ventiles, between 20 and 25 percent for ventiles 6 through 17, and increased to 37 percent for the highest income ventile.

The share with labor income either directly or through a spouse was higher at every age than the share who receive it directly, as some without labor income had a spouse who worked (Figure 18, top panels). At age 55, the incidence of own or spouse labor income was higher than 90 percent for the top 15 ventiles (that is, the top 75 percent of the age 55-59 income distribution). At age 72, the incidence of own or spouse labor income was 30 percent or less for the bottom five ventiles, between 30 and 38 percent for ventiles 6 through 17, and increased to 52 percent for the highest income ventile.

The age at which we observed individuals receiving their own Social Security income tended to increase with age 55-59 income (Figure 18, middle left panel). Across all income ventiles, most (74 percent to 87 percent) of the Social Security claiming we observed (that is, claiming after age 55) occurred from age 62 through age 66. Within that age range, however, lower income ventiles were more likely than higher income ventiles to claim at age 62, and higher income ventiles were more likely than lower income ventiles to claim when older, particularly at the full benefit age of 66. Similarly, outside of that age range, lower income ventiles were more likely to have their own Social Security income prior to age 62, and higher income ventiles were more likely to begin receiving their own Social Security benefits after age 66.

Until the full benefit retirement age, the lowest income ventiles had the highest own Social Security incidence. From age 55 to 65, ventile 2 had the highest incidence of own Social Security income. From the full benefit age of 66 to age 72, ventiles 5 to 9 had the highest incidence.

At age 72, ventiles 15 through 19 had lower incidence of own Social Security income than all but the two lowest income ventiles. Most of those with lower age 55-59 income without their own Social Security presumably did not work long enough to qualify for benefits, nor did they

have a spouse who did.[35] In contrast, those with higher age 55-59 income without benefits were most likely former government workers who, because they were covered by an alternative pension system, were not required to participate in Social Security.

The share with Social Security income either directly or through a spouse was higher than the share who received it directly, especially at younger ages (Figure 18, middle panels). Across all ventiles, the share who did not receive their own Social Security benefits but had a spouse who did peaked at age 61. After age 61, this share declined more rapidly for lower income ventiles, with the highest income ventiles not experiencing rapid declines in spousal only Social Security incidence until the full benefit retirement age of 66.

By age 70, nearly all had Social Security income. At age 72, only 79 percent in the lowest income ventile received Social Security benefits directly or through a spouse. For the other 19 ventiles (that is, the top 95 percent of the age 55-59 income distribution), this share averaged 98 percent and ranged from 95 percent for ventile 2 to 99 percent for ventile 9.

The incidence of retirement income generally increased with age 55-59 income but, depending on age, peaked in ventiles 15 through 18 and was noticeably lower in the highest income ventile until age 71 (Figure 18, bottom panels). At age 55, more than 20 percent of ventiles 11 through 18 already received their own retirement income and more than 30 percent received retirement income directly or through a spouse. Incidence increased each year across the income distribution but increased more slowly for the highest income until after age 69. For example, own retirement income incidence at age 69 was 20 percentage points higher for ventile 15 than it was for ventile 20 (70 percent compared with 50 percent) but was about the same by age 72 (84 percent for both).

By age 72, retirement income was common across the income distribution. The share of the population who received retirement income either directly or through a spouse was greater than 60 percent for the top 16 income ventiles (that is, the top 80 percent of the age 55–59

[35] Individuals are required to have the equivalent of 10 years of covered employment to qualify for Social Security benefits. Individuals who do not qualify based on their own work history, however, would be eligible to receive spousal or survivor benefits if they were married, for 10 years or longer, to a worker who qualified for Social Security benefits. See note 31 for a further explanation of how we measure receipt of own Social Security income.

income distribution), above 80 percent for the top 12 ventiles, and 90 percent or more for the top 8 ventiles.

## Median Amounts

In addition to fewer individuals working at older ages, the earnings of those who continued to work typically declined with age for all but those with the lowest age 55-59 income (Figure 19). At age 55 and expressed in constant 2017 dollars, median own labor income ranged from $6,200 for ventile 1 (bottom left panel) to more than $170,000 for ventile 20 (top left panel). At age 72 (in 2017), median own labor income ranged from $8,900 for ventile 2 to $53,000 for ventile 20.

Conditional on working, median inflation-indexed own labor income fell the most for the highest income ventiles between age 55 and age 72 (Figure 19, left panels). Median own labor income fell by 69 percent or more for the top 10 ventiles (Figure 19, top left panel). In contrast, median labor income declined by less than 50 percent for ventiles 2 through 5 and actually increased for ventile 1 (Figure 19, bottom left panel).

Conditional on either the individual or their spouse working, we see changes by ventile in median per capita labor income between age 55 and age 72 (Figure 19, right panels) that were similar to the changes in median own labor income.

Social Security benefits increased with age 55-59 income but, reflecting the progressive benefit formula, varied less by income ventile than either labor or retirement income. Among those who received benefits directly, median own Social Security income at age 72 ranged from $9,300 for the lowest income ventile to $26,000 for the highest income ventile (Figure 20, top left panel). Conditional on either the individual or their spouse receiving benefits, median per capita Social Security income at age 72 ranged from $8,700 for ventile 1 to just over $22,000 for ventile 20 (Figure 20, bottom left panel). By contrast, among those with retirement income when age 72, both own and per capita median retirement income ranged from under $4,000 for the three lowest income ventiles to just over $39,000 for the highest income ventile (Figure 20, right panels).

### *4.1.4 Labor+SS+Retire Income by Income Ventile*

The incidence of own Labor+SS+Retire income increased substantially between age 55 and age 72 across the income distribution (Figure 21, top panel). At age 55, incidence of own Labor+SS+Retire income ranged from 55 percent for ventile 1 to more than 90 percent for ventiles 12 through 18. Own incidence by ventile remained about the same through age 61, with only the lowest and highest income ventiles experiencing noticeable declines. Beginning at age 62, the incidence of own Labor+SS+Retire income increased noticeably, particularly among lower income ventiles. By age 72, incidence of own Labor+SS+Retire income was more than 95 percent for all but the lowest income ventile and more than 99 percent for the top 15 ventiles (that is, the top 75 percent of the age 55–59 income distribution).

For all but the lowest income ventiles, the vast majority of the increase in own Labor+SS+Retire income incidence over these ages was attributable to individuals who did not have the income at younger ages but had a spouse who did. The share of the population with only spousal Labor+SS+Retire income declined markedly after age 61 (Figure 19, middle panel). From age 55 through age 61, the share of ventiles with only spousal Labor+SS+Retire income ranged from 7 percent to 17 percent, with the lowest and highest ventiles nearer to the top of that range. Beginning at age 62, the share with only spousal income from these sources declined substantially and is close to zero by age 72 across all ventiles.

As a result, the increase in the share of the population who received Labor+SS+Retire income either directly or through a spouse was much less dramatic over these ages. Incidence of own or spouse Labor+SS+Retire income increased by more than 4.0 percentage points for only the lowest three income ventiles, with ventiles 9 through 19 experiencing an increase of less than 2.0 percentage points.

Changes in the amount of Labor+SS+Retire income were very similar to the changes we observed in total income, with the largest declines experienced by those with the highest age 55–59 income (Figure 22). Median per capita Labor+SS+Retire income fell by nearly half between age 55 and age 72 for ventile 20 and fell by more than one-third for ventile 19. Over these same ages, median per capita Labor+SS+Retire income fell by 22 percent for ventiles 10

and 11, fell by 11 percent for ventile 5, and actually increased for the lowest two income ventiles.

Because the highest income ventiles experienced the largest declines in median Labor+SS+Retire income, differences across ventiles fell with age. At age 55 and expressed in constant 2017 dollars, median per capita Labor+SS+Retire income ranged from $5,800 for ventile 1 to more than $160,000 for ventile 20. At age 72, median per capita Labor+SS+Retire income ranged from $9,700 for ventile 1 to $84,000 for ventile 20.

#### *4.1.5 Non-Labor+SS+Retire Income*

A large share of the population received non-Labor+SS+Retire income, but the amounts were typically modest. Over the period studied, incidence of non-Labor+SS+Retire income fell 14 percentage points, from 82 percent at age 55 in 2000 to 68 percent at age 72 in 2017 (Figure 23, top panel, blue line). Among those with the income, median non-Labor+SS+Retire income was about $500 per year, on average, but ranged from roughly $300 to $1,000 depending on the year (Figure 23, middle panel, blue line).

Although the incidence of non-Labor+SS+Retire income fell considerably, we believe a good portion of that decline was related to market returns—particularly the fall in interest rates and the reduction in interest paid on checking and savings accounts—rather than age. Similarly, we believe changes in median amounts were more related to market returns than age.

Among the components of non-Labor+SS+Retire income, taxable interest had the largest decline in both incidence and amounts. The share of the population with taxable interest income fell by 20 percentage points between age 55 and age 72, from 73 percent to 53 percent (Figure 23, top panel, orange line). From a peak of nearly $400 in 2007 (at age 62), median taxable interest fell to less than $100 after 2012 (Figure 23, middle panel, orange line).

The pattern of taxable interest incidence and amounts by year appear related to market interest rates—especially the unprecedented extended period of low interest rates after 2008. For example, the federal funds rate—which anchors interest rates paid on bank deposits and short-term debt securities—averaged over 6.0 percent in 2000, fell in response to the 2001 recession, and then increased, averaging 5.0 percent in 2006 and 2007, before falling sharply

during the great recession (Figure 23, bottom panel, orange line).[36] From 2009 to 2015, the federal funds rate averaged less than 0.2 percent. In addition to lowering the target federal funds rate, the Federal Reserve System also engaged in so-called "quantitative easing" which lowered longer-term interest rates, with the third round of quantitative easing starting in September 2012.

Another indication that the declining incidence of taxable interest was related to market interest rates—rather than, say, solely due to the drawdown of assets earning taxable interest with age—is that incidence declined across the income distribution (Figure 24, middle panel). There was a similar percentage point decline in incidence across all but the highest income ventiles, with the share of the decline occurring after 2007 (age 62) increasing with income.

The incidence of other non-Labor+SS+Retire income also fell as the cohort aged, falling 9.0 percentage points between age 55 and age 72, from 63 percent to 54 percent (Figure 23, top panel, green line). Of the components of other non-Labor+SS+Retire income, the incidence of business income—that is, the business income of the self-employed—fell the most, from 23 percent of the panel at age 55 in 2000 to 13 percent at age 72 in 2017 (not shown).[37]

Among those with the income, median other non-Labor+SS+Retire income varied over the business cycle (Figure 23, middle panel, green line), driven by variations in gains/losses and, to a lesser extent, dividends. Median gains/losses ranged from gains of $1,000 in 2000 to losses of $1,700 in 2009 (not shown). Median dividends were also cyclical but peaked in 2017 and had a narrower range, from $280 in 2002 to $1,000 in 2017 (not shown). Perhaps not surprisingly given the importance of gains/losses and dividends, the amount of other non-Labor+SS+Retire income appears to have been related to equity market returns (Figure 23, bottom panel, green line).

[36] The federal funds rate is the rate charged on overnight interbank loans of excess reserves. As part of its monetary policy, the Federal Open Market Committee (FOMC) of the Federal Reserve System sets a target federal funds rate and engages in market transactions to keep the federal funds rate in the target range.

[37] Although most business and farm income is included in our measure of self-employment earnings, and thus included in labor income, individuals with this income also will receive at least some business and farm income. Individuals with business or farm losses have the income because self-employment earnings cannot be negative, thus the entire amount of the any loss would be counted as business or farm income. Individuals with positive business or farm income would have a small residual amount of business or farm income due to the way self-employment earnings are calculated by the tax code. See appendix for an explanation of that calculation.

Those with lower age 55-59 income were less likely to have non-Labor+SS+Retire income in any given year and experienced the biggest declines in incidence between age 55 and age 72 (Figure 24, top panel). At age 55, incidence ranged from 57 percent of individuals in ventile 2 to 99 percent of individuals in ventile 20. Between age 55 and age 72, incidence fell by more than 20 percentage points for the lowest income ventiles, by around 15 percentage points for the middle income ventiles, and by less than 10 percentage points for the highest income ventiles. As a result, incidence at age 72 ranged from 28 percent for ventile 1 to 97 percent for ventile 20.

Incidence of non-Labor+SS+Retire income declined more for lower income ventiles for two reasons. First, lower income ventiles experienced a larger percentage point decline in the incidence of business income from self-employment (a component of other non-Labor+SS+Retire income). Second, conditional on having non-Labor+SS+Retire income, lower income ventiles were less likely to have both taxable interest income and other non-Labor+SS+Retire income. Thus, reduced incidence of either type of income is more likely to translate into reduced overall incidence for the lower income ventiles.

The incidence of taxable interest income generally increases with age 55-59 income but, as already noted, all but the highest income ventiles experienced similar percentage point declines in incidence between 2000 and 2017 (Figure 24, middle panel). For example, incidence fell from 57 percent in 2000 (age 55) to 36 percent in 2017 (age 72) for ventile 5 and fell from 86 percent to 65 percent for ventile 15.

Those with higher age 55-59 income were more likely to both have other non-Labor+SS+Retire income at age 55 and to continue to have it throughout the period analyzed (Figure 24, middle panel). Lower income ventiles experienced larger declines in incidence primarily because of larger declines in the incidence of business income from self-employment (not shown).[38] The share of the population with business income was similar across ventiles at age 55, but incidence falls more with age for the lower income ventiles.

Although non-Labor+SS+Retire income was common across the income distribution, substantial amounts were typical only among those with the highest age 55-59 income (Figure

[38] See note 37.

25, top panel). Although it varied over time, median non-Labor+SS+Retire income averaged less than $200 for the lowest 7 ventiles, less than $500 for the lowest 14 ventiles, and less than $1,000 for the lowest 17 ventiles. For ventile 20, in contrast, median annual non-Labor+SS+Retire averaged just under $25,000.

After peaking in 2007 (age 62), median taxable interest declined substantially for all income groups (Figure 25, middle panel). By 2017 (age 72), median taxable interest was $100 or less for the lowest 17 ventiles (that is, the bottom 85 percent of the age 55–59 income distribution).

Median other non-Labor+SS+Retire income was more cyclical, but when the peak occurred differs with income. For 16 of the lowest 17 income ventiles, median amounts peaked in 2017 at age 72. For the top three income ventiles (that is, the top 15 percent of the age 55–59 income distribution), the peak was in 2007 at age 62. For example, median inflation-adjusted other non-Labor+SS+Retire income of the top income ventile hit $27,500 in 2000, $37,300 in 2007, and was about $23,000 in 2014 and 2017.

### *4.2 Income Shares*

To better quantify the importance of different types of income, this section analyzes the share of total income from different sources. These measures capture both the likelihood that individuals have a particular source of income—either directly or through a spouse—and the amount received by those who have the income.

For each individual we calculate income shares as:

$$S_{\alpha}^{i} = \frac{X_{\alpha}^{i}}{Z_{\alpha}^{i}}$$

Where S = share of per capita total income from a given source[39]

$X$= per capita income from a given source

$Z$ = per capita total income

$i$ indexes individuals

$\alpha$ indexes year-end age, ranging from age 55 (in 2000) to age 72 (in 2017)

[39] For individuals with positive source income and negative total income, the income share from that source is set to 100 percent. For individuals with negative source income—which can only occur in the case of non-Labor+SS+Retire income and some of its components—the income share from that source is set to zero. Because both negative total income and negative source income are uncommon, individuals to whom these income shares are assigned are unlikely to represent the 25th percentile, median, or 75th percentile.

### *4.2.1 Income Shares by Age*

From age 55 (in 2000) through age 72 (in 2017), most individuals received most of their income from some combination of three sources: labor earnings, Social Security benefits, and retirement income (that is, distributions from IRAs, pensions, and annuities). In all years, the typical individual got more than 99 percent of their total income from these sources, with the median share from Labor+SS+Retire income averaging 99.7 percent from age 55 in 2000 to age 72 in 2017 (Figure 26, orange line). Over the same period, the 25th percentile of the Labor+SS+Retire income share of total income averaged 93.7 percent, falling below 90 percent only at ages 61 and 62 in 2006 and 2007 (Figure 26, lower blue line).

The median share of total income from the combination of own and spousal labor income was 95 percent at age 55 and 56 but then begins to decline and was zero by age 69 (Figure 27, top panel). At least 25 percent got nearly all their income from labor through age 61, and 25 percent still got 11 percent or more of their income from labor at age 72. Another 25 percent got less than two-thirds of their income from labor at age 55, and at least 25 percent had no labor income by age 64.

As labor income declined, Social Security and retirement income increased in importance (Figure 27, middle and bottom panel). The typical individual received neither Social Security nor retirement income—either directly or through a spouse—before age 62. The median share of income from Social Security hit 47 percent by age 72, with 25 percent of the panel getting 75 percent or more of their income from Social Security, and 25 percent getting 29 percent or less. The median share of income from retirement hit 27 percent by age 72, with 25 percent of the panel getting 52 percent or more of their income from retirement plans, and 25 percent getting 1.3 percent or less.

### *4.2.2 Income Shares by Age and Income Ventile*

It was only in the highest age 55-59 income ventiles where non-Labor+SS+Retire income provided more than a de minimus share of total income for the typical individual at any point during the study period (Figure 28). By income, the median Labor+SS+Retire income share averaged less than 99 percent for only the top three income ventiles (that is, the top 15 percent of the age 55-59 income distribution). Similarly, other than the lowest income ventile where

some have no Labor+SS+Retire income at younger ages, the 25th percentile of the Labor+SS+Retire income share averaged less than 90 percent for only the top three income ventiles. For the highest income ventile at age 72, the median share was 81 percent, with 25 percent getting more than 98 percent and 25 percent getting less than 49 percent of their total income from Labor+SS+Retire income.

All but the lowest and highest income typically got nearly all their income from labor at age 55 but labor income was generally more important at older ages for those with higher age 55-59 income (Figure 29). At age 55, the median share of an individual's per capita total income from labor was 95 percent or more for ventiles 3 through 17. The median share declined with age, falling most quickly for those with lower age 55-59 income but eventually hitting zero for all but the highest income ventile. From age 64 through age 72, the highest income ventile had the highest median share of income from labor.

Reflecting the progressive benefit formula, Social Security income was more important for those with lower age 55-59 income (Figure 30). The median Social Security income share increased earlier and more sharply for those in the lowest income ventiles. At age 72, the median share of per capita total income from Social Security was 100 percent for the two lowest income ventiles, fell below 50 percent by ventile 11, and was below 33 percent for the highest four income ventiles (that is, the top 20 percent of the age 55-59 income distribution).

Retirement plan distributions were most important for those with moderate to moderately high age 55-59 income (Figure 31). The median share of per capita total income from retirement was positive at age 60 for ventiles 10 through 19 and the median share remained highest for these ventiles through age 72. At age 72, typical individuals in the four lowest income ventiles (that is, the bottom 20 percent of the age 55-59 income distribution) got little to no retirement income. The median retirement income share generally increased with income at age 72, peaking at 50 percent for ventile 18.

The median retirement income share generally increased with age but there was a notable jump up for most ventiles between ages 69 and 71, likely related to the start of RMDs from IRAs and DC pensions. This was particularly true for the highest income ventile, with the median retirement income share increasing from 11 percent at age 69 to 27 percent at age 71.

### *4.3 Summary*

Over the period studied, most individuals received nearly all their income from three sources: labor earnings, Social Security benefits, and retirement plan distributions. Across all years, only those with the highest age 55-59 income typically received substantially amounts of non-Labor+SS+Retire income (which includes sources such as interest, dividends, gains/losses, and income from partnerships and S-corps).

We observe a decline in the incidence of labor income and an increase in the incidence of both Social Security and retirement income from age 55 to age 72, but annual changes in incidence were not highly correlated. For example, although 76 percent of the panel claimed Social Security benefits from ages 62 through 66, incidence of own labor income declined by only 26 percentage points between age 61 and age 67.

Changes in income composition with age suggest that, for many individuals, retirement is a transitional process rather than a single point in time. Some individuals stop working well before claiming Social Security and some continue to work well after claiming. Some begin receiving retirement income while they continue to work while others delay drawing down retirement assets until they are required to do so. Married individuals, who represent about two-thirds of the panel, may have a spouse who receives Social Security or retirement income before they do, or have a spouse who continues to work after they no longer do.

By age 72, most individuals in the panel received both Social Security and retirement income. Considering both income received directly or through a spouse, 97 percent of the panel received Social Security income and 75 percent received retirement income, with 74 percent receiving both. Among those with the income at age 72, median per capita Social Security income was $16,400 and median per capita retirement income was $15,300.

The progressive formula for Social Security benefits results in those with lower age 55-59 income relying more on Social Security income at age 72 and contributes to Labor+SS+Retire income being more evenly distributed at age 72 than it is at age 55. The variation of median retirement income across income ventiles at age 72 was similar to the variation of median labor income at age 55. In contrast, median Social Security income varied less across ventiles than either labor income or retirement income. As a result, Social Security benefits represented a

higher share of total income at age 72 for those with lower age 55-59 income while retirement plan distributions represented a higher share of total income at age 72 for those with moderate to moderately high age 55-59 income.

Retirement plan distributions were common across the income distribution. At age 72, the share of the population who received retirement income either directly or through a spouse was greater than 60 percent for the top 16 income ventiles (that is, the top 80 percent of the age 55–59 income distribution), above 80 percent for the top 12 ventiles (that is, the top 60 percent), and 90 percent or more for the top 8 ventiles (that is, the top 40 percent). For those with the income, median per capita retirement income at age 72 ranged from under $4,000 for the three lowest income ventiles to just over $39,000 for the highest income ventile.

