Using Panel Tax Data to Examine the Transition to Retirement

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Abstract: Using panel data from the Internal Revenue Service's Statistics of Income (SOI) Division, we find that most individuals do not experience a reduction in inflation-adjusted spendable income after claiming Social Security. We also examine the composition of income after claiming and find that both Social Security benefits and non-Social Security retirement distributions typically represent substantial shares of income. Examining the five-year period from one year before individuals first receive Social Security retirement benefits to three years after, 81 percent of individuals had income, either directly or through a spouse, from employer retirement plans, annuities, or IRAs; and another 8 percent had a Form 1099-R (indicating a retirement account transaction, such as a rollover, that did not generate income), a Form 5498 (indicating IRA ownership), or both. This study uses the SOI 1999 Edited Panel of individual income tax returns, with information through tax year 2010, supplemented with data from information returns. We structure the data to follow individual taxpayers—specifically, individuals who were the primary or secondary taxpayer on a joint return or the primary taxpayer on a non-joint return in 1999—rather than tax returns. Information returns and various schedules filed with Form 1040 allow us to allocate labor income, Social Security benefits, and retirement income (pension, annuity, and IRA distributions) to primary and secondary filers on joint returns. Information returns also allow us to measure the income of all 1999 taxpayers through 2010 regardless of whether they filed a tax return in a subsequent year or not. We focus on working individuals age 55 to 61 in 1999 who did not receive Social Security benefits in 1999. Comparison with U.S. population counts suggests that nearly all individuals in this category filed a tax return in 1999.

* 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.

1. Introduction

This study uses panel data from the Internal Revenue Service's Statistics of Income (SOI) Division to investigate changes in spendable income and changes in income composition after Social Security retirement benefits are claimed. The primary focus of the study is on net work-related income—that is, the combination of labor income, Social Security benefits, and retirement income from pensions, annuities, and IRAs; less federal payroll and income taxes. We find that most individuals maintain net work-related income after claiming, with a median replacement rate three years after claiming—measured relative to inflation-adjusted net income in the year before claiming—of 103 percent. Individuals typically rely on multiple sources of income after claiming Social Security benefits. For most individuals, both Social Security benefits and retirement income represent a substantial share of income, with Social Security relatively more important for lower-income individuals and retirement income relatively more important for higher-income individuals.

The data used in this study are derived from the SOI 1999 Edited Panel, with information through tax year 2010. These data are supplemented with data from information returns on wages and salary, Social Security benefits, and retirement contributions and distributions. The study focuses on individuals aged 55 to 61 in 1999 who were working and who were not receiving Social Security benefits. Comparisons with population estimates suggest that nearly all such individuals filed a tax return in 1999, and we are able to follow all through 2010 whether they continued to file tax returns in subsequent years or not.

The goal of this paper is to increase the understanding of the transition into retirement among policymakers and administrators and, in particular, to clarify the roles that Social Security benefits and distributions from employer-sponsored retirement plans and IRAs play in providing retirement resources. The Social Security system and the voluntary employer plan system are important components of the U.S. tax and transfer system. To assess proposals that would change either system, it is important to understand the resources they provide to retirees. In addition, as wage and salary income declines during this transition period, taxpayers rely more on Social Security benefits, distributions from employer-provided retirement plans and individual retirement accounts (IRAs), and capital income (interest, dividends, and capital gains). The tax code treats income from each of these sources differently. A portion of Social Security benefits is exempt from tax. The tax code allows individuals to defer tax on a portion of their earnings set aside for retirement in employer plans and IRAs. Dividends and capital gains are generally taxed less heavily than ordinary income. Analysis of the

transition into retirement can help policymakers understand the impact of taxation on retiree behavior and the impact of retiree behavior on tax revenue.

This paper also relates to the literature on the so-called *consumption puzzle*. As summarized in Hurst (2008), there is considerable empirical evidence that consumption expenditures fall when individuals retire. As noted in Attanasio (1999) and Bernheim et al. (2001), this is a puzzle given that life-cycle models suggest that individuals will smooth consumption over their lifetime. Subsequent research, however, suggested that behavior near retirement may not be so puzzling. For example, in a series of papers, Aguiar and Hurst (2005, 2007, 2013) find that: expenditures fall in two primary categories—food and work-related expenses; that, although food expenditures fall, actual calorie intake does not, as individuals substitute home-produced meals for eating out and pay less for groceries (by spending more time shopping); and that, outside of the home, eating at fast food restaurants and cafeterias is reduced, but eating at full-service restaurants is not. In two separate studies, Hurd and Rohwedder (2006, 2008) also document that food expenditures fall after retirement because eating outside the house is reduced, and, in addition, find that, other than for individuals who retired due to poor health, there is little reduction in spending when a person retirees. Although we do not directly measure spending, this study complements the existing literature by examining changes in spendable income during the transition into retirement.

In addition to finding that most individuals are able to maintain spendable income after claiming Social Security, we find that lower-income individuals typically have higher replacement rates. We measure replacement rates as the ratio of net work-related income in a given year to inflation-adjusted net work-related income in the year before Social Security benefits were claimed. If individuals are ranked by their 1999 total income, median replacement rates three years after claiming were 122 percent for individuals in the lowest income quintile, 103 percent for workers in the middle income quintile, and 87 percent for those in the 95th to 99th percentile of income. Nearly half of individuals continued to work three years after claiming, but this pattern holds regardless of work status—albeit it is more pronounced among those who continued to work. Among those who worked three years after claiming, the median replacement rate was 137 percent for individuals in the lowest income quintile, compared with 112 percent overall. Among those who did not work three years after claiming, the median replacement rate was 104 percent for individuals in the lowest income quintile, compared with 96 percent overall.

Changes in spendable income after claiming arose from both changes in income and changes in taxes. Across all individuals, average work-related income actually declined after claiming, but this decline was largely offset by a reduction in taxes. Lower-income individuals experienced the largest reduction in average tax rates. Although payroll taxes as a share of work-related income fell for all income groups, they accounted for two-thirds of the overall change in average tax rates for individuals in the lowest quintile of 1999 income and 46 percent of the reduction for individuals in the second and middle quintiles. Income tax rates also fell, on average, across all income groups.

Retirement income from pensions (including both defined benefit and defined contribution pensions), annuities, and IRAs was widespread and persistent. The share of individuals who received retirement income increased from 67 percent one year after claiming to 71 percent three years after claiming. Of those with retirement income one year after claiming, 92 percent had retirement income in each of the subsequent two years. Looking over the five year period from one year before claiming to three years after claiming, 81 percent of individuals had retirement income and another 8 percent had a Form 1099-R (indicating a retirement account transaction, such as a rollover, that did not generate income), a Form 5498 (indicating IRA ownership), or both.

Most individuals got a substantial share of income from both Social Security benefits and retirement income, with the primary exceptions being individuals in the lowest quintile of 1999 income (who typically had small amounts of retirement income) and individuals in the top 1 percent of 1999 income (for whom neither Social Security benefits nor retirement income typically were a large share of income). Those in the 20th to 99th percentile of 1999 income typically had a mix of both.

The remainder of the paper is organized as follows. Section 2 describes the data; defines the measures of gross income, taxes, net income and replacement rates used in the study; and examines the Social Security claiming behavior of the individuals who are the focus of this study. Section 3 examines changes in net income after Social Security retirement benefits are claimed. Section 4 illustrates the composition of income before and after claiming. Section 5 discusses the results and Section 6 concludes the paper.

2. Description of Data

The data used in this study are derived from the SOI 1999 Edited Panel, with information through tax year 2010. The 1999 Edited Panel is a subsample of the 1999 Cross Section consisting of 83,434 returns.[1] Panel members include the primary taxpayer and secondary taxpayer from joint returns and the primary taxpayer from non-joint returns in the 1999 Cross Section subsample. In subsequent years, a tax return is included in the panel if any panel member is a primary or secondary taxpayer on that return. Each observation in the panel represents a single tax return for a single tax year.

For each tax return included in the sample, the required information is entered into a database, and undergoes extensive processing to ensure both internal validity and conformance with tax reporting requirements. Codes are assigned to certain data items and some amounts may be reclassified in order to improve the analytical usefulness of the data. In addition to tax return data, taxpayer Social Security numbers are used to associate each taxpayer with Social Security Administration data on date of birth, gender, and (if applicable) date of death.

2.1 Structuring and Supplementing the Panel Data

For purposes of this study, the 1999 Edited Panel data were restructured so that individuals were the unit of analysis rather than tax returns. That is, for panel members who filed a non-joint return in 1999, the primary taxpayer represents an observation; for panel members who filed a joint return in 1999, the primary taxpayer and the secondary taxpayer each represent an observation. Each observation includes data from all tax returns with which the taxpayer is associated from 1999 to 2010. In any year in which a joint return was filed, the record would include information pertaining to the panel member's spouse.[2] As restructured, the panel has longitudinal data on 118,882 individual taxpayers.

To supplement the tax return and demographic data available in the 1999 Edited Panel, we added wage, tax, and retirement plan contribution data from Form W-2; Social Security benefits from Form SSA-1099; annuity, pension, and individual retirement account (IRA) distributions from Form 1099-

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[1] For a more complete description of the SOI Individual Cross Sectional Sample, see IRS (2011). For a more complete description of the Edited Panel, see Weber and Bryant (2005) and Weber (2006).

[2] This sample design does not result in any double counting of income. To the extent the data are used to calculate any aggregate statistics, per capita income measures are used. All return level measures of income in the paper are also presented on a per capita basis.

R; and information on IRA contributions and balances from Form 5498. Information returns were collected for all tax returns filed for tax year 1999 and any other tax returns filed for tax years 2000 to 2010 with which they were associated. For individuals who filed a joint return in any year, we included information return data for the spouse.

Information return data were also included for individuals in the panel who did not file in a given year. For non-filers who filed a joint return in the most recent year they filed, we included information return data for the spouse identified on that return.

2.2 Replacement Rates and Measures of Gross and Net Income

The replacement rate measure used in this analysis is based on the measure developed in Brady (2010) and measures the extent to which spending can be maintained in retirement. As discussed in Brady (2010), traditional replacement rate measures compare income in the first year of retirement to income in the year, or the average of several years, just before retirement. Economic theory suggests that—rather than maintaining income or earnings in retirement—individuals wish to maintain consumption in retirement.[3] Therefore, the income measures that are the focus of this study are intended to measure spendable income in the years near the claiming of Social Security benefits.

The net income measures that are the focus of this study differ from the typical measures of income used to calculate replacement rates, and also differ from measures of income—such as adjusted gross income or taxable income—used for tax purposes. First, income that cannot be used for spending is subtracted from income. This means the measure of spendable income excludes income used to pay payroll taxes and federal income taxes.[4] The measure also excludes income used to fund retirement

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[3] 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 (2004) 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 (2007) 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.

[4] State income taxes should also be subtracted from income. We do not subtract state income taxes because we can only observe state income taxes for those who itemize and do not have a consistent measure across all

contributions, including after-tax contributions to traditional IRAs and Roth contributions to either IRAs or employer-sponsored retirement plans;[5] and it excludes income generated by taxable IRA recharacterizations and taxable Roth conversions. Second, some income sources that are not included in income for tax purposes are added to income. This means the measure of spendable income includes tax-exempt interest, non-taxable Social Security benefits, and non-taxable IRA distributions (both Roth distributions and the return of basis from traditional IRAs).[6] Finally, to better measure purchasing power, all income measures are adjusted for inflation.

Mechanically, these adjustment are achieved in two steps. First (pre-tax) income is measured, with taxable retirement contributions and transfers subtracted from income, and non-taxable interest income, Social Security benefits, and retirement distributions added to income. Second, net income is calculated by subtracting taxes.

Components of income are (see appendix for more complete descriptions):
- Labor income (wage and salary, tips, and self-employment earnings)
- Social Security benefits
- Retirement income (pension, annuity, and IRA distributions)
- Capital gains/losses; dividends; taxable interest; and tax-exempt interest
- Business and farm income (also includes rents, royalties, partnership, S-corp, and trust income)
- Other income (net alimony income, unemployment compensation, and other income)

The adjustments to taxable income discussed above are incorporated into the components of income. Labor income excludes taxable retirement plan contributions. Social Security benefits include the portion of benefits excluded from taxable income. Retirement income includes non-taxable Roth distributions and the return of basis from traditional IRAs, and excludes taxable IRA recharacterizations and Roth conversions.

For non-filers, income is calculated from information returns. Specifically, Form W-2 is used to derive labor income; Form SSA-1099 is used to derive Social Security benefits; and Form 1099-R is used to derive retirement income. For non-filers who filed a joint return in the most recent year in which they

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taxpayers in the sample. In addition to not excluding state income taxes from our measure of income, we do not include state income tax refunds in our measure of income.

[5] The data did not allow us to identify (non-Roth) after-tax contributions to employer-sponsored retirement plans, so they are not excluded from the measure of spendable income.

[6] The data did not allow us to identify distributions from employer-sponsored retirement plans, that is, distributions that represent the return of after-tax contributions, so they are not included in the measure of spendable income.

filed, information returns from both spouses are used to calculate per capita income. It is assumed that non-filers have no income from any other sources.

Two broad measures of income are analyzed:

- *Total income* includes all the categories of income listed above.
- *Work-related income* is the combination of labor income, Social Security benefits, and retirement income.

Net income measures are calculated for these two income measures by subtracting taxes.

- *Net total income* is total income less federal payroll taxes and federal income taxes.
- *Net work-related income* is work-related income less federal payroll taxes and a proportionate share of federal income taxes.[7]

In general, the presence of income from any source is determined at the return level and the amount of income from any source is calculated on a per capita basis. That is, for married individuals filing a joint return, an individual would be categorized as receiving income from a given source if either the individual or the spouse received the income, and each spouse would be allocated half of the return level income.

Information on the receipt of income by individuals, however, was required for some of the analysis. This was accomplished by using information returns and various schedules and forms filed with the Form 1040 to allocate labor income, Social Security benefits, and retirement income to individuals filing a joint return. As explained below, individual level data on labor income were used to classify individuals as workers and individual level data from Form SSA-1099 were used to classify individuals as having claimed Social Security.

2.3 Sample of Interest

This study focuses on a subset of the 1999 Edited Panel: individuals aged 55 to 61 at year-end 1999 who were working and who were not receiving Social Security benefits. Taxpayers were classified as working or as receiving Social Security benefits on an individual, rather than a return, basis. To be considered a worker in 1999, an individual taxpayer had to have at least one of the following: wage and salary or tip income reported on Form W-2; unreported wage income (that is, wage income not reported on Form W-2) reported on Form 8919; unreported tip income (that is, tip income not reported

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[7] Work-related federal income taxes are calculated as federal income taxes multiplied by the ratio of work-related income to total income (or 100% if less).

on Form W-2) reported on Form 4137; or self-employment income reported on Schedule SE. To be classified as not receiving Social Security benefits in 1999, an individual taxpayer could have neither retirement nor disability benefits. There were 16.4 million individual taxpayers age 55 to 61 in 1999. Of these, 12.5 million worked and did not receive Social Security benefits in 1999.

This sample was chosen because the aim of the study was to observe the income of workers before and after the claiming of Social Security retirement benefits. The members of the group were younger than the early claiming age for Social Security (age 62), but were likely to claim benefits during the sample period, as they would be 66 to 72 years of age at year-end 2010.

An additional advantage of analyzing this group is that we have reason to believe that the primary and secondary taxpayers aged 55 to 61 in 1999 were likely to be fairly representative of all individuals aged 55 to 61 in 1999. Tabulation from the March 2000 Current Population Survey indicate that the 16.4 million individual taxpayers age 55 to 61 in 1999 represented more than 95 percent of the US population that age.[8] And it is likely that nearly all individuals age 55 to 61 in 1999 who worked and who were not receiving Social Security filed a tax return.[9]

In the analysis below, individuals are often grouped by their 1999 per capita total income rank within the sample of interest. For reference, the cutoffs for the income categories are listed in Table 1. Note that individuals with negative 1999 total income are included in any statistics calculated for the full sample, but are not included in the tabulations by income.

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[8] The 16.4 million taxpayers aged 55 to 61 at year-end 1999 would represent 95.2 percent of individuals aged 55 to 61 and 98.7 percent of individuals aged 56 to 62 in the March 2000 Current Population Survey (CPS).

[9] The claim of representativeness with regard to the sample of interest is more qualitative than quantitative. The 12.5 million taxpayers aged 55 to 61 at year-end 1999 who worked and did not receive Social Security benefits in 1999 is greater than the March 2000 CPS population estimates for those same individuals. Specifically, the CPS estimates that there were 11.9 million individuals aged 55 to 61 in March 2000 who worked in 1999 and did not receive Social Security benefits in 1999; and that there were 10.8 million of such individuals aged 56 to 62 in March 2000. Our working assumption is that the CPS is a good source of population estimates but is not as reliable a source for information on receipt of income by source. As such, we do not think the CPS can provide us with a reliable estimate of the total number of individuals aged 55 to 61 in 1999 who worked and did not receive Social Security benefits, and would only venture that the percentage of this group who filed a tax return is somewhere between 95 percent (representing the 95 percent or so of all individuals age 55 to 61 who filed a tax return in 1999) and 100 percent.

Table 1
Dollar Ranges for Categories of 1999 Per Capita Total Income

	1999 per capita total income categories						
	Quintile				*Percentile*		
	Lowest	**Second**	**Middle**	**Fourth**	**80th to 95th**	**95th to 99th**	**Top 1**
1999 dollars	$0 to $16,558	$16,558 to $25,471	$25,471 to $35,441	$35,441 to $52,860	$52,860 to $101,688	$101,688 to $270,296	Over $270,296
2016 dollars	$0 to $23,930	$23,930 to $36,811	$36,811 to $51,220	$51,220 to $76,394	$76,394 to $146,961	$146,961 to $390,637	Over $390,637

Note: For individuals filing a non-joint return, per capita income is equal to return-level income. For married individuals filing a joint return, per capita income is equal to return-level income divided by two.

2.4 Social Security Claiming Age

Individuals are classified as claiming Social Security beginning with the first year an individual receives Social Security retirement benefits, as reported on the individual's SSA-1099.[10] Of the 12.5 million taxpayers represented by the sample of interest, 82 percent had claimed Social Security retirement benefits by 2010, and another 13 percent were alive in 2010 but had not yet claimed retirement benefits. The remaining 5 percent had died by 2010 without having claimed Social Security retirement benefits.[11]

The most common ages for workers to claim benefits were age 62 and age 66, with 20 percent of the sample claiming benefits at both ages (Figure 1). The full-benefit retirement age (FRA) for workers in the sample ranged from age 65 years 2 months (for those born in 1938, who were age 61 in 1999) to age 66 years (for those born in 1943 and 1944, who were age 55 and age 56 in 1999), and roughly one-third of the sample claimed Social Security at either age 65 or age 66. Another 8 percent claimed at age 67 or older.

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[10] Receipt of Social Security disability income is not classified as claiming. By selection, no individual in the sample of interest received any type of Social Security benefits (either disability or retirement) in 1999. Those receiving Social Security disability benefits after 1999 would not be classified as claiming. If an individual received Social Security disability benefits prior to receiving Social Security retirement benefits, the individual would be classified as claiming beginning with the first year the individual received Social Security retirement benefits.

[11] Not all of those who died prior to claiming or who were alive and had not yet claimed by 2010 were necessarily eligible to claim Social Security benefits. Some may not have worked long enough (40 covered quarters) to qualify for benefits. Some may have worked long enough but were federal, state, or municipal employees covered by an alternative government pension plan.

Figure 1

Age 62 and Age 66 Most Common Ages for Claiming Social Security Benefits

Percentage of working taxpayers[1] aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, by age in the year they first received Social Security retirement benefits[2]

Age of Social Security retirement benefit claiming

[1]Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Percentages do not add to 100 percent because some individuals died before claiming Social Security retirement benefits (see Figure 3).

[3]Widows and widowers may receive Social Security retirement benefits prior to attaining age 62.

Source: Authors' tabulation of tax return data.

<Insert "Figure 1: Age 62 and Age 66 Most Common Ages for Claiming Social Security Benefits" here>

2.4.1 Claiming Age by Birth-Year Cohort

When the claiming ages for each birth-year cohort are examined separately, it suggests that—among working individuals age 55 to 61 in 1999—the FRA was the most common age to claim Social Security benefits (Figure 2). Although we cannot identify a taxpayer's exact age in the month they claim Social Security, the annual data indicate that individuals reacted to increases in the Social Security retirement age. For example, of those in the sample born in 1938, who had an FRA of 65 years and 2 months, 28 percent claimed benefits in the calendar year they attained age 65 and 10 percent claimed benefits in the calendar year they attained age 66. For younger workers, the share claiming at age 65 declines and the share claiming at age 66 increases as the FRA is increased. For workers born in 1943 or 1944, who had an FRA of 66 years, 9 percent claimed benefits in the year they attained age 65 and 25 percent claimed benefits in the year they attained age 66.

The analysis by birth year also suggests that the portion of the sample claiming Social Security at age 67 or older would be higher if we had data from years after 2010—years in which the youngest individuals in the sample will approach and pass age 70. Among those in the sample born in 1938, who were age 72 in 2010, 14 percent had claimed at age 67 or older and 6 percent were alive in 2010 but had not yet claimed Social Security (Figure 2). For younger individuals, the share claiming at age 67 or older declines and the share who have yet to claim increases. For those born in 1943 or 1944—who were age 67 and age 66, respectively, in 2010—only 3 percent had claimed at age 67 (all of whom were born in 1943), whereas 19 percent had yet to claim. Thus, the overall percentage who claim at age 67 or older will increase when many who had not claimed as of 2010 claim in later years.[12]

<Insert "Figure 2: Benefits Most Often Claimed at Full Benefit Retirement Age" here>

2.4.2 Claiming Age by Income

In addition to differences in claiming ages by year of birth, claiming ages also are correlated with income. Individuals with higher 1999 per capita total income tended to claim Social Security retirement benefits at older ages (Figure 3). For example, 31 percent of individuals in the lowest quintile of 1999
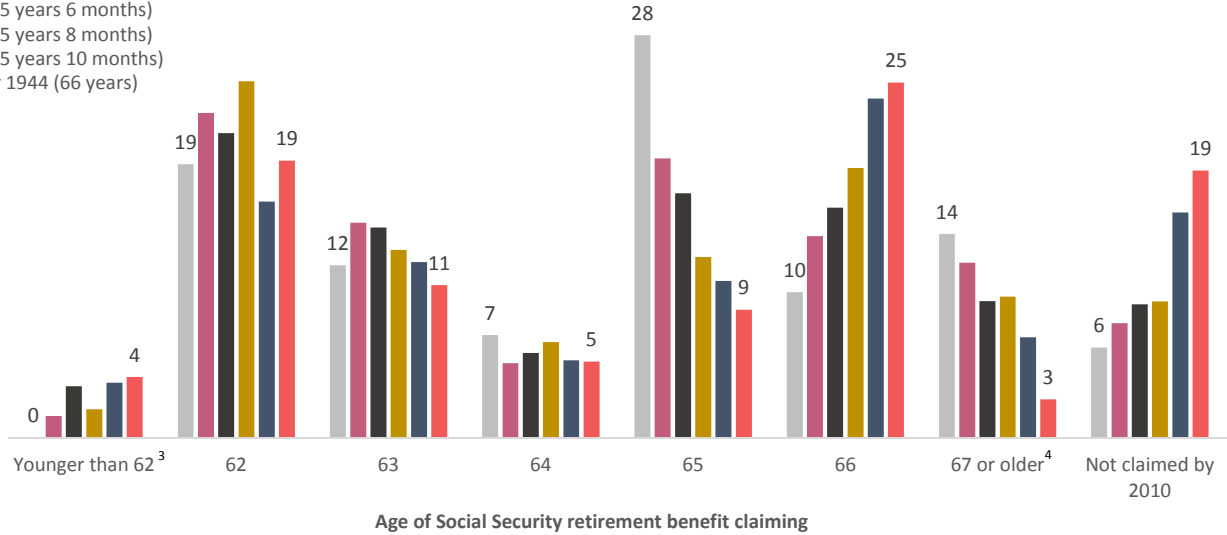
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[12] As discussed in note 11, not all of those who died prior to claiming or who were alive and had not yet claimed by 2010 were necessarily eligible to claim Social Security benefits.