## 5. Conclusion

In this study, we use administrative tax data to build a unique panel dataset that follows the 1945 birth-year cohort from 2000 (when aged 55) through 2017 (when aged 72). These data allow us to observe changes in the amount and composition of individuals' income from before they are eligible to claim Social Security retirement benefits until after they are eligible for maximum Social Security benefits and generally must begin taking distributions from their IRAs and DC plans.

We find that the typical individual maintained more than 90 percent of their age 55-59 spendable income—that is, the income available to spend after paying taxes and saving for retirement—through age 72. Those with lower age 55-59 income typically had higher spendable-income replacement rates. At age 72, the median spendable-income replacement rate was greater than 100 for the bottom 25 percent of the age 55-59 income distribution, between 90 and 95 percent near the middle, and only less than 80 percent for the top 10 percent.

Over the period studied, most individuals received nearly all their income from three sources: labor income (wage and salary, self-employment earnings, and unemployment compensation), Social Security income (disability and retirement benefits), and retirement income (IRA distributions and income from pensions and annuities). Although most transition from predominately relying on labor income at younger ages to predominately relying on Social

Security and retirement income at older ages, that transition often takes place over a number of years.

We find much higher incidence of (non-Social-Security) retirement income than is typically reported in household survey data. By age 72, 67 percent receive retirement income directly and 75 percent receive the income directly or through a spouse. Retirement income is common across the age 55-59 income distribution, with own or spouse incidence above 80 percent at age 72 for the middle 20 percent and 90 percent or more for the top 40 percent.

The median share of income from Social Security was 47 percent at age 72, with 25 percent of the panel getting 75 percent or more of their income from Social Security, and 25 percent getting 29 percent or less. Reflecting the design of the US Social Security system, those with lower age 55-59 income tended to rely more on Social Security benefits in retirement while those with higher age 55-59 income tended to rely more on retirement plan distributions.

The results of this study challenge two widely held beliefs about the US retirement system. The data show that the US retirement system has allowed most workers to replace a substantial share of their spendable income in retirement, with those with lower pre-retirement income typically replacing a higher percentage. The data also show that most retirees rely on a combination of Social Security benefits and retirement plan distributions in retirement.

**References**

Bee, Adam C. and Joshua Mitchell. 2017. "Do Older Americans Have More Income Than We Think?" SEHSD Working Paper No. 2017-39. Washington, DC: US Census Bureau Social, Economic, and Housing Statistics Division. Available at https://www.census.gov/content/dam/Census/library/working-papers/2017/demo/SEHSD-WP2017-39.pdf.

Brady, Peter J., 2010. "Measuring retirement resource adequacy." *Journal of Pension Economics and Finance*, 9 (2), 235–262.

Brady, Peter J., 2016. *How America Supports Retirement: Challenging the Conventional Wisdom on Who Benefits*. Washington, DC: Investment Company Institute. Available at https://www.ici.org/pdf/rpt_16_america_supports_retirement.pdf.

Brady, Peter J. and Steven Bass. 2020a. "Reconciling Form 1040 and Form 1099-R Data." *SOI Working Paper*. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-soi/20rpreconciling10401099R.pdf.

Brady, Peter J. and Steven Bass. 2021. "Comparing the Current Population Survey to Income Tax Data." *SOI Working Paper*. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-soi/21rpcomparingcpstoincometaxdata.pdf.

Brady, Peter J. and Steven Bass. 2023. "Imagine All the People: Constructing a Representative Sample of the US Population from Tax Data." *SOI Working Paper*. Washington, DC: Internal Revenue Service.

Brady, Peter, Steven Bass, Jessica Holland, and Kevin Pierce. 2017. "Using Panel Tax Data to Examine the Transition to Retirement." *SOI Working Paper*. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-soi/17rptransitionretirement.pdf.

Brady, Peter and Kevin Pierce. 2012. "The Promise and Potential Pitfalls of Using Administrative Tax Data: A Case Study." Unpublished paper, Investment Company Institute (April).

Engen, Eric M., William G. Gale, and Cori E. Uccello. 2005. "Lifetime Earnings, Social Security Benefits, and the Adequacy of Retirement Wealth Accumulation." *Social Security Bulletin*, 66 (1), 38–57. Available at https://www.ssa.gov/policy/docs/ssb/v66n1/v66n1p38.html.

Federal Reserve Economic Data (FRED). St. Louis: Federal Reserve Bank of St. Louis.

Hurd, Michael D. and Susann Rohwedder. 2015. "Measuring Economic Preparation for Retirement: Income Versus Consumption." *Michigan Retirement Research Center Research Paper* no. WP 2015-332. Available at https://mrdrc.isr.umich.edu/publications/papers/pdf/wp332.pdf.

Hurst, Eric. 2008. "Understanding Consumption in Retirement: Recent Developments." In *Recalibrating Retirement Spending and Saving*, edited by John Ameriks and Olivia S. Mitchell, 29–45. New York: Oxford University Press.

Internal Revenue Service. 2018a. *U.S. Tax Guide for Aliens: For Use in Preparing 2017 Returns*, Publication 519. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-prior/p519--2017.pdf.

Internal Revenue Service. 2018b. *Tax Guide for Seniors: For Use in Preparing 2017 Returns*, Publication 554. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-prior/p554--2017.pdf.

Internal Revenue Service. 2018c. *Tax Guide for Individuals with Income from U.S. Possessions for Use in Preparing 2017 Returns*, Publication 570. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-prior/p570--2017.pdf.

Internal Revenue Service. 2017a. *Exemptions, Standard Deduction, and Filing Information: For Use in Preparing 2017 Returns*, Publication 501. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-prior/p501--2017.pdf.

Internal Revenue Service. 2017b. *1040 Instructions 2017*. Washington, DC: Internal Revenue Service. Available at https://www.irs.gov/pub/irs-prior/i1040gi--2017.pdf.

Meyer, Bruce D., Wallace K. C. Mok, and James X. Sullivan. 2009. "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences." NBER Working Paper no. 15181 (July). Cambridge, MA: National Bureau of Economic Research. Available at https://www.nber.org/papers/w15181.

Munnell, Alicia H. and Dina Bleckman. 2014. "Is Pension Coverage a Problem in the Private Sector?" (April). *Center for Retirement Research at Boston College Issue in Brief*, no. 14-7. Available at https://crr.bc.edu/wp-content/uploads/2014/04/IB_14-7-508.pdf.

Munnell, Alicia H., Anqi Chen, and Robert L. Siliciano. 2021. "The National Retirement Risk Index: An Update from the 2019 SCF." *Center for Retirement Research at Boston College Issue Brief*, no. 21-2 (January). Available at https://crr.bc.edu/wp-content/uploads/2021/01/IB_21-2.pdf.

Office of Personnel Management. 2011. *Information for FERS Annuitants*. Washington, DC: Office of Personnel Management. Available at https://www.opm.gov/retirement-center/publications-forms/pamphlets/ri90-8.pdf.

Rector, Robert E., Kirk A. Johnson, and Sarah E. Youssef. 1999. "The Extent of Material Hardship and Poverty in the United States." *Review of Social Economy*, 57 (3): 351–58.

Schieber, Sylvester J. 1995. "Why Do Pension Benefits Seem So Small?" *Benefits Quarterly* 11(4): 57–70.

Scholz, John Karl and Ananth Seshadri. 2007. "Children and Household Wealth" (October). *Michigan Retirement Research Center Research Paper* no. WP 2007-158. Available at https://mrdrc.isr.umich.edu/publications/papers/pdf/wp158.pdf.

Scholz, John Karl, Ananth Seshadri, and Surachai Khitatrakun. 2006. "Are Americans Saving 'Optimally' for Retirement." *Journal of Political Economy*, 114 (4): 607–643.

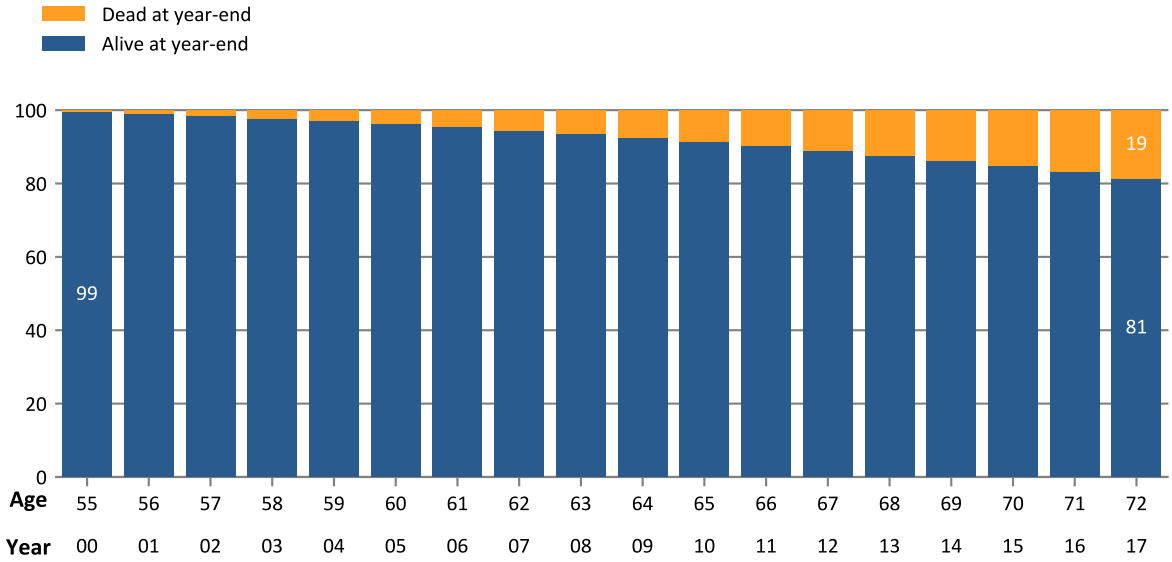
Social Security Administration. 2016. "Income of the Population 55 or Older, 2014." SSA Publication No. 13-11871. Washington, DC: Social Security Administration. Available at https://www.ssa.gov/policy/docs/statcomps/income_pop55/2014/incpop14.pdf.

VanDerhei, Jack. 2019. "Retirement Savings Shortfalls: Evidence from EBRI's 2019 Retirement Security Projection Model®." *EBRI Issue Brief*, no. 475 (March). Available at https://www.ebri.org/docs/default-source/ebri-issue-brief/ebri_ib_475_rspm-7mar19.pdf.

Figure 1

**Panel Consists of Individuals Who Survive to Age 72**

Share of population born in 1945 and alive on January 1, 2000 by age/year (percentage)

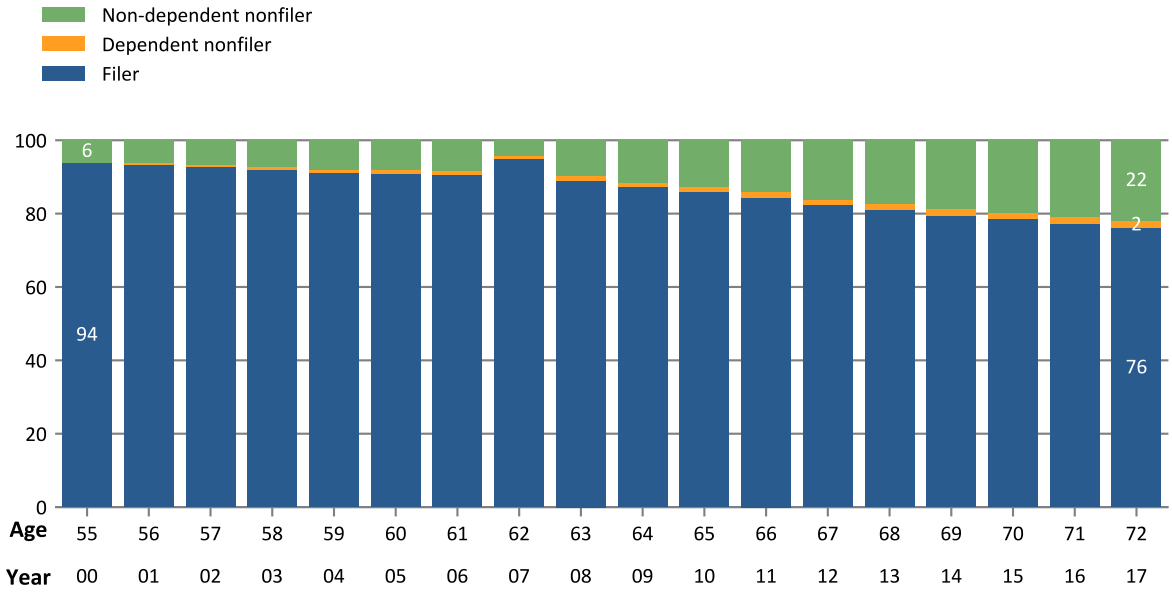



Source: Authors' tabulation of IRS data

Figure 2

**Share of the Panel Who File a Return Falls with Age**

Composition of panel (age 55 in 2000 and alive at end of 2017) by sample component and age/year (percentage)

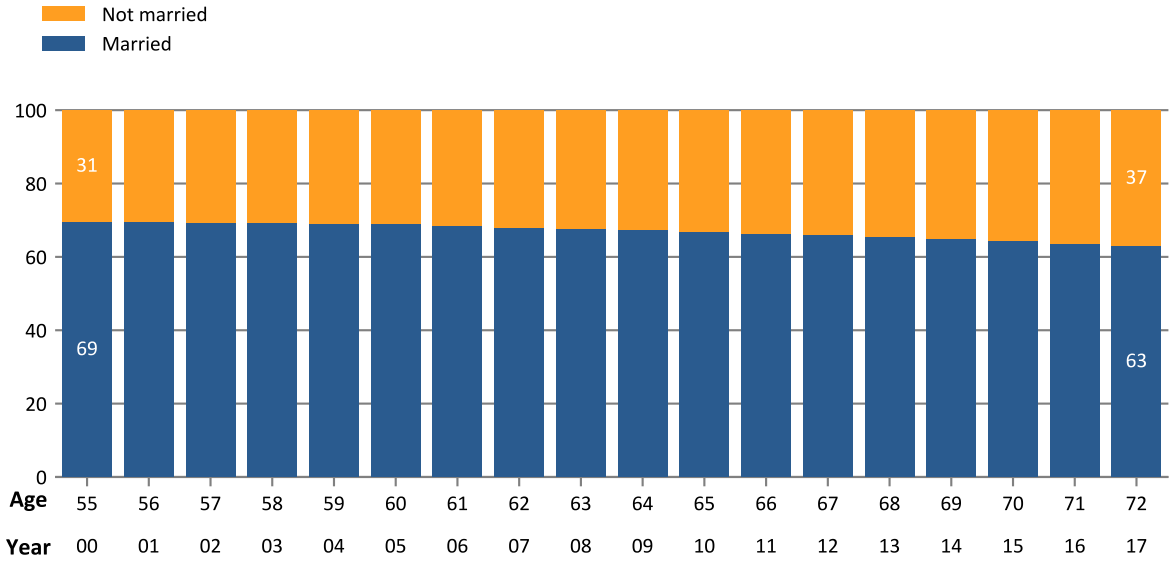



Source: Authors' tabulation of IRS data

Figure 3

**Most in Panel Married But Married Share Falls with Age**

Composition of panel (age 55 in 2000 and alive at end of 2017) by marital status (percentage)



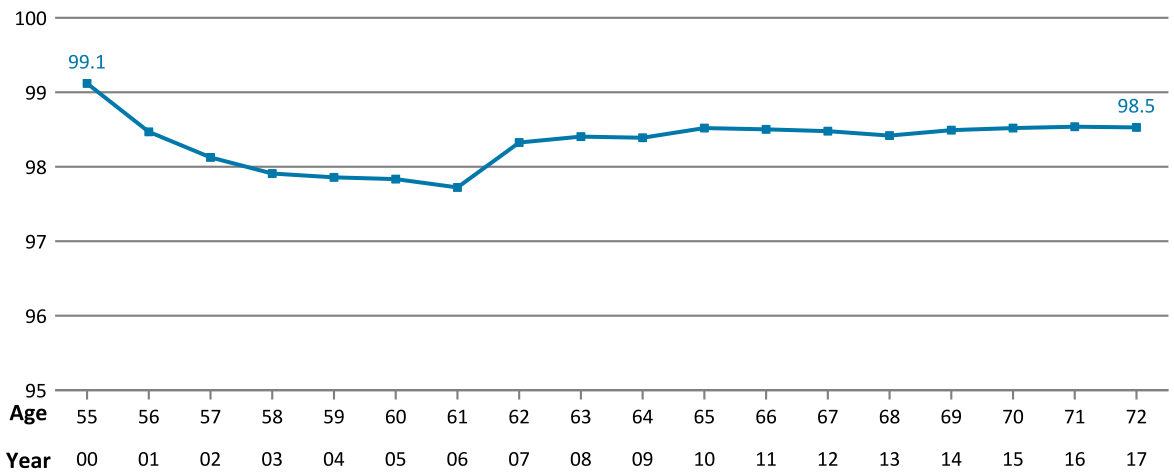

Note: In a given year, nonfilers are classified as "not married" unless they were observed filing a joint 1040 in a separate year with a spouse who is still alive in the year indicated.

Source: Authors' tabulation of IRS data

Figure 4

**Most Individuals Have Income Throughout the Panel**

Share of panel with own or spouse total income by age/year (percentage)

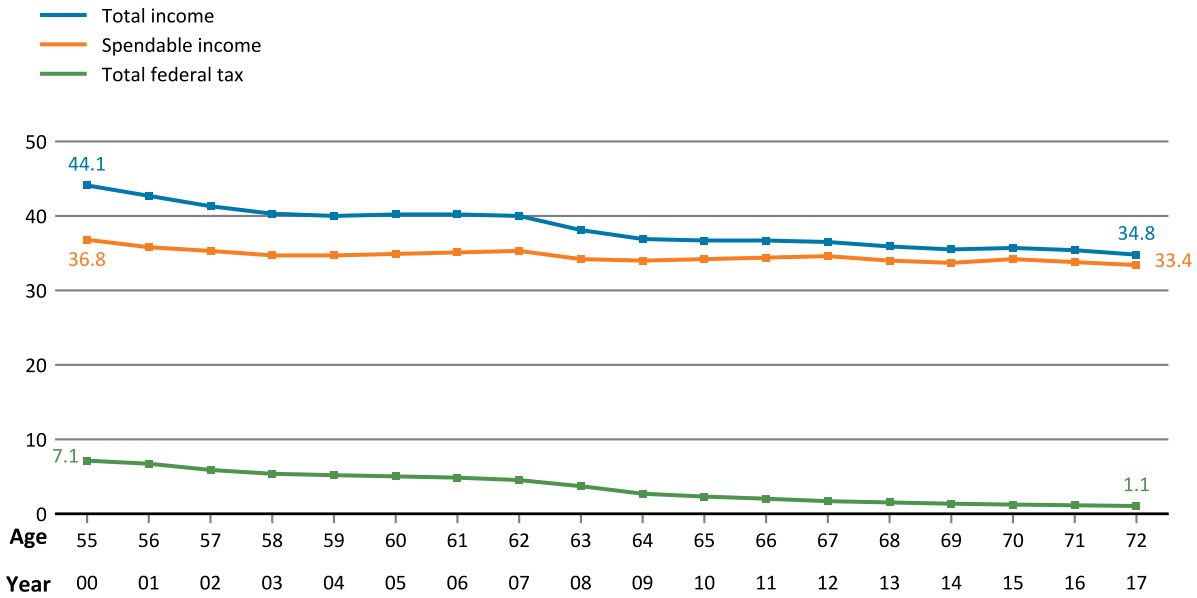



Note: Gray shading indicates a recession. According to the NBER's Business Cycle Dating Committee, recessions occurred from March to November 2001 and from December 2007 to June 2009.
Source: Authors' tabulation of IRS data