Figure 2

Benefits Most Often Claimed at Full Benefit Retirement Age

Percentage of working taxpayers[1] aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, by birth year and age in the year they first received Social Security retirement benefits[2]

Birth year (full benefit retirement age)
- 1938 (65 years 2 months)
- 1939 (65 years 4 months)
- 1940 (65 years 6 months)
- 1941 (65 years 8 months)
- 1942 (65 years 10 months)
- 1943 or 1944 (66 years)

Age of Social Security retirement benefit claiming

[1]Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Percentages do not add to 100 percent because some individuals died before claiming Social Security retirement benefits (see Figure 5).

[3]Widows and widowers may receive Social Security retirement benefits prior to attaining age 62. Individuals born in 1938 were age 61 in 1999 and could not be observed claiming before age 62.

[4]Individuals born in 1944 were age 66 in 2010 and could not be observed claiming at age 67 or older.

Source: Authors' tabulation of tax return data.

Figure 3

Higher-Income Workers More Likely to Have Claimed Social Security when Older

Percentage of working taxpayers[1] aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, by Social Security retirement benefit claiming age and 1999 total income[2]

1999 per capita income rank
- Lowest quintile
- Second quintile
- Middle quintile
- Fourth quintile
- 80th to 95th percentile
- Top 5 percent

Age of Social Security retirement benefit claiming

[1]Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Percentages do not add to 100 percent because some individuals died before claiming Social Security retirement benefits (see Figure 5).

[3]Widows and widowers may receive Social Security retirement benefits prior to attaining age 62.

Source: Authors' tabulation of tax return data.

income claimed at age 62 or younger and 35 percent claimed at age 65 or older. In contrast, among individuals in the top 5 percent of 1999 income, 11 percent claimed at age 62 or younger and 58 percent claimed at age 65 or older.

<mark><Insert "Figure 3: Higher-Income Workers More Likely to Have Claimed Social Security when Older" here></mark>

2.4.3 Comparison to Previous Research on Claiming Age

The claiming ages found in this study are older than those found in studies looking at all Social Security claimants.[13] For example, using unpublished data from the Social Security Administration, Munnell and Chen (2015) finds that about half of insured individuals attaining age 62 between 2000 and 2006 claimed benefits at age 62.[14] Using data from the Health and Retirement Survey, Amour and Hung (2017) finds that, among individuals born from 1936 through 1941 who were eligible for Social Security retirement benefits, 44 percent of individuals claimed at age 62 and 26 percent claimed at the FRA or older.[15] By comparison, this study finds that only 28 percent of those in our sample who had claimed by 2010 had claimed at age 62 or younger and half had claimed at age 65 or older.[16]

The likely explanation for this discrepancy is that individuals excluded from our sample—that is, individuals aged 55 to 61 in 1999 who were either not working or who were already receiving Social Security benefits (either disability benefits or retirement benefits) were more likely to claim Social Security retirement benefits at a younger age. This would be consistent with the findings in Amour and

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[13] Amour and Hung (2017) provides a helpful review of the literature on Social Security claiming. Our results are closest to Goda, et al. (2015), which also uses administrative tax data. Goda, et al. (2015) find that about one-third of individuals in the 1940 birth cohort claim Social Security retirement at age 62. It is not clear how the sample analyzed in that study compares to the sample we analyze. The sample analyzed in Goda, et al. (2015) is based on the population of individuals age 59 in 1999, including both filers and non-filers. The sample, however, excludes women who filed a joint return in 1999, those who received Social Security disability benefits at some point from 1999 through 2011, those who did not file a Form 1040 or did not receive a Form W-2 or Form SSA-1099 from 1999 through 2011, and those who did not claim Social Security by age 70).

[14] This estimate is based on ocular analysis of Figure 4 in Munnell and Chen (2015).

[15] Amour and Hung (2017) report that 23 percent of the cohort was not eligible for Social Security retirement benefits.

[16] In our sample, 23 percent had claimed at age 62 or younger and 82 percent had claimed by 2010. So, 28 percent of those claiming (=23%/82%) had claimed by age 62. Forty-one percent (=14%+20%+8%, with rounding) had claimed at age 65 or older and 82 percent had claimed by 2010. So, 50 percent of those claiming (=41%/82%) had claimed at age 65 or older.

Hung (2017), which finds that only 44 percent of individuals who claimed benefits at age 62 were working at ages 60 and 61, compared with 76 percent of individuals who claimed benefits after age 62 but before the FRA and 86 percent of individuals who claimed at the FRA or older. This is an issue that we have yet to explore, but one that could be examined with the panel data. We hope to more carefully examine Social Security claiming behavior in future research.

Our other findings are consistent with the literature on claiming age. For example, Song and Manchester (2007), Mastobuoni (2009), and Behagle and Blau (2012) find that the increase in the FRA was associated with an increase in claiming age. In addition, Li, Hurd and Loughran (2008), Glickman and Hermes (2015), and Amour and Hung (2015) find that those who claimed when older tended to have higher earnings prior to claiming.

2.5 Subsample Used for Analysis

To examine changes in income, we further restricted the analysis to individuals who claimed Social Security between 2000 and 2007 and who were alive three years after claiming. This choice involved weighing the trade-off between the share of the sample included in the analysis and the number of years after claiming included in the analysis. The decision to restrict the analysis to individuals for whom we observed three years of post-claiming income was made after we determined that including either fewer years after claiming (and more individuals) or more years after claiming (and fewer individuals) did not have much of an effect on the results.

Figure 4 illustrates how the group chosen for the analysis relates to the sample of interest. Of the 12.5 million working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits, 61 percent—representing 7.6 million individuals—claimed Social Security between 2000 and 2007 (Figure 4). Among those claiming between 2000 and 2007, 3 percent had died within three years of claiming. For the remaining 97 percent, we were able to measure income in all five years from the year before claiming to the third year after claiming. For the 84 percent who filed a tax return in all five years, income was measured using information from both the Form 1040 and information returns. For the 13 percent who did not file a tax return in all five years, income was measured using only information returns in at least some years.

<mark><Insert "Figure 4: 97 Percent Were Alive Three Years After Claiming Social Security" here></mark>

Figure 4
97 Percent Were Alive Three Years After Claiming Social Security

Percentage of working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999*

Percentage of working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 and who claimed Social Security retirement benefits between 2000 and 2007*

Claim in years 2008 through 2010

22

Alive but have not claimed (through 2010)

13

5

Do not claim prior to year of death

61

Claim in years 2000 through 2007

12.5 million taxpayers

3

13

84

Die within 3 years of claiming

Alive three years after claiming (t + 3) but do not file in all years

Alive three years after claiming (t + 3) and file in all years

7.6 million taxpayers

*Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

Compared with the full sample of interest, the subsample used for analysis tends to be older, because younger workers were less likely to have claimed between 2000 and 2007 (Figure 5).[17] For example, among workers born in 1938 (who attained age 69 during 2007), 85 percent had claimed Social Security by 2007. In contrast, about half of workers born in 1942 (who were age 65 in 2007) and about one-third of workers born in 1944 (who were age 63 in 2007) had claimed by 2007.

<Insert "Figure 5: Older Workers More Likely to Have Claimed Social Security by 2007" here>

The subsample used for analysis was also lower-income than the full sample of interest because workers with lower income were more likely to have claimed Social Security between 2000 and 2007 (Figure 6).[18] For example, 64 percent of workers in the lowest quintile of 1999 per capita total income had claimed Social Security by 2007, compared with 57 percent of workers in the fourth quintile and 46 percent in the top 5 percent. By 2010, differences in the share claiming Social Security were somewhat less pronounced, but still persisted. Those with lower 1999 income were also less likely to be alive in 2010 having not claimed Social Security (10 percent for the lowest income quintile compared with 18 percent for the top 5 percent of the income distribution) and more likely to have died by 2010 without having claimed Social Security retirement benefits (7 percent for the lowest quintile compared with 3 percent for the top 5 percent).[19]

<Insert "Figure 6: Lower-Income Workers More Likely to Have Claimed Social Security by 2007" here>

Figure 7 illustrates that tax return data needs to be supplemented with information return data to properly represent lower-income retirees. Among those claiming Social Security retirement benefits

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[17] See Table A.3 in the appendix for a comparison of the sample of interest and the subsample used for analysis. The differences by birth-year in the share of workers who die before claiming Social Security benefits appear to be attributable to the different ages at which we observe the workers, and not attributable to differences in mortality. For example, individuals born in 1938 were age 61 at year-end 1999, were eligible to claim Social Security by year-end 2000, and were age 72 by year-end 2010. By comparison, individuals born in 1944 were age 55 in 1999, were eligible to claim by year-end 2006, and were age 66 by year-end 2010. Both the 1938 birth-year cohort and the 1944 birth-year cohort had a similar percentage die from the age of 62 to the age of 66 without having received Social Security retirement benefits. For the 1944 birth-year cohort, however, we observed individuals who died before the calendar year they attained age 62; and for the 1938 birth cohort, we observed individuals who died after the calendar year they attained age 66.

[18] The subsample used for analysis is only slightly lower income than the sample of interest because, although lower-income individuals were more likely to claim between 2000 and 2007, they were also more likely to die within three years of claiming (see Figure 7). The two effects partially offset (see Table A.3 in the appendix).

[19] As discussed in note 11, not all of those who died prior to claiming or who were alive and had not yet claimed by 2010 were necessarily eligible to claim Social Security benefits.

Figure 5

Older Workers More Likely to Have Claimed Social Security by 2007

Percentage of working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, by year of birth and year in which they first received Social Security retirement benefits*

■ Claim in years 2000 through 2007
■ Claim in years 2008 through 2010
■ Alive but have not claimed (through 2010)
■ Do not claim prior to year of death (through 2010)

Year of birth	Claim 2000–2007	Claim 2008–2010	Alive but not claimed	Do not claim prior to death
All	61	22	13	5
1944	33	39	22	7
1943	40	39	15	6
1942	49	30	16	5
1941	78	10	9	3
1940	81	6	9	3
1939	83	6	8	3
1938	85	5	6	4

*Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

Figure 6

Lower-Income Workers More Likely to Have Claimed Social Security by 2007

Percentage of working taxpayers* aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, by 1999 total income and year in which they first received Social Security retirement benefits

- Claim in years 2000 through 2007
- Claim in years 2008 through 2010
- Alive but have not claimed (through 2010)
- Do not claim prior to year of death (through 2010)

1999 per capita income rank	Blue	Green	Orange	Yellow
All	61	22	13	5
Lowest quintile	64	19	10	7
Second quintile	65	21	9	5
Middle quintile	62	22	13	3
Fourth quintile	57	22	17	4
80th to 95th percentile	56	23	16	4
Top 5 percent	46	33	18	3

*Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.
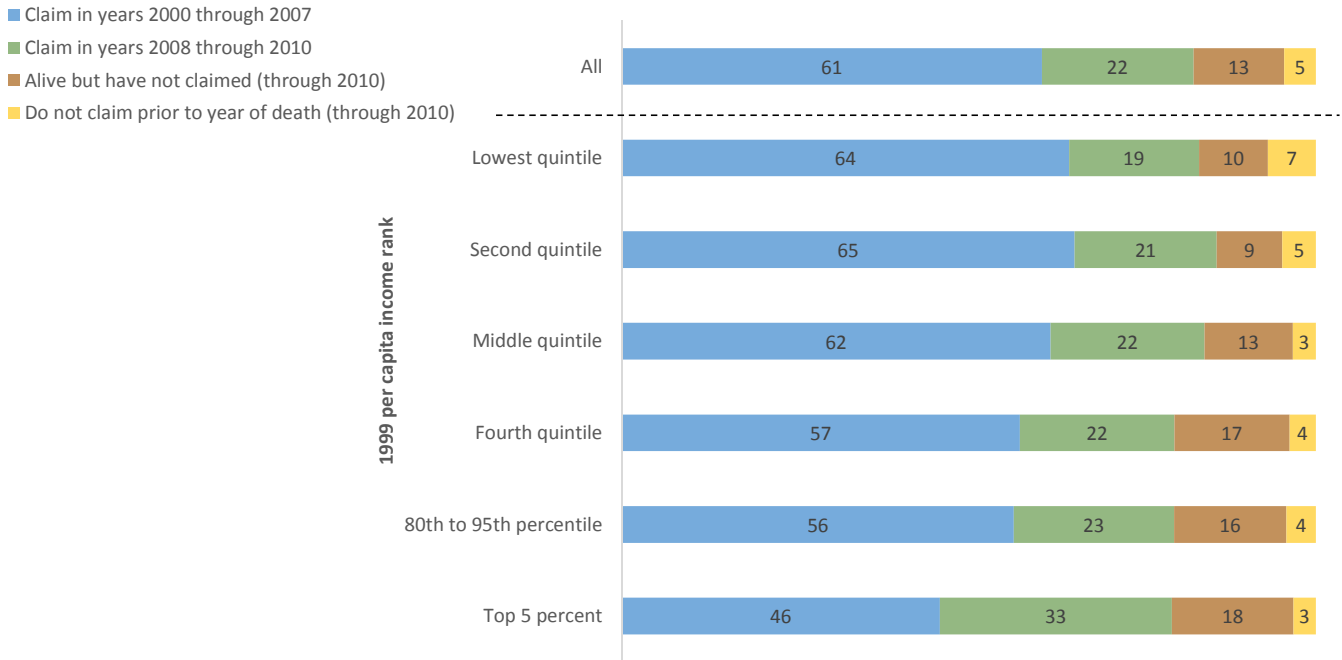
Source: Authors' tabulation of tax return data.

between 2000 and 2007, workers with lower 1999 per capita total income where less likely to have filed a tax return in all five years from the year before claiming to the third year after claiming. Of those who claimed by 2007, 28 percent of those in the lowest quintile of 1999 income where alive three years later but did not file a tax return in all five years, compared with 8 percent of the middle quintile of income, and 1 percent for the top 5 percent of the income distribution. In the analysis that follows, income in for those not filing a tax return in any given year is measured using only information returns in that year.

<Insert "Figure 7: Higher-Income Workers More Likely to Have Filed a Tax Return After Claiming Social Security" here>

Figure 7

Higher-Income Workers More Likely to Have Filed a Tax Return After Claiming Social Security

Percentage of working taxpayers* aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 and who claimed Social Security retirement benefits between 2000 and 2007, by 1999 total income

■ Alive three years after claiming and file in all years
■ Alive three years after claiming, but do not file in all years
■ Die within 3 years of claiming

1999 per capita income rank

All	84	13	3
Lowest quintile	67	28	4
Second quintile	79	19	3
Middle quintile	89	8	4
Fourth quintile	94	4	2
80th to 95th percentile	94	3	3
Top 5 percent	97	1	2

*Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

3. Changes in Net Income after Claiming Social Security

This section examines changes in inflation-adjusted net income around the first year in which individuals receive Social Security retirement benefits. All dollar amounts contained in the figures and included in the text are expressed in constant 2016 dollars. For expositional ease, all dollar amounts are also rounded to the nearest $100.[20]

The year in which an individual claims Social Security retirement benefits is referred to as year t and can be any year from 2000 to 2007. The years near claiming are labeled as year t plus or minus additional years.

Year	Explanation
$t-1$	The year one year before the year in which Social Security retirement benefits are claimed
t	The year in which Social Security retirement benefits are claimed
$t+1$	The year one year after the year in which Social Security retirement benefits are claimed
$t+2$	The year two years after the year in which Social Security retirement benefits are claimed
$t+3$	The year three years after the year in which Social Security retirement benefits are claimed

As with the analysis presented in Section 2, individuals will often be grouped by their 1999 per capita total income. Ideally, the analysis would group individuals using more robust measure of an individual's economic resources—such as average lifetime earnings—rather than income in a single year, but we do not have access to such data. Total income in 1999 was viewed as the next best alternative measure available. By selection, all individuals analyzed were working and did not receive Social Security income in 1999, allowing us to compare individuals at a similar point in their working careers. Using 1999 income rank also allows us to group individuals in a way that is largely exogenous to the income measures we are analyzing. That is, we analyze income from year $t-1$ to year $t+3$, and 1999 income would be included in the analysis only for individuals who claimed Social Security retirement benefits in 2000 (for whom 1999 income represents their income in year $t-1$).[21]

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[20] In the discussions that follow, the components may not add to the total because of this rounding. Unrounded amounts are reported in the supplemental tables. An Excel file containing the supplemental tables is available upon request.

[21] In the subsample used for analysis, 4.7 percent of individuals claim in 2000.

In addition to examining changes in average income near the claiming of Social Security, we calculate replacement rates for each individual in the sample and report the distribution of replacement rates across individuals. The replacement rates measure net income as a percentage of inflation-adjusted net income in the year prior to claiming Social Security (year $t – 1$). Replacement rates are calculated for the year of claiming (year t) and the three years following claiming (year $t + 1$ through year $t + 3$). The analysis below will focus on the replacement of net work-related income.[22] Again, we would ideally want to compare an individual's net work-related income after claiming Social Security to the individual's average lifetime earnings (net of taxes and savings), but we do not have access to lifetime earnings data. Net work-related income in year t-1 was considered the next best alternative measure available.[23]

3.1 Trends in Average Income

For the sample analyzed, Figure 8 through Figure 11 present measures of average inflation-indexed income from year $t – 1$ through year $t + 3$. Mean, rather than median, measures were used in these figures for expositional purposes. That is, these figures illustrate that net income is affected by both changes in the amount of income an individual receives and changes in the amount of taxes an individual pays. Whereas mean income is equal to the sum of the means of net income and taxes, median income is not equal to the sum of the medians of its constituent parts (other than by chance). Trends in median net income are similar to trends in mean net income and those statistics are reported in the supplemental tables.[24] For the replacement rate analysis, changes in net work-related income were calculated for every individual in the sample and the distribution of those values across individuals, including the median value, are presented in Section 3.3.

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[22] Analysis of the replacement of net total income are available upon request.

[23] One concern we had with using income in the year prior to retirement was the possibility that income may fall in the years leading up to retirement. Investigation of the data, however, showed no discernable trend in inflation-adjusted net income—evaluated at the mean and the median, and evaluated within 1999 income groupings—in the years leading up to claiming Social Security. In addition, there was little difference in results when net income from year $t – 2$ was used as the denominator. The decision was made to use net income from year $t – 1$ as the denominator to maximize the number of individuals we could include in the analysis.

[24] An Excel file containing the supplemental tables is available upon request.

3.1.1 Average Total Income

In constant 2016 dollars, average per capita net total income fell by 7 percent, from $45,200 in year *t − 1* to $42,000 in year *t + 3* (Figure 8, top panel).[25] Average total income fell by 14 percent, or $7,500, over this period. The decline in total income, however, was partially offset by a $4,200 reduction over this period in average annual federal taxes (inclusive of both payroll tax and income tax).

Average per capita net total income increased slightly (up by less than 2 percent) for individuals who continued to work in year *t + 3* and declined by 15 percent for individuals who no longer worked in year *t +* 3 (Figure 8, middle and lower panels). Nearly half of the individuals in the sample worked three years after claiming Social Security (see discussion in Section 4).[26] For those individuals who continued to work in year *t + 3*, average net total income increased from $48,400 per person in year *t − 1* to $49,100 per person in year *t + 3*. Net total income increased for this group even though average total income fell by $2,700 over this period because average federal taxes dropped by even more—falling by $3,400. For those individuals who no longer worked in year *t + 3*, average net total income fell from $42,600 per person in year *t − 1* to $36,100 per person in year *t + 3*. For this group, average total income declined by $11,400, with that decline only partially offset by a $5,000 reduction in average federal taxes.

<mark><Insert "Figure 8: Net Total Income Declined Modestly after Claiming" here></mark>

3.1.2 Average Work-Related Income

The replacement rate analysis in Section 3.3 will focus on trends in work-related income—the combination of labor income, Social Security benefits, and retirement income. There are two primary reasons for this focus. First, the Social Security system and the voluntary employer plan system are

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[25] Looking separately at individuals who filed a joint return in year *t − 1* (or, for non-filers, filed a joint return in the most recent year they filed prior to year *t − 1*) and individuals who filed a non-joint return in year *t − 1* (or, for non-filers, filed a non-joint return in the most recent year they filed prior to year *t − 1*) suggests that doubling per capita income would provide a fairly good estimate of a married couple's income. In fact, per capita income for taxpayers who filed a joint return was slightly higher, on average, than the income of individuals filing a non-joint return. For married individuals who filed a joint return in year *t − 1,* average per capita net total income fell from $46,900 in year *t − 1* to $43,600 in year *t + 3*. For individuals who filed a non-joint return in year *t − 1,* average per capita net total income fell from $41,400 in year *t − 1* to $38,200 in year *t + 3.*
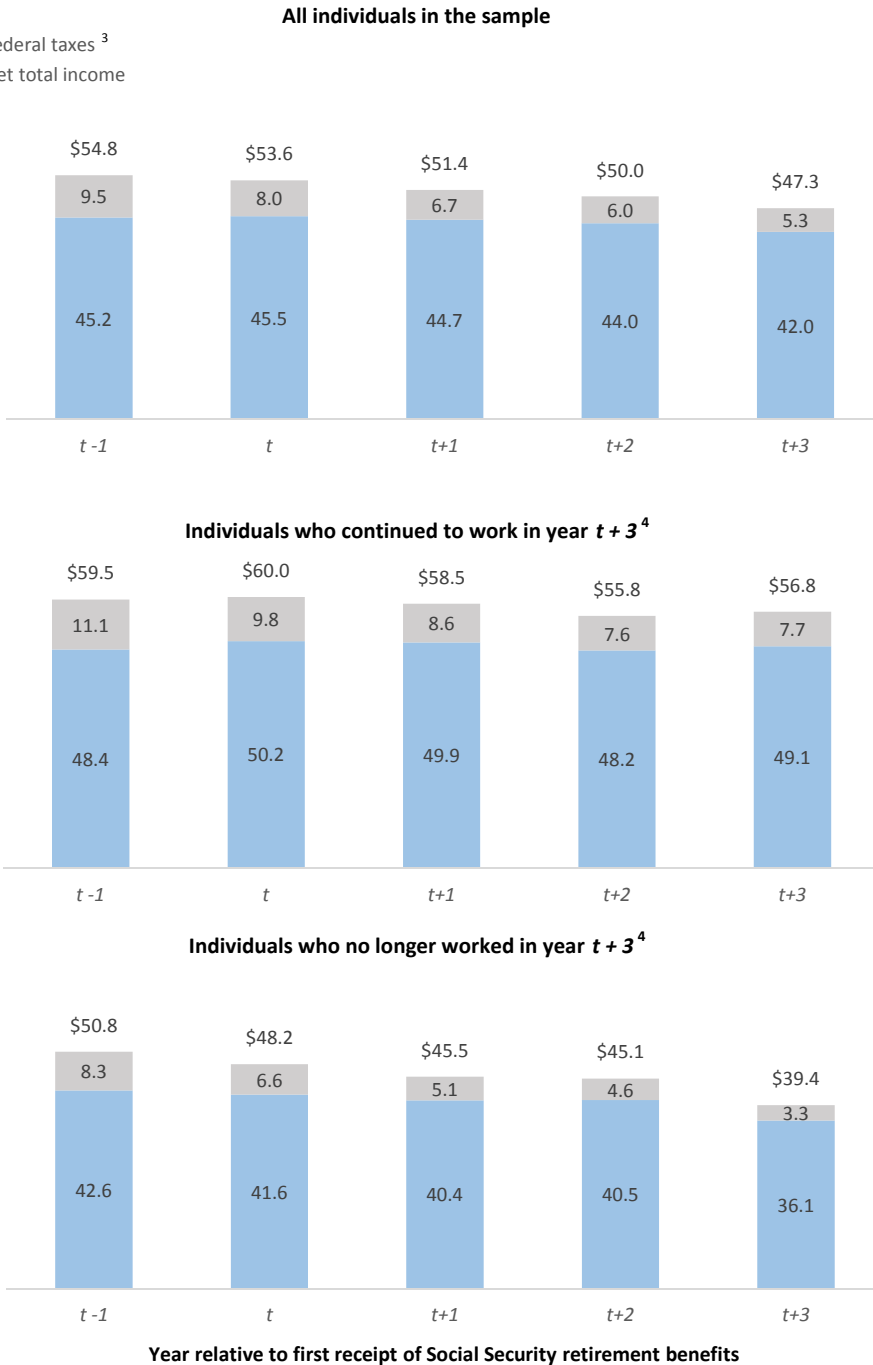
[26] As noted in the discussion of selecting individuals into the sample of interest, work status is determined on an individual, rather than a return, basis. To be classified as working in year t + 3, an individual had to have labor income—either wage and salary or tip income (reported on Form W-2, Form 8919, or Form 4137) or self-employment income (reported on Schedule SE).