Figure 5

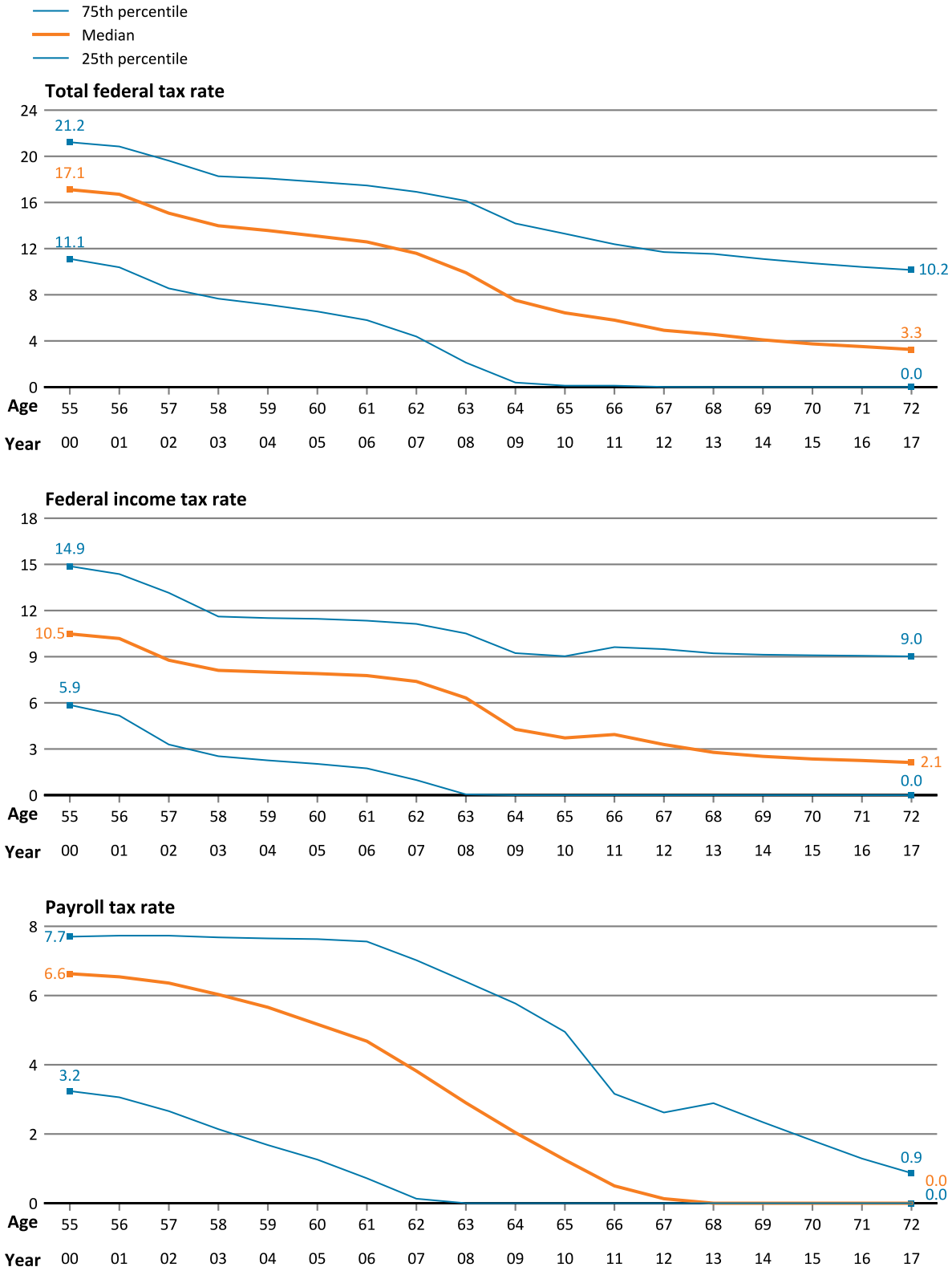
**Spendable Income Declines by Less Than Total Income Because Taxes Decline**

Median per capita inflation-adjusted amounts for those with total income by age/year (thousands of 2017 dollars)



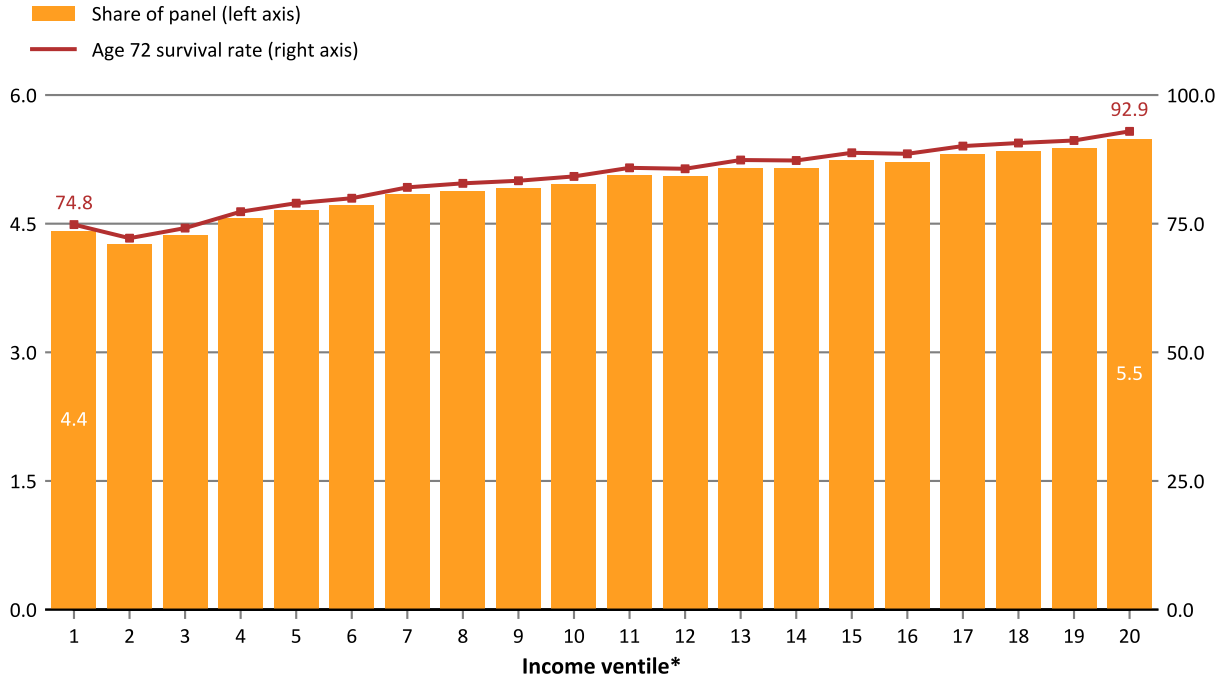

*Medians are are calculated for individuals with non-zero total income in a given year, regardless of whether they have spendable income or taxes.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 6
**Federal Taxes Substantially Lower in Retirement**
Federal tax rates* for those with total income by age/year (percent)




*Tax rates are calculated for each individual alive at year-end 2017 as their average effective tax rate—that is, the rates are calculated as taxes paid divided by total income. Medians are the median rate across individuals with non-zero total income, regardless of whether they have federal or payroll taxes.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

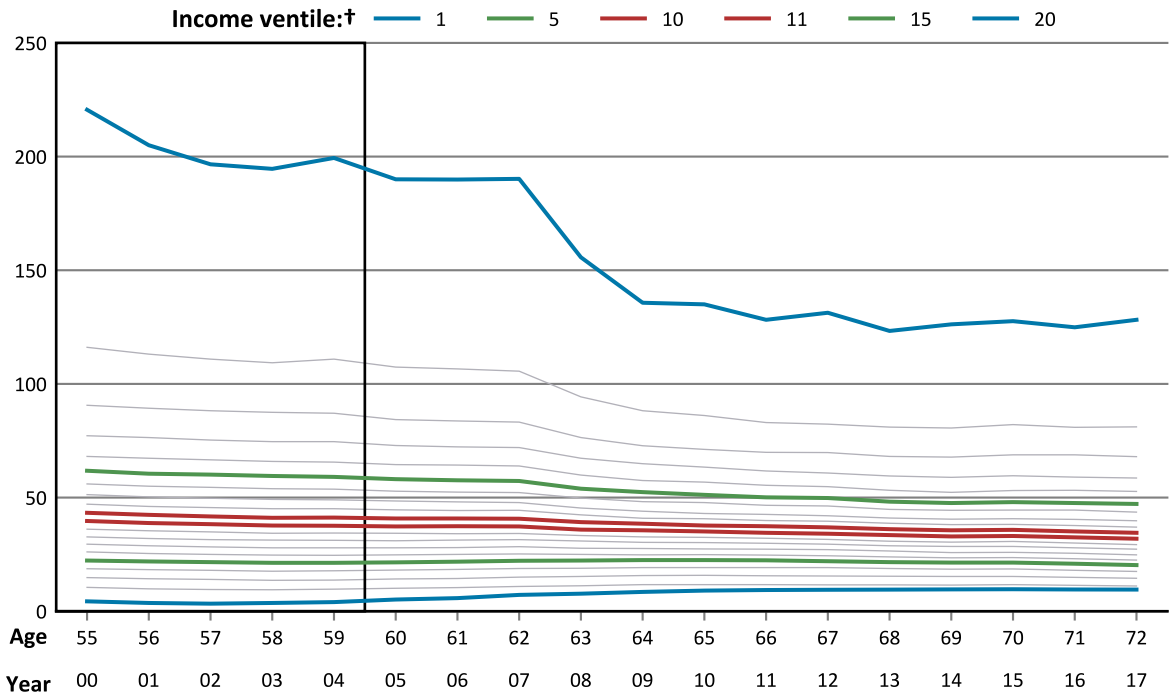
Figure 7
**Higher Income Individuals More Likely to Survive to Age 72**
Share of panel and percentage of individuals surviving to age 72 by income ventile*




*Individuals alive at age 59 are ranked by their average total income between ages 55 and 59. Individuals with positive average total income are split into 20 equally sized groups or "ventiles" with ventile 1 having the lowest income and ventile 20 having the highest income. The 1.0 percent of the panel with zero or negative average total income between ages 55 and 59 are included in the totals but not presented separately here.

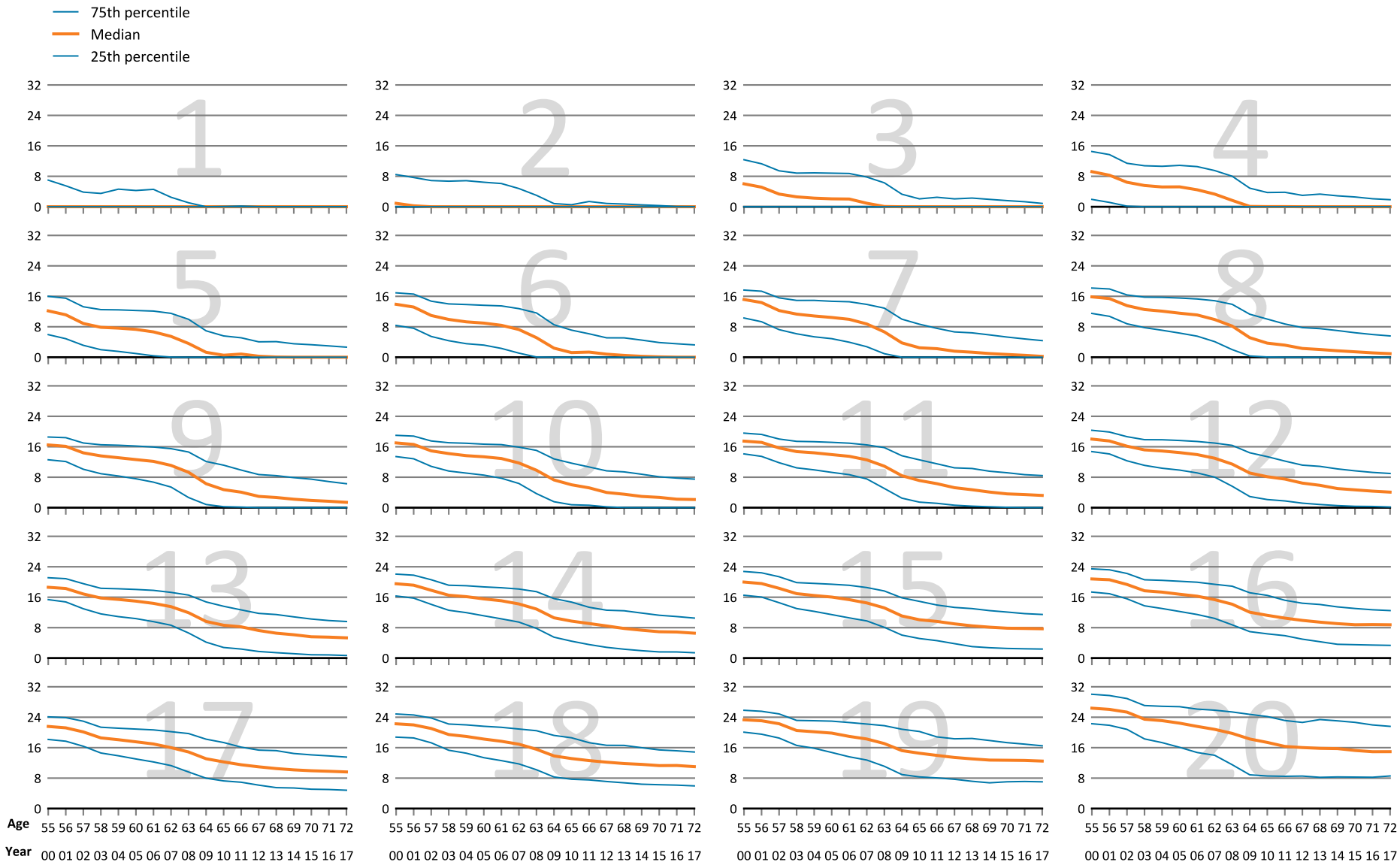
Source: Authors' tabulation of IRS data

Figure 8
**Total Income Declines the Most With Age For Highest Income**
Median per capita inflation-adjusted total income* by age/year and income ventile†
(thousands of 2017 dollars)




*Medians are among individuals with total income.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 9a
**Taxes Fall the Most in the Middle of the Income Distribution**
Total federal tax rates* by age/year and income ventile† (percentage)

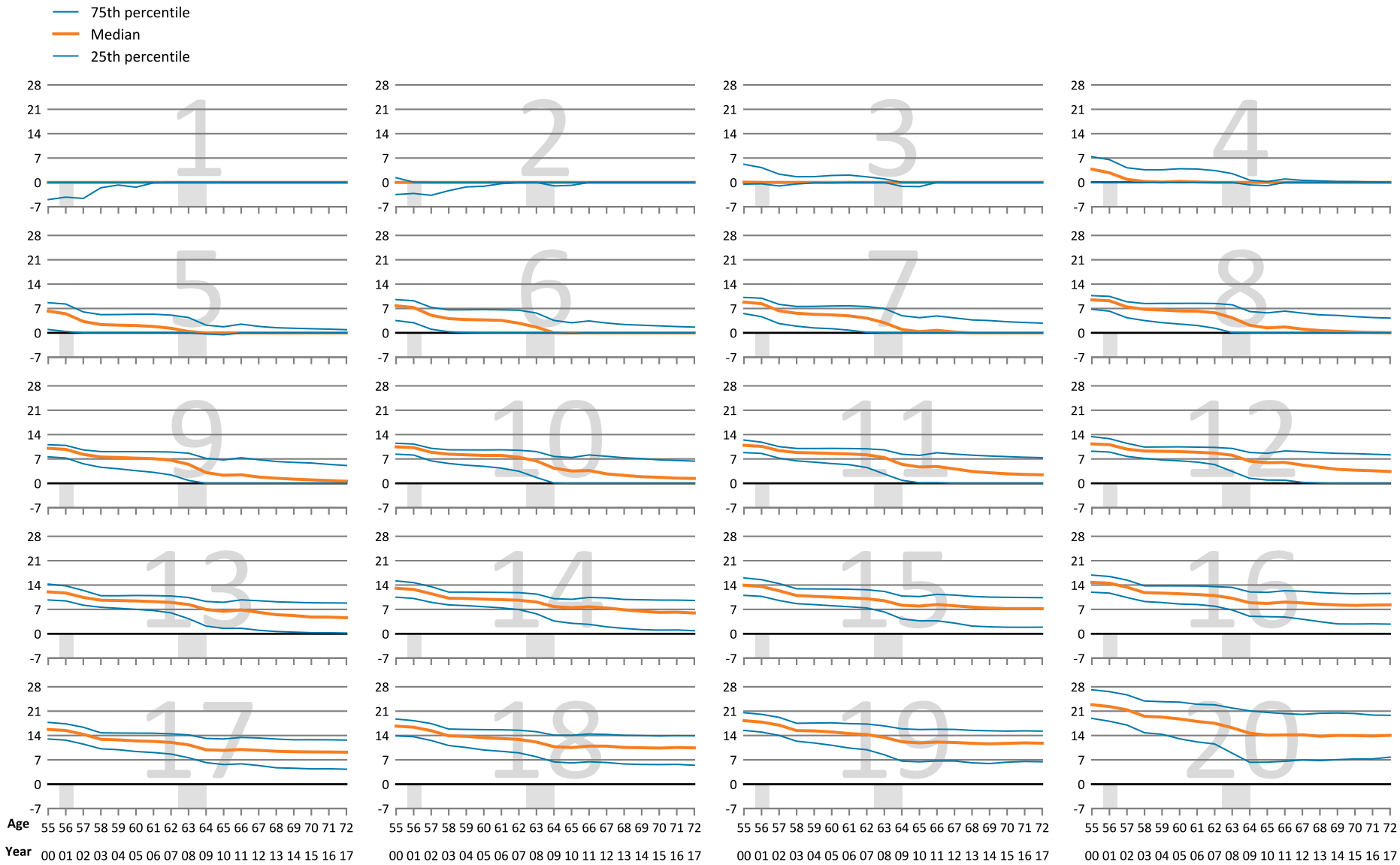



*For a description of the tax rate calculation, see the note on Figure 6. Medians and percentiles are among individuals with total income.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 9b

**Taxes Fall the Most in the Middle of the Income Distribution**

Federal income tax rates* by age/year and income ventile† (percentage)



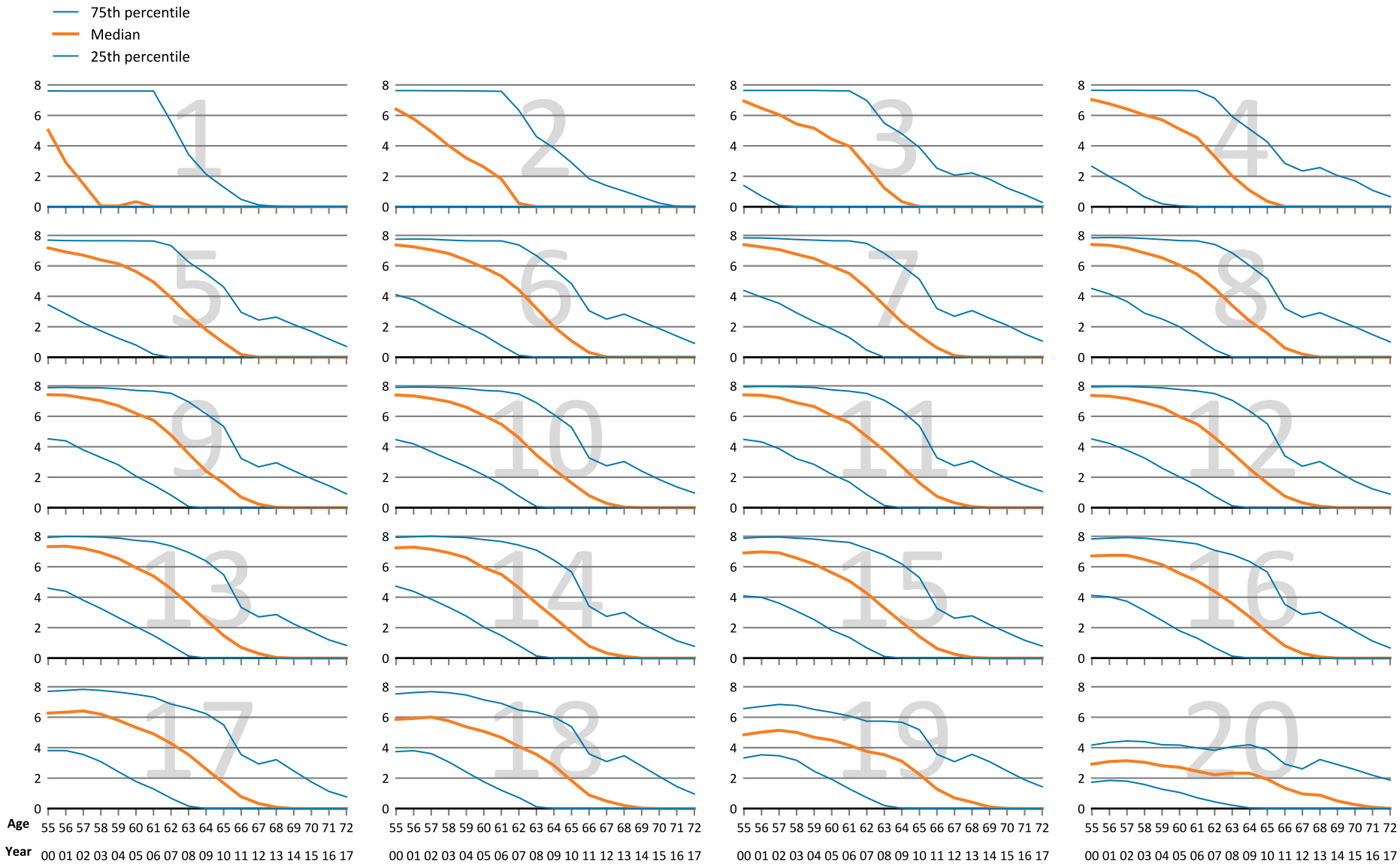

*For a description of the tax rate calculation, see the note on Figure 6. Medians and percentiles are among individuals with total income.

†For a description of the income ventiles, see the note on Figure 7.

Note: Gray shading indicates a recession. See note on Figure 4.