Figure 8

Net Total Income Declined Modestly after Claiming

Average per capita total income [1] for the sample,[2] by year relative to first receipt of Social Security retirement benefits and work status in year t + 3*, thousands of constant 2016 dollars*

All individuals in the sample

■ Federal taxes [3]
■ Net total income

	t -1	t	t+1	t+2	t+3
Total	$54.8	$53.6	$51.4	$50.0	$47.3
Federal taxes	9.5	8.0	6.7	6.0	5.3
Net total income	45.2	45.5	44.7	44.0	42.0

Individuals who continued to work in year *t + 3* [4]

	t -1	t	t+1	t+2	t+3
Total	$59.5	$60.0	$58.5	$55.8	$56.8
Federal taxes	11.1	9.8	8.6	7.6	7.7
Net total income	48.4	50.2	49.9	48.2	49.1

Individuals who no longer worked in year *t + 3* [4]

	t -1	t	t+1	t+2	t+3
Total	$50.8	$48.2	$45.5	$45.1	$39.4
Federal taxes	8.3	6.6	5.1	4.6	3.3
Net total income	42.6	41.6	40.4	40.5	36.1

Year relative to first receipt of Social Security retirement benefits

[1]Total income includes work-related income (labor income, Social Security benefits, and retirement income) plus capital gains; dividends; taxable interest; tax-exempt interest; business and farm income; and other income.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[3]Federal taxes consist of income and payroll taxes.

[4]Working individuals are those with their own (as opposed to return-level) wage, salary, or self-employment income.

Source: Authors' tabulation of tax return data.

designed to help workers accumulate resources to replace their labor income in retirement, so focusing on work-related income will allow a better assessment of how successful these programs have been in providing retirement resources. Second, non-work-related income is only an important component of income, on average, for higher-income individuals. For example, from year $t - 1$ through year $t + 3$, roughly 90 percent of the total income received by the lowest 95 percent of individuals ranked by 1999 income was from the combination of labor income, Social Security benefits, and retirement income. In contrast, over the same time period these three income sources accounted for only about 35 percent of income for the highest 5 percent of the 1999 income distribution.

Average net work-related income remained relatively flat from year $t - 1$ to year $t + 3$, falling only 2 percent in constant 2016 dollars, from $35,800 per person to $35,000 per person (Figure 9, top panel).[27] Average work-related income fell by 10 percent, or $4,400, over this period. More than 80 percent of the reduction in income, however, was offset by lower taxes. The combination of payroll taxes and federal income taxes attributable to work-related income fell from $7,500 to $3,900. As a result, average net work-related income fell by only $800.

Average net work-related income rose by 4 percent for individuals who continued to work in year $t + 3$ and fell by 8 percent for individuals who no longer worked in year $t + 3$ (Figure 9, middle and lower panels). For those individuals who continued to work, average net work-related income increased from $39,200 per person in year $t - 1$ to $40,600 per person in year $t + 3$. Net work-related income increased for this group despite a decline of $1,500 in average work-related income over this period, as the decline in work-related income was more than offset by a $2,900 reduction in average work-related taxes. For those individuals who no longer worked, average net work-related income fell from $32,900 per person in year $t - 1$ to $30,300 per person in year $t + 3$. The drop in net work-related income for this group over this period was the result of a $6,700 reduction in average work-related income, partially offset by a $4,100 reduction in average work-related taxes.

<mark><Insert "Figure 9: Net Work-Related Income Relatively Flat after Claiming" here></mark>

If individuals in the sample are ranked by their 1999 per capita total income, average net work-related income increases substantially after claiming for lower-income workers; remains relatively flat

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[27] For individuals filing a joint return in year $t - 1$, average net work-related income fell from $36,800 per person in year $t - 1$ to $35,500 per person in year $t + 3$. For individuals filing a non-joint return in year $t - 1$, average net work-related income rose slightly from $33,400 per person in year $t - 1$ to $33,800 per person in year $t + 3$.

Figure 9

Net Work-Related Income Relatively Flat after Claiming

Average per capita work-related income [1] for the sample, [2] by year relative to first receipt of Social Security retirement benefits and work status in year t + 3*, thousands of constant 2016 dollars*

All individuals in the sample

■ Work-related taxes [3]
■ Net work-related income

	t -1	t	t+1	t+2	t+3
Total	$43.3	$42.8	$41.1	$39.4	$38.9
Work-related taxes	7.5	6.1	4.9	4.2	3.9
Net work-related income	35.8	36.6	36.2	35.2	35.0

Individuals who continued to work in year *t + 3* [4]

	t -1	t	t+1	t+2	t+3
Total	$48.0	$47.9	$47.4	$45.9	$46.5
Work-related taxes	8.8	7.5	6.6	5.9	5.9
Net work-related income	39.2	40.4	40.9	40.0	40.6

Individuals who no longer worked in year *t + 3* [4]

	t -1	t	t+1	t+2	t+3
Total	$39.3	$38.4	$35.9	$34.0	$32.6
Work-related taxes	6.4	5.0	3.5	2.9	2.3
Net work-related income	32.9	33.4	32.4	31.2	30.3

Year relative to first receipt of Social Security retirement benefits

[1]Work-related income is the sum of labor income, Social Security benefits, and retirement income.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

3Work-related taxes consist of payroll taxes and a proportional amount of federal income taxes.

4Working individuals are those with their own (as opposed to return-level) wage, salary, or self-employment income.

Source: Authors' tabulation of tax return data.

for middle-income workers; and falls for higher-income workers (Figure 10). For example, from year $t – 1$ to year $t + 3$, average net work-related income increased by 28 percent for individuals in the lowest quintile of 1999 total income, increased 1 percent for individuals in the middle quintile, and fell by 20 percent for individuals in the top 5 percent of the income distribution.

For individuals in the lowest quintile of 1999 total income, average net work-related income increased by $4,300 (in constant 2016 dollars), from $15,700 per person in year $t – 1$ to $20,100 per person in year $t + 3$ (Figure 10, top left panel). The increase was attributable to a combination of higher income and lower taxes. Average work-related income increased by $3,600 over this period and average work-related taxes were reduced by $700.

For individuals in the middle quintile of 1999 total income, average net work-related income was about unchanged, increasing from $33,200 per person in year $t – 1$ to $33,500 per person in year $t + 3$ (Figure 10, middle left panel). Average work-related income fell by $2,700 from year $t – 1$ to year $t + 3$, but this drop in income was more than offset by a reduction in average work-related taxes of $3,000.

For individuals in the top 5 percent of 1999 total income, average net work-related income fell by $20,200, from $103,000 per person in year $t – 1$ to $82,800 per person in year $t + 3$ (Figure 7, lower right panel). Average work-related income fell by $34,700 over this period, with the drop in income partially offset by a $14,600 reduction in average work-related taxes.
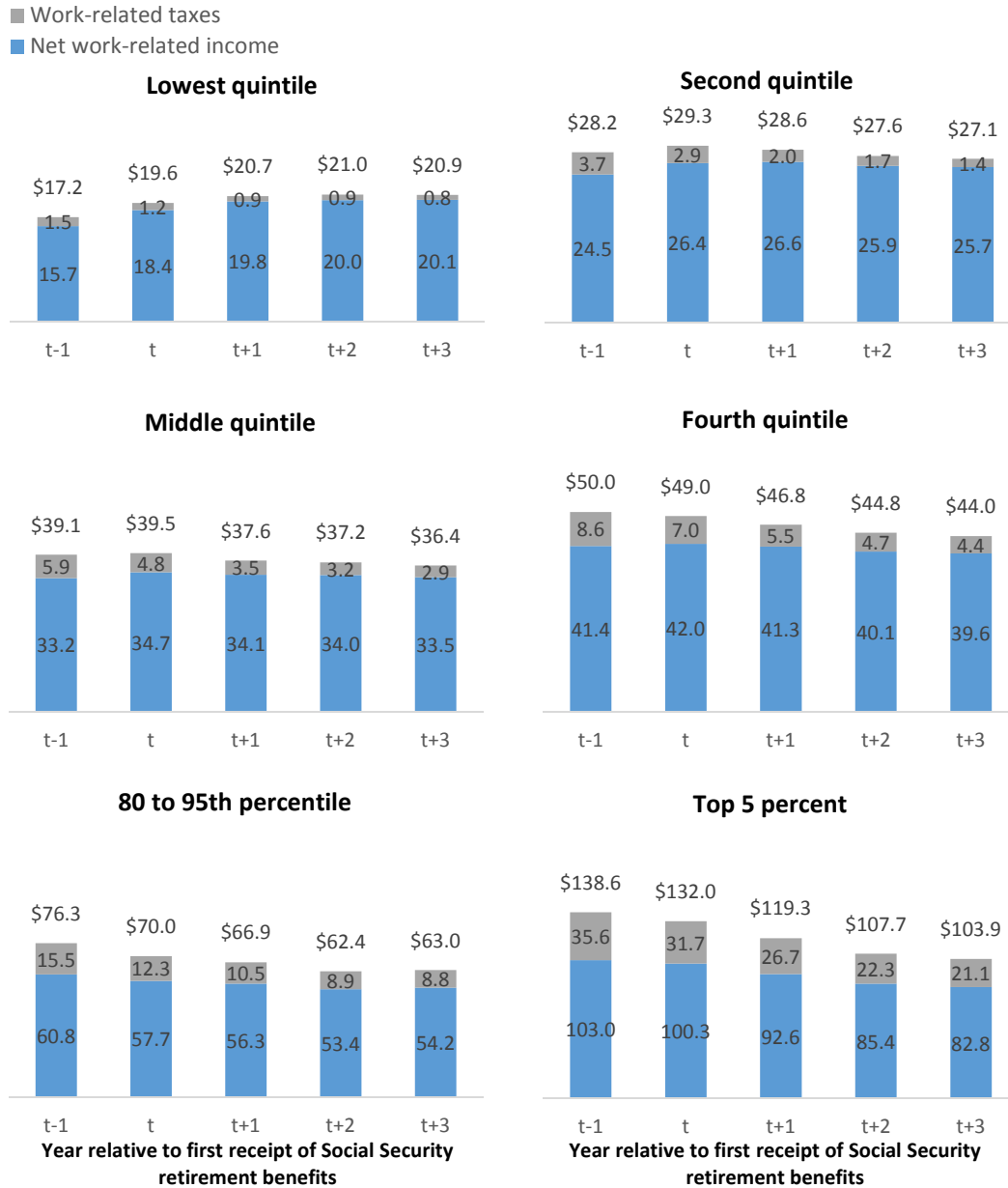
<mark><Insert "Figure 10: Net Work-Related Income Increased for Low Income, Remained Steady for Middle Income After Claiming" here></mark>

This pattern—average net work-related income increasing for lower-income individuals, remaining relatively flat for middle-income individuals, and declining for higher-income individuals— persists regardless of work status in year $t + 3$. Controlling for 1999 total income, those who continued to work in year $t + 3$ had higher average net work-related income prior to claiming Social Security than those who no longer worked in year $t + 3$, and they experienced larger increases (or smaller reductions) in average net work-related income after claiming. Whether or not individuals continued to work, however, substantial declines in average net work-related income are only observed for the higher-income groups.

For those individuals who continued to work in year $t + 3$, average net work-related income increased substantially for individuals in the lowest quintile of 1999 total income, increased modestly for individuals in the middle three quintiles, and declined for those in the top quintile (Figure 11). Among

Figure 10

Net Work-Related Income Increased for Low Income, Remained Steady for Middle Income After Claiming

Average per capita work-related income [1] for individuals in the sample, [2] by year relative to first receipt of Social Security retirement benefits and 1999 total income, thousands of constant 2016 dollars

■ Work-related taxes
■ Net work-related income

Lowest quintile

	t-1	t	t+1	t+2	t+3
Total	$17.2	$19.6	$20.7	$21.0	$20.9
Taxes	1.5	1.2	0.9	0.9	0.8
Net	15.7	18.4	19.8	20.0	20.1

Second quintile

	t-1	t	t+1	t+2	t+3
Total	$28.2	$29.3	$28.6	$27.6	$27.1
Taxes	3.7	2.9	2.0	1.7	1.4
Net	24.5	26.4	26.6	25.9	25.7

Middle quintile

	t-1	t	t+1	t+2	t+3
Total	$39.1	$39.5	$37.6	$37.2	$36.4
Taxes	5.9	4.8	3.5	3.2	2.9
Net	33.2	34.7	34.1	34.0	33.5

Fourth quintile

	t-1	t	t+1	t+2	t+3
Total	$50.0	$49.0	$46.8	$44.8	$44.0
Taxes	8.6	7.0	5.5	4.7	4.4
Net	41.4	42.0	41.3	40.1	39.6

80 to 95th percentile

	t-1	t	t+1	t+2	t+3
Total	$76.3	$70.0	$66.9	$62.4	$63.0
Taxes	15.5	12.3	10.5	8.9	8.8
Net	60.8	57.7	56.3	53.4	54.2

Year relative to first receipt of Social Security retirement benefits

Top 5 percent

	t-1	t	t+1	t+2	t+3
Total	$138.6	$132.0	$119.3	$107.7	$103.9
Taxes	35.6	31.7	26.7	22.3	21.1
Net	103.0	100.3	92.6	85.4	82.8

Year relative to first receipt of Social Security retirement benefits

[1]Work-related income is labor income; Social Security income; and retirement income. Work-related taxes consist of payroll taxes and a proportional amount of federal income taxes.
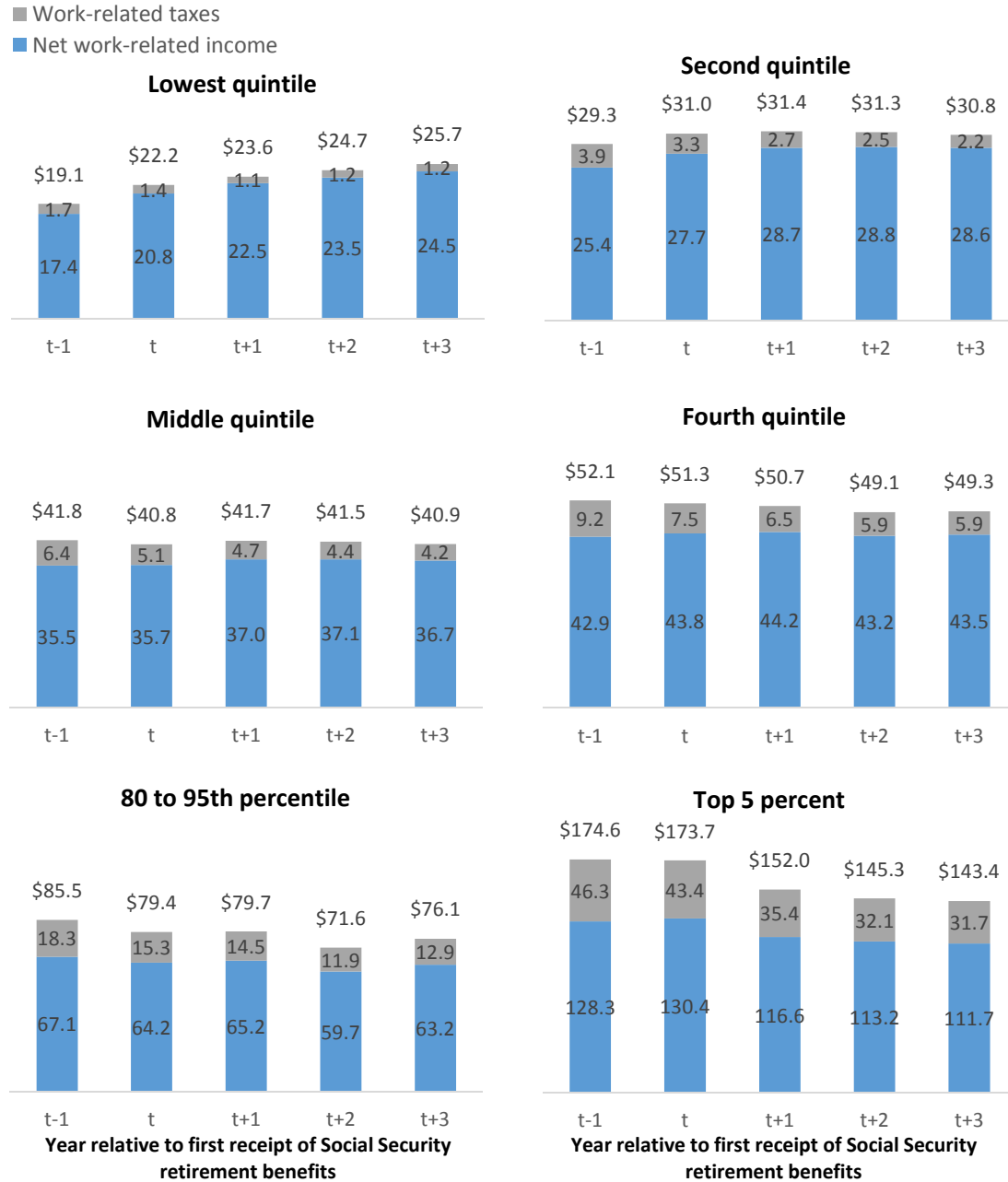
[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

Figure 11

Net Income Increased Substantially for Low Income Who Continued to Work

Average per capita work-related income [1] for individuals in the sample [2] working in year t + 3, *by year relative to first receipt of Social Security retirement benefits and 1999 total income, thousands of 2016 dollars*

■ Work-related taxes
■ Net work-related income

Lowest quintile

	t-1	t	t+1	t+2	t+3
Total	$19.1	$22.2	$23.6	$24.7	$25.7
Taxes	1.7	1.4	1.1	1.2	1.2
Net	17.4	20.8	22.5	23.5	24.5

Second quintile

	t-1	t	t+1	t+2	t+3
Total	$29.3	$31.0	$31.4	$31.3	$30.8
Taxes	3.9	3.3	2.7	2.5	2.2
Net	25.4	27.7	28.7	28.8	28.6

Middle quintile

	t-1	t	t+1	t+2	t+3
Total	$41.8	$40.8	$41.7	$41.5	$40.9
Taxes	6.4	5.1	4.7	4.4	4.2
Net	35.5	35.7	37.0	37.1	36.7

Fourth quintile

	t-1	t	t+1	t+2	t+3
Total	$52.1	$51.3	$50.7	$49.1	$49.3
Taxes	9.2	7.5	6.5	5.9	5.9
Net	42.9	43.8	44.2	43.2	43.5

80 to 95th percentile

	t-1	t	t+1	t+2	t+3
Total	$85.5	$79.4	$79.7	$71.6	$76.1
Taxes	18.3	15.3	14.5	11.9	12.9
Net	67.1	64.2	65.2	59.7	63.2

Year relative to first receipt of Social Security retirement benefits

Top 5 percent

	t-1	t	t+1	t+2	t+3
Total	$174.6	$173.7	$152.0	$145.3	$143.4
Taxes	46.3	43.4	35.4	32.1	31.7
Net	128.3	130.4	116.6	113.2	111.7

Year relative to first receipt of Social Security retirement benefits

[1]Work-related income is labor income; Social Security income; and retirement income. Work-related taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income. Source: Authors' tabulation of tax return data.

individuals who continued to work in the lowest income quintile, average net work-related income increased by over 40 percent, from $17,400 per person in year $t – 1$ to $25,700 per person in year t + 3. Workers in the middle quintile experienced a more modest 3 percent increase in average net work-related income over this period, from $35,500 per person to $36,700 per person. In contrast, those in the top 5 percent who continued to work experienced a 13 percent reduction in average net work-related income, from $128,300 per person in year $t – 1$ to $111,700 per person in year t + 3.

<mark><Insert "Figure 11: Net Income Increased Substantially for Low Income Who Continued to Work" here></mark>

For individuals who no longer worked in year $t + 3$, average net work-related income increased modestly for the lowest quintile of 1999 income, fell modestly for the second and middle quintiles, and declined more substantially for the top two quintiles (Figure 12). Among individuals in the lowest quintile who no longer worked, average net work-related income increased 4 percent from $15,300 per person in year $t – 1$ to $15,900 per person in year $t + 3$. Average net work-related income declined 1 percent for those who no longer worked in the middle quintile over this period, from $31,600 per person to $31,200 per person. Those in the top 5 percent who no longer worked experienced the largest reduction in average net income for any of the groups analyzed, falling by more than one-third, from $70,900 per person in year $t – 1$ to $46,200 per person in year t + 3.

<mark><Insert "Figure 12: Net Income Modestly Higher for Low Income Who No Longer Worked" here></mark>

3.2 Changes in Payroll Taxes and Federal Income Taxes

As noted in the discussion of net work-related income, the decline in federal taxes from year $t – 1$ to year $t + 3$ either amplified or offset changes in work-related income. To better understand how taxes changed over this period, Figure 13 plots average tax rates for years near Social Security claiming by 1999 total income category. Average tax rates are calculated as the ratio of aggregate work-related taxes to aggregate work-related income within each income category, with rates calculated separately for federal income taxes and payroll taxes.
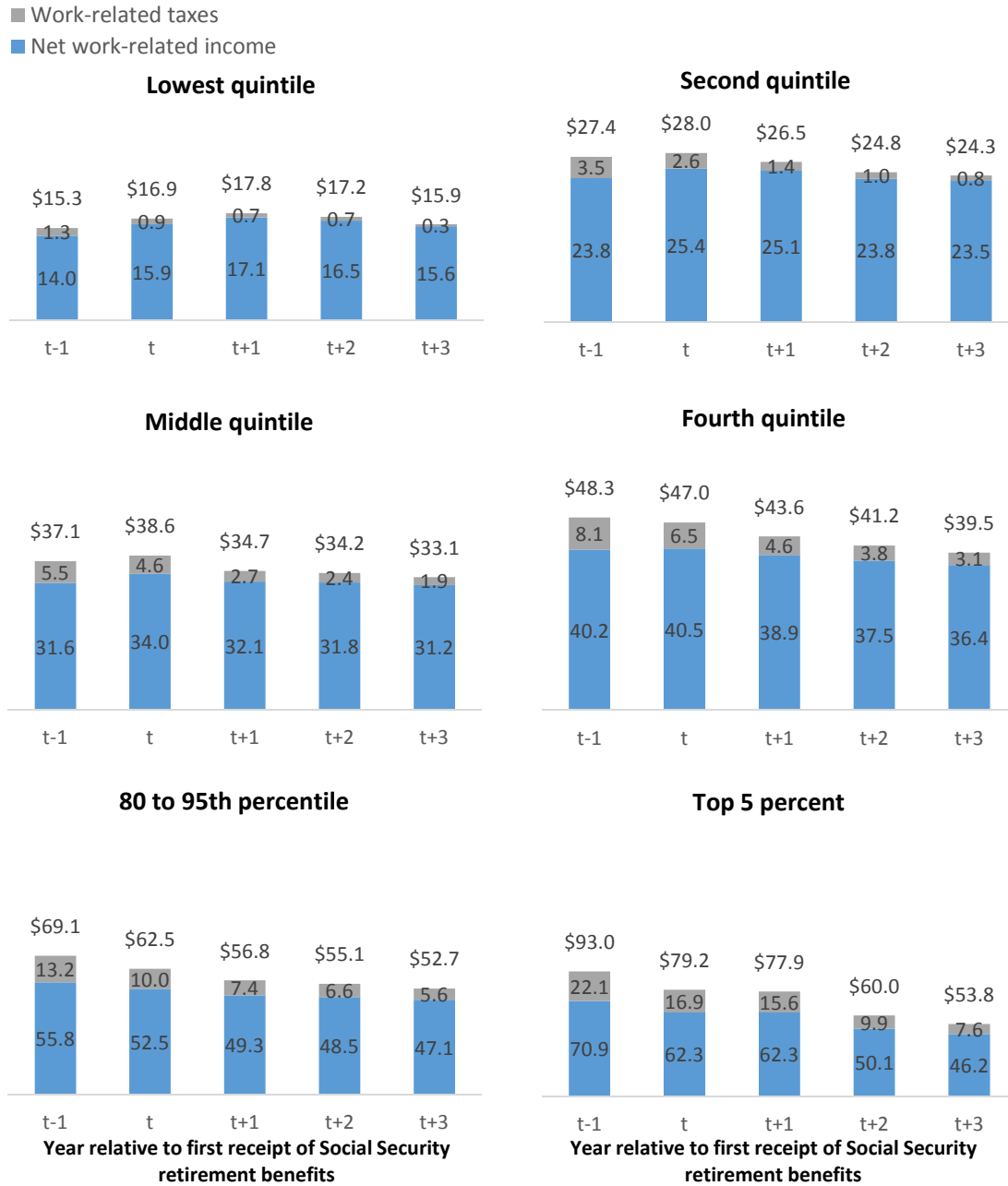
In general, lower-income workers experienced the largest drop in average tax rates from year $t – 1$ to year $t + 3$ (Figure 13). Individuals ranked in the second quintile of 1999 per capita total income experienced the largest drop in average tax rates, whether measured as the absolute change in tax rates or percentage change in tax rates. Average tax rates for these workers fell from 13.1 percent in year

Figure 12

Net Income Modestly Higher for Low Income Who No Longer Worked

Average per capita work-related income[1] for individuals in the sample[2] not working in year t + 3, by year relative to first receipt of Social Security retirement benefits and 1999 total income, thousands of 2016 dollars

■ Work-related taxes
■ Net work-related income

[1]Work-related income is labor income; Social Security income; and retirement income. Work-related taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

Figure 13

Average Tax Rates Declined the Most for Lower Income Workers

Taxes as a percentage of work-related income [1] for individuals in the sample, [2] by year relative to first receipt of Social Security retirement benefits and 1999 total income

■ Payroll tax
■ Federal income tax

Lowest quintile

	t-1	t	t+1	t+2	t+3
Total	8.7%	6.0%	4.3%	4.5%	3.8%
Payroll tax	5.7	3.9	2.8	2.7	2.4
Federal income tax	3.0	2.2	1.5	1.7	1.3

Second quintile

	t-1	t	t+1	t+2	t+3
Total	13.1%	9.9%	6.9%	6.1%	5.1%
Payroll tax	5.7	3.8	2.5	2.2	2.0
Federal income tax	7.4	6.1	4.4	3.8	3.1

Middle quintile

	t-1	t	t+1	t+2	t+3
Total	15.0%	12.2%	9.3%	8.6%	7.9%
Payroll tax	5.2	3.4	2.4	2.2	1.9
Federal income tax	9.8	8.8	6.9	6.4	6.0

Fourth quintile

	t-1	t	t+1	t+2	t+3
Total	17.1%	14.2%	11.7%	10.6%	9.9%
Payroll tax	5.2	3.6	2.5	2.2	1.9
Federal income tax	11.9	10.7	9.3	8.4	8.0

80 to 95th percentile

	t-1	t	t+1	t+2	t+3
Total	20.3%	17.6%	15.8%	14.3%	14.0%
Payroll tax	4.7	3.6	2.5	2.4	2.2
Federal income tax	15.6	14.0	13.2	11.9	11.8

Year relative to first receipt of Social Security retirement benefits

Top 5 percent

	t-1	t	t+1	t+2	t+3
Total	25.7%	24.0%	22.3%	20.7%	20.3%
Payroll tax	3.6	2.7	2.4	2.4	2.3
Federal income tax	22.1	21.3	19.9	18.3	18.0

Year relative to first receipt of Social Security retirement benefits

[1]Work-related income includes labor income; Social Security income; and retirement income. Taxes include payroll taxes and a proportionate share of federal income taxes. The percentages are calculated as the sum of taxes paid by all individuals in the income group divided by the sum of the income of all individuals in the income group.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

t – 1 to 5.1 percent in year *t + 3*, a reduction of 7.9 percentage points or 61 percent. Average tax rates for individuals ranked in the lowest quintile of 1999 total income fell 56 percent, from 8.7 percent in year *t – 1* to 3.8 percent in year *t + 3*. Higher income workers experienced a smaller percentage drop in average tax rates. For example, average tax rates for the Individuals in the top 5 percent of 1999 income fell 21 percent, from 25.7 percent in year *t – 1* to 20.3 percent in year *t + 3*.

<mark><Insert "Figure 13: Average Tax Rates Declined the Most for Lower Income Workers" here></mark>

The fact that taxes decline after the claiming of Social Security benefits is not unexpected. For example, simulations of income and taxes over the lifetime of six representative workers in Brady (2016) show that average tax rates are projected to decline in retirement for all six workers. This is because (1) individuals who are no longer working no longer have to pay payroll taxes; and because (2) total income is reduced and (3) only a portion of Social Security benefits are subject to tax, both of which contribute to a reduction in average income tax rates. Further, consistent with the empirical results, the simulations in Brady (2016) show that tax liability fell the most for workers with lower lifetime earnings.

The interpretation of the observed drop in average tax rates after claiming Social Security is complicated, however, by the many changes in tax law that occurred between 1999 and 2010. Among the changes were the reduction in statutory tax rates between 2000 and 2003; the expansion of the 15 percent tax bracket and increase in the standard deduction for married couples filing a tax return between 2000 and 2003; the reduction in tax rates for capital gains and dividend income in 2003; and the availability of Making Work Pay credit in 2009 and 2010.

That said, the fall in average tax rates does not appear to be primarily due to tax law changes, particularly for low- and moderate-income individuals.

First, payroll taxes as a share of work-related income fell substantially for all income groups after the claiming of Social Security (Figure 13), and payroll taxes were not cut between 1999 and 2010. In fact, the decline in the average payroll tax rate accounted for two-thirds of the overall change in average tax rates for individuals in the lowest quintile of 1999 income and 46 percent of the reduction for individuals in the second and middle quintiles.

Second, the drop in average income tax rates between year t-1 and year t+3 is too large to be solely due to tax law changes. For example, even for those who claimed Social Security in 2000, back-of-the-envelope calculations suggest that the tax law changes between 1999 and 2003 (including both the drop in statutory tax rates and changes that reduced taxes for married couples filing a joint return) could

only account for about one-quarter of the drop in average income tax rates experienced by individuals in the middle three quintiles of 1999 income, and could account for 44 percent and 61 percent of the decline, respectively, for those in the highest and lowest income quintiles.[28]

In future work, we hope to address this issue more directly by deriving tax liability using a consistent law tax calculator for the entire 1999 to 2010 period.

3.3 Replacement Rate Analysis

To get a better idea of the range of experience across individuals, this section examines the distribution of replacement rates. Replacement rates are calculated as the ratio of inflation-indexed net work-related income in a given year to net work-related income in year $t - 1$ (the year before individuals first received Social Security retirement benefits). For each individual, four replacement rates are calculated, one for each year from the year t to year $t + 3$.

3.3.1 Distribution of Replacement Rates

In Figure 14 through Figure 16, five different percentiles of the distribution of replacement rates will be reported: the 10th percentile (lower gray bar); the 25th percentile (lower green dot); the median (middle blue box); the 75th percentile (upper green dot); and the 90th percentile (upper gray bar).

Among all individuals in the sample, the distribution of replacement rates remained fairly stable from year t through year $t + 3$ (Figure 14). The median replacement was little changed over the period, remaining above 100 percent in all four years, although the distribution of replacement rates widened somewhat over time. In year t, the median replacement rate was 105 percent, with one quarter of the sample having a replacement rate of 88 percent or lower and one quarter of the sample having a replacement rate of 126 percent or higher. In year t + 3, the median replacement rate was 103 percent, with one quarter of the sample having a replacement rate of 79 percent or lower and one quarter of the sample having a replacement rate of 134 percent or higher.

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[28] The back-of-the-envelope calculations compare predicted changes in average income tax rates between 1999 law and 2003 law to the observed changes in average income tax rates between year $t - 1$ and year $t + 3$. The calculations set adjusted gross income (AGI) equal to the mean value of total income in year $t - 1$ for each of the five quintiles. Taxable income was calculated by subtracting exemptions and the standard deduction. The calculated percentage change in average income tax rates was then compared to the actual percentage change in average income tax rates for each income quintile.

Figure 14

Net Work-Related Income Increased after Claiming for Many Individuals

Distribution of the ratio of inflation-adjusted net work-related income[1] to net work-related income in year t - 1 *among individuals in the sample,[2] by year relative to first receipt of Social Security retirement benefits*

Percentile of the distribution
- 25th and 75th
- 10th and 90th
- Median

Percentage

t: 161, 126, 105, 88, 67

t+1: 176, 135, 107, 84, 60

t+2: 177, 134, 105, 81, 59

t+3: 182, 134, 103, 79, 56

Year relative to first receipt of Social Security retirement benefits

[1]Net work-related income is wage, salary, and self-employment income; Social Security income; and pension, annuity, and IRA income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

<Insert "Figure 14: Net Work-Related Income Increased after Claiming for Many Individuals" here>

If individuals are ranked by their 1999 total income, lower-income individuals typically had higher replacement rates, although there was considerable variation in replacement rates within income groups (Figure 15). For example, the median replacement rate in year $t + 3$ was 122 percent for individuals in the lowest quintile of 1999 income, 103 percent for individuals in the middle income quintile, and 87 percent for individuals in the 95th to 99th percentile of income. Both lower-income and higher-income individuals had a wider range of replacement rates than individuals in the middle of the income distribution. For example, the 25th to 75th percentile range of replacement rates was 82 percentage points (from 90 percent to 172 percent) for the lowest income quintile, compared with 47 percentage points (from 81 percent to 128 percent) for the middle income quintile and 45 percentage points (from 79 percent to 124 percent) for the fourth income quintile. The 25th percentile of the replacement rate distribution continues to decline with income for individuals in the highest income quintile, but the dispersion of replacement rates widens. For example, among those in the top 1 percent of the 1999 income distribution, the 25th to 75th percentile range was 123 percentage points, from a 49 percent replacement rate to a 172 percent replacement rate.

<Insert "Figure 15: Replacement Rates Typically Higher for Lower Income Individuals" here>

Individuals who continued to work in year $t + 3$ typically had higher replacement rates than those who no longer worked, but the variation in replacement rates by 1999 income—with lower-income individuals typically having higher replacement rates—was generally similar for both groups (Figure 16). For example, median replacement rates in year $t + 3$ are above 100 percent for individuals in the lower four quintiles of 1999 income who continued to work, ranging from 137 percent for the lowest quintile to 107 percent for the fourth quintile. Among those who no longer worked in year $t + 3$, median replacement rates ranged from 104 percent for the lowest income quintile to 93 percent for the fourth income quintile.

There were, however, two differences between the groups in the pattern of replacement rates by income—one difference at the low end of the 1999 income distribution and one difference at the high end. For those who continued to work in year $t + 3$, the entire distribution of replacement rates shifts lower with income (Figure 16). For example, the 25th percentile of the replacement rate distribution falls from 107 percent for the lowest income quintile to 86 percent for the fourth income quintile. This is not the case for those who no longer worked. For example, the 25th percentile of the

Figure 15

Replacement Rates Typically Higher for Lower Income Individuals

Distribution of the ratio of inflation-adjusted net work-related income [1] in year t + 3 *to net work-related income in year* t - 1 *among individuals in the sample, [2] by 1999 total income*

Percentile of the distribution

- 25th and 75th
- 10th and 90th
- Median

Quintile of 1999 income				Percentile of 1999 income			All
Lowest	Second	Middle	Fourth	80th to 95th	95th to 99th	Top 1 percent	

[1]Net work-related income is wage, salary, and self-employment income; Social Security income; and pension, annuity, and IRA income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[3]The axis is truncated at 200 percent. The replacement rate at the 90th percentile for taxpayers in the lowest per capita 1999 income quintile is 258 percent, while the replacement rate at the 90th percentile for taxpayers in the top 1 percent of per capita 1999 income is 343 percent.

Source: Authors' tabulation of tax return data.

Figure 16

Individuals Who Continued to Work Typically Had Higher Replacement Rates

Distribution of the ratio of inflation-adjusted net work-related income [1] in year t + 3 *to net work-related income in year* t - 1 *among individuals in the sample,* [2] *by 1999 total income and work status in year* t + 3

Percentile of the distribution

- 25th and 75th
- 10th and 90th
- Median

Year t + 3, individuals who continued to work

Year t + 3, individuals who no longer worked

	Lowest	Second	Middle	Fourth	80th to 95th	95th to 99th	Top 1 percent	All
		Quintile of 1999 income				Percentile of 1999 income		

[1]Net work-related income is wage, salary, and self-employment income; Social Security income; and pension, annuity, and IRA income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[3]The axis is truncated at 200 percent. The replacement rate at the 90th percentile for taxpayers in the lowest per capita 1999 income quintile is 258 percent, while the

Source: Authors' tabulation of tax return data.

replacement rate distribution for the lowest income quintile, at 70 percent, is 5 to 7 percentage points lower than the 25th percentile for the middle three income quintiles. Another difference is among individuals in the 95th to 99th percentile of income. The median replacement rate for individuals in the income group who no longer worked was 65 percent, substantially lower than median replacement rate for individuals in the income group who continued to work, as well as being lower than the median replacement rate for every other group analyzed regardless of work status.

<mark><Insert "Figure 16: Individuals Who Continued to Work Typically Had Higher Replacement Rates" here></mark>

3.3.2 Predicted Median Replacement Rates

Figure 17 through Figure 19 present predicted median replacement rates or marginal effects derived from a median regression. The dependent variable for the regression is the replacement rate for net work-related income in year t + 3. Independent variables include 1999 total income quintile, claiming year, claiming age, work status, filing status, and gender. In addition, work status is interacted with income quintile and claiming age, and gender is interacted with filing status, income quintile, and claiming age. The full specification is reported in Table A4 of the appendix. Coefficients on income and work status, as well as coefficients on claiming age and work status, were statistically significant (at the 95 percent confidence level). The coefficients on filing status in year $t - 1$ and gender were small and not statistically significant, although the coefficient on changing from a joint return in year $t - 1$ to a non-joint return in year $t + 3$ was large and statistically significant. The coefficients for claiming year were small and typically not statistically significant.

Figure 17 illustrates that predicted median replacement rates are higher for individuals who continued to work and for lower-income individuals, with little difference by gender. The figure plots baseline predicted values for individuals who claimed Social Security retirement benefits at age 62 and who filed a non-joint return in both year $t - 1$ and year $t + 3$.

Regardless of gender or work status, individuals in the lowest quintile of 1999 income have the highest predicted replacement rates, but the differences are most pronounced for individuals who continued to work in year t + 3. Predicted replacement rates range from 132 percent for the lowest quintile to 89 percent for the highest quintile for males who continued to work in year $t + 3$, and range from 103 percent to 85 percent for males who no longer worked. For females, predicted replacement rates by income and work status are similar, although slightly higher.
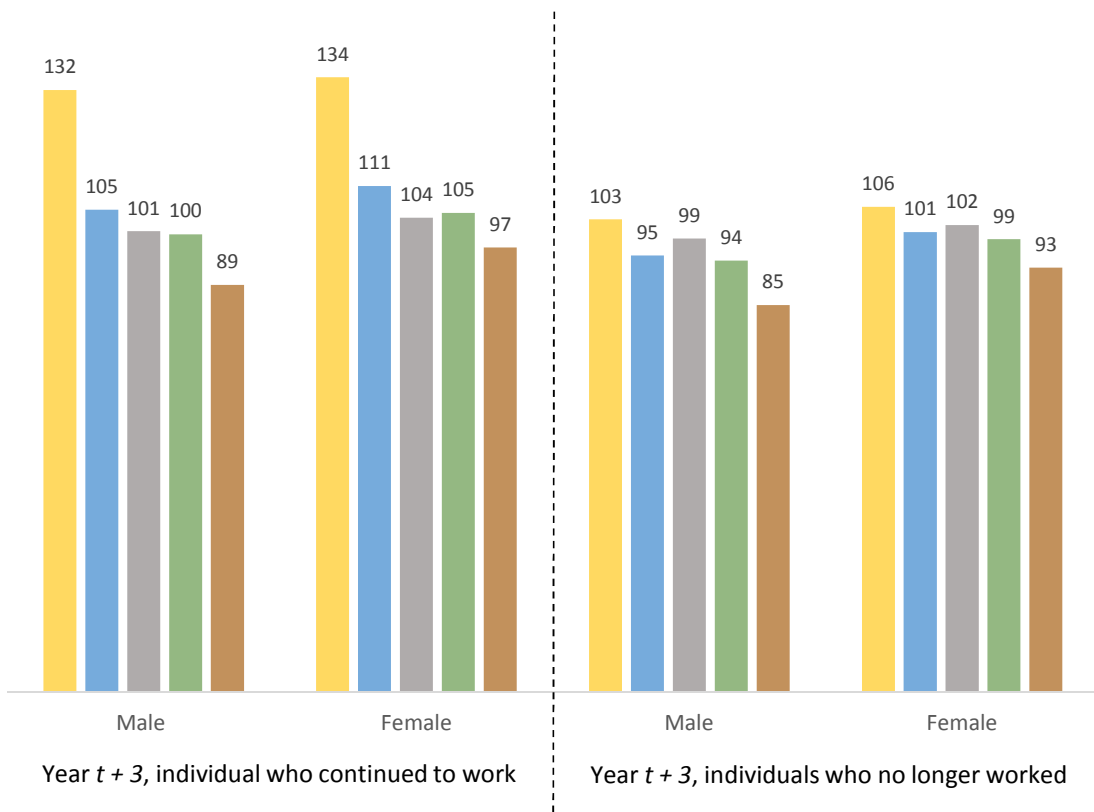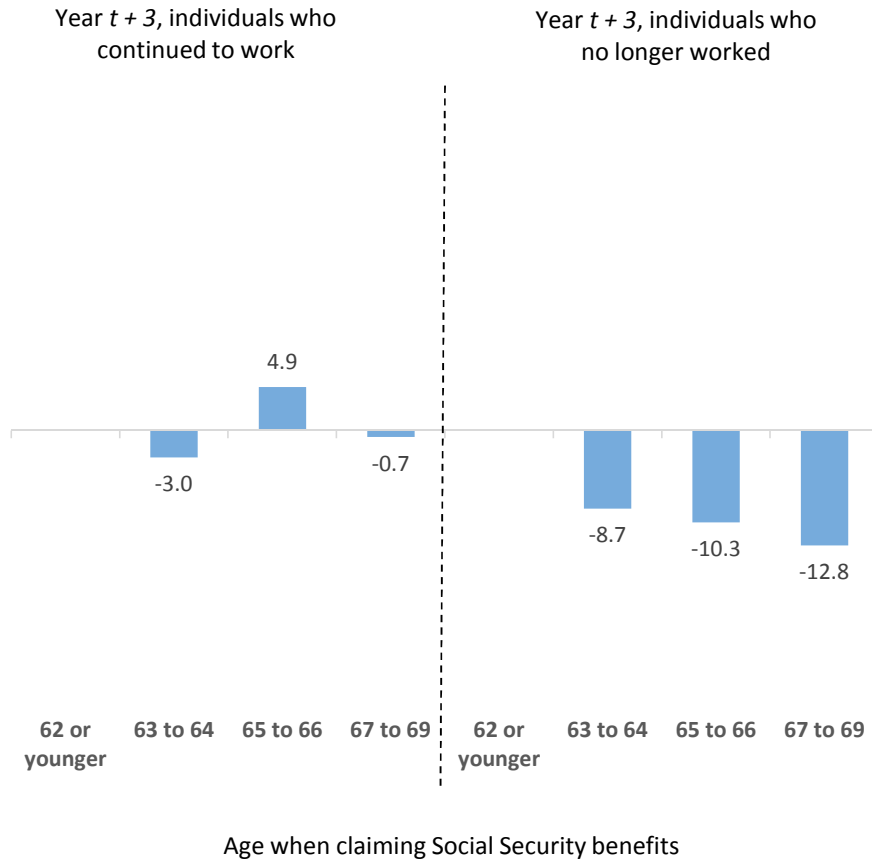
Figure 17

Predicted Replacement Rates Higher for Lower-Income Workers

Predicted median replacement rates [1] for individuals in the sample [2] filing a non-joint return [3] who claim Social Security retirement benefits at age 62 or younger; by work status in year t + 3, gender, and 1999 total income; percent

Quintile of 1999 per capita income

- Lowest
- Second
- Middle
- Fourth
- Highest

	Year t + 3, individual who continued to work		Year t + 3, individuals who no longer worked	
	Male	Female	Male	Female

[1]Replacement rate is the ratio of inflation-adjusted net work-related income in year *t + 3* to net work-related income in year *t - 1*. Net work related income is the sum of labor income; Social Security benefits; and retirement income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[3]Individuals filed a non-joint return in the year prior to claiming Social Security retirement benefits and filed a non-joint return three years after claiming Social Security retirement benefits.