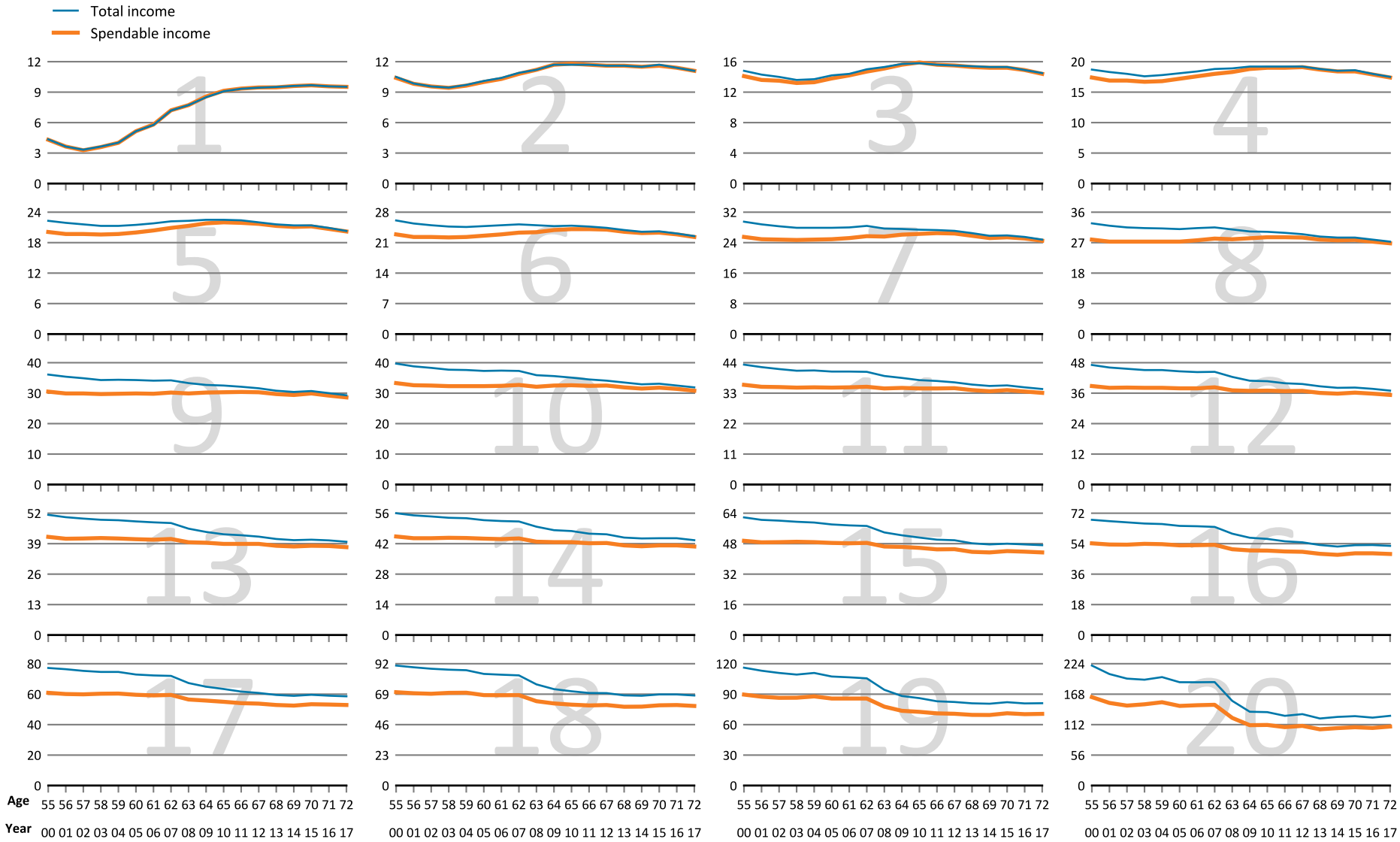
Source: Authors' tabulation of IRS data

Figure 9c
**Taxes Fall the Most in the Middle of the Income Distribution**
Payroll tax rates* by age/year and income ventile† (percentage)



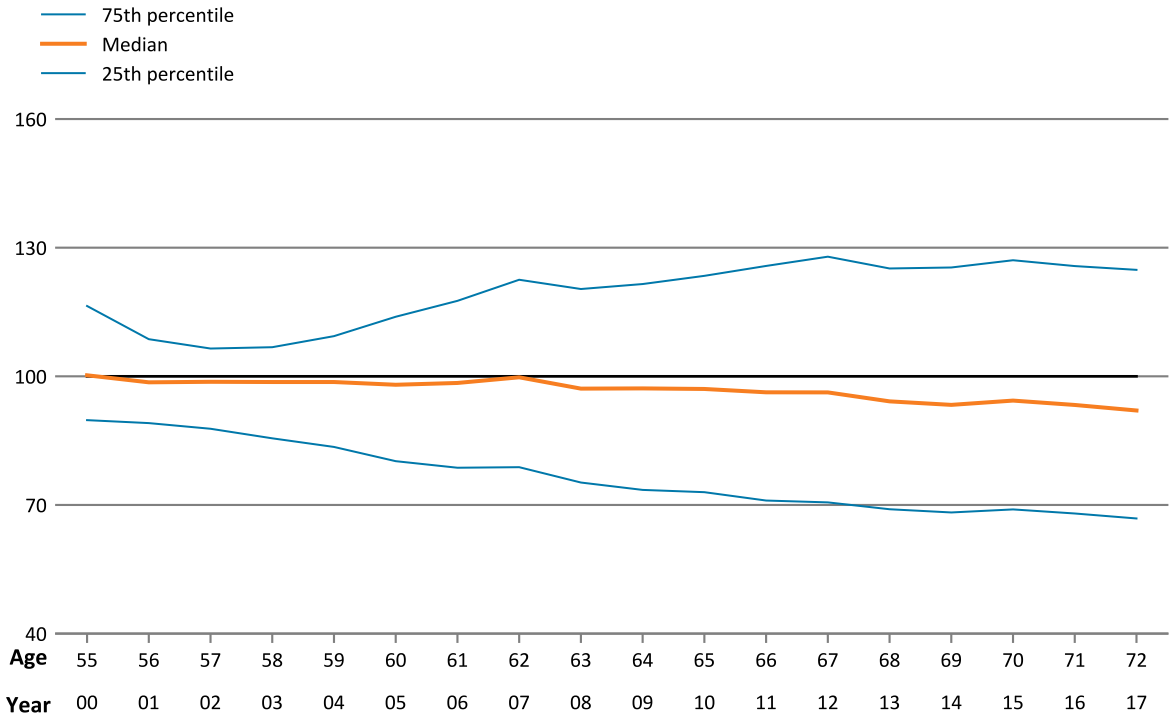

*For a description of the tax rate calculation, see the note on Figure 6. Medians and percentiles are among individuals with total income.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 10
**Largest Spendable Income Declines Among Highest Income Despite Reduction in Taxes**
Median per capita inflation-adjusted income* by age/year and income ventile† (thousands of 2017 dollars)




*Medians are among individuals with total income.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 11
**Typical Individual Replaces More Than 90 Percent of Spendable Income**
Spendable income replacement rate* by age/year (percentage)

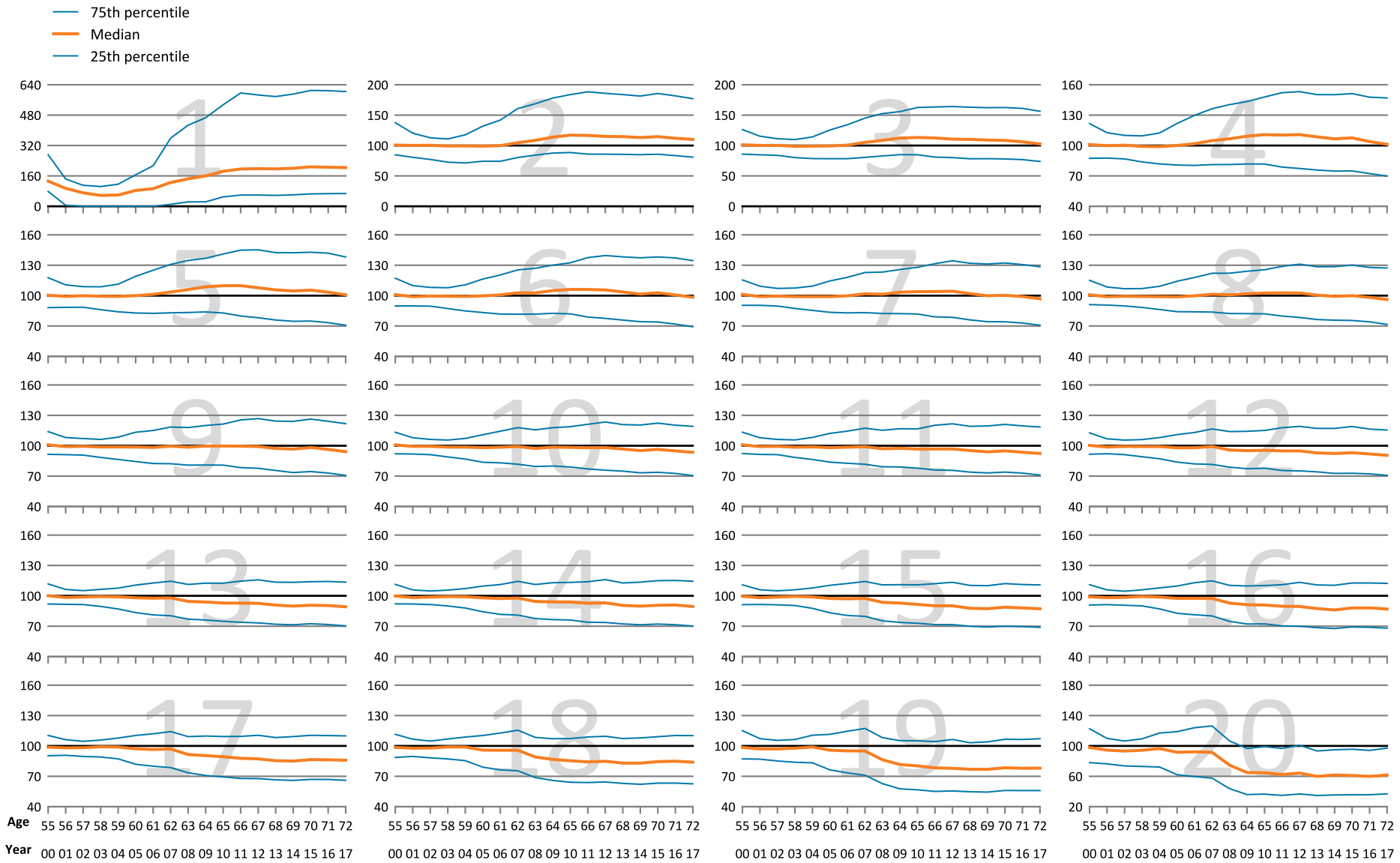



*The spendable income replacement rate is inflation-adjusted spendable income at a given age as a percentage of average inflation-adjusted spendable income between age 55 and 59. Individuals with zero or negative average age 55–59 income are excluded from the results presented here.

Note: Gray shading indicates a recession. See note on Figure 4.

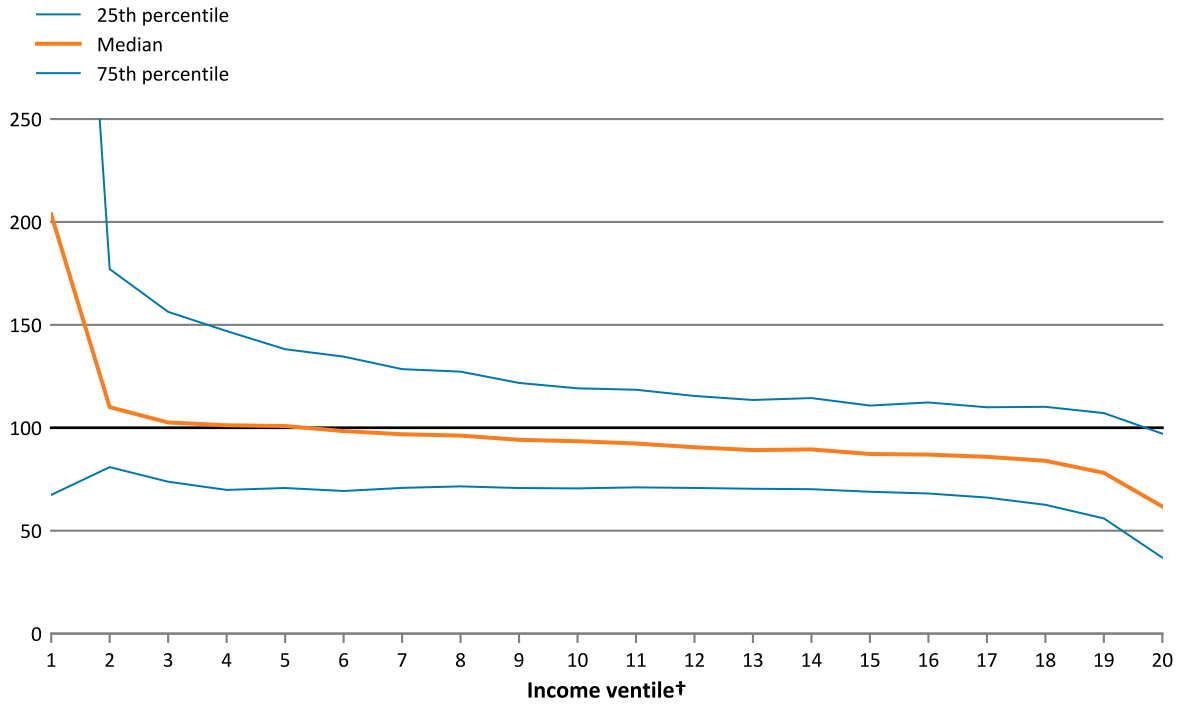
Source: Authors' tabulation of IRS data

Figure 12
**Lower Income Typically Maintain Higher Share of Spendable Income**
Spendable income replacement rate* by age/year and income ventile† (percentage)



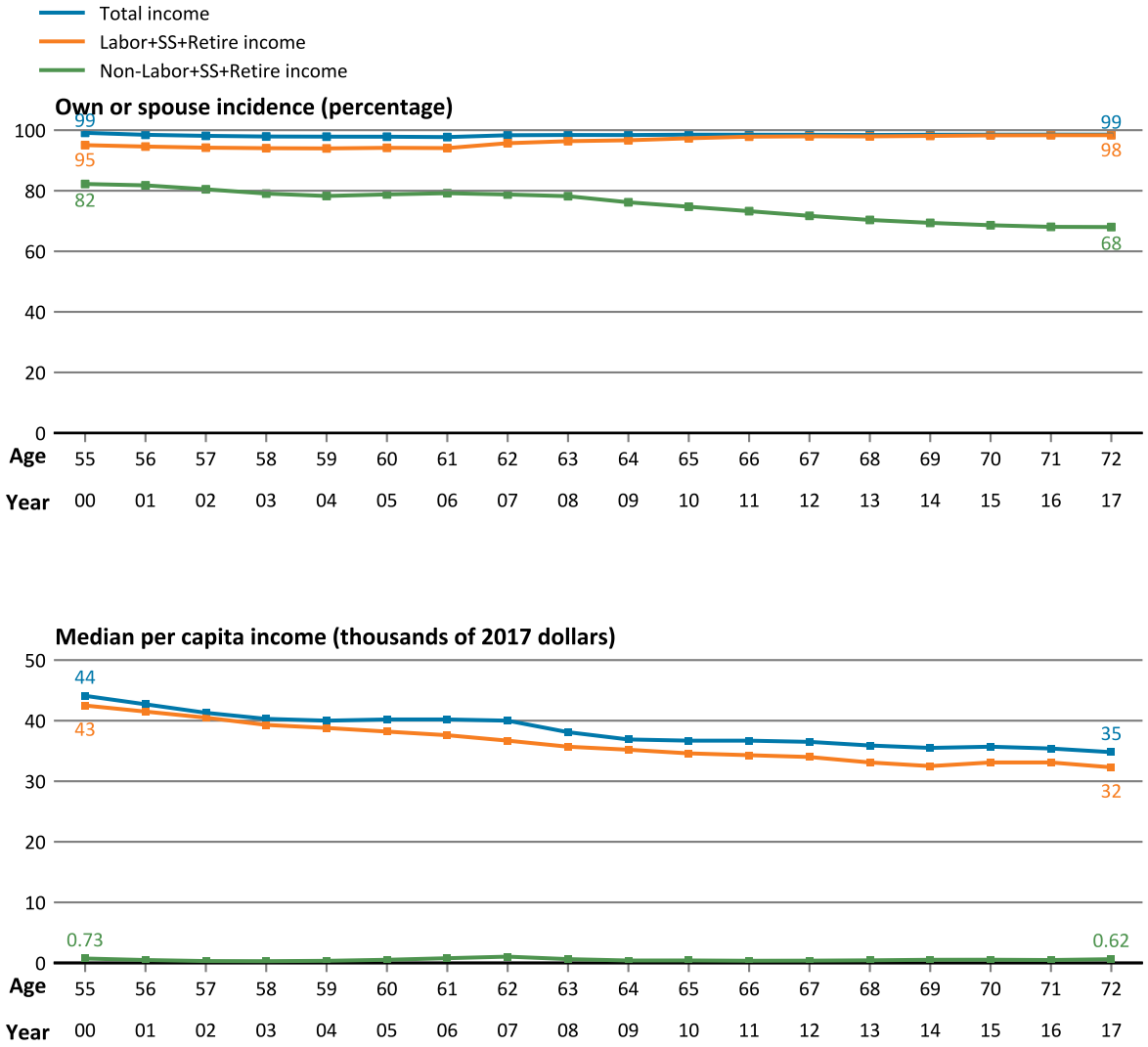

*For a description of the spendable income replacement rate, see the note on Figure 11.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 13
**Highest Income Experience Sharpest Declines in Spendable Income**
Spendable income replacement rate* at age 72 by income ventile† (percentage)



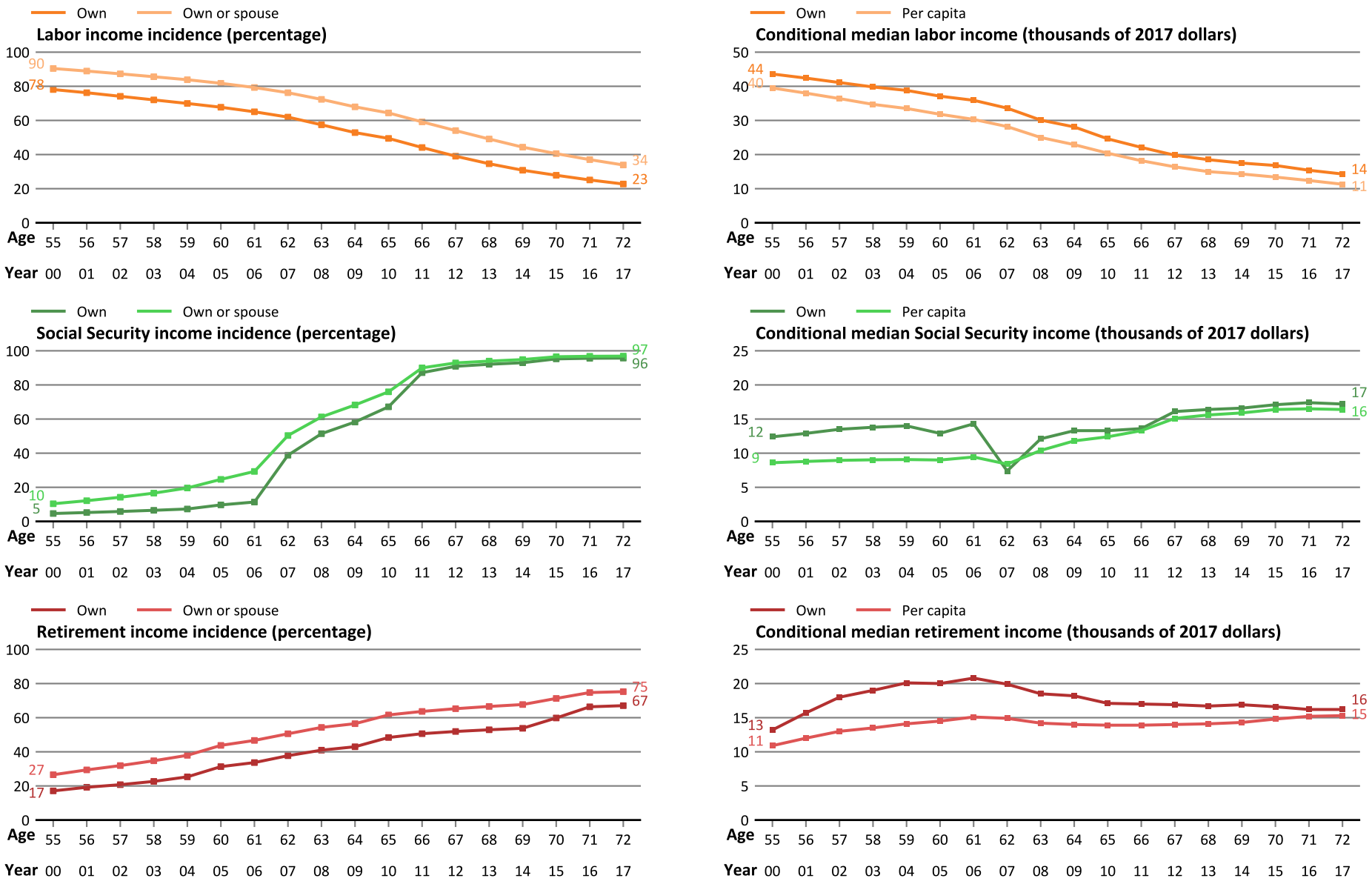

*For a description of the spendable income replacement rate, see the note on Figure 11. The 75th percentile replacement rate for individuals in the first income ventile was 604 percent.
†For a description of the income ventiles, see the note on Figure 7.
Source: Authors' tabulation of IRS data

Figure 14
**Typical Individual Gets Bulk of Income from Labor, Social Security, and Retirement**
Panel incidence and conditional median inflation-adjusted income by age/year