Source: Authors' tabulation of tax return data.

Similarly, regardless of gender or income, individuals who continued to work in year *t + 3* have higher predicted replacement rates, but the differences are most pronounced for individuals in the lowest quintile of 1999 income. For example, for females in the lowest quintile, predicted replacement rates are 134 percent for individuals who continued to work and 106 percent for individuals who no longer worked. For females in the second quintile and middle quintile, predicted replacement rates are 111 percent and 104 percent, respectively, for individuals who continued to work, and 101 percent and 102 percent, respectively, for individuals who no longer worked.

<Insert "Figure 17: Predicted Replacement Rates Higher for Lower-Income Workers" here>

Predicted median replacement rates are typically higher for individuals who claimed Social Security retirement benefits when age 62 or younger than for those who claimed when older (Figure 18). Among individuals who continued to work in year *t + 3*, predicted replacement rates for individuals who claimed when age 62 or younger were 5 percentage points lower than predicted replacement rates for those who claimed when age 65 or age 66, but higher than the predicted replacement rates for those who claimed at other ages. Among individuals who no longer worked, individuals who claimed when age 62 or younger had the highest predicted replacement rates, 9 percentage points higher than those claiming when age 63 or 64, 10 percentage points higher than those claiming when age 65 or 66, and 13 percentage points higher than those claiming when age 67 or older.

<Insert "Figure 18: Predicted Replacement Rates Typically Higher for Individuals Who Claimed at Age 62" here>

Changes in marital status had a larger effect on predicted replacement rates than marital status itself (Figure 19). Compared with individuals who filed a non-joint return in year *t – 1* (or the most recent year prior to year *t – 1* in which they filed a tax return), predicted replacement rates for individuals who filed a joint return in year *t – 1* were 5 percentage points higher for males and 3 percentage points higher for females. The marginal effects of changing filing status were larger. Compared with individuals who did not change filing status, replacement rates for individuals who filed a non-joint return in year t – 1 and a joint return in year *t + 3* were 10 percentage points lower for males and 15 percentage points lower for females. In contrast, replacement rates for individuals who filed a joint return in year t – 1 and a non-joint return in year *t + 3* were 37 percentage points higher for males and 11 percentage points higher for females.
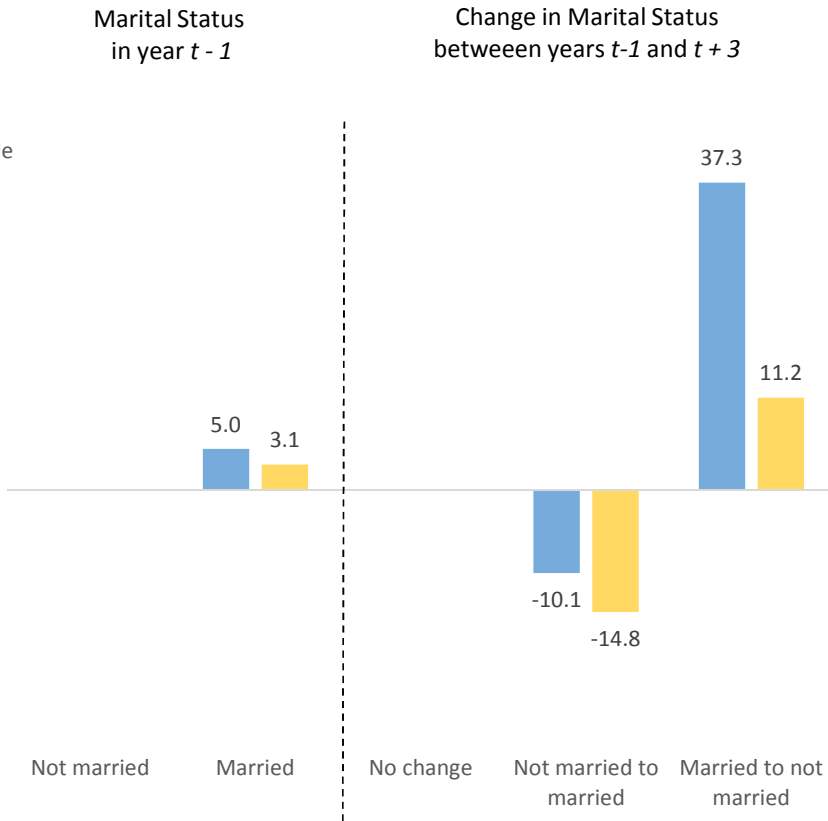
Figure 18
Predicted Replacement Rates Typically Higher for Individuals Who Claimed at Age 62
Predicted marginal effect of claiming age on median replacement rates, percent

Year *t + 3*, individuals who continued to work

Year *t + 3*, individuals who no longer worked

62 or younger	63 to 64	65 to 66	67 to 69	62 or younger	63 to 64	65 to 66	67 to 69

4.9
-3.0
-0.7
-8.7
-10.3
-12.8

Age when claiming Social Security benefits

*Replacement rate is the ratio of inflation-adjusted net work-related income three years after claiming Social Security retirement benefits (t + 3) to net work-related income in the year prior to claiming Social Security retirement benefits (t - 1). Net work related income is the sum of labor income; Social Security benefits; and retirement income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

Source: Authors' tabulation of tax return data.

Figure 19

Changes in Marital Status Affect Predicted Replacement Rates More Than Marital Status Itself

Predicted marginal effect of marital status and changes in marital status on median replacement rate, percent

*Replacement rate is the ratio of inflation-adjusted net work-related income three years after claiming Social Security retirement benefits (t + 3) to net work-related income in the year prior to claiming Social Security retirement benefits (t - 1). Net work related income is the sum of labor income; Social Security benefits; and retirement income net of taxes. Taxes consist of payroll taxes and a proportional amount of federal income taxes.

Source: Authors' tabulation of tax return data.

3.4 Summary

Most individuals in the sample were able to maintain inflation-adjusted net work-related income after claiming Social Security retirement benefits. As a percentage of an individual's net work-related income in the year prior to claiming Social Security, the median replacement rate three years after claiming was 103 percent. The median replacement rate is higher for those who continue to work in year $t + 3$ (112 percent) than it is for those who no longer worked (96 percent).

If individuals are ranked by 1999 per capita total income, those with lower income typically had higher replacement rates. The median replacement rate three years after claiming was 122 percent for individuals in the lowest quintile of 1999 income, 103 percent for individuals in the middle quintile, and 87 percent for those in the 95th to 99th percentile of income. Regardless of work status, lower income individuals tended to have higher replacement rates, but the differences in replacement rates by income were more pronounced among for those who continued to work in year $t + 3$. In addition, differences in replacement rates by work status were more pronounced for lower-income individuals.

Regression analysis indicates that 1999 income, work status in year $t + 3$, and the age at which Social Security benefits are claimed all have substantial and statistically significant effects on predicted replacement rates. All else equal, individuals who were lower income in 1999, individuals who continued to work three years after claiming, and individuals who claimed Social Security benefits when age 62 or younger had higher predicted replacement rates. Gender and marital status do not have very large effects on predicted replacement rates, but changes in marital status do.

4. The Composition of Income after Claiming Social Security

Having illustrated in section 3 that most individuals maintained their net work-related income after claiming, this section examines the income sources on which individuals relied after claiming Social Security retirement benefits. Specifically, this section focuses on the composition of (pre-tax) total income.

4.1 Incidence of Income by Source

The sources of work-related income—labor income, Social Security benefits, and retirement income—were the most common sources of income in the years after individuals first received Social Security retirement benefits. In addition to Social Security benefits, 60 percent received labor income and 71 percent received retirement income—either directly or through a spouse—three years after claiming. Other than taxable interest, other sources of income were much less common, particularly for individuals with lower 1999 income.

4.1.1 Labor Income

Analysis of income by source indicates that it was quite common for those claiming Social Security to continue to work. Fifty-six percent of individuals worked one year after claiming, and 46 percent continued to work three years after claiming (Figure 20, upper panel). In both year *t + 1* and year *t + 3*, another 14 percent of individuals did not work but had a spouse who worked.

If individuals are grouped by their 1999 total income, there were modest differences in the share of individuals who have their own labor income after claiming (Figure 20, lower panel). The highest incidence was among those in the top 5 percent of 1999 income and those in the lowest quintile, with 56 percent and 50 percent, respectively, working in year *t + 3*. The lowest incidence was among those in the middle income quintile, with 40 percent working in year *t + 3*.

<mark><Insert "Figure 20: Nearly Half of Individuals Were Working Three Years after Claiming Social Security" here></mark>

Figure 20

Nearly Half of Individuals Were Working Three Years after Claiming Social Security

Percentage of sample [1] with labor income, by year relative to first receipt pf Social Security retirement benefits and 1999 total income

Individual or spouse has labor income

Individual has labor income

Individual has labor income

Year relative to year of claiming Social Security

[1] Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

4.1.2 Retirement Income

The incidence of retirement income—that is, income from pension, annuity, and IRA distributions—was widespread. About half of individuals received retirement income—either their own or from a spouse—the year before they claimed Social Security (Figure 21, upper panel). The incidence increased in each subsequent year, hitting 71 percent three year after claiming. [29] Pension and annuity income was more common (64 percent of individuals in year *t + 3*) than IRA income (22 percent of individuals in year *t + 3*).

The incidence of retirement income was highest among individuals in the middle of the 1999 income distribution (Figure 21, lower panel). For example, 41 percent of individuals in the lowest income quintile and 60 percent of individuals in the top 1 percent of income received retirement income in year *t + 3*. By comparison, 70 percent of individuals in the second quintile and about 85 percent of individuals in the 40th to 95th percentile of 1999 income had retirement income in year *t + 3*.

<mark><Insert "Figure 21: Over 70 Percent Had Retirement Income Three Years after Claiming Social Security, Higher for Moderate Income" here></mark>

In addition to being widespread, retirement income was persistent. In the three years after claiming Social Security, 77 percent of individuals had retirement income in at least one year, with 62 percent receiving it in all 3 years (Figure 22). Those who received retirement income in one year tended to receive the income in the next year. For example, of individuals who received retirement income in year *t + 1*, 92 percent (62 percent of the 67 percent who had retirement income in year t + 1) received it in all three years.[30]

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[29] Compared with individuals who filed a non-joint return in year *t – 1*, the incidence of retirement income was higher in every year from year *t – 1* to year t + 3 for individuals who filed a joint return in year *t – 1*. Among individuals who filed a joint return in year *t – 1,* 58 percent had retirement income in year *t – 1* and 76 percent had retirement income in year *t + 3*. Among individuals who filed a non-joint return in year *t – 1,* incidence was 38 percent in year *t – 1* and 61 percent in year t + 3. See Table S4d and S4e in the supplemental tables (Excel spreadsheet with supplemental tables available upon request).

[30] A higher percentage of individuals received pension and annuity income than received IRA income, and the pension and annuity income was more persistent. In the three years following claiming, 70 percent of the sample received pension and annuity income in at least one year and 32 percent received IRA income in at least one year. Of those who received the income from the source in year *t + 1,* 91 percent received pension and annuity income in all three years (55 percent of the 60 percent who received it in year *t + 1*) and 61 percent received IRA income in all three years (12 percent of the 20 percent who received it in year *t + 1*).
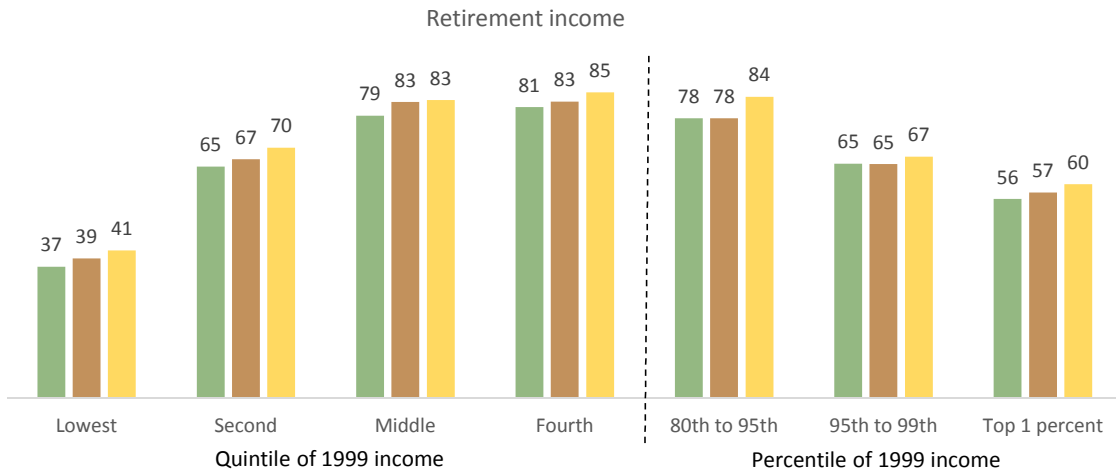
Figure 21

Over 70 Percent Had Retirement Income Three Years after Claiming Social Security, Higher for Moderate Income

Percentage of sample* with income from pensions, annuities, and IRAs, by year relative to first receipt of Social Security retirement benefits and 1999 total income

Retirement income · Pension and annuity income · IRA income

Retirement income

Year relative to year of claiming Social Security: t+1, t+2, t+3

Quintile of 1999 income · Percentile of 1999 income

* Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

Figure 22

Six in Ten Received Retirement Income in All Three Years After Claiming Social Security

Percentage of sample [1] by number of years in which they had retirement income [2] in the three years after claiming Social Security retirement benefits, by 1999 total income

Years with
retirement income

- 1 year
- 2 years
- All 3 years

Quintile of 1999 income

Percentile of 1999 income

[1]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Retirement income consists of pension, annuity, and IRA income.

Source: Authors' tabulation of tax return data.

Persistence was slightly higher for those in the middle of the income distribution. For example, among individuals who received retirement income in year $t + 1$ who were in the first income quintile, 82 percent (30 percent of the 37 percent who had retirement income in year $t + 1$) received it in all three years; and among those who were in the top 1 percent of income, 85 percent (47 percent of the 55 percent who had retirement income in year $t + 1$) received it in all three years. By comparison, among those in the middle income quintile who received retirement income in year $t + 1$, 95 percent (75 percent of the 79 percent who had retirement income in year $t + 1$) received it in all three years.

<mark><Insert "Figure 22: Six in Ten Received Retirement Income in All Three Years After Claiming Social Security" here></mark>

Expanding the time period analyzed to the five years from year $t − 1$ to year $t + 3$, non-Social Security retirement resources were ubiquitous, with nearly 90 percent of individuals having evidence of resources from employer plans, annuities, or IRAs (Figure 23). Over the five-year period, 81 percent received retirement income and another 8 percent had a Form 1099-R transaction that did not generate spendable income (such as a rollover), a Form 5498 (that indicates IRA ownership), or both.

Among individuals in the top 80 percent of the 1999 income distribution, nearly all have evidence of non-Social Security retirement resources (Figure 23). Only 65 percent of individuals in the lowest income quintile have evidence of retirement resources. That share increases to 90 percent for individuals in the second income quintile to over 95 percent for the top three income quintiles.

Higher income individuals were more likely to have had evidence of retirement resources without having received retirement income (Figure 23). For example, 24 percent of individual in the top 1 percent of the income distribution had evidence of retirement resources, but did not receive retirement income over the five year period from year $t − 1$ to year $t + 3$.

<mark><Insert "Figure 23: Nearly Nine in 10 Had Evidence of Non-Social Security Retirement Resources" here></mark>

The tax data do not identify whether the source of pension and annuity income was a defined benefit (DB) pension plan, a defined contribution (DC) pension plan, or an annuity. These distinctions are important for employers and for plans, but they are not relevant for computing individual income tax liability and are not reported on individual income tax forms.

We did investigate one method to impute plan type, but decided against using the method. This method would have used the persistence in the amount of nominal pension income that an individual
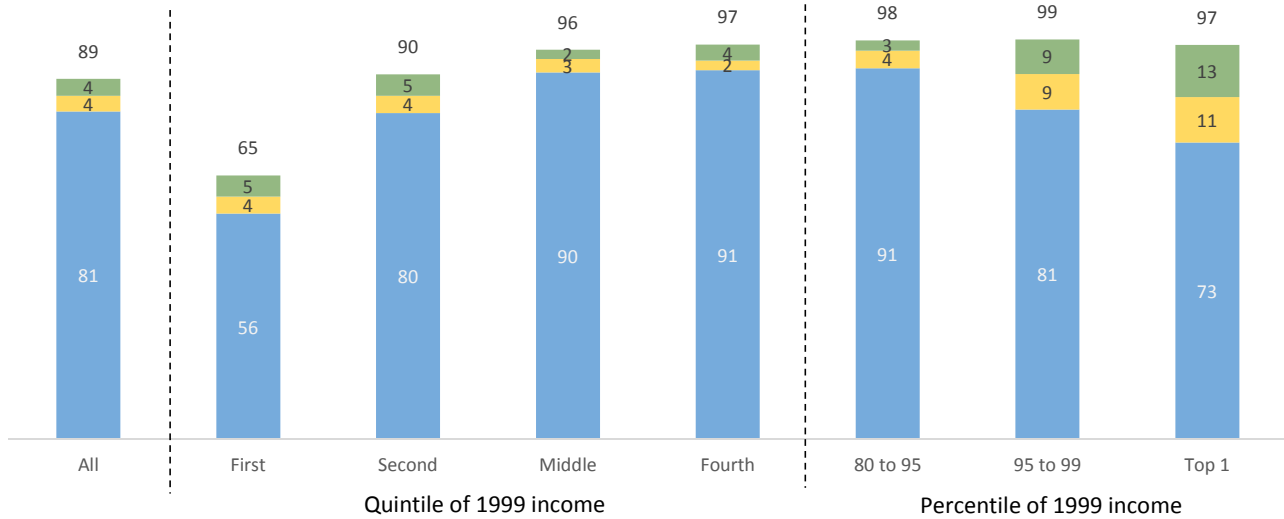
Figure 23

Nearly Nine in 10 Had Evidence of Non-Social Security Retirement Resources

Percentage of sample [1] *who had Form 1099-R , Form 5498, or had pension or IRA income on Form 1040 at some point from year* t -1 *to year* t + 3*, by 1999 total income*

Evidence of retirement resources:

■ Form 5498, but no Form 1099-R or retirement income [2]

■ Form 1099-R, but no retirement income[2]

■ Retirement income[2]

[1]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Retirement income consists of pension, annuity, and IRA income.

Source: Authors' tabulation of tax return data.

Table 2
No Easy Way to Distinguish DB Plan Distributions from DC Plan Distributions
Ratio of nominal income from current and previous year for taxpayers with pension, annuity, or IRA Income in consecutive years

	Ratio of own nominal pension & annuity income					Ratio of own nominal IRA income			
	t/t-1	t+1/t	t+2/t+1	t+3/t+2		t/t-1	t+1/t	t+2/t+1	t+3/t+2
Percentage of Sample									
Distribution in prior year	37	51	52	53		10	14	16	17
Distribution in latter year	51	52	53	55		14	16	17	18
Distribution in both years	34	46	48	50		6	9	11	12
Percentage in Category with Income Ratio in Range									
With distribution in prior year	100%	100%	100%	100%		100%	100%	100%	100%
No distribution in latter year	9	10	7	6		35	33	28	31
Less than 80%	13	15	10	8		26	22	22	20
80% to <99%	11	8	10	9		9	7	8	9
99% to <101%	23	21	36	39		8	7	11	14
101% to <105%	17	15	20	22		1	1	1	2
105% to <125%	7	8	8	7		4	4	8	7
125% and greater	21	23	9	9		17	27	22	17
With distribution in both years	100%	100%	100%	100%		100%	100%	100%	100%
Less than 80%	14	17	11	8		40	32	30	28
80% to <99%	12	9	10	10		15	11	11	13
99% to <101%	25	23	39	41		12	10	15	20
101% to <105%	19	17	22	23		1	1	1	3
105% to <125%	7	9	9	8		7	5	12	10
125% and greater	23	25	9	10		25	40	31	25

*SAS has been sick.

Note: Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 and who claimed Social Security retirement benefits between 2000 and 2007 and were alive three years after claiming Social Security. Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income. Year *t* denotes the year Social Security benefits were claimed.

Source: Author's tabulation of tax return data

received (on an individual, rather than per capita, basis). That is, among individuals who received pension income in two consecutive years, we would have imputed the source of pension income to be a private-sector DB plan if the ratio of nominal income in the second year to nominal income in the first year was between 99 percent and 101 percent; and we would have imputed the source to be a government DB plan if the ratio was between 101 percent and 105 percent.

We decided against this imputation method because, although a large percentage received the same nominal amount in pension and annuity distributions in consecutive years, a large percentage of those who received IRA distributions in consecutive years did as well. For example, for individuals who received retirement income in year *t + 2*, we measured the ratio of nominal income in year *t + 3* to nominal income in year *t +2*. Among those who received pension and annuity income in both years, 41 percent had a ratio between 99 percent and 101 percent (Table 2). Among those who received IRA income in both years, however, 20 percent had a ratio between 99 percent and 101 percent. This suggests that a sizable fraction of individuals who take distributions from a retirement account—either an IRA or a DC plan—choose to take the same amount from one year to the next, and, as a result, persistence in nominal amounts does not necessarily indicate that the source of a pension and annuity distribution was a DB plan.

<mark><Insert "Table 2: No Easy Way to Distinguish DB Plan Distributions from DC Plan Distributions" here></mark>

4.1.2 Other Income Sources

The incidence of other income sources varied less from year t – 1 to year t + 3 than labor income and retirement income. For example, the share of individuals with taxable interest changed little over the period, falling slightly from 70 percent in year *t – 1* to 66 percent in year *t + 3* (Figure 24, upper panel). Similarly, the share of individuals with capital gains, dividends, and tax exempt interest fell slightly from 46 percent to 43 percent and the share with business and farm income (which also includes rents, royalties, partnership, S-corp, and trust income) fell from 39 percent to 34 percent over this period.
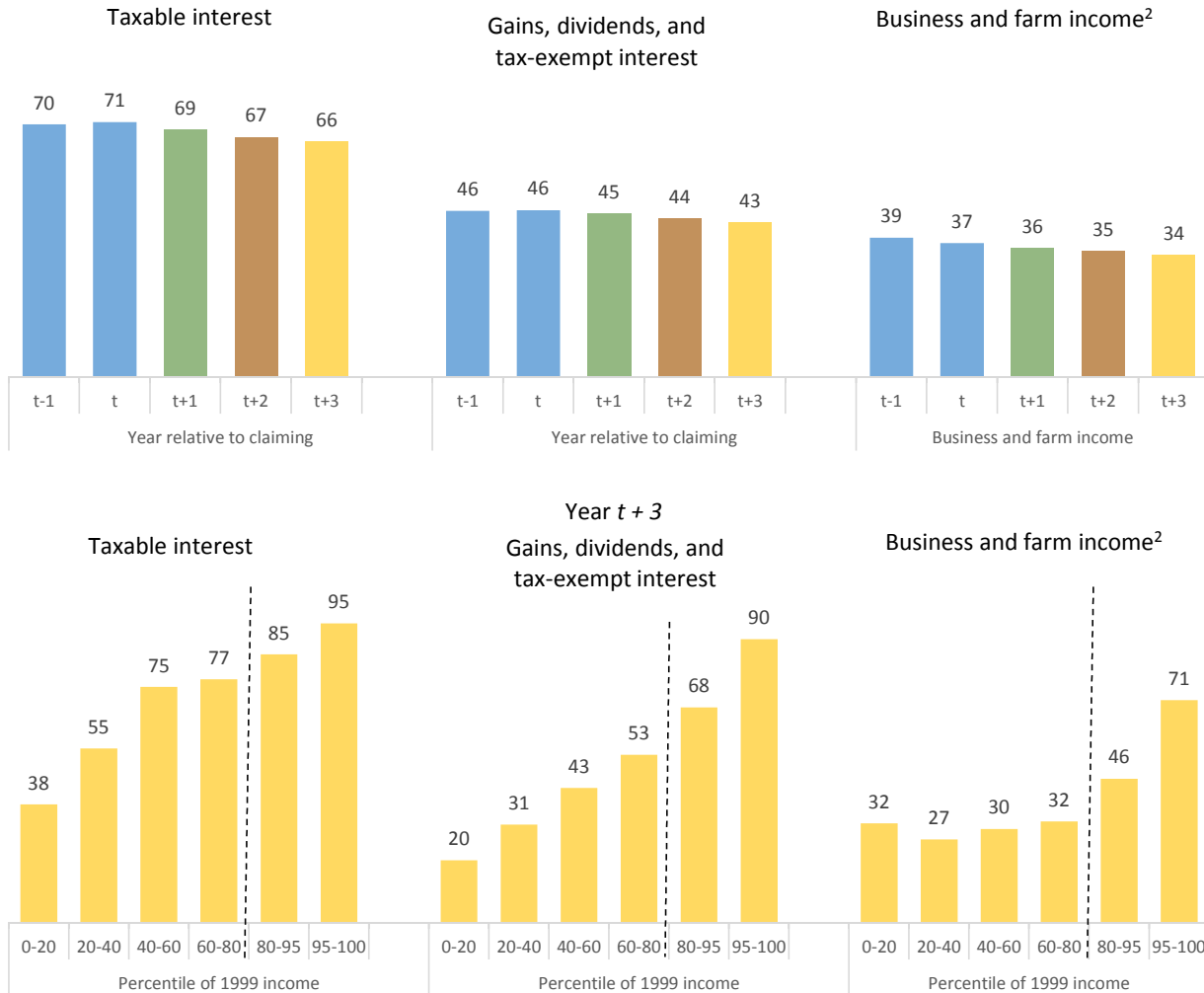
Focusing on year t + 3, these other income sources were more prevalent among higher-income individuals (Figure 24, lower panel). For example, among individuals in the top 5 percent of 1999 total income, 95 percent had taxable interest; 90 percent had gains, dividends, and tax-exempt interest; and

Figure 24

Higher-Income Individuals More Likely to Have Had Investment and Business Income

Percentage of sample [1] with the income from source, by year relative to first receipt of Social Security retirement benefits and 1999 total income

[1]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2]Business and farm income also includes income from rents, royalties, partnerships, S corps, and trusts.

Source: Authors' tabulation of tax return data.

71 percent had business and farm income. Among the middle income quintile (40th to 60th percentile) the shares were 75 percent, 43 percent and 30 percent, respectively.

<mark><Insert "Figure 24: Higher-Income Individuals More Likely to Have Had Investment and Business Income" here></mark>

4.2 Average Income by Source

Figure 25 and Figure 26 present average income by source and by 1999 income rank for the five-year period from $t – 1$ to $t + 3$.

As would be expected, from year $t – 1$ to year $t + 3$, average labor income fell and average Social Security benefits and retirement income rose for all income groups (Figure 25). For example, for individuals in the lowest quintile of 1999 income, average per capita labor income decreased from $13,100 in year $t – 1$ to $7,000 in year $t + 3$, and the combination of Social Security benefits and retirement income increased from $4,100 to $13,900.[31] Over this same period, average labor income fell from $26,900 per person to $9,100 per person and average combined Social Security and retirement income rose from $12,200 per person to $27,200 per person for individuals in the middle income quintile. For individuals in the 80th to 95th percentile of income, average per capita labor income dropped from $55,100 to $22,100 and combined Social Security and retirement income per capita grew from $21,200 to $40,900.

Across income groups, however, the relative importance of Social Security and retirement income varied markedly, with Social Security more important for lower-income individuals and retirement income more important for higher-income individuals (Figure 25). For example, in year $t + 3$, average Social Security benefits ($10,500 per person) were considerably higher than average retirement income ($3,400 per person) for individuals in the lowest income quintile. Average per capita Social Security benefits ($13,900) and average per capita retirement income ($13,300) were very similar for
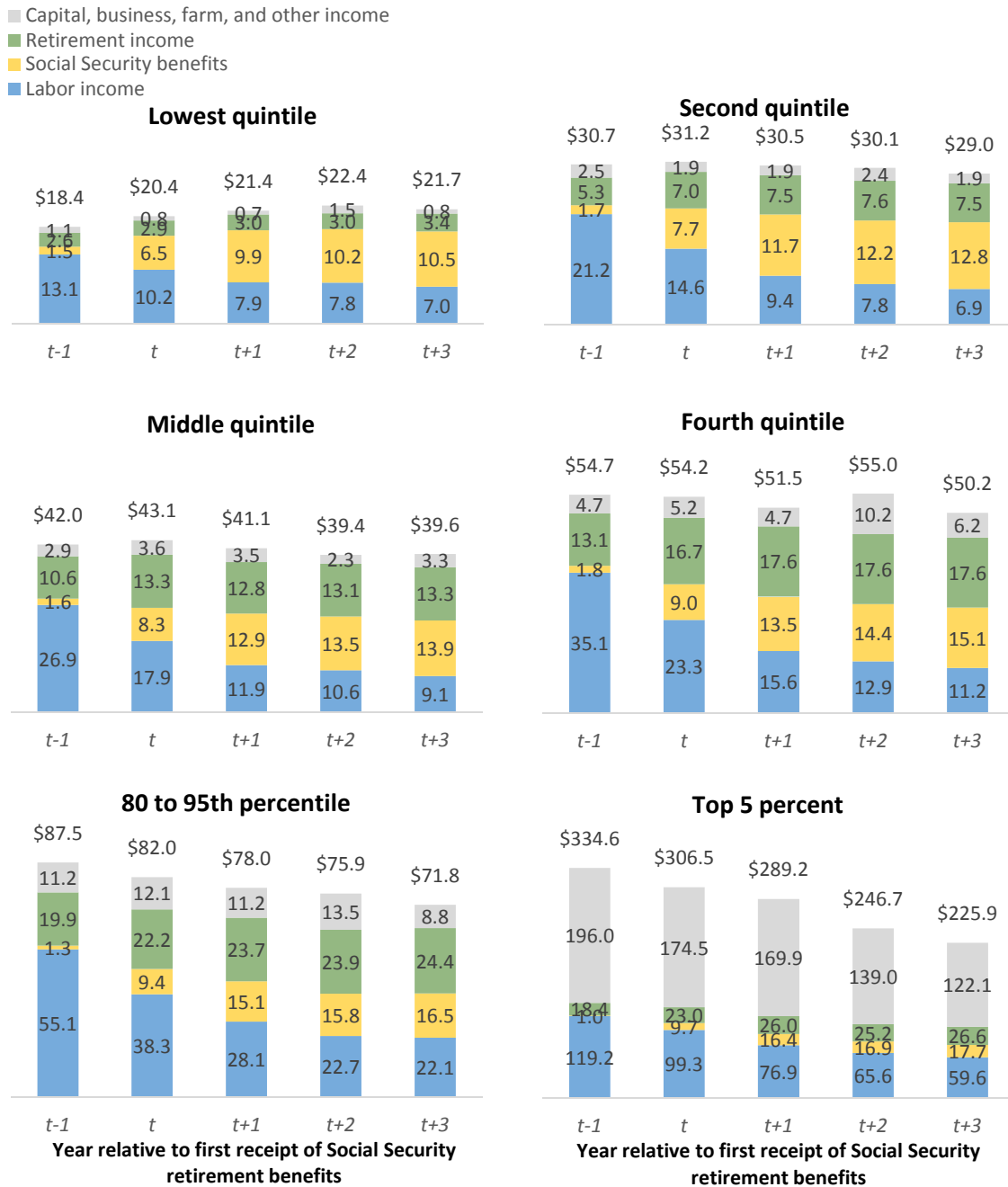
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[31] There are two possible reasons why individuals could have had Social Security benefits in the year before they claimed Social Security retirement benefits. First, the spouse of a married individual filing a joint return may have received Social Security benefits in year $t – 1$. In this case, the individual would have income from Social Security because all income is measured on a per capita basis. Second, the individual could have received Social Security disability benefits prior to the year in which they first received Social Security retirement benefits. Among those who filed a joint return in year $t – 1$, 30 percent of individuals had income from Social Security (measured on a per capita basis). Among those who filed a non-joint return in year in year $t – 1$, only 5 percent had income from Social Security.

Figure 25

Social Security More Important than Retirement Income for Lower Income

Mean per capita total income [1] for individuals in the sample, [2] by year relative to first receipt of Social Security retirement benefits and 1999 total income, thousands of constant 2016 dollars

■ Capital, business, farm, and other income
■ Retirement income
■ Social Security benefits
■ Labor income

Lowest quintile

	t-1	t	t+1	t+2	t+3
Total	$18.4	$20.4	$21.4	$22.4	$21.7
Capital	1.1	0.8	0.7	1.5	0.8
Retirement	2.6	2.9	3.0	3.0	3.4
Social Security	1.5	6.5	9.9	10.2	10.5
Labor	13.1	10.2	7.9	7.8	7.0

Second quintile

	t-1	t	t+1	t+2	t+3
Total	$30.7	$31.2	$30.5	$30.1	$29.0
Capital	2.5	1.9	1.9	2.4	1.9
Retirement	5.3	7.0	7.5	7.6	7.5
Social Security	1.7	7.7	11.7	12.2	12.8
Labor	21.2	14.6	9.4	7.8	6.9

Middle quintile

	t-1	t	t+1	t+2	t+3
Total	$42.0	$43.1	$41.1	$39.4	$39.6
Capital	2.9	3.6	3.5	2.3	3.3
Retirement	10.6	13.3	12.8	13.1	13.3
Social Security	1.6	8.3	12.9	13.5	13.9
Labor	26.9	17.9	11.9	10.6	9.1

Fourth quintile

	t-1	t	t+1	t+2	t+3
Total	$54.7	$54.2	$51.5	$55.0	$50.2
Capital	4.7	5.2	4.7	10.2	6.2
Retirement	13.1	16.7	17.6	17.6	17.6
Social Security	1.8	9.0	13.5	14.4	15.1
Labor	35.1	23.3	15.6	12.9	11.2

80 to 95th percentile

	t-1	t	t+1	t+2	t+3
Total	$87.5	$82.0	$78.0	$75.9	$71.8
Capital	11.2	12.1	11.2	13.5	8.8
Retirement	19.9	22.2	23.7	23.9	24.4
Social Security	1.3	9.4	15.1	15.8	16.5
Labor	55.1	38.3	28.1	22.7	22.1

Year relative to first receipt of Social Security retirement benefits

Top 5 percent

	t-1	t	t+1	t+2	t+3
Total	$334.6	$306.5	$289.2	$246.7	$225.9
Capital	196.0	174.5	169.9	139.0	122.1
Retirement	18.4	23.0	26.0	25.2	26.6
Social Security	1.0	9.7	16.4	16.9	17.7
Labor	119.2	99.3	76.9	65.6	59.6

Year relative to first receipt of Social Security retirement benefits

[1]Work-related income is labor income; Social Security income; and retirement income.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment

Source: Authors' tabulation of tax return data.

individuals in the middle income quintile. For individuals in the 80th to 95th percentile of income, average Social Security benefits ($16,500 per person) were much lower than average retirement income ($24,400 per person).[32]

Both Social Security benefits and retirement income are a much smaller component of total income for individuals in the top 5 percent of 1999 income than they are for any other income group (Figure 25). Compared with individuals in the 80th to 95th percentile of income, those in the top 5 percent had similar average per capita Social Security benefits ($17,700 versus $16,500) and similar average per capita retirement income ($26,600 versus $24,400) in year $t + 3$, but had much higher average labor income and average income from sources that were not work-related.

<mark><Insert "Figure 25: Social Security More Important than Retirement Income for Lower Income" here></mark>

Individuals who continued to work three years after claiming Social Security had higher average labor income prior to claiming than those who no longer worked in year $t + 3$ (Figure 26). For example, among individuals in the lowest quintile of 1999 income, average per capita labor income in year $t - 1$ was $15,100 for those who worked in year $t + 3$, compared with $11,100 for those who no longer worked in year $t + 3$. Among those who continued to work, individuals in the lowest income quintile experienced the smallest percentage drop in average labor income, experiencing a 21 percent decline versus typical declines of 40 percent or more for other income groups.

Average Social Security benefits were about the same regardless of work status, but those who continued to work in year $t + 3$ had lower average retirement income (Figure 26). For example, for individuals in the middle income quintile, average per capita Social Security benefits in year t + 3 were $13,700 for those who worked and $14,100 for those who did not work, whereas average retirement income was $10,300 per person and $15,400 per person, respectively. Similarly, for individuals in the 80th to 95th percentile of 1999 income, average per capita Social Security benefits in year t + 3 were

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[32] Although joint filers typically had higher per capita income from most income sources than non-joint filers, Social Security benefits were an exception to that rule. Average per capita benefits in year t + 3 were $13,210 for individuals who filed a joint return in year $t - 1$ and $14,853 for those who filed a non-joint return in year $t - 1$. This was true regardless of 1999 income. For those who filed a joint return in year $t - 1$, average Social Security benefits in year $t + 3$ ranged from $10,313 per person for those in the lowest income quintile to $17,215 per person for those in the top 1 percent of income. For those who filed a non-joint return in year $t - 1$, average Social Security benefits in year $t + 3$ ranged from $10,804 for those in the lowest income quintile to $22,347 for those in the top 1 percent of income. See Table 5d and Table 5e in the supplemental tables.
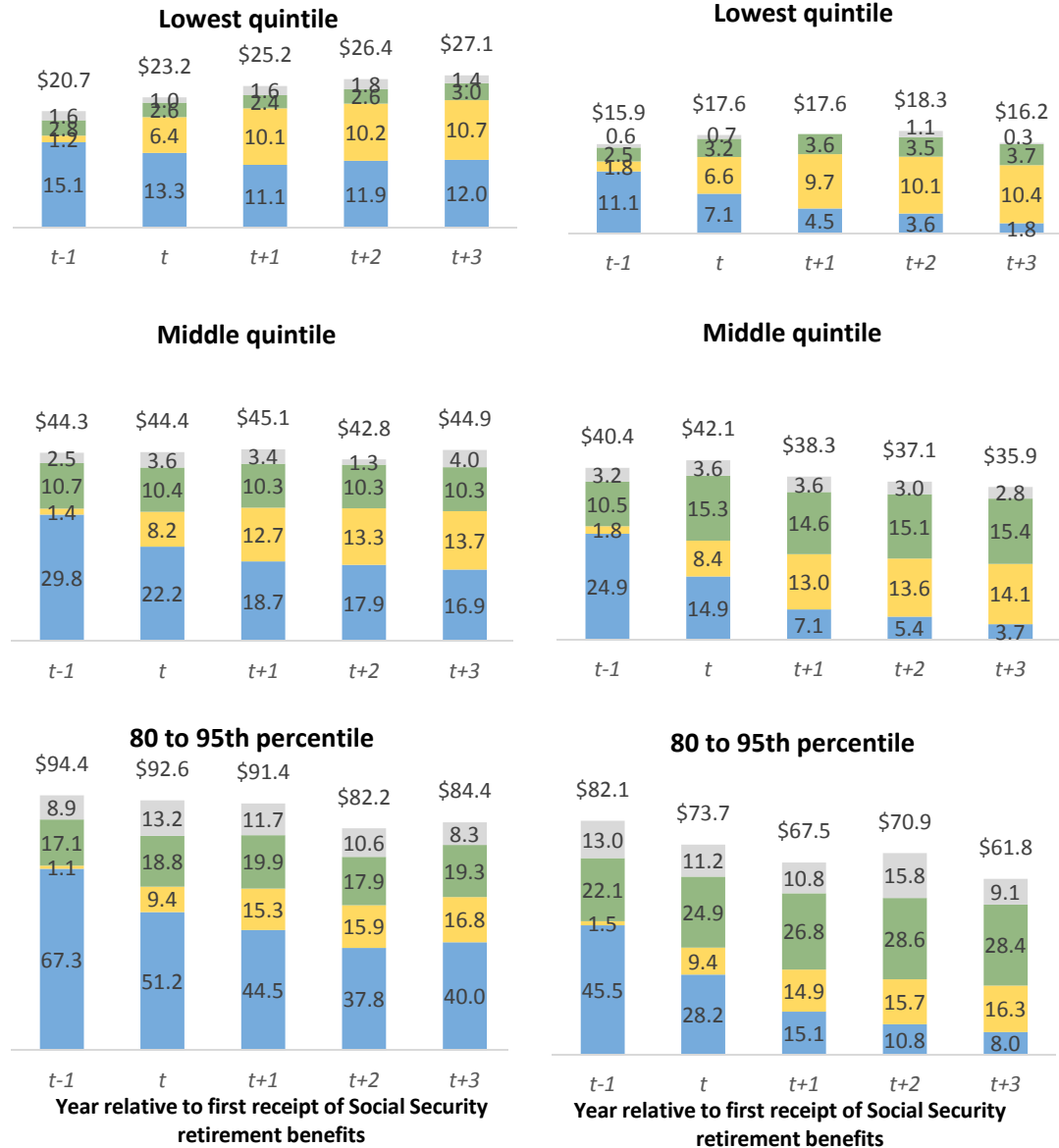
Figure 26

Individuals Who Continued to Work Were Higher Earning Prior to Claiming

Mean per capita gross total income[1] for sample;[2] by year relative to first receipt of Social Security retirement benefits, work status in year t + 3, and selected 1999 income categories; thousands of constant 2016 dollars

Individual continued to work in year *t + 3*   **Individual no longer worked in year *t + 3***

■ Capital, business, farm, and other income
■ Retirement income
■ Social Security benefits
■ Labor income

[1]Work-related income is labor income; Social Security income; and retirement income.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 , who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data

$16,800 for those who worked and $16,300 for those who did not work, whereas average retirement income was $19,300 per person and $28,400 per person, respectively.

<mark><Insert "Figure 26: Individuals Who Continued to Work Were Higher Earning Prior to Claiming" here></mark>

4.2 Composition of Income

This section examines how the composition of income changed after individuals claimed Social Security and how that composition varied by income and work status. First, we examine the composition of aggregate income by income group. Then, using income shares calculated at the individual level, we examine how the composition of income varies across individuals.

4.2.1 Composition of Aggregate Income

Both before and after claiming, work-related income represents the vast majority of income for the lowest 95 percent of individuals ranked by 1999 total income (Figure 27). For example, for individuals in the middle income quintile, the combination of labor income, Social Security benefits, and retirement income accounted for 93 percent of income in year $t – 1$ and 92 percent of income in year $t + 3$. In contrast, for individuals in the 95th to the 99th percentile of income, work-related income accounted for 54 percent of income in year $t – 1$ and 57 percent of income in year $t + 3$.

Across most income groups, retirement income was a substantial share of income in the year prior to claiming Social Security (Figure 27). Although the share of income from work-related income was relatively stable, from year $t – 1$ to year $t + 3$ the share of income from labor income declined and the share of income from Social Security and retirement income increased. By construction, the share of income from Social Security increased sharply between year $t – 1$ and year $t + 3$.[33] The share represented by retirement income, however, did not increase as much. For example, for individuals in the lowest income quintile, retirement income is 14 percent of total income in year $t – 1$ and 15 percent in year $t + 3$. For individuals in the middle income quintile, the share increases from 25 percent in year $t – 1$ to 34 percent in year $t + 3$.
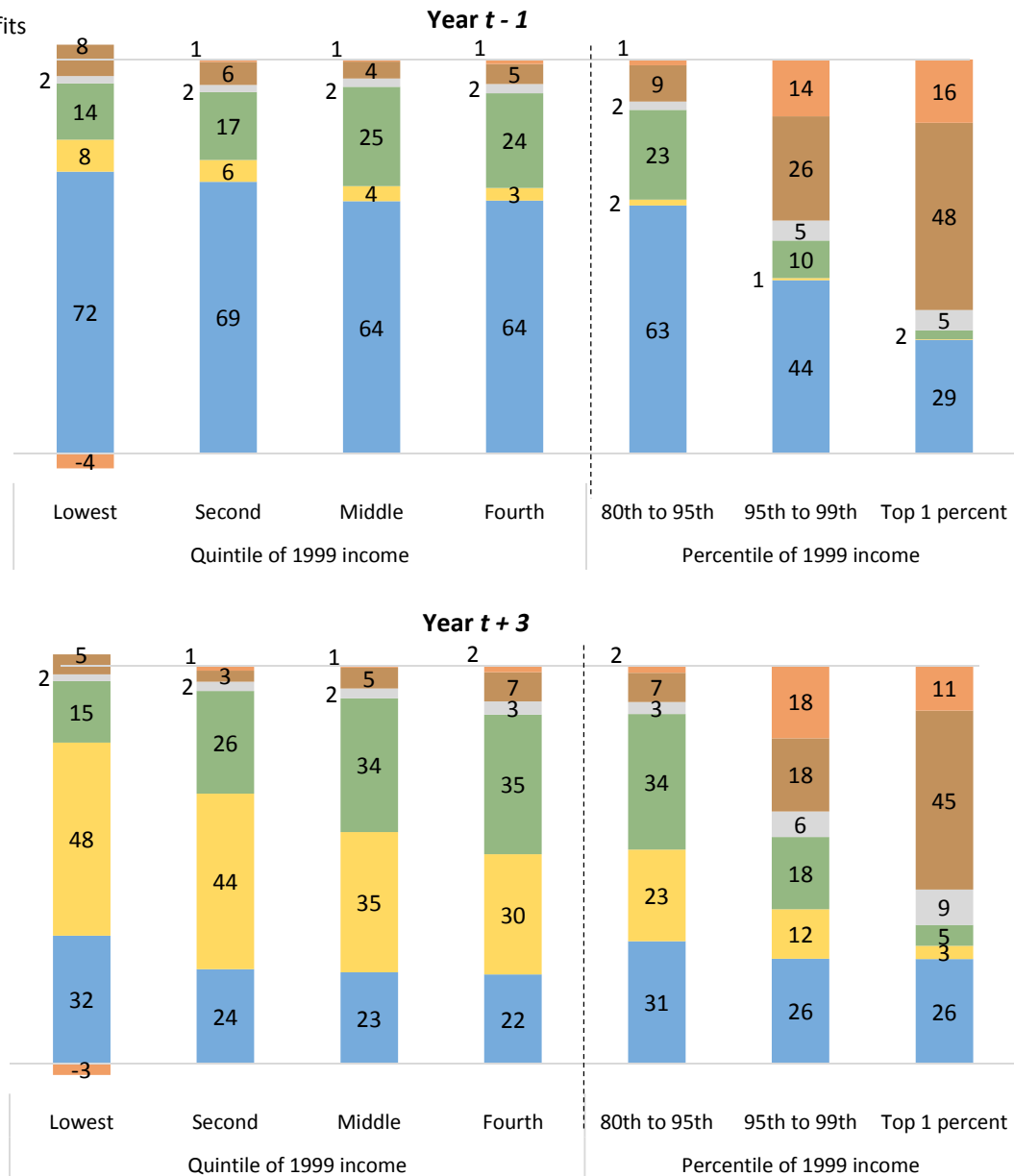
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[33] All income is measured on a per capita basis. As discussed in note 31, individuals who received Social Security benefits in year t – 1 either received disability benefits prior to receiving retirement benefits or had a spouse with Social Security income.