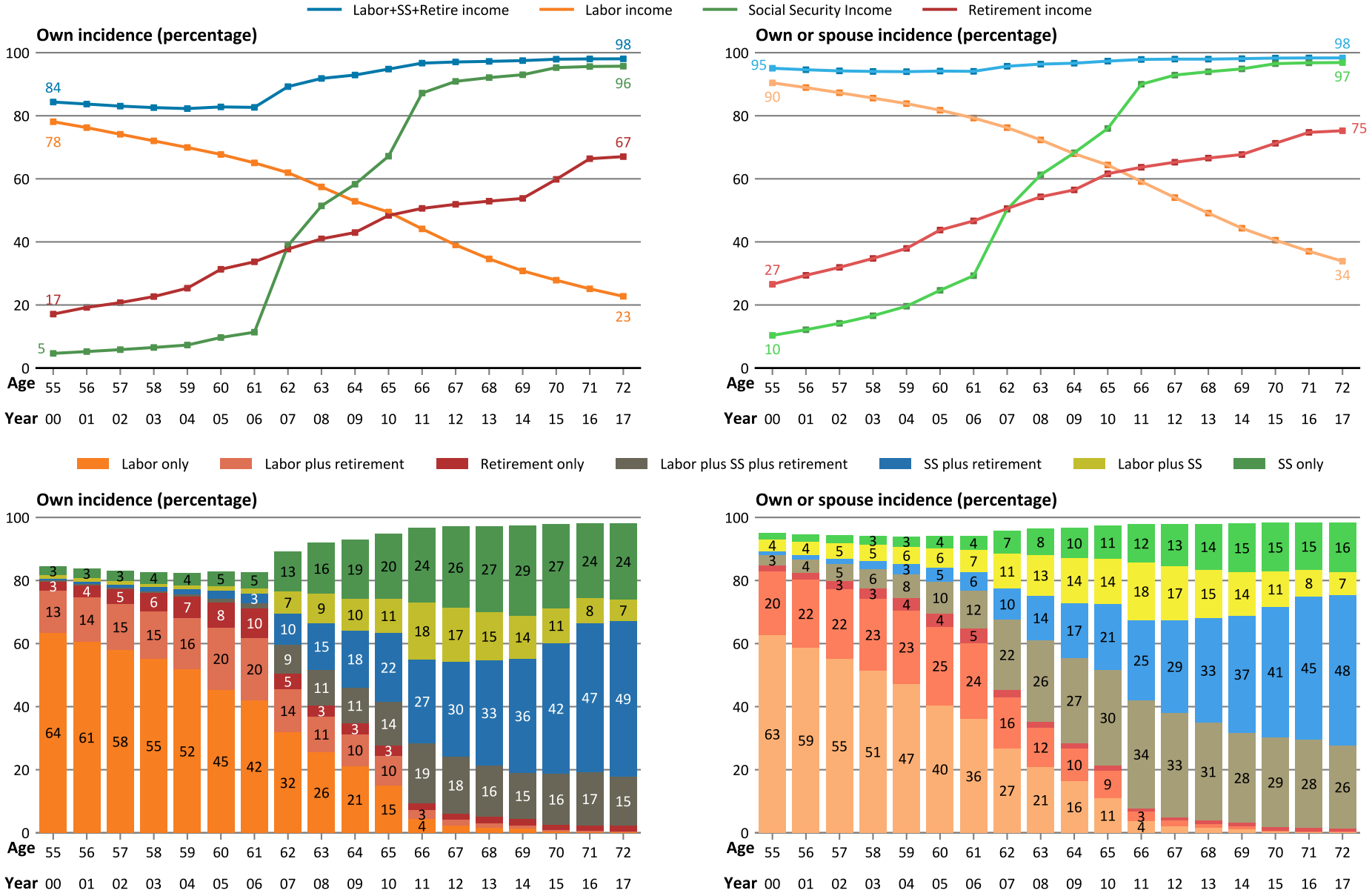

Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 15
**Reliance on Social Security and Retirement Income Increases During Transition into Retirement**
Panel incidence and conditional median inflation-adjusted income by age/year




Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 16
**Claiming of Social Security not Always Associated with Stopping Work**
Panel incidence of Labor+SS+Retire income and components by age/year (percentage)

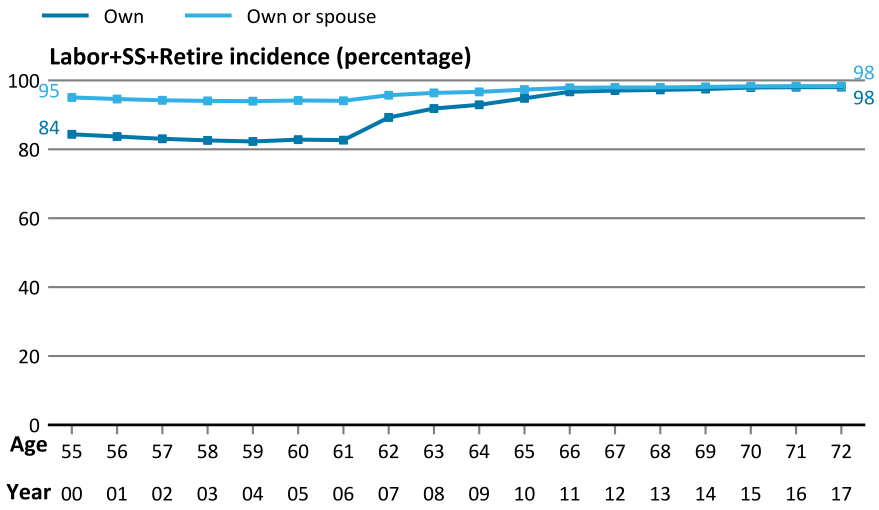


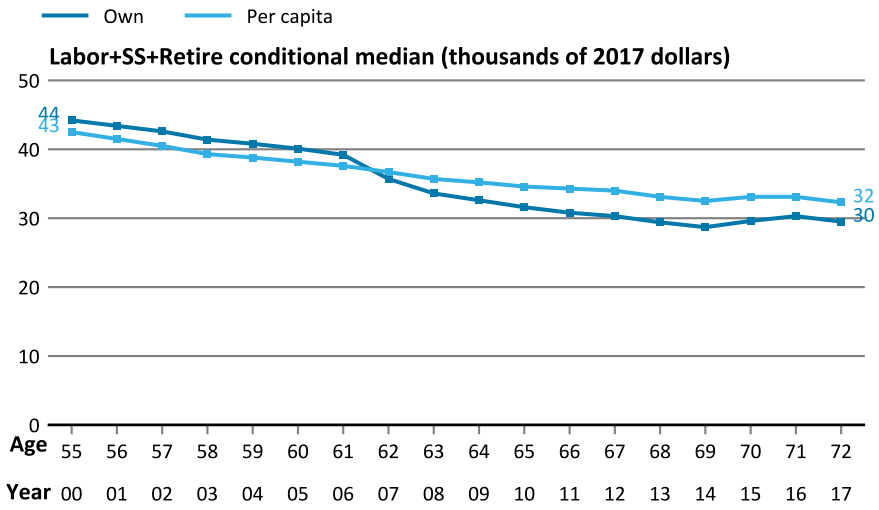

Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 17

**Most Receive Labor+SS+Retire Income Throughout Period Studied**

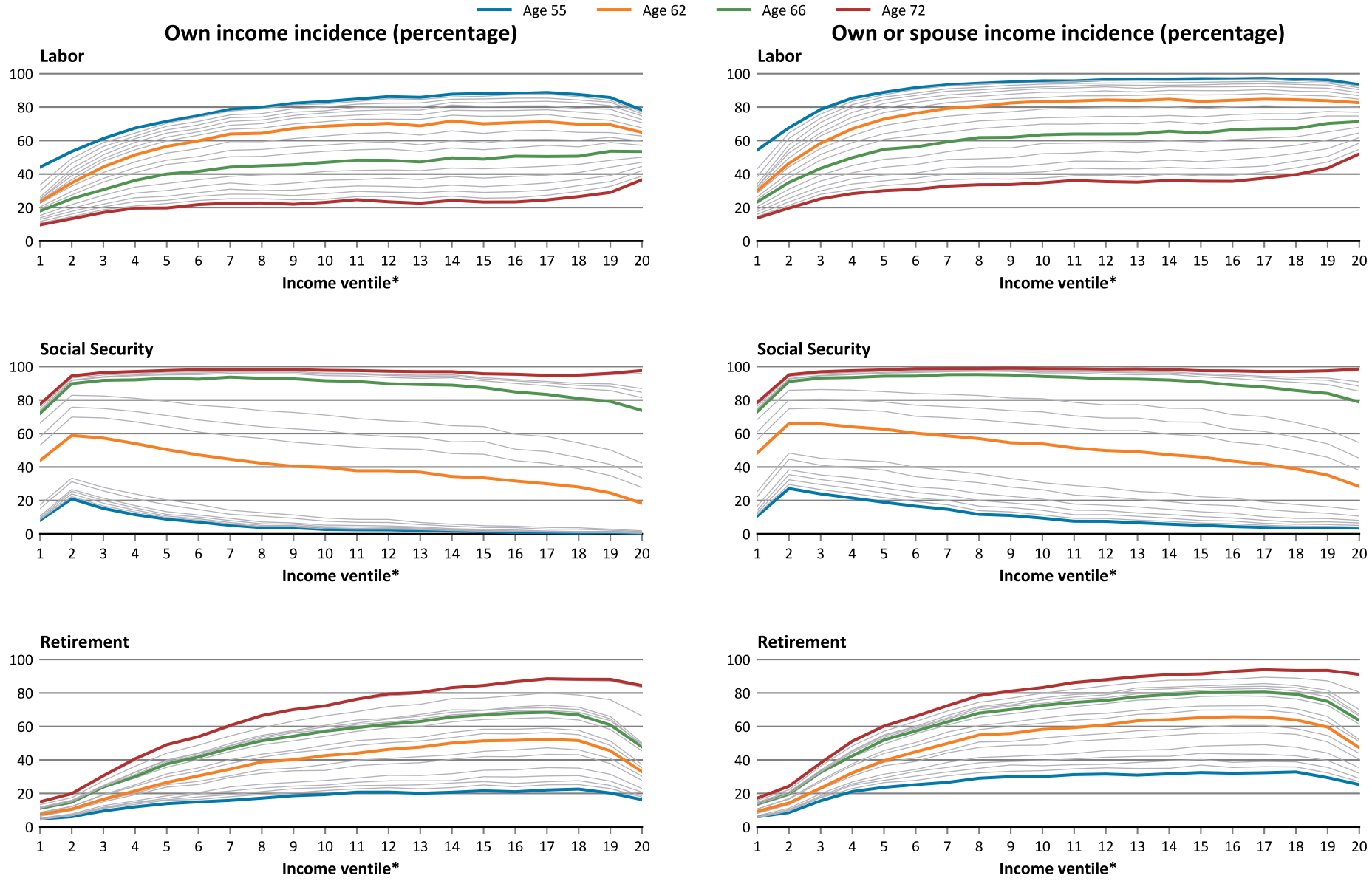
Panel incidence and conditional median inflation-adjusted income from the combination of labor, Social Security, and retirement income




Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 18
**Higher-Income Work Longer and Claim Later**
Panel incidence of income by age/year and income ventile*

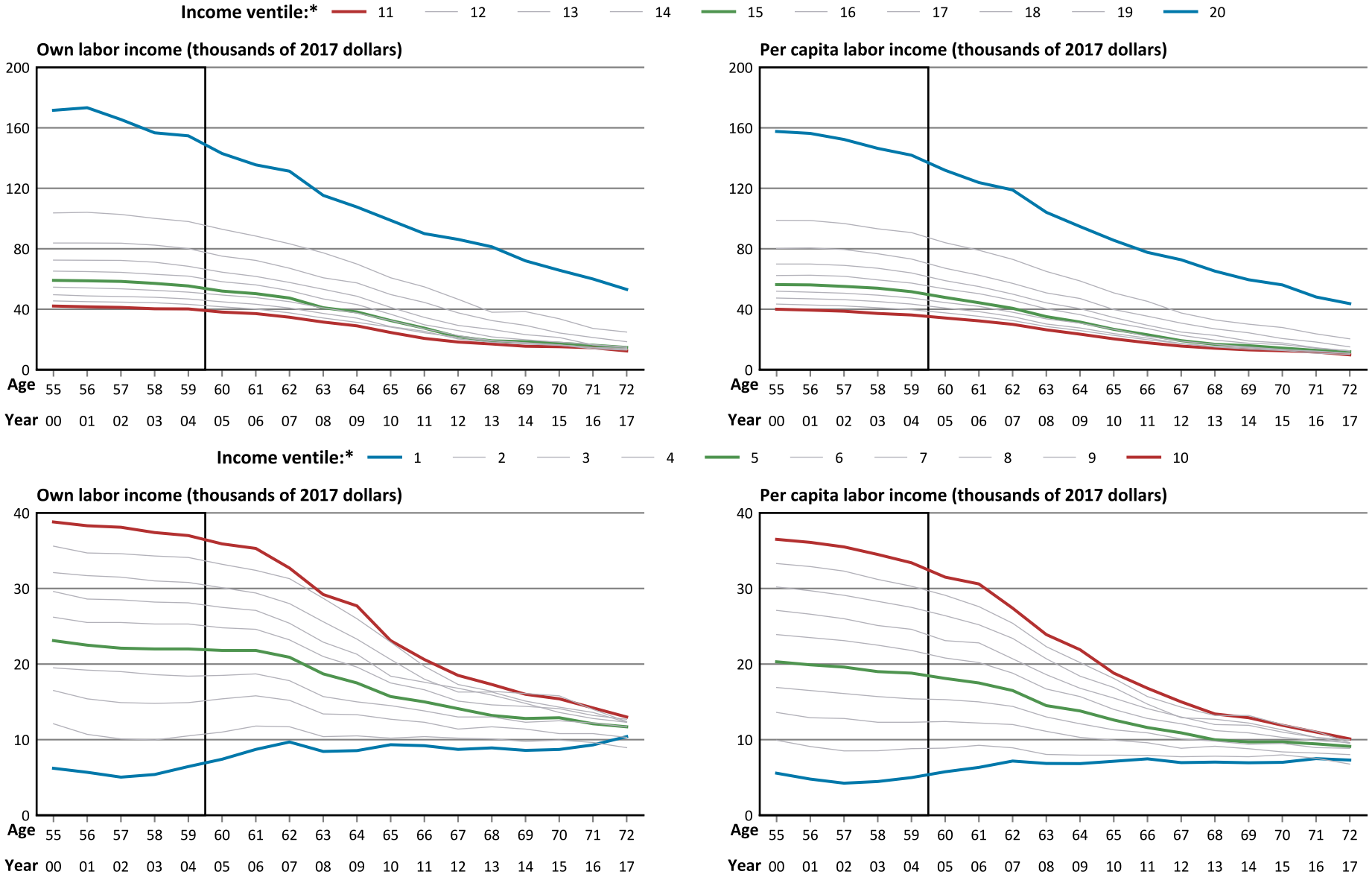



*For a description of the income ventiles, see the note on Figure 7.
Source: Authors' tabulation of IRS data

Figure 19

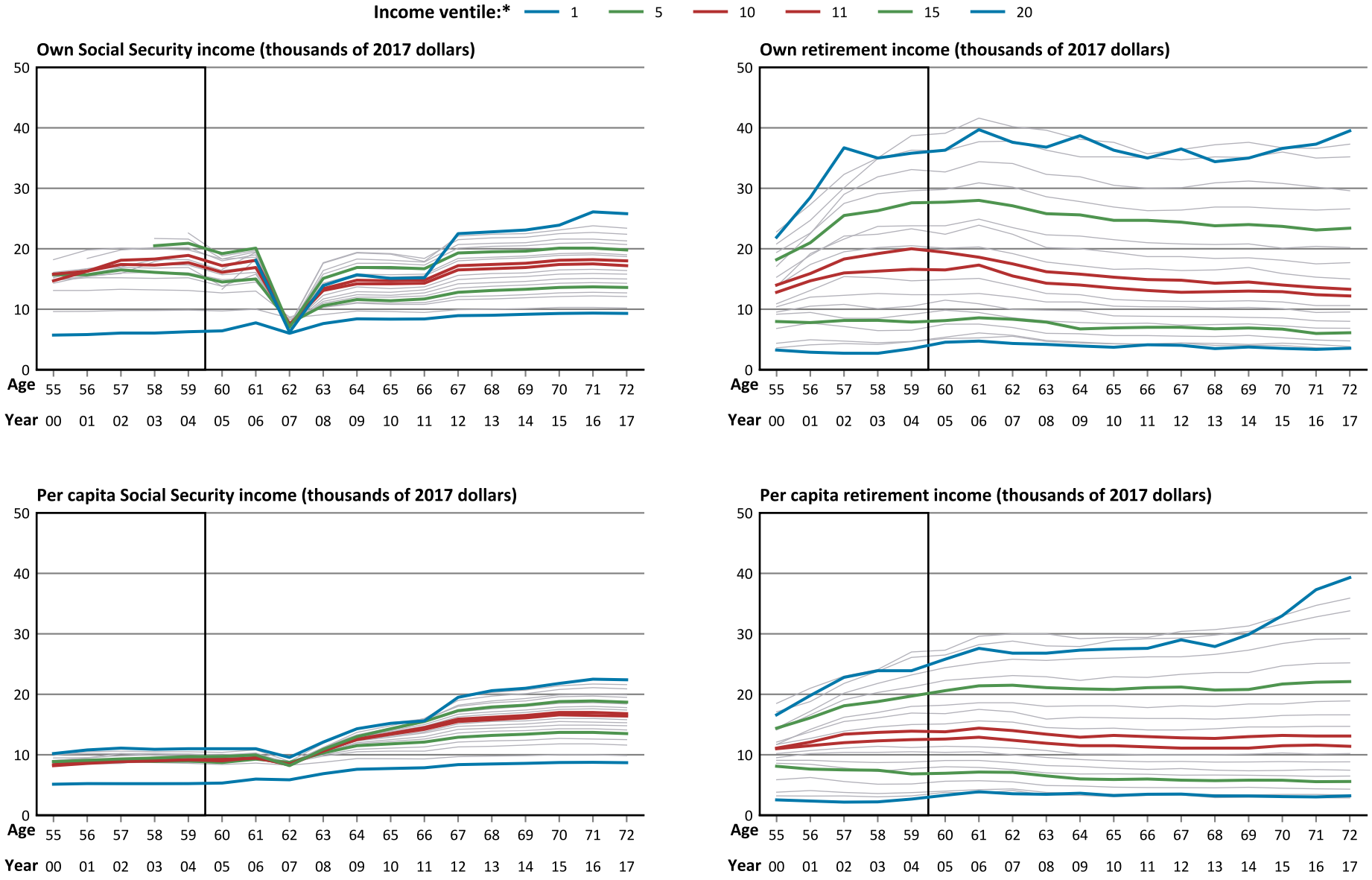
**Median Labor Income Is Typically Lower for Those who Continue to Work**

Conditional median inflation-adjusted labor income by age/year and income ventile*



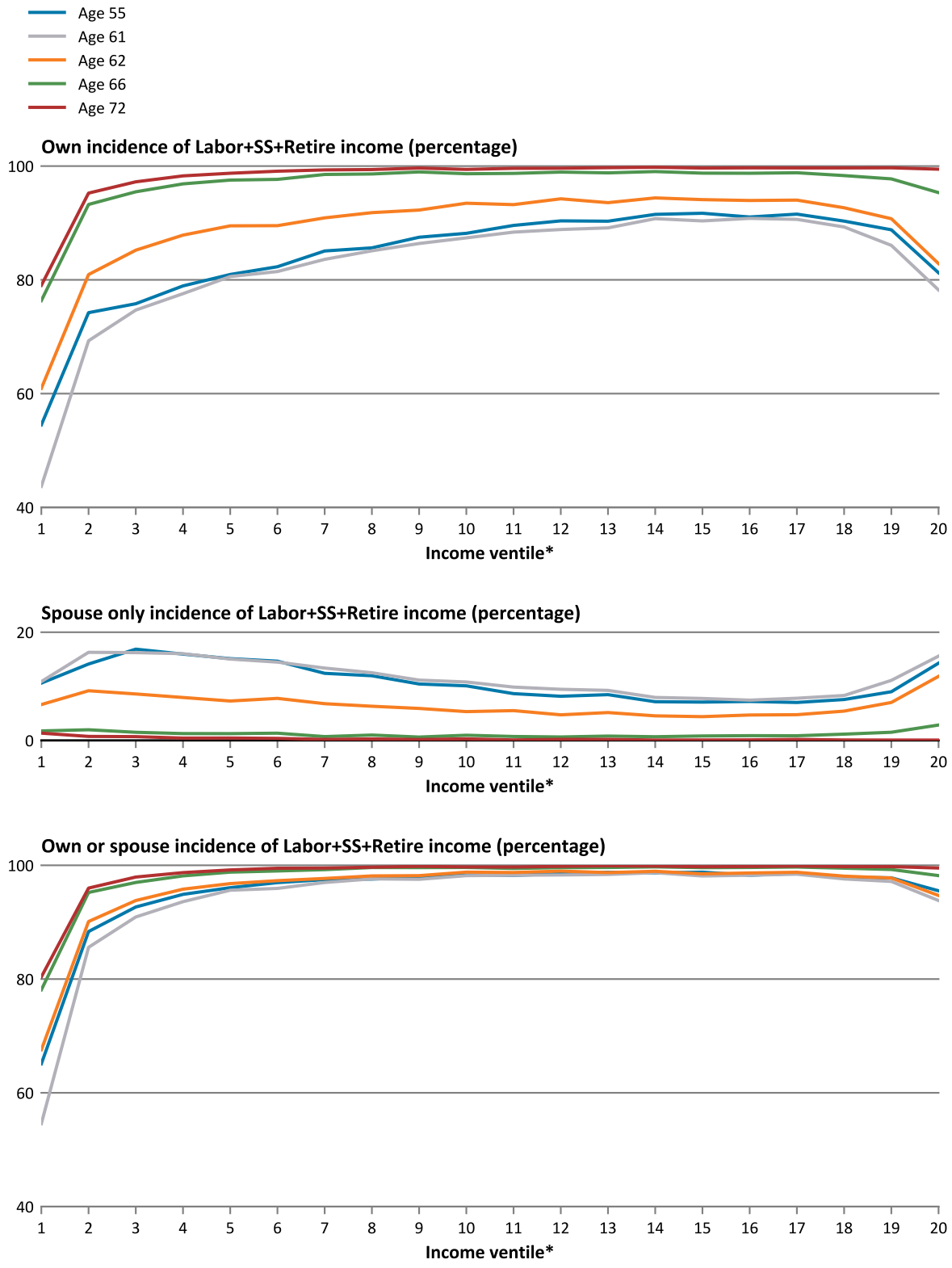

*For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 20
**Amount of Age 72 Retirement Income Varies More Across Ventiles Than Social Security**
Conditional median inflation-adjusted income by age/year and income ventile*




*For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 21
**Most Have Labor+SS+Retire Income by Age 66**
Panel incidence of Labor+SS+Retire income by age/year and income ventile*

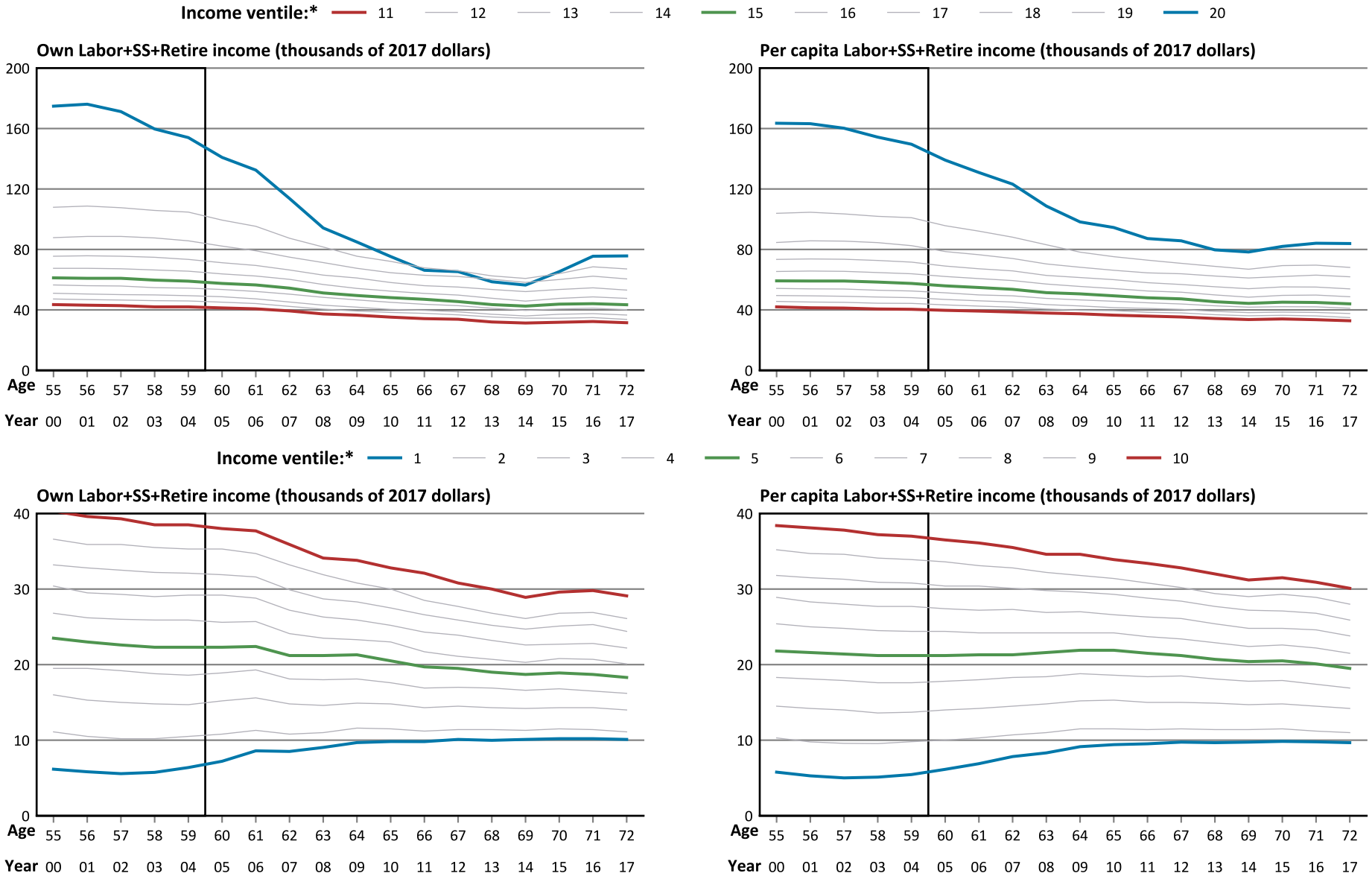



*For a description of the income ventiles, see the note on Figure 7.
Source: Authors' tabulation of IRS data

Figure 22

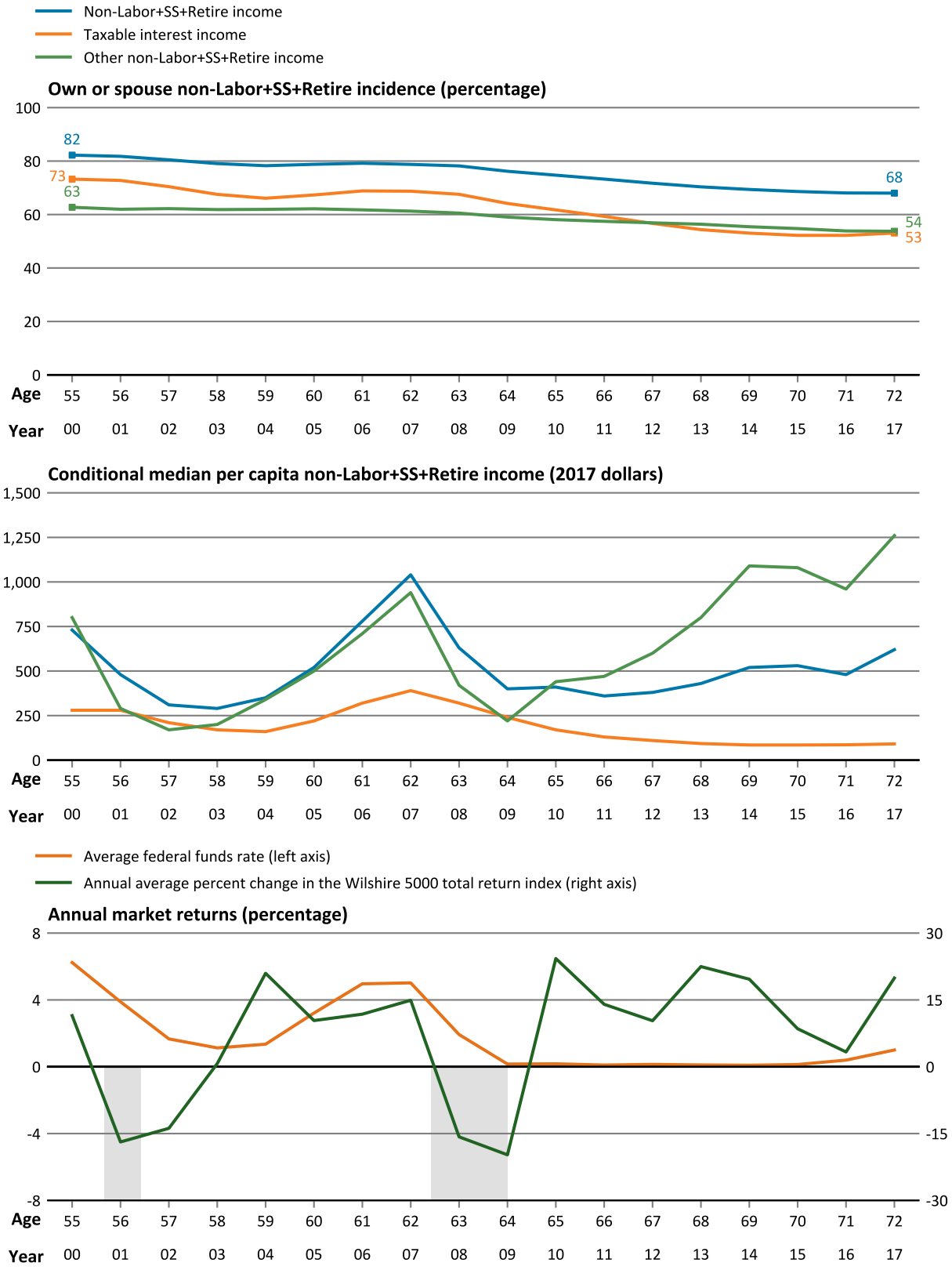
**Differences in Labor+SS+Retire Income Across Ventiles Decline with Age**

Conditional median inflation-adjusted Labor+SS+Retire income by age/year and income ventile*




*For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 23
**Many Have Non-Labor+SS+Retire Income But Amounts Typically Modest and Cyclical**
Panel incidence, conditional inflation-adjusted median, and market returns by age/year

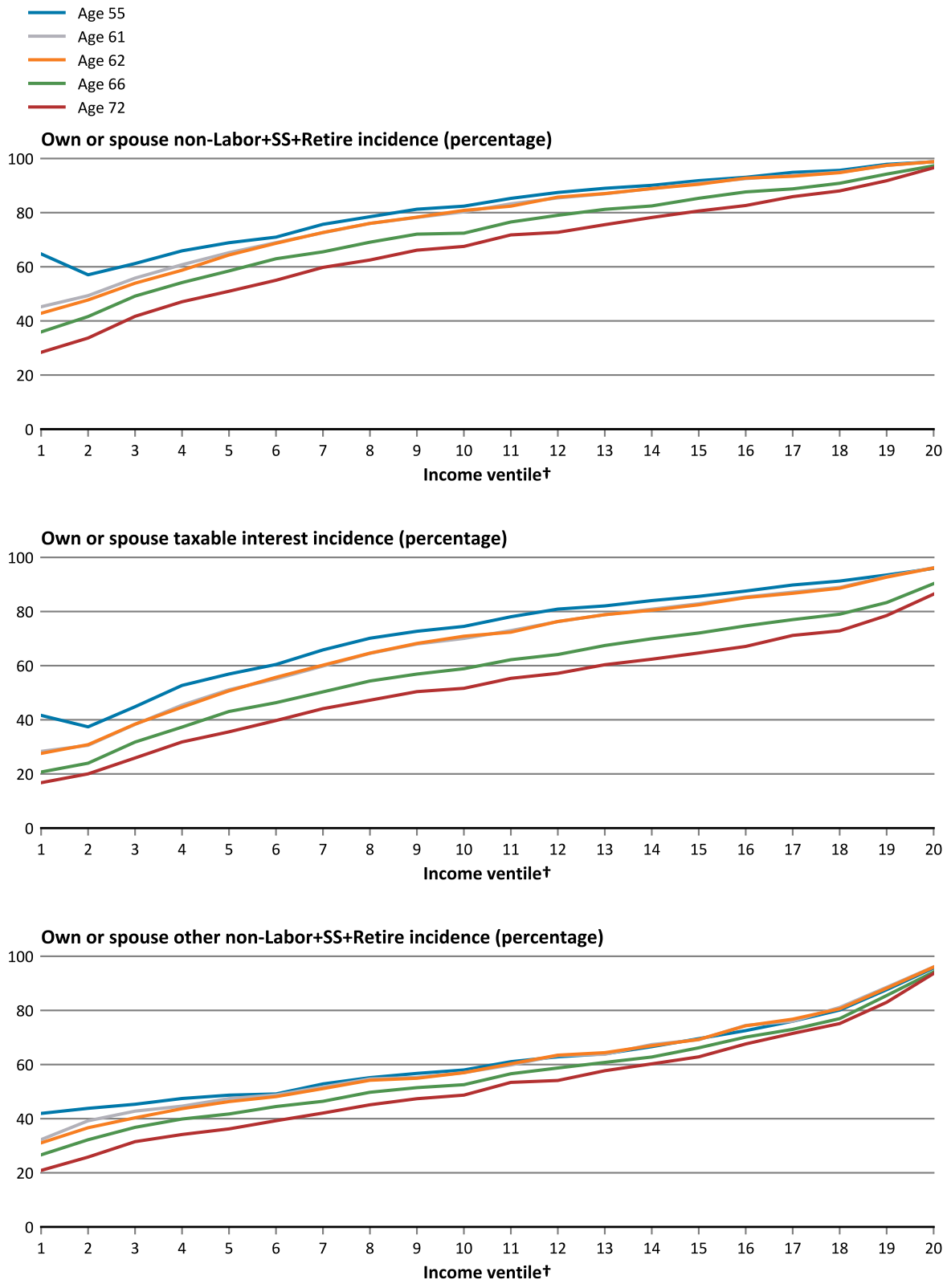



Note: Gray shading indicates a recession. See note on Figure 4.
Sources: Authors' tabulation of IRS data and Federal Reserve Bank of St. Louis

Figure 24

**Non-Labor+SS+Retire Incidence Falls More for Lower Income But Taxable Interest Declines Widespread**

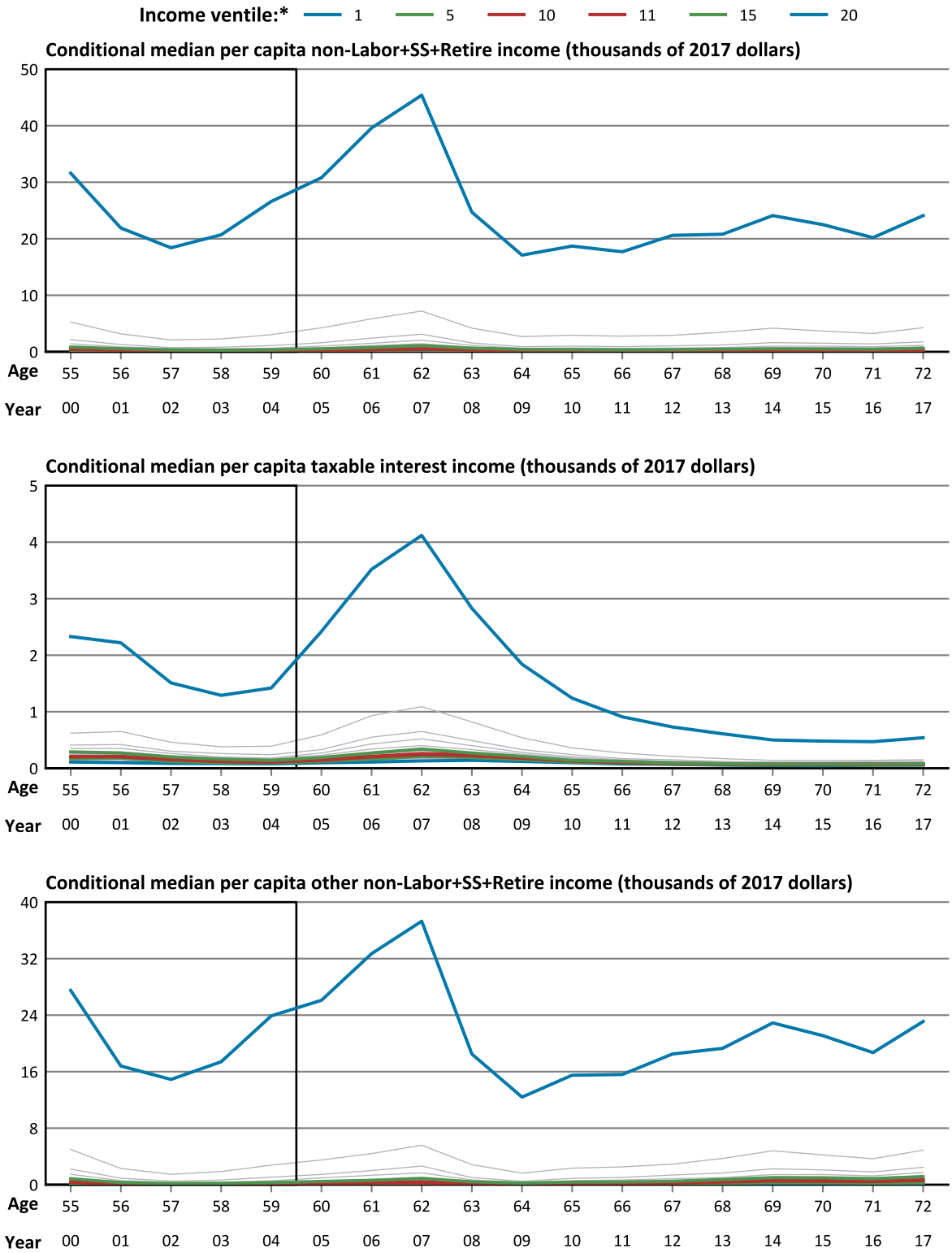
Panel incidence of non-Labor+SS+Retire income by age/year and income ventile*




*For a description of the income ventiles, see the note on Figure 7.

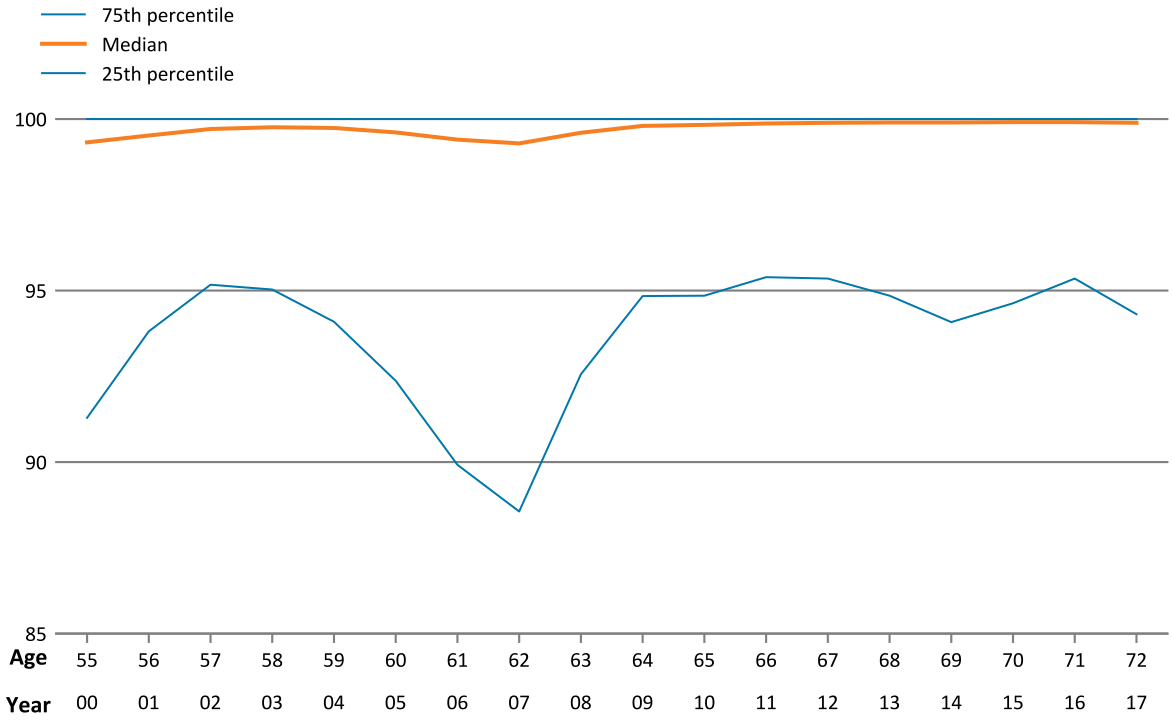
Source: Authors' tabulation of IRS data

Figure 25
**Non-Labor+SS+Retire Income Amounts Substantial Only for Those with Highest Age 55-59 Income**
Conditional median inflation-adjusted non-Labor+SS+Retire income by age/year and income ventile* (thousands of 2017 dollars)