Figure 27

Importance of Social Security and Retirement Income Differs by 1999 Income

Aggregate income from source as a share of agregate total income for individuals in the sample,* in year t -1 *and year* t +3*, by 1999 total income*

*Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 , who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

In year *t + 3*, the share of income from Social Security benefits declined and the share from retirement income increased with 1999 income (Figure 27). Individuals in the lower two quintiles got a higher share of income from Social Security benefits, individuals in the middle income quintile got about an equal share from both, and individuals in the upper two quintiles got a higher share from retirement income.

As illustrated in the simulations in Brady (2016), this pattern is expected given the progressive benefit formula used by Social Security. By design, Social Security replaces a higher percentage of earnings for workers with lower lifetime earnings. For any given target replacement rate, workers with higher lifetime earnings rely more on employer-sponsored retirement plans and IRAs.

<Insert "Figure 27: Importance of Social Security and Retirement Income Differs by 1999 Income" here>

The relative importance of Social Security and retirement income by income group is perhaps easiest to see for those who no longer worked in year t + 3 (Figure 28, lower panel). Social Security represented 65 percent of income for the lowest quintile, 39 percent for the middle quintile, and 26 percent for the 80th to 95th percentile. In contrast, retirement income represented 23 percent of income for those in the lowest quintile, 43 percent for those in the middle income quintile, and 46 percent for those in the 80th to 95th percentile.

Relative to Social Security benefits, retirement income was less important for those who continued to work in year *t + 3*. For example, for individuals in the middle income quintile, aggregate retirement income was about 25 percent lower than aggregate Social Security benefits for those who continued to work and about 10 percent higher than Social Security benefits for those who no longer worked.

<Insert "Figure 28: Relative to Social Security, Retirement Income More Important for Individuals Who Stopped Working" here>

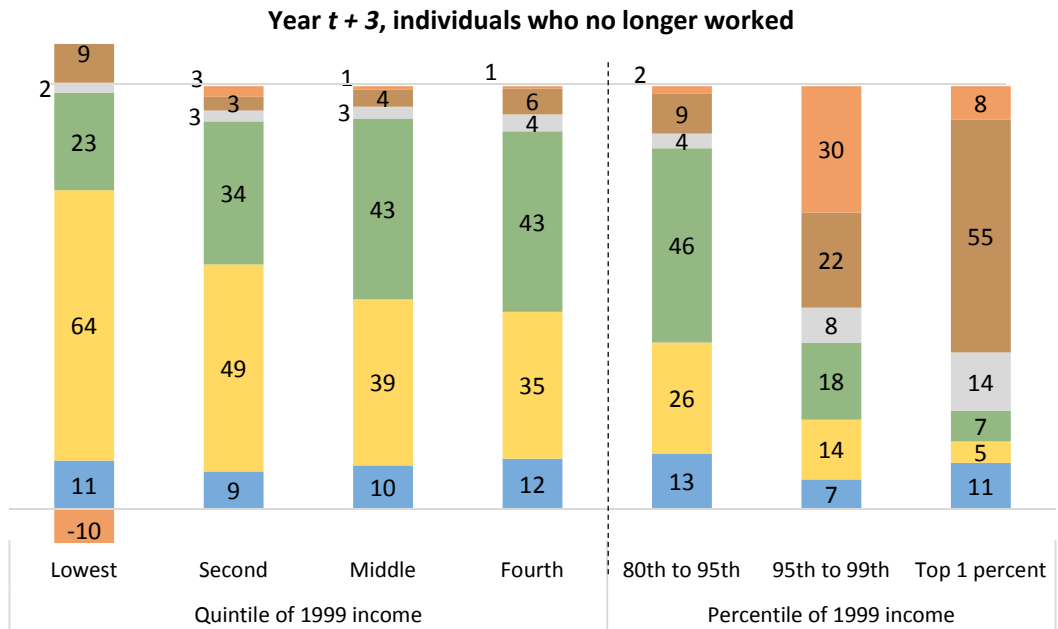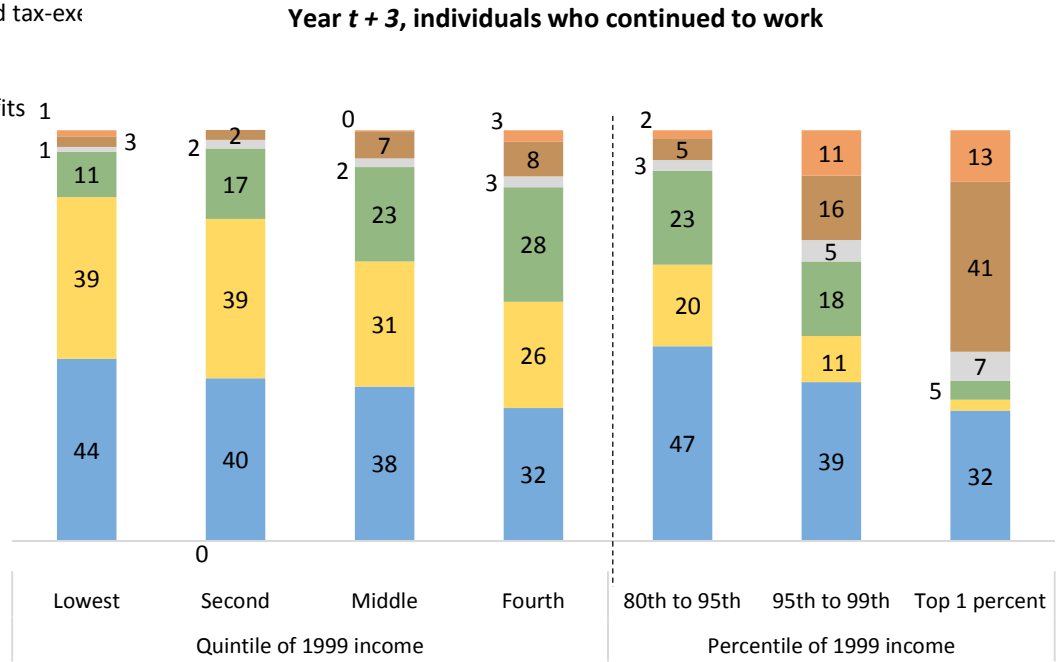*4.2.2 Variation in Income Composition across Individuals*

To get a better sense of the typical composition of income, we also calculated income shares for each individual in the sample. Although aggregate income shares are intuitive—in large part because the shares add to 100 percent—they can be misleading to the extent a small number of individuals within an income group had an unusually large amount of income from a given source.

Figure 28

Relative to Social Security, Retirement Income More Important for Individuals Who Stopped Working

Aggregate income from source as a share of aggregate total income for individuals in the sample,* in year t + 3*, by work status in year* t + 3 *and 1999 total income*

*Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

Source: Authors' tabulation of tax return data.

The income shares that we calculate for individuals differ slightly from the aggregate income shares in that we calculate shares of positive total income for each individual. That is, two of the components of income listed in Figure 27 and Figure 28—the gains, dividends, and tax exempt interest category and the business, farm, and other income category—can be negative.[34] For individuals with negative income in either, or both, of these categories, total income shares for one or more of the other income categories can be over 100 percent or, if total income was negative, less than zero (i.e., negative shares). To ensure that income shares add to 100 for each individual and to ensure that categories with positive income are not assigned negative values, we calculate income shares as a percentage of positive income. That is, if individuals have negative income in any category, the income for that category was set to zero. An individual's positive total income was then calculated as the sum of the zero-bounded amounts from each category.

Although the composition of income changes when individuals claim Social Security retirement benefits, the distribution of income shares across individuals remains fairly stable in the three year after claiming (Figure 29). For example, among individuals who continue to work in year *t + 3*, median income shares in year *t + 1* are 39 percent for labor income, 30 percent for Social Security, and 8 percent for retirement income. Although there is a slight shift away from labor income in the next two years, the median shares are similar in year *t + 3*—at 34 percent, 34 percent, and 12 percent, respectively. Among individuals who no longer worked in year t + 3, the median income shares in year t + 1 are 37 percent for Social Security and 28 percent for retirement income. As the importance of labor income declines for this group the median shares increase slightly, to 44 percent and 32 percent, respectively, in year t + 3.

Although the distribution of income shares was stable across years, the composition of income varies considerably across workers in any given year (Figure 29). For example, in year t + 3 among individuals who no longer worked, Social Security benefits were 65 percent of total income or more for one-quarter of individuals and were the only source of income for 10 percent of individuals. For these same individuals, retirement income was 3 percent of total income or less for one-quarter of individuals and more than 10 percent had no retirement income.[35]
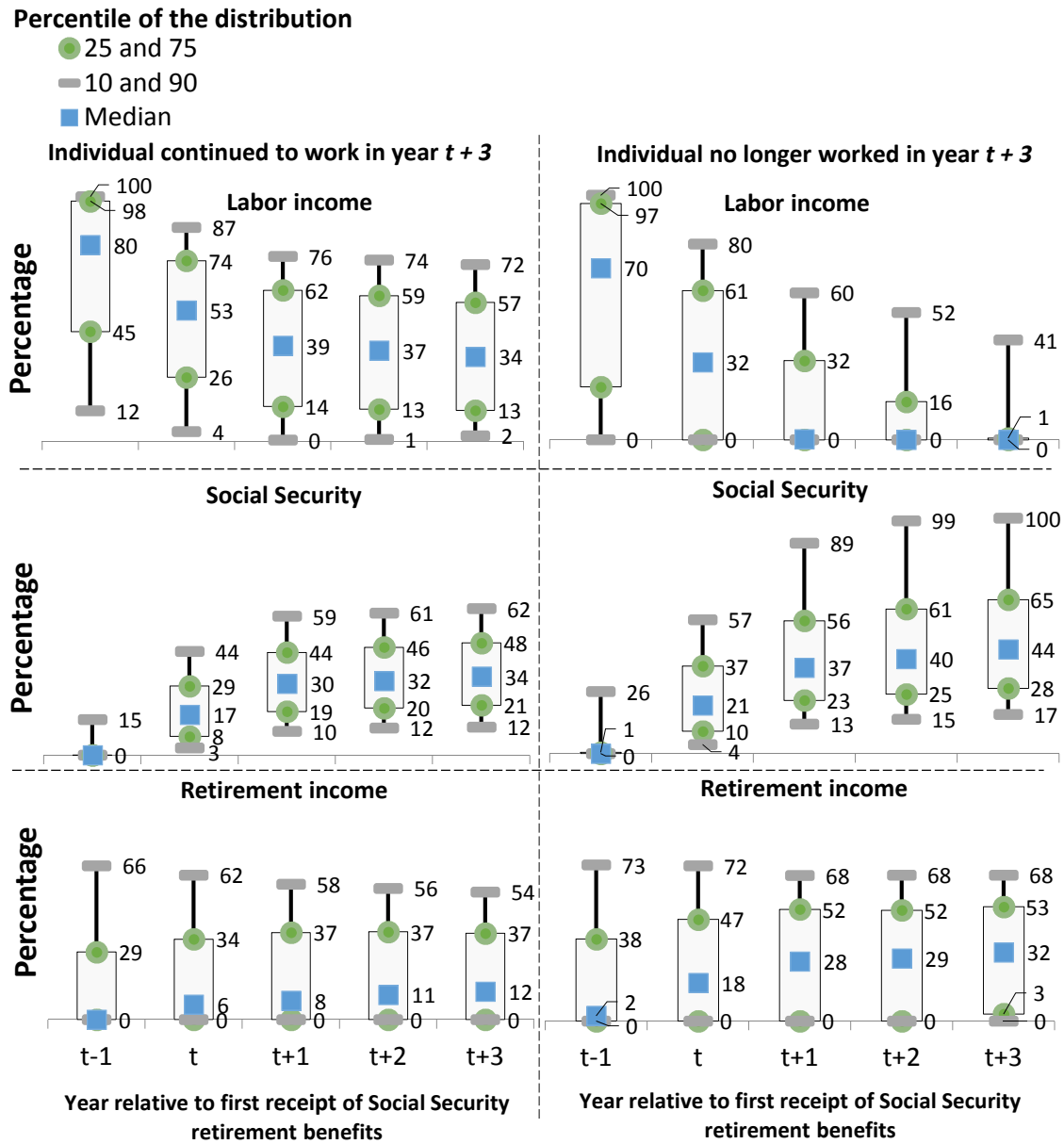
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[34] In addition to these two categories, the other categories are labor income, Social Security benefits, retirement income, and taxable interest.

[35] Although not reported in Figure 29, 24 percent of individuals who no longer worked in year *t + 3* had no retirement income in year *t + 3*. See Table S4c in the supplemental tables.

Figure 29

Income Composition Fairly Stable in the Three Years After Claiming

Distribution of income shares [1] across individuals in sample,[2] by year relative to first receipt of Social Security retirement benefits and work status in year t + 3

Percentile of the distribution
- 25 and 75
- 10 and 90
- Median

[1] Income shares are calculated for each individual in the sample as the ratio of a specified income category to positive total income. Positive total income is the sum of zero-bounded income amounts for each income category (i.e., categories with negative income were set equal to zero). For a complete list of income categories, see Figure 26.

[2] Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment

Source: Authors' tabulation of tax return data.

<Insert "Figure 29: Income Composition Fairly Stable in the Three Years after Claiming" here>

Focusing on year *t + 3*, most individuals relied on a mix of Social Security benefits and retirement income (Figure 30). The exceptions to this were individuals in the lowest quintile of 1999 income and individuals in the top 1 percent of 1999 income. Regardless of work status, the median income share for retirement income was zero for the lowest income quintile and 1 percent for the top 1 percent of income. Income sources were typically more mixed for other income groups. For example, among individuals who no longer worked, the median share of income from Social Security benefits ranged from 55 percent for the second quintile to 27 percent for the 80th to 95th percentile, and the median share from retirement income ranged from 28 percent for the second quintile to 47 percent for the 80th to 95th percentile.

There is considerable variation in the composition of income within income groups (Figure 30). For example, among individuals who no longer worked in year t + 3, Social Security benefits were the only source of income for 25 percent of individuals in the lowest quintile and 10 percent of individuals in the second quintile of 1999 income. Among these same individuals, more than half of individuals in the lowest income quintile and about 25 percent of individuals in the second income quintile had no retirement income. Most other individuals who no longer worked, however, relied on a mix of both Social Security benefits and retirement income.
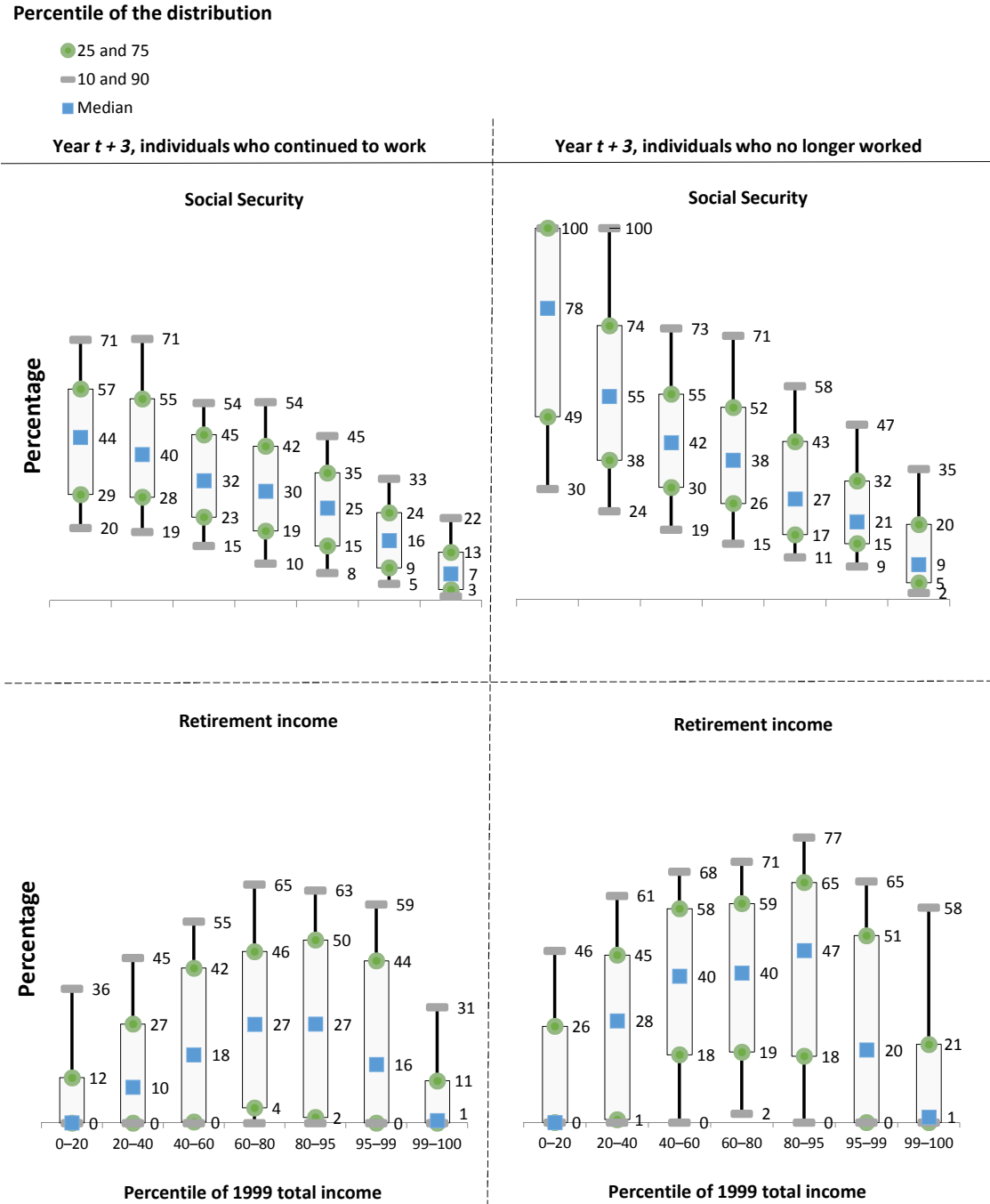
<Insert "Figure 30: Moderate Income Relied on Both Social Security Benefits and Retirement Income" here>

Capital gains, dividends, and tax exempt interest are generally an important component of income only for individuals at the top of the 1999 income distribution, although the typical share for individuals is considerably lower than the aggregate share of income for the group as whole (Figure 31). Unlike work-related income, the distribution of income shares from the combination of capital gains, dividends, and tax-exempt interest is fairly stable over the entire five-year period from year *t -1* to year *t + 3*. Although these income sources represent a substantial share of income for some individuals in the 80th to 99th percentile of 1999 income, they are much more important for the typical individual in the top 1 percent of 1999 income. Regardless of work status, the median share of income from these sources is zero in year *t + 3* for individuals in the 80th to 95th percentile of 1999 income. For individuals in the 95th to 99th percentile of 1999 income, the median share in year *t + 3* is 6 percent for those who continued to work and 17 percent for those who no longer worked. For individuals in the top 1 percent

Figure 30

Moderate Income Relied on Both Social Security Benefits and Retirement Income

Distribution of income shares [1] in year t + 3 *across individuals in sample,[2] by work status in year* t + 3 *and 1999 total income*

[1]Income shares are calculated for each individual in the sample as the ratio of a specified income category to positive total income. Positive total income is the sum of zero-bounded income amounts for each income category (i.e., categories with negative income were set equal to zero). For a complete list of income categories, see Figure 26.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

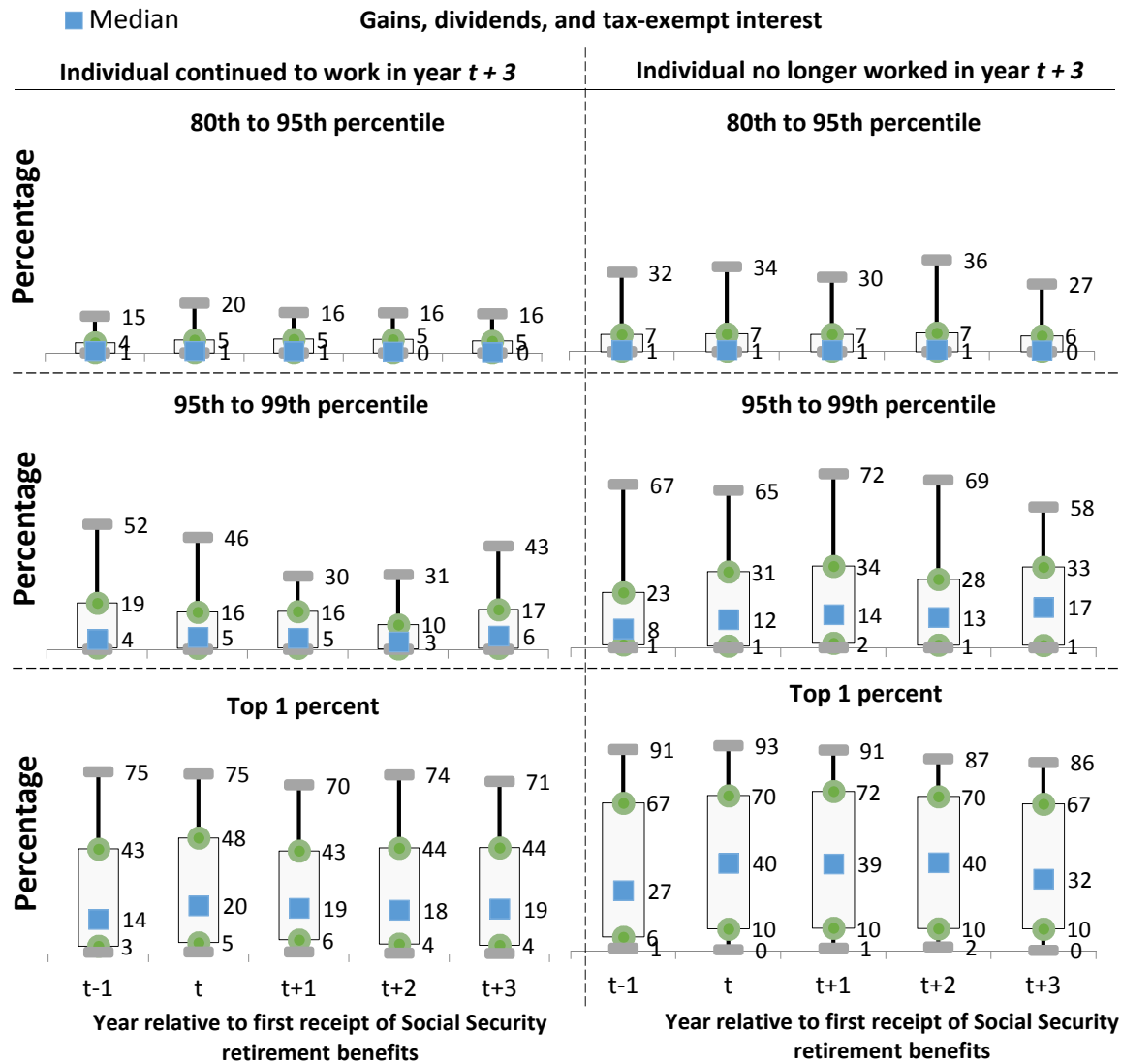Source: Authors' tabulation of tax return data.