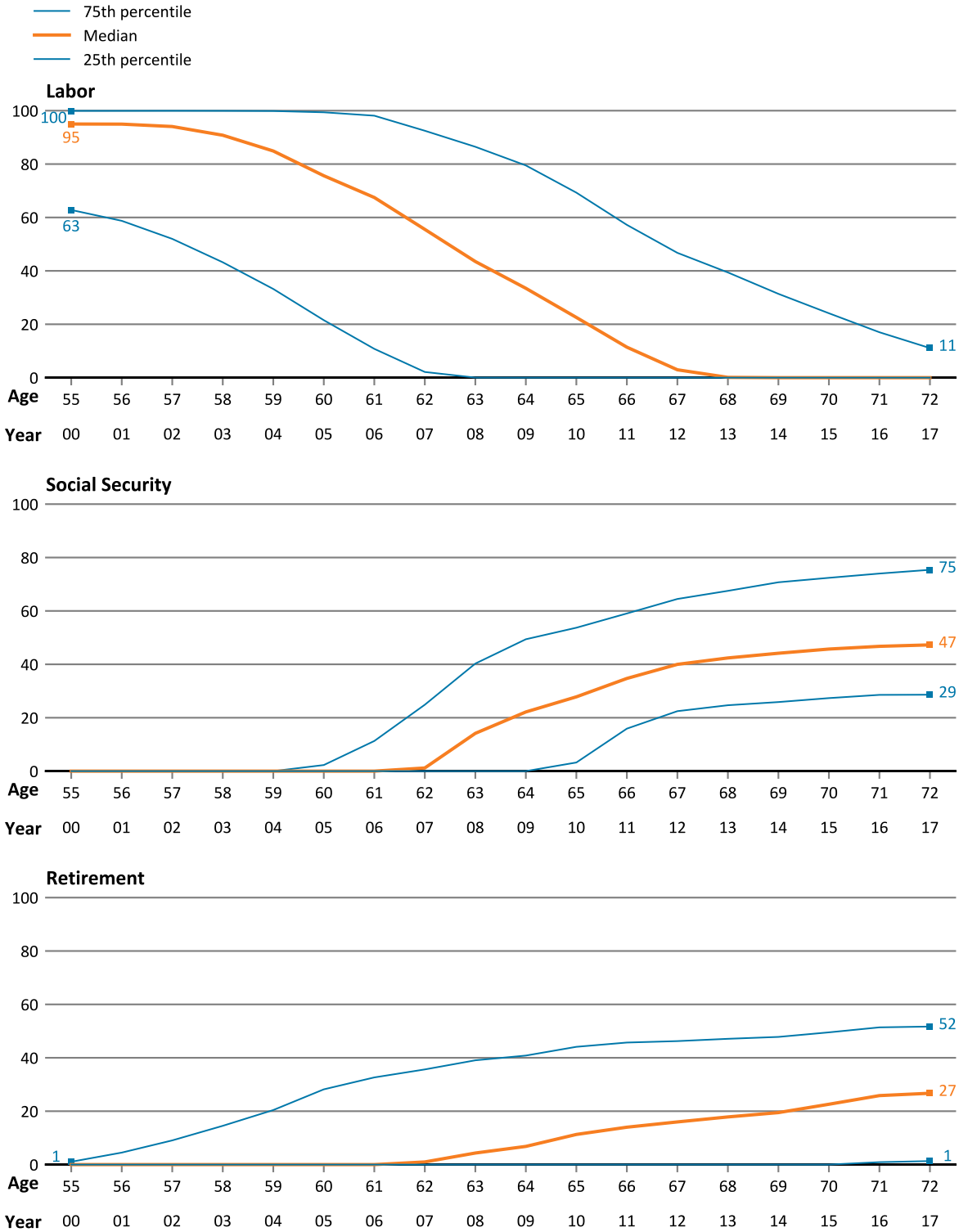

*For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 26
**Most Get Nearly All Their Income from Labor, Social Security, and Retirement Income**
Labor+SS+Retire share of total income* (percentage)



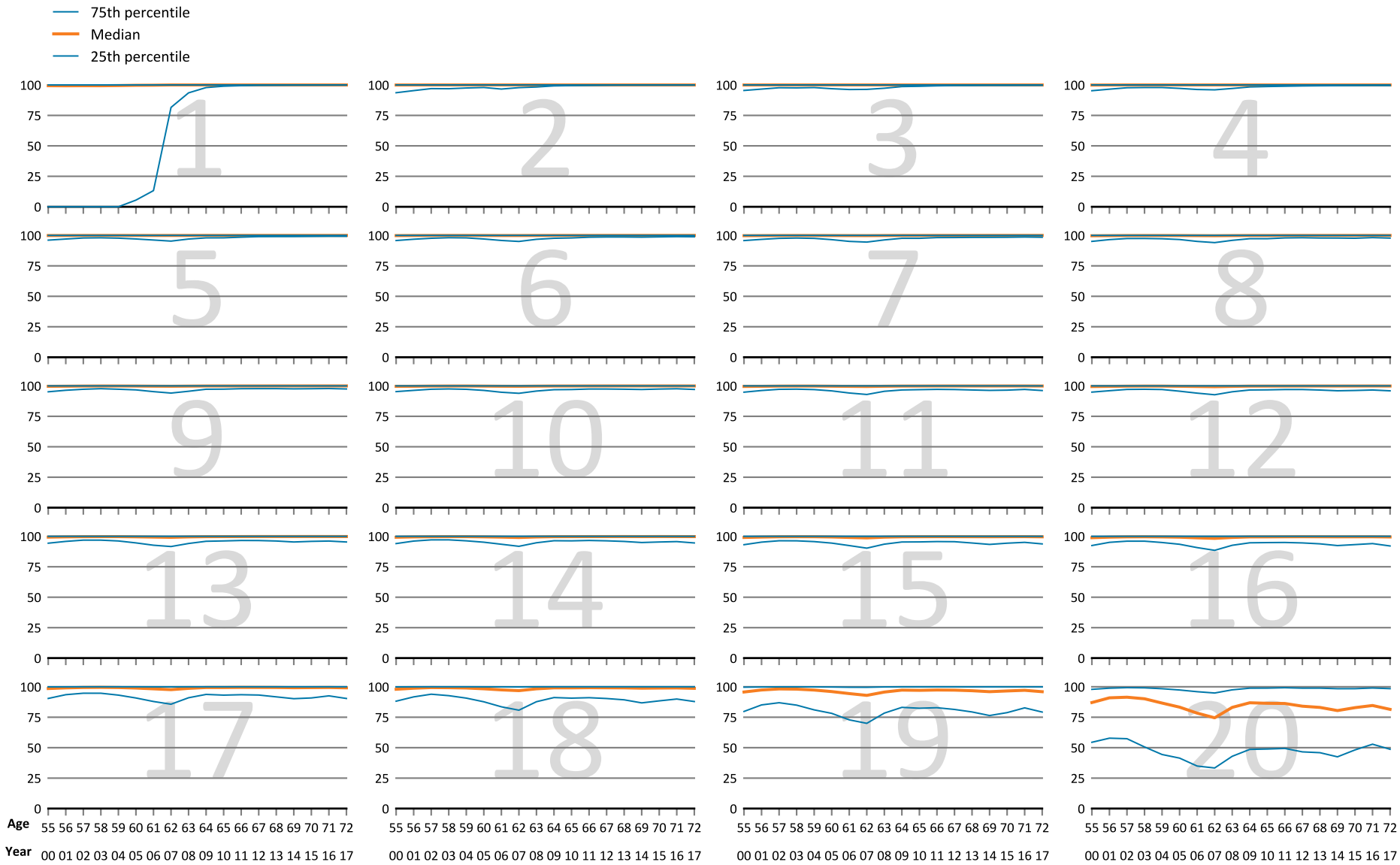

*For individuals with negative total income, the share from Labor+SS+Retire is set to 0 for individuals with no Labor+SS+Retire income, and 100 for individuals with positive Labor+SS+Retire income.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 27
**Typical 72 Year-Old Gets About Half of Their Income from Social Security**
Share of total income* (percentage)



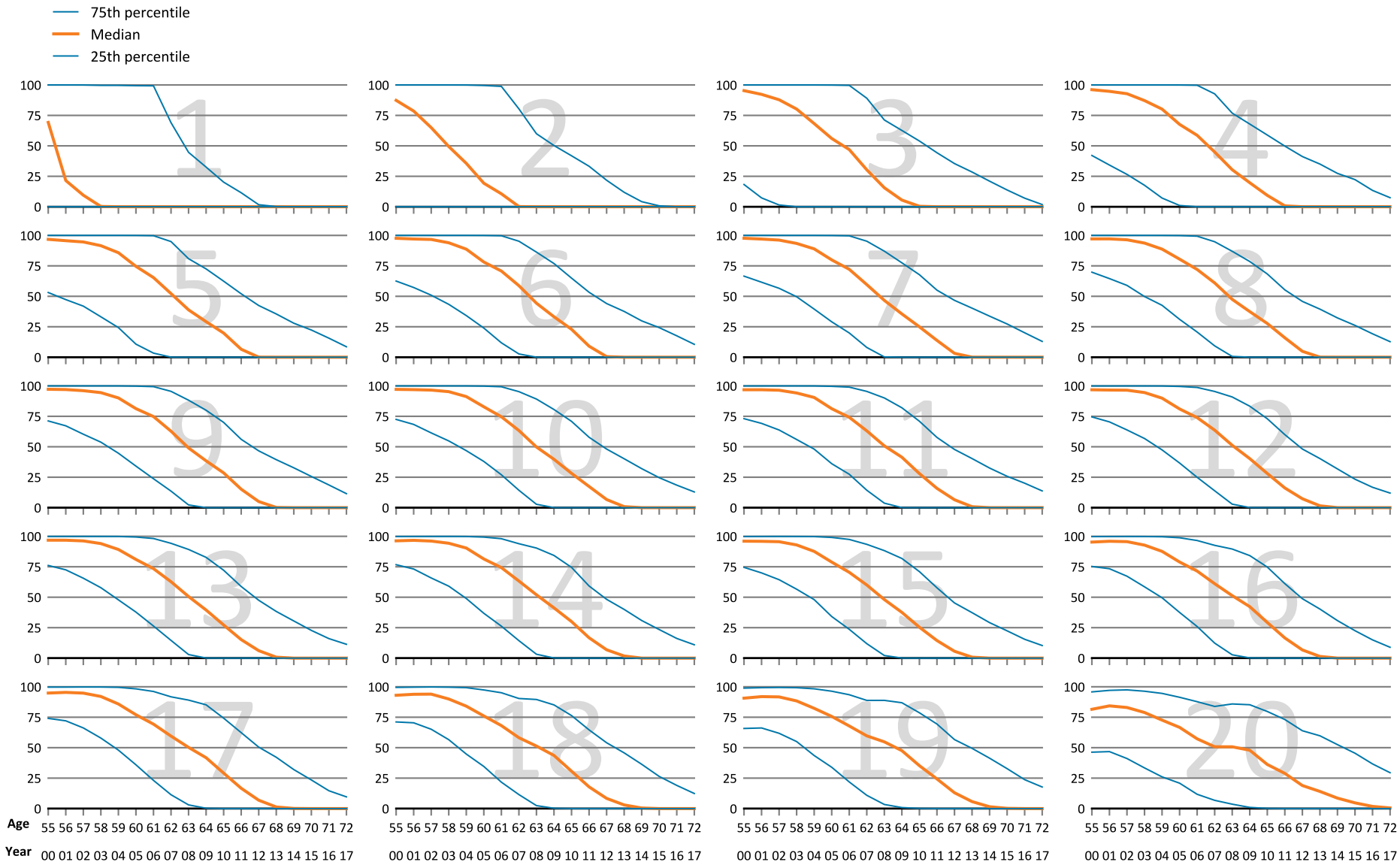

*For a description of the income share calculation, see the note on Figure 26.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 28
**Median Labor+SS+Retire Income Shares Average Less Than 99 Percent for Top Three Ventiles Only**
Labor+SS+Retire share of total income* by age/year and income ventile† (percentage)




*For a description of the income share calculation, see the note on Figure 26.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 29
**Middle-Income Typically Get Nearly All Income from Labor at Age 55**
Labor share of total income* by age/year and income ventile†

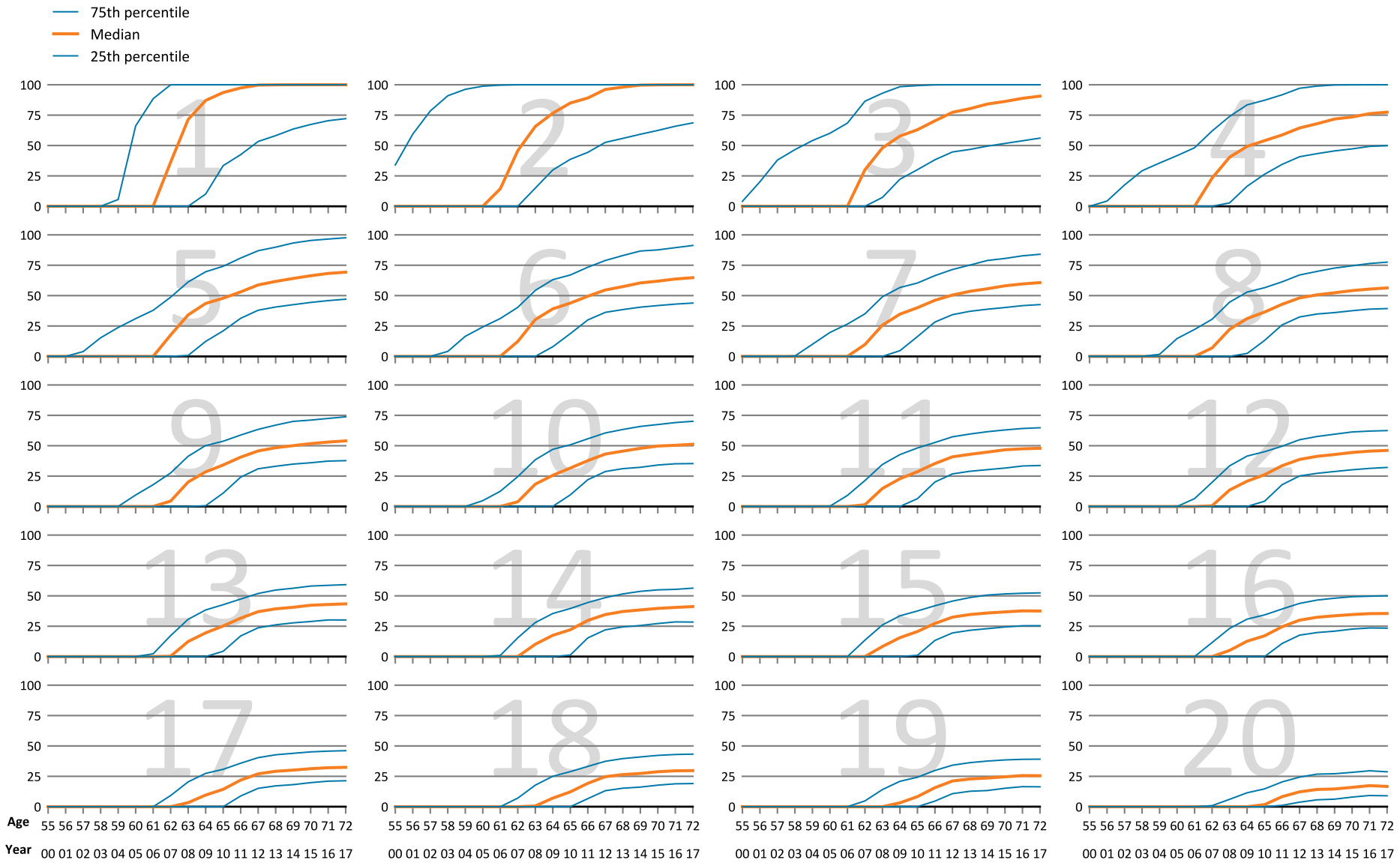



*For a description of the income share calculation, see the note on Figure 26.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

Figure 30

**Those with Lower Age 55-59 Income Have Higher Social Security Income Share at Age 72**

Social Security share of total income* by age/year and income ventile†



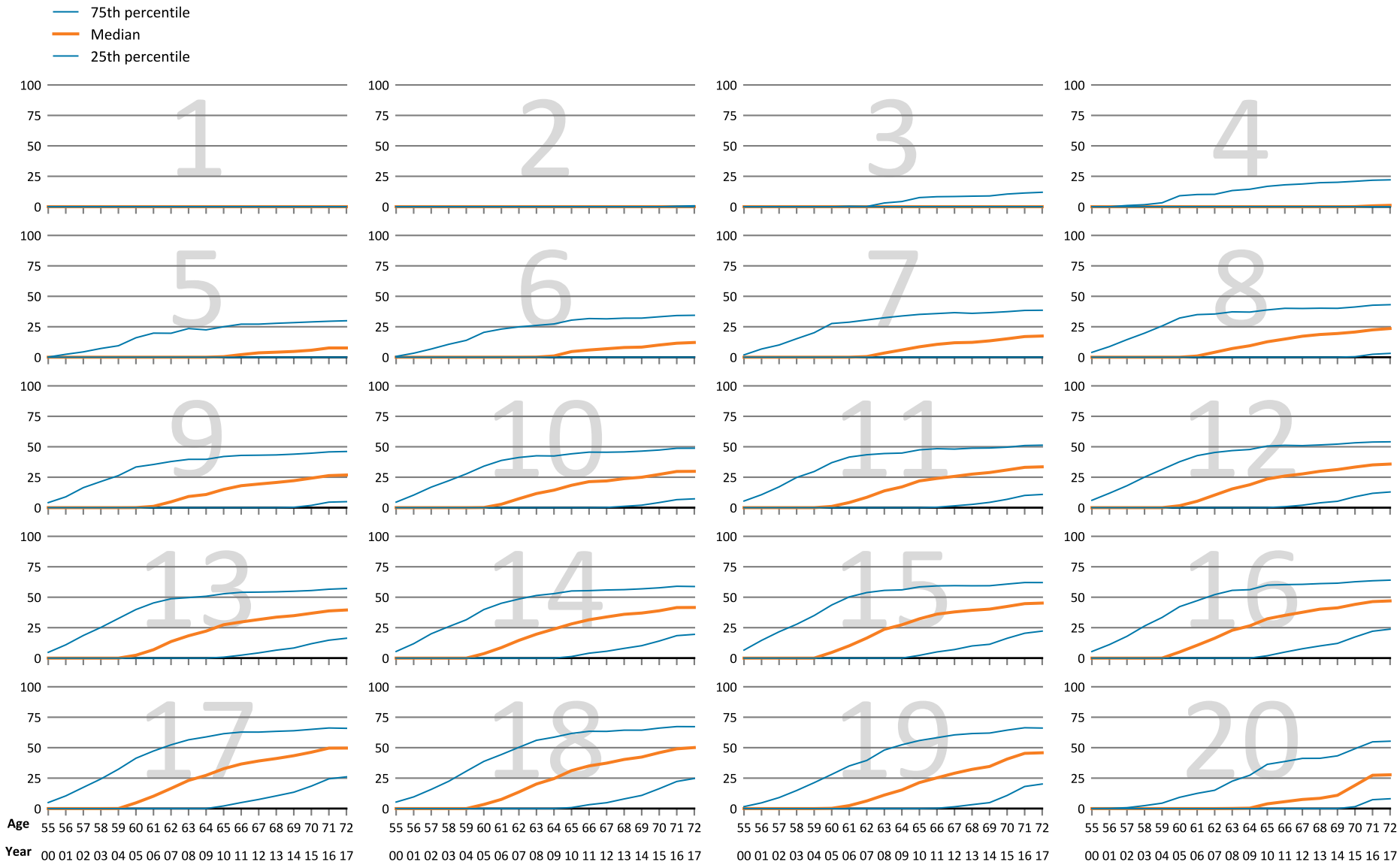

*For a description of the income share calculation, see the note on Figure 26.

†For a description of the income ventiles, see the note on Figure 7.

Note: Gray shading indicates a recession. See note on Figure 4.

Source: Authors' tabulation of IRS data

Figure 31
**Moderate to Moderately High Income Have Higher Retirement Income Shares at Age 72**
Retirement share of total income* by age/year and income ventile†




*For a description of the income share calculation, see the note on Figure 26.
†For a description of the income ventiles, see the note on Figure 7.
Note: Gray shading indicates a recession. See note on Figure 4.
Source: Authors' tabulation of IRS data

# Appendix

## *Impact of Tax Law Changes on Tax Liability*

Although there were many legislative changes between 2000 and 2017, most of the changes in median effective tax rates would have occurred absent the changes to tax law. Some changes—such as the Make Work Pay Tax Credit and a reduction in payroll tax rates—only affected taxpayers with labor income and were temporary. Other changes—such as the increase in the child tax credit (CTC) and changes to the earned income tax credit (EITC)—only affected taxpayers with qualified dependent children, so did not impact many in the 1945 birth-year cohort over the study period. In 2017, the primary differences with 2000 taxes were reductions in statutory tax rates and the addition of new taxes to finance Medicare.

Compared with 2000, legislative changes reduced 2017 effective federal income tax rates by less than 3 percentage points and did not affect payroll tax rates. Assuming there were no qualified dependent children and total income was equal to taxable income plus personal exemptions and the standard deduction, 2017 average effective tax rates would have declined from 1.0 percentage point (for a single individual with taxable income at the top of the 15 percent statutory tax rate bracket in 2017) to 2.8 percentage points (for a married couple at the top of the 28 percent bracket in 2017) between 2000 and 2017.

Larger reductions in both income and payroll taxes occurred between 2000 and 2017. Statutory tax rate reductions occurred by 2003. These reductions were partially offset for higher income taxpayers in 2013 by the additional Medicare tax and the Net Investment Income Tax (which, as explained below, are both treated as income taxes in our calculations) and a new 39.6 percent statutory tax rate bracket. Income taxes were also temporarily reduced in 2009 and 2010 by the Make Work Pay Tax Credit. Payroll taxes were reduced in 2011 and 2012 by a 2.0 percentage point reduction in the Social Security payroll tax.

We summarize the most prominent changes to federal income and payroll taxes that occurred from 2000 through 2017 below.

**Selected Legislation that Affected Federal Individual Taxation from 2000 through 2017**

| Acronym | Full Name |
|---|---|
| EGTRRA | Economic Growth and Tax Relief Reconciliation Act of 2001 |
| JGTRRA | Jobs and Growth Tax Relief Reconciliation Act of 2003 |
| ESA | Economic Stimulus Act of 2008 |
| EESA | Emergency Economic Stabilization Act of 2008 |
| ARRA | American Reinvestment and Recovery Act of 2009 |
| ACA | Affordable Care Act of 2010 |
| TRUIRJCA | Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 |
| ATRA | American Taxpayer Relief Act of 2012 |

**Legislative Changes to Statutory Tax Rates on Ordinary Taxable Income**[40]

2000 ordinary statutory tax rates

- 15 percent
- 28 percent
- 31 percent
- 36 percent
- 39.6 percent

EGTRRA

- Effective 2002:
  - Created new 10 percent statutory tax rate bracket.
- Phased in through 2005:
  - Expanded 15 percent tax bracket for joint filers so income range was double that of single filers.
  - Lowered other statutory tax rates:
    - 28 percent to 25 percent
    - 31 percent to 28 percent
    - 36 percent to 33 percent
    - 39.6 percent to 35 percent

JGTRRA

- Effective 2003:
  - Accelerated phased-in tax rate schedule changes in EGTRRA.

ATRA

- Effective 2013:
  - Created new 39.6 percent statutory tax rate bracket.

[40] For historical annual data on tax rates and brackets, see Tax Foundation (2021).

**Legislative Changes to Statutory Tax Rates on Capital Gains and Qualified Dividends**

2000 capital gains statutory tax rates

- 10 percent for taxpayers in the 15 percent ordinary statutory tax rate bracket.
- 20 percent for taxpayers in or above the 28 percent ordinary statutory tax rate bracket.

JGTRRA

- Effective 2003:
  - Qualified dividends taxed at capital gains tax rates.
  - Reduced 10 percent capital gains rate to 5 percent.
  - Reduced 20 percent capital gains rate to 15 percent.
- Effective 2008:
  - Reduced 5 percent capital gains rate to zero.

ATRA

- Effective 2013:
  - Created new 20 percent statutory capital gains tax rate bracket for taxpayers in the new 39.6 percent ordinary statutory tax rate bracket.

**Legislation Creating Additional Medicare Tax and Net Investment Income Tax**

We count these taxes as federal income taxes rather than payroll taxes. Although these taxes are used to fund Medicare, they are based on annual income and calculated, reported, and collected on Form 1040.

2000 tax law

- Neither tax existed.

ACA

- Effective 2013:
  - *Additional Medicare Tax:* 0.9 percent tax on earned income (wage and salary income plus self-employment income) above $200,000 for single filers or $250,000 for joint filers (not indexed for inflation)
  - *Net Investment Income Tax:* 3.8 percent tax on the portion of net investment income (capital gains, dividends, taxable interest, rental and royalty income, and certain other investment income) that, when combined with other income included in modified adjusted gross income (MAGI), exceeds $200,000 for single filers or $250,000 for joint filers (not indexed for inflation)

**Legislative Changes to the Child Tax Credit (CTC)[41]**

2000 CTC

- $500 per child credit that was generally non-refundable but was partially refundable if a taxpayer had three or more qualifying children.
- The credit amount was reduced by 5 percent of adjusted gross income (AGI) in excess of $75,000 for non-joint filers or by 5 percent of AGI in excess of $110,000 for joint filers (not indexed for inflation).

EGTRRA

- Effective 2002:
  - Increased the per child credit to $600.
  - Made the credit partially refundable regardless of the number of children.
- Increased the per child credit incrementally until it was equal to $1,000 in 2010.

JGTRRA

- Effective 2003 and 2004:
  - Increased the per child tax credit to $1,000.

Subsequent legislation

- $1,000 credit amount extended for additional years and eventually made permanent.
- Eligibility for the refundable portion of the credit was expanded.

**Legislative Changes to the Earned Income Tax Credit (EITC)[42]**

2000 EITC

- A credit that phases in with earned income and phases out with the greater of earned income or adjusted gross income (AGI).
- The EITC credit formula differs for taxpayers with (1) no children; (2) one child; and (3) two or more children.

EGTRRA

- Increased—in steps in 2002, 2005, and 2008—the income levels at which credits begin phasing out for married couples.

ARRA

- Effective 2009:
  - Further increased the income levels at which credits begin phasing out for married couples.
  - Created a new higher credit for taxpayers with 3 or more children.

Subsequent legislation

- EGTRRA and ARRA changes made permanent.

[41] For a detailed legislative history of the CTC, see Crandall-Hollick (2021).

[42] For a detailed legislative history of the EITC, see Crandall-Hollick (2022).

**Legislation Creating Temporary Tax Reductions for Workers**

ARRA: Making Work Pay Tax Credit

- Effective 2009 and 2010:
  - Refundable credit equal to 6.2% of earned income up to $400 single, $800 joint
  - Income limited, with maximum credit phased out:
    - Between $75,000 and $95,000 of MAGI for non-joint
    - Between $150,000 and $190,000 of MAGI for joint

TRUIRJCA: Payroll tax cut

- Effective 2011 & 2012:
  - Employee share of the Social Security payroll tax cut 2.0 percentage points, from 6.2 percent to 4.2 percent.
  - Social Security payroll tax for self-employed workers cut 2.0 percentage points, from 12.4 percent to 10.4 percent.

**Note on 2008 Recovery Rebate Payments**

In our study, we treat recovery rebates like means tested government transfers—such as Supplemental Security Income (SSI) or Veteran Administration (VA) benefits—and neither include the rebates in our measure of income nor deduct the rebates from taxes paid.[43] We do not attempt to impute recovery rebate checks received in 2008 based on 2007 income tax returns, nor do we deduct recovery rebates claimed on 2008 tax returns from our measure of federal income taxes.

ESA:

- Authorized for Recovery Rebates to be sent out in early 2008.
  - Although sent out in early 2008 to anyone who filed a tax return in 2007, the rebates were technically a credit against 2008 taxes.
  - This allowed those who did not get a check in 2008, or who did get a check but would have gotten a bigger rebate based on their 2008 income, to claim a credit when they filed their 2008 tax return.
- Amount of the payment was based on income—2007 income for rebates sent out in early 2008 or 2008 income for those who claimed the credit on their 2008 tax return.
  - Most received $600 non-joint, $1,200 joint, plus $300 for each child eligible for the regular (that is, non-refundable portion of the) CTC.
  - The amount could be reduced for those with very low income.
  - The amount was reduced by 5% of AGI in excess of $75,000 for non-joint filers or by 5% of AGI in excess of 150,000 for joint filers.

[43] See note 11 from the text.

### *Calculation of Business/Farm/Rents/Royalties Income*

The primary focus of this study is the transition American workers make from relying primarily on labor earnings at younger ages to relying primarily on Social Security benefits and distributions from retirement plans at older ages. As such, we categorize income a bit differently than is done on Form 1040.

We include self-employment earnings in our measure of labor income. Self-employed individuals generally report their earnings as either business, farm, or partnership income on Form 1040. They also report self-employment earnings on Schedule SE and pay self-employment taxes on those earnings. Because we include self-employment earnings in labor income, we subtract those earnings from our business/farm/rents/royalties category to avoid double counting the income.

To conform the payroll tax measure for self-employed workers to that of wage and salary workers, we treat half of the self-employment tax as a payroll tax on workers and half of the self-employment tax as a business expense. This is implicitly the treatment given to the self-employment tax on Form 1040. Taxpayers deduct half of the self-employment tax from income when calculating adjusted gross income (AGI) and, thus, implicitly include the other half of the self-employment tax in AGI. This also corresponds to the tax treatment of wage and salary workers, with the employee portion of payroll taxes included in taxable income but the employer share is excluded. We allocate the Form 1040 deduction of half of the self-employment tax to the business/farm/rents/royalties income category. This corresponds to the tax treatment of businesses with wage and salary workers, which deduct the employer share of payroll taxes from their income as an expense.

Although we count self-employment earnings as labor income, the self-employed will also have a residual amount of business/farm/rents/royalties income because the math used in the tax code to calculate self-employment earnings and self-employment taxes only approximates the tax treatment of wage and salary workers. Self-employment earnings are set equal to 92.35 percent of the business, farm, or partnership income attributable to self-employment. The self-employment tax is then calculated using tax rates equal to the sum of the employer and employee payroll tax rates (12.4 percent on Social Security earnings plus 2.9 percent of Medicare

earnings). This calculation approximates the tax treatment of wage and salary workers, who do not include the employer share of the payroll tax (6.2 percent of Social Security earnings plus 1.45 percent of Medicare earnings) in income. For those with self-employment earnings, however, the total amount of business, farm, or partnership income attributable to self-employment will be greater than the sum of self-employment earnings plus half of self-employment taxes.

For example, for those with self-employment plus other earnings below the Social Security earnings cap, the relevant calculations are as follows.

$$Y_{SE} = 0.9235 * Y_{BFP}^{1040}$$
$$T_{SE} = 0.153 * Y_{SE}$$
$$Y_{BFP}^{net} = Y_{BFP}^{1040} - Y_{SE} - 0.5 * T_{SE}$$

Where $Y_{SE}$ = self-employment earnings
$Y_{BFP}^{1040}$ = business, farm, and (relevant) partnership income reported on Form 1040
$T_{SE}$ = self-employment tax
$Y_{BFP}^{net}$ = net business, farm, and partnership included in business/farm/rents/royalties

Substituting the formulas for self-employment earnings and the self-employment tax into the third equation yields (approximately):

$$Y_{BFP}^{net} = 0.0058 * Y_{BFP}^{1040}$$

Thus, in this example, the individual with self-employment earnings will have included in our measure of business/farm/rents/royalties income less than one percent of the business, farm, and (relevant) partnership income reported on Form 1040.

Table A.1

**List of Information Returns Used to Identify Nonfilers**

| Form number | Form name |
|---|---|
| ***Forms used to identify nonfilers and measure nonfiler income*** | |
| Income reporting forms | |
| Form W-2 | Wage and Tax Statement |
| Form W2-G | Certain Gambling Winnings |
| Form SSA-1099 | Social Security Benefit Statement |
| Form 1065 | Partner's Share of Income, Deductions, Credits, etc. |
| 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, Retirement or Profit-Sharing Plans, IRAs, Insurance Contracts, etc. |
| Form 1120-S | Shareholder's Share of Income, Deductions, Credits, etc. |
| Qualified account contribution reporting forms | |
| Form 5498 | IRA Contribution Information |
| ***Forms used to identify nonfilers but not used to measure nonfiler income*** | |
| Income reporting forms | |
| Form 1041 | Beneficiary's Share of Income, Deductions, Credits, etc. |
| Form 1042-S[a] | Foreign Person's U.S. Source Income Subject to Withholding |
| Form 1099-C | Cancellation of Debt |
| Form 1099-OID | Original Issue Discount |
| Form 1099-PATR | Taxable Distributions Received From Cooperatives |
| Form 8805[a] | Foreign Partner's Information Statement of Section 1446 Withholding Tax |
| Expenses and charitable contribution reporting forms | |
| Form 1098 | Mortgage Interest Statement |
| Form 1098-T | Tuition Statement |
| Form 1098-E | Student Loan Interest Statement |
| Form 1098-C | Contributions of Motor Vehicles, Boats, and Airplanes |
| Transaction and financial account reporting forms | |
| Form 1099-A | Acquisition or Abandonment of Secured Property |
| Form 1099-B | Proceeds From Broker and Barter Exchange Transactions |
| Form 1099-CAP | Changes in Corporate Control and Capital Structure |
| Form 1099-K | Payment Card and Third Party Network Transactions |
| Form 1099-S | Proceeds From Real Estate Transactions |
| Form 8288-A[a] | Statement of Withholding on Dispositions by Foreign Persons of U.S. Real Property Interests |
| Form 8300 | Report of Cash Payments Over $10,000 Received in a Trade or Business |
| FinCEN Form 103 | Currency Transaction Report by Casinos |
| FinCEN Form 104 | Currency Transaction Report |
| FinCEN Form 105 | Report of International Transportation of Currency or Monetary Instruments |
| FinCEN Form 114 | Report of Foreign Bank and Financial Accounts (FBAR) |

Continued next page (notes at end of table)

Table A.1 (continued)

**List of Information Returns Used to Identify Nonfilers**

| Form number | Form name |
|---|---|
| *Forms used to identify nonfilers but not used to measure nonfiler income (continued)* | |
| Qualified account distribution, transaction, and contribution reporting forms | |
| Form 1099-Q | Payments From Qualified Education Programs Under Sections 529 and 530 |
| Form 1099-SA | Distributions From an HSA, Archer MSA, or Medicare Advantage MSA |
| Form 3921 | Exercise of an Incentive Stock Option Under Section 422 (b) |
| Form 3922 | Transfer of Stock Acquired Through an Employee Stock Purchase Plan Under Section 423 (c) |
| Form 5498-ESA | Coverdell ESA Contribution Information |
| Form 5498-SA | HSA, Archer MSA, or Medicare Advantage MSA Information |
| Other forms | |
| Form DS-11 | Application for a US Passport |
| Form 1097-BTC | "Bond Tax Credit" |
| Form 1098-Q | "Qualifying Longevity Annuity Contract Information") |
| Form 1099-H | "Health Coverage Tax Credit (HCTC) Advance Payments" |
| Form 1099-LTC | "Long-Term Care and Accelerated Death Benefits" |
| Form 8596 | "Information Return for Federal Contracts" |
| SCIR | State Corporate Information Return |
| SIIR | State Individual Information Return |
| SSSTIR | State, Sales, Service or Transaction Information Return |
| SWIP | State Withholding Information Return |

[a] Other nonfilers with Form 1042-S, Form 8805, or Form 8288-A are assumed to be foreign citizens and excluded from the other nonfiler sample.

Table A.2

**Definitions of Income and Tax Measures**

| Income/tax type | Definition for filers[a] | Definition for nonfilers[a] |
|---|---|---|
| **Total income** | *Labor* + *Social Security* + *retirement* + *business/farm/rents/royalties* + *investment* + *other* | |
| **Positive total income** | Calculated as total income above, with any income component that is negative set equal to zero | |
| **Income originating from work** | *Labor* + *Social Security* + *retirement* | |
| **Total spendable income** | **Total income – total taxes** | |
| **Spendable income originating from work** | **Income originating from work – total taxes on income originating from work** | |
| **Components of Income** | | |
| *Labor* | Wage and salary + self-employment + unemployment compensation – health savings account deduction reported on Form 1040 (line 25) – self-employed health insurance deduction reported on Form 1040 (line 29) – self-employed SEP, SIMPLE, and qualified plans deduction reported on Form 1040 (line 28) – IRA deduction reported on Form 1040 (line 32) – Form 5498 Box 1 (IRA contributions) to traditional IRAs in excess of IRA deduction reported on Form 1040 – Form 5498 Box 1 (IRA contributions) to Roth IRAs | Wage and salary + self-employment + unemployment compensation – Form 5498 Box 1 (IRA contributions) to traditional IRAs – Form 5498 Box 1 (IRA contributions) to Roth IRAs |
| Wage and salary | Wages, salaries, tips, etc. reported on Form 1040 (line 7) – Roth contributions reported in Form W-2 Box 12 | Form W-2 Box 1 (wages, tips, other compensation) + Form W-2 Box 8 (allocated tips) – Roth contributions reported in Form W-2 Box 12 |
| Self-employment | Net self-employment earnings from Schedule SE (Section A line 4 or Section B Part I line 4a). | Business and farm * 92.35% |
| Unemployment compensation | Unemployment compensation reported on Form 1040 (line 19) | Form 1099-G Box 1 (unemployment compensation) |

Continued next page (notes at end of table)

Table A.2 (continued)

**Definitions of Income and Tax Measures**

| Income/tax type | Definition for filers[a] | Definition for non-filers[a] |
|---|---|---|
| ***Social Security*** | The greater of:<br>• Social Security benefits reported on Form 1040 (line 20a), or<br>• Form SSA-1099 Box 5 (net benefits) | Form SSA-1099 Box 5 (net benefits) |
| ***Retirement*** | IRA distributions + pensions and annuities | |
| IRA distributions | Non-rollover IRA distributions reported on Form 1040 (lines 15a and 15b)[b] | Non-rollover IRA distributions reported on Form 1099-R[b] |
| Pensions and annuities | Non-rollover distributions from pensions and annuities reported on Form 1040 (lines 16a and 16b)[b] | Non-rollover distributions from pensions and annuities reported on Form 1099-R[b] |
| ***Investment*** | Taxable interest + tax-exempt interest + dividends + gains (or losses) | |
| Taxable interest | Taxable interest reported on Form 1040 (line 8a) – penalty on early withdrawal of savings reported on Form 1040 (line 30) | Form 1099-INT Box 1 (interest income) + Form 1099-INT Box 3 (interest on US Savings Bonds and Treas. obligations) + Form 1120-S Box 4 (interest income) + Form 1065 Box 5 (interest income) – Form 1099-INT Box 2 (early withdrawal penalty) |
| Tax-exempt interest | Tax-exempt interest reported on Form 1040 (line 8b) | Form 1099-INT Box 8 (tax-exempt interest) + Form 1099-DIV Box 10 (exempt-interest dividends) |
| Dividends | Ordinary dividends reported on Form 1040 (line 9a) | Form 1099-DIV Box 1a (total ordinary dividends) + Form 1120-S Box 5a (ordinary dividends) + Form 1065 Box 6a (ordinary dividends) |
| Gains (or losses) | Capital gain (or loss) reported on Form 1040 (line 13) + other gains reported on Form 1040 (line 14) | Form 1099-DIV Box 2a (total capital gain distr.) |
| ***Business/farm/ rents/royalties*** | Business and farm + rents, royalties, etc. – self-employment earnings – 0.5*self-employment tax | Business and farm + rents, royalties, etc. – self-employment earnings – 0.5*self-employment tax |

Continued next page (notes at end of table)

Table A.2 (continued)

**Definitions of Income and Tax Measures**

| Income/tax type | Definition for filers[a] | Definition for non-filers[a] |
|---|---|---|
| Business and farm | Business income on Form 1040 (line 12) + farm income on Form 1040 (line 18) | Form 1099-MISC [Boxes: 5 (fishing boat proceeds); 6 (medical and health care payments); 7 (nonemployee compensation); 10 (crop insurance proceeds); 14 (gross proceeds paid to an attorney)] + Form 1099-G [Boxes: 6 (taxable grants); 7 (agriculture payments); 9 (market gain)] + Form 1065 Box 4 (guaranteed payments) |
| Rents, royalties, etc. | Rental real estate, royalties, partnerships, S corporations, trusts, etc. on Form 1040 (line 17) | Form 1099-MISC Box 1 (rents) + Form 1099-MISC Box 2 (royalties) |
| ***Other*** | Other income reported on Form 1040 (line 21) + alimony received reported on Form 1040 (line 11) – alimony paid reported on Form 1040 (line 31a) | Form 1099-MISC Box 3 (other income) + Form 1099-MISC Box 8 (substitute payments in lieu of dividends or interest) + Form 1099-G Box 5 (RTAA payments) + Form W2-G Box 1 (gross winnings) |
| **Taxes** | | |
| **Total taxes** | ***Payroll taxes* + *federal income taxes*** | |
| ***Payroll taxes*** | OASDI tax on wages + HI tax on wages + 0.5 * self-employment tax | |
| OASDI tax on wages | Form W-2 Box 4 (Social Security tax withheld) + (6.2% * unreported tips reported on Form 4137 line 6) + (6.2% * wages reported on Form 8919 line 6), subject to maximum withholding ($7,347 in 2016) | Form W-2 Box 4 (Social Security tax withheld), subject to maximum withholding ($7,347 in 2016) |
| HI tax on wages | Form W-2 Box 6 (Medicare tax withheld) + (1.45% * unreported tips reported on Form 4137 line 6) + (1.45% * wages reported on Form 8919 line 6) | Form W-2 Box 6 (Medicare tax withheld) |
| Self-employment tax | Deductible portion of self-employment tax reported on Form 1040 (line 27) * 2 | Minimum of 15.3% * self-employment or federal income tax withheld on Form 1099-MISC and Form 1099-G |

Continued next page (notes at end of table)

Table A.2 (continued)

**Definitions of Income and Tax Measures**

| Income/tax type | Definition for filers[a] | Definition for non-filers[a] |
|---|---|---|
| ***Federal income taxes*** | Total tax reported on Form 1040 (line 63) – self-employment tax – payroll taxes on wages not reported on Form W-2 – credits treated as tax payments[c] | Sum of federal income tax withheld on Form W-2, Form SSA-1099, Form 1099-R, Form 1099-INT, and Form 1099-DIV + federal income tax withheld on Form 1099-MISC and Form 1099-G in excess of self-employment tax + Form W-2 Social Security tax withheld in excess of OASDI tax on wages |

Notes

[a] The line numbers referenced in the definitions refer to form for tax year 2017.

[b] Non-rollover distributions exclude rollovers, Roth conversions, and Section 1035 exchanges of annuity contracts. In addition, we exclude from retirement income any amounts attributable to the recharacterization of IRA contributions, the return of excess contributions, or distributions related to prohibited transactions. For a detailed explanation of how we reconcile information reported by taxpayers on Form 1040 and associated Forms and Schedules with information reported by recordkeepers on Form 1099-R and Form 5498, see Brady and Bass (2020a).

[c] During the sample period, credits treated as tax payments included the earned income credit (Form 1040 line 66a), additional child tax credit (line 67), American opportunity credit (line 68), net premium tax credit (line 69), first time homebuyer credit (2008 Form 1040 line 69), and the making work pay credit (2010 Form 1040 line 63).

**Appendix References**

Crandal-Hollick, Margot L. 2021. "The Child Tax Credit: Legislative History" *CRS Report* R45124. Available at https://crsreports.congress.gov/product/pdf/R/R45124

Crandal-Hollick, Margot L. 2022. "The Earned Income Tax Credit (EITC): Legislative History" *CRS Report* R44825. Available at https://crsreports.congress.gov/product/pdf/R/R44825

Tax Foundation. 2021. "Historical U.S. Federal Individual Income Tax Rates & Brackets, 1862-2021". Available at https://taxfoundation.org/historical-income-tax-rates-brackets/.