Figure 31

Gains, Dividends, and Interest Important for Many Higher-Income Individuals

Distribution of the share of income[1] from gains, dividends and tax exempt interest across individuals in sample[2] who ranked in the top 20 percent of 1999 per capita total income, by 1999 total income and year relative to first receipt of Social Security retirement benefits

Percentile of the distribution

- ● 25 and 75
- ▬ 10 and 90
- ■ Median

Gains, dividends, and tax-exempt interest

Individual continued to work in year *t + 3*

80th to 95th percentile

Individual no longer worked in year *t + 3*

80th to 95th percentile

95th to 99th percentile

95th to 99th percentile

Top 1 percent

Top 1 percent

Percentage (y-axis labels for all panels)

Year relative to first receipt of Social Security retirement benefits (x-axis: t-1, t, t+1, t+2, t+3)

[1]Income shares are calculated for each individual in the sample as the ratio of a specified income category to positive total income. Positive total income is the sum of zero-bounded income amounts for each income category (i.e., categories with negative income were set equal to zero). For a complete list of income categories, see Figure 26.

[2]Sample consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999, who claimed Social Security retirement benefits between 2000 and 2007, and were alive three years after claiming Social Security. Working taxpayers in 1999 include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.
Source: Authors' tabulation of tax return data.

of 1999 income, the median share in year *t + 3* is 19 percent for those who continued to work and 32 percent for those who no longer worked.

<mark><Insert "Figure 31: Gains, Dividends, and Interest Important for Many Higher-Income Individuals" here></mark>

4.3 Summary

For many individuals, retirement appears to be a multi-year transition rather than an action taken at a discrete point in time. Just over half of individuals received retirement income—either directly or through a spouse—one year before they claimed Social Security. Three years after claiming, 46 percent of individuals were working, and another 14 percent were not working but had a spouse who was.

In addition to Social Security benefits and (for those who worked or had a working spouse) labor income, nearly 90 percent of individuals had evidence of non-Social Security retirement resources, including over 95 percent of individuals in the top 60 percent of the 1999 income distribution. Retirement income was also persistent, especially among those in the middle of the 1999 income distribution. Overall, across all income groups, 92 percent of those who received retirement income in year *t + 1* received it in all three years from year *t + 1* to year *t + 3*.

For most individuals, both Social Security benefits and retirement income represent a substantial share of income, with Social Security relatively more important for lower-income individuals and retirement income relatively more important for higher-income individuals. For those in the middle of the income distribution, Social Security benefits and retirement income were typically similar in magnitude. For example, among those in the middle quintile of 1999 income who no longer worked, the median income shares in year *t + 3* were 42 percent for Social Security benefits and 40 percent for retirement income.

Although most relied on both Social Security benefits and retirement income, there was considerable variation across individuals. For example, among those who no longer worked in in year *t + 3*, Social Security benefits were 65 percent of total income or more for one-in-four individuals and were the only source of income for one-in-10—including 25 percent of individuals in the lowest quintile of 1999 income who no longer worked.

5. Discussion of Results

The findings that income from pensions, annuities, and IRAs is widespread and persistent for those who recently claimed Social Security benefits are at odds with the conclusions drawn from analysis of data from household surveys, such as the Annual Social and Economic (ASEC) Supplement to the Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP). This discrepancy is consistent, however, with other evidence indicating that retirement income is underreported in household surveys.

Concerns about measures of retirement income in the ASEC are long standing. Although it is not the focus of this study, research comparing the ASEC to other sources of data on income indicate that the ASEC suffers from misclassification of income, underreporting of income, and underreporting of enrollment in means-tested government programs (see, for example, Meyer, Mok, and Sullivan 2009). Schieber (1995) illustrated the discrepancy between pension income reported on the March 1991 ASEC and pension income reported on 1990 tax returns—the amount reported in the ASEC was one-third less than the amount reported on tax returns. Nearly two decades later, Miller and Schieber (2014) concluded that the undercounting of pension income had persisted and had likely gotten worse, with the amount reported in the March 2009 ASEC roughly 60 percent less than the amount reported on 2008 tax returns. Bee and Mitchell (2016), a recent study using survey data linked to administrative tax data, confirms that retirement income is substantially understated in both the ASEC and the SIPP.

Although not consistent with household survey data on the income of retirees, our findings are consistent with household survey data on the retirement resources accumulated by households approaching retirement. For example, tabulations of the Federal Reserve Board's Survey of Consumer Finances (SCF) show that, among households with a head aged 55 to 64 in 2013, 73 percent of all households and 81 percent of working households had accrued benefits in a DB plan, accumulated assets in a DC plan or IRA, or both. And these percentages have been roughly the same since 1989. Using Health and Retirement Survey (HRS) data, Gustman, Steinmeier and Tabatabi (2010) similarly finds that about three-quarters of households aged 51 to 56 had a pension from a current or previous job. In addition, the study finds that the combined value of pension and IRAs is substantial—about 90 percent of the expected value of future Social Security benefits. Further, Gustman, Steinmeier and Tabatabai (2009) ranks households aged 53 to 58 in 2006 by a comprehensive measure of wealth and shows that the expected value of future Social Security benefits is greater than the value of pensions and IRAs for

the lower two wealth quintiles, about the same as the value of pensions and IRAs for the middle wealth quintile, and less than the value of pensions and IRAs lower for the top two wealth quintiles—similar to our findings about the relative importance of Social Security benefits and retirement income.

Gustman, Steinmeier and Tabatabai (2012) refers to the discrepancy between the accumulation of pensions and IRAs reported by near retirees in the HRS, and the pension and IRA income reported by retirees in the ASEC as "the mystery of the disappearing pensions." Our findings indicate that there is no such mystery when the HRS data is compared to administrative tax data. We have no insights as to why there is not more pension and IRA income reported in the ASEC, but our results reinforce the study's conclusion that, "… the bottom line is that CPS data on pension incomes received in retirement understates the full contribution pensions make to supporting retirees."

6. Conclusion

This study uses administrative tax data from the Internal Revenue Service's Statistics of Income (SOI) Division to examine changes in spendable income near the claiming of Social Security benefits. The study focuses on individuals who were either the primary taxpayer on a non-joint return or the primary or secondary filer on a joint return in 1999 who were aged 55 to 61, were working, and were not receiving Social Security benefits. Comparisons with population estimates suggest that nearly all such individuals filed a tax return in 1999. Using both tax returns and information returns, we were able to follow the individuals through 2010, regardless of whether they filed a tax return in any subsequent year. The analysis in this study focuses on individuals in this group who claimed Social Security retirement benefits from 2000 to 2007 and were alive three years after claiming.

Most individuals were able to maintain their inflation-adjusted net work-related income after claiming Social Security. Work-related income is defined as the combination of labor income, Social Security benefits, and retirement income. Net work-related income subtracts from this total payroll taxes and a proportionate share of federal income tax. The median ratio of net income three years after claiming to net income one year before claiming was 103 percent. On average, net work-related income increased substantially after claiming for individuals in the lowest quintile of 1999 income, was relatively flat for those in the middle of the income distribution, and fell for those in the highest income quintile. Three years after claiming, the median replacement rate was 122 percent for those in the lowest income quintile, 103 percent for individuals in the middle quintile, and 87 percent for those in the 95th to 99th percentile of income. Regression analysis indicates that, all else equal, individuals who were lower income in 1999, individuals who continued to work three years after claiming, and individuals who claimed Social Security benefits when age 62 or younger had higher predicted replacement rates. There was little difference in predicted replacement rates by gender or filing status (joint versus non-joint returns), although changes in filing status did have an effect.

Individuals typically rely on multiple sources of income after claiming Social Security benefits. Directly or through a spouse, 60 percent of individuals had labor income three years after claiming, and 71 percent had income from pensions, annuities, and IRAs. Throughout the period analyzed, retirement income was persistent and widespread. Over 90 percent of those with retirement income in the first year after claiming also had retirement income in each of the next two years. In the five-year period from one year before claiming to three years after claiming, 81 percent of individuals had retirement income in at least one year and another 8 percent had no retirement income but did have evidence of

retirement resources (a Form 1099-R, a Form 5498, or both). For all but individuals in the lowest quintile of 1999 income, non-Social Security retirement resources were ubiquitous, with 90 percent of individuals in the second quintile and over 95 percent of individuals in the top 60 percent of the income distribution having evidence of retirement resources.

For most individuals, both Social Security benefits and retirement income represent a substantial share of income, with Social Security relatively more important for lower-income individuals and retirement income relatively more important for higher-income individuals. Those in the middle of the 1999 income distribution who no longer worked in year *t + 3* typically received about the same shares of income from Social Security benefits and retirement income.

Although most individuals were able to maintain net work-related income after claiming Social Security, and although most individuals relied on both Social Security benefits and retirement income, there was considerable variation across individuals. For example, although the median replacement rate three years after claiming was 103 percent, one-in-four individuals has a replacement rate of 79 percent or lower and one-in-four had a replacement rate of 134 percent or higher. Similarly, among those who no longer worked three years after claiming, the median Social Security income share was 44 percent, but one-in-four had a share of 65 percent or higher, and it was the only source of income for one-in-10.

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Appendix

A.1 Method Used to Allocate Pension, Annuity, and IRA Distributions by Type

A Form 1099-R must be filed for each person to whom distributions are made from "…profit-sharing or retirement plans, any individual retirement arrangements (IRAs), annuities, pensions, insurance contracts, survivor income benefit plans, permanent and total disability payments under life insurance contracts, charitable gift annuities, etc."[1]

Because individuals may receive multiple Form 1099-Rs in a given year, the information needs to be aggregated to be included on the tax return record.[2] The information includes dollar amounts for various categories, such as total distributions and taxable amounts. There are also various checkboxes that could be checked to indicate, for example, that the distribution came from a traditional IRA, SIMPLE IRA, or a SEP IRA; or that the taxable amount was not determined. Finally, there are codes that provide detailed information on the type of distribution that is being made, such as a normal distribution, an early distribution, or a rollover.

The typical method used by the SOI to aggregate the information from Form 1099-R correctly records the aggregate dollar amounts from multiple Form 1099-Rs, but does not provide those dollar amounts by type of distribution. That is, the various dollar amounts from the multiple forms are aggregated and included with the record. Separately, any detailed distribution code reported on any of the forms are recorded. The dollar amounts, however, are not linked to the distribution codes. Thus, the aggregate amounts are known, and the types of distributions included are known, but there is no way to know the dollar amount attributable to any given code.

For many purposes it is important to know the dollar amount associated with each type of distribution. For example, it is important when reconciling the amounts reported on information returns with the amounts reported on tax returns, because some types of distributions reported on Form 1099-R are not included in the amounts reported on line 15 (IRA distributions) and line 16 (pension and annuity distributions) of Form 1040. In this study it was also important to know because we include

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[1] From *2016 Instructions for Forms 1099-R and 5498*, available at https://www.irs.gov/pub/irs-pdf/i1099r.pdf.

[2] For example, in related work done by the authors using cross-sectional data, we found that, among individual taxpayers who received at least one Form 1099-R in 2010, 41 percent received more than one. Specifically, among those who received at least one Form 1099-R 24 percent received two, 10 percent received three, 4 percent received four, and 3 percent received five or more.

some distributions in our measure of income that are neither included in taxable distributions (lines 15b and 16b) nor separately identified elsewhere on tax returns—such as non-taxable Roth distributions.[3]

We developed a new method of aggregating the information return data that allowed us to know the total amount an individual received by type of distribution. To do this we allocated the dollar amount of distributions by category for every Form 1099-R before aggregating the amounts. This allowed us to know the dollar amount associated with each type of distribution.

In addition, we were able to get a more accurate measure of taxable distributions by adjusting the amount reported on the underlying Form 1099-Rs before aggregating. Although recordkeepers for entities making pension and annuity distributions are instructed to "make every effort to compute the taxable amount", IRA recordkeepers are instructed to "Check the 'Taxable amount not determined' box" for IRA distributions.[4] In situations where Box 2b (the "Taxable amount not determined" box) is checked, we classify Roth distributions as entirely nontaxable and we classify most other distributions as entirely taxable. Exceptions to this rule include rollovers and section 1035 like-kind exchanges, which are always treated as nontaxable. In addition, IRA recharacterizations may be taxable (traditional to Roth) or non-taxable (Roth to traditional). For IRA recharacterizations, we determine tax status by comparing distributions reported on Form 1099-R with distributions reported on the tax return.

For individuals who receive multiple Form 1099-R distributions in a given year,[5] this method allows us to allocate the amount of total distributions and taxable distributions received by an individual to different categories of distributions. Using a combination of the codes reported in Box 7 of Form 1099-R and the IRA/SEP/SIMPLE checkbox we were able to categorize distributions by type, source (IRA, SEP, or SIMPLE distributions), and certain tax characteristics (Roth distributions and distributions with a 10-year tax option). In addition, we record capital gains reported in Box 3 for distributions with a 10-year tax option and distributions from a charitable gift annuity.

Table A.1 illustrates the different categories into which Form 1099-R distributions are allocated. The primary distributions types reported in Box 7 of Form 1099-R are reported in the first column. The next three columns indicate whether or not the IRA/SEP/SIMPLE checkbox could be checked in

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[3] Roth distributions should be included in total distributions (lines 15b and 16b). However, total distributions include other non-taxable distributions, such as rollovers and Section 1035 like-kind exchanges that we do not include in our measure of income.

[4] From the 2016 instructions (see note 1).

[5] See note 2.

combination with the distribution type; whether or not the distribution type could be a Roth distribution; and whether or not the distribution type could have a 10-year tax option. In addition, we report whether or not the distribution type should be included in the amount reported on Form 1040 line 15 (pension and annuity distributions) or line 16 (IRA distributions)—either as part of total distributions (line 15a or line 16a) or as part of taxable distributions (line 15b and line 16b).

<Insert "Figure A.1 Types of Distributions Reported on Form 1099-R" here>

For individuals who file a tax return, we reconcile the Form 1099-R distribution amounts with the amounts reported on line 15 and line 16 of Form 1040.

In the first part of the process, Form 1099-R distributions are compared to distributions reported on Form 1040. Distribution types that are not reported on lines 15 or 16 are excluded from Form 1099-R distributions before matching. These include the return of excess contributions (included in wages and salary income on line 7 of Form 1040) and education IRAs distributions (included in other income on line 21 of Form 1040). In addition, for charitable gift annuity distributions and 10-year tax option distributions where Form 4972 was filed, the capital gain income reported on Form 4972 (and included in capital gain or loss on line 13 of Form 1040) was subtracted from the Form 1099-R amounts. Then, using the SEP/SIMPLE/IRA checkbox, the adjusted Form 1099-R distributions are categorized as either IRA distributions (lines 15a and 15b) or pension and annuity distributions (lines 16a and 16b).[6] In the case where the IRA distribution amount and the pension and annuity distribution amount match the amounts reported on Form 1040, Form 1040 distributions are apportioned to the various categories as reported on Form 1099-R.

If the amounts do not match initially, several adjustments are made to either the amount reported on Form 1040 or the amounts reported on Form 1099-R if those changes result in the two sources matching.[7] For example, if the Form 1040 amount matches the 1099-R amount without pension

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[6] For Roth IRAs, financial institutions are not instructed to check the SEP/SIMPLE/IRA box. In the initial step, we treat all Roth distributions where the SEP/SIMPLE/IRA box is not checked as pension and annuity distributions (line 16). Later in the reconciliation process, when 1099-R distributions are compared to distributions reported on Form 1040, Roth distributions may be recategorized as IRA distributions.

[7] The adjustments we make to amounts reported on Form 1040 are not terribly relevant for this study. We developed the reconciliation method used in this study in other work we did comparing Form 1040 reporting and Form 1099-R reporting. In that work, no changes were made to the taxable amounts reported on Form 1040. In cases where taxable amounts matched but total amounts did not, rollovers or like-kind exchanges reported on Form 1099-R were added to total distributions reported on Form 1040 if the addition resulted in a match.

Table A.1
Types of Distributions Reported on Form 1099-R

Distribution type	Could distribution also be categorized as one of the following?			Should distribution be reported on Form 1040 line 15 or line 16?	
	IRA/ SIMPLE/SEP	Roth	10-year tax option*	Total (15a or 16a)	Taxable (15b or 16b)
Normal	Yes	Yes	Yes	Yes	Yes
Early, no known exception	Yes	Yes	No	Yes	Yes
Early, exception applies	Yes	Yes	No	Yes	Yes
Early SIMPLE	Yes	No	No	Yes	Yes
Disability	Yes	Yes	Yes	Maybe	Maybe
Inherited	Yes	Yes	Yes	Yes	Yes
Prohibited transaction	Yes	Yes	No	Yes	Yes
ESOP	No	Yes	No	Yes	Yes
Charitable gift annuity*	No	No	No	Yes	Yes
Railroad benefits (from Form RRB-1099-R)	No	No	No	Yes	Yes
Rollover	Yes	Yes	No	Yes	No
Section 1035 exchange	No	No	No	Yes	No
Recharacterized contribution	Yes	Yes	No	Yes	Maybe
Education IRA (prior to 2003)	No	No	No	No	No
Return of excess contributions	No	No	No	No	No
Cost of current life insurance protection	No	No	No	Yes	Yes
Unknown	Yes	No	No	Maybe	Maybe

* A portion of distributions could be included in capital gain or loss (line 13), with the remainder reported on line 15 or line 16.

disability distributions, then pension disability distributions were removed from the 1099-R amounts (and assumed to be reported with wage and salary income on line 7 of Form 1040). If the amounts match after adjustment, Form 1040 distributions are apportioned to the various categories as reported on Form 1099-R.

If the two sources could not be reconciled, the amounts reported of Form 1040 were used, and distributions were apportioned to the various categories based on the relative amounts reported on Form 1099-R.

For taxpayers who did not file Form 1040 in a given year, only information data are used to calculate the totals. That is, we exclude excess contributions and education IRAs distributions from total distributions and taxable distributions reported on Form 1099-R.

In this study, we adjust our measure of taxable pension and IRA distributions to more closely match the concept of spendable income. That is, we subtract Roth conversions and recharacterized IRA contributions, and add back in nontaxable Roth distributions and the return of basis from traditional IRAs. In addition, because we do not generally exclude charitable donations from our measure of spendable income, we add qualified charitable contributions to our measure of IRA income.

A.2 Income Measures

The income measures in this study are based on income measures reported on income tax returns, but are adjusted to better measure spendable income. Table A.2 provides definitions for income and tax measures used in this study.

<Insert "Figure A.2 Definitions of Income and Tax Measures" here>

A.3 Sample Characteristics

Table A.3 compares the sample of interest with the subsample used for analysis.

<Insert "Figure A.3 Comparison of Sample of Interest and Subsample Used for Analysis" here>

A.4 Regression Analysis

Table A.4 reports coefficient estimates from the median regression. The dependent variable is the net work-related income replacement rate in year *t + 3*.

<Insert "Figure A.4 Median Replacement Rate Regression Results" here>

Table A.2
Definitions of Income and Tax Measures

Income/tax type[a]	Definition for filers	Definition for non-filers
Labor	Wages, salaries, tips, etc. on Form 1040 + net self-employment earnings from Schedule SE – traditional IRA contributions deducted on Form 1040 – Form 5498 traditional IRA contributions in excess of those deducted on Form 1040 – Keogh deduction on Form 1040 – self-employed health insurance deduction on Form 1040 – health savings account deduction on Form 1040 – Archer MSA deduction on Form 1040 – Form W-2 Roth contributions – Form 5498 Roth IRA contributions	Wages, tips, other compensation on Form W-2 + allocated tips on Form W-2 – Form W-2 Roth contributions – Form 5498 traditional IRA contributions – Form 5498 Roth IRA contributions
Social Security	The higher of either Social Security benefits on Form 1040 or Social Security benefits on Form SSA-1099 (including both retirement and disability benefits)	Social Security benefits on Form SSA-1099 (including both retirement and disability benefits)
IRA	Taxable IRA distributions on Form 1040 + return of basis in traditional IRAs from Form 8606 + nontaxable Roth IRA distributions from Form 8606 + qualified charitable distributions[c] – taxable Roth conversions from Form 8606 and Form 5498 – taxable IRA recharacterizations from Form 1099-R	Taxable IRA distributions on Form 1099-R + nontaxable Roth IRA distributions – Roth conversions from Form 5498 – taxable IRA recharacterizations from Form 1099-R
Pension and annuity	Taxable pensions and annuities on Form 1040 – taxable Roth rollovers from Forms 8606 and 5498 – taxable pension recharacterizations from Form 1099-R	Taxable pension distributions on Form 1099-R
Retirement	*IRA + pension and annuity*	*IRA + pension and annuity*
Capital gains	Capital gain (or loss) on Form 1040 + other gains (or losses) on Form 1040	N/A
Dividends	Ordinary dividends on Form 1040	N/A
Tax-exempt interest	Tax-exempt interest on Form 1040	N/A
Taxable interest	Taxable interest on Form 1040	N/A

Continued next page (notes at end of table)

Table A.2 (continued)
Definitions of Income and Tax Measures

Income/tax type[a]	Definition for filers	Definition for non-filers
Business and farm	Business income on Form 1040 + farm income on Form 1040 + rental real estate, royalties, partnerships, S corporations, trusts on Form 1040 – net self-employment earnings from Schedule SE – 0.5 * self-employment tax reported on Schedule SE	N/A
Other	Alimony received on Form 1040 – alimony paid on Form 1040 + unemployment compensation on Form 1040 + other income on Form 1040	N/A
Total income	*Labor + Social Security + IRA + pension and annuity + capital gains + dividends + tax-exempt interest + taxable interest + business/farm + other*	*Labor + Social Security + IRA + pension and annuity*
Positive total income	Calculated as total income, with each component part bounded at zero	Calculated as total income, with each component part bounded at zero
Work-related income	*Labor + Social Security + IRA + pension and annuity*	*Labor + Social Security + IRA + pension and annuity*
OASDI taxes[c]	Social Security tax withheld on Form W-2 + 0.062 * unreported tips reported on Form 4137 + 0.062 * wages reported on Form 8919	Social Security tax withheld on Form W-2
HI taxes	Medicare tax withheld on Form W-2 + 0.0145 * unreported tips reported on Form 4137 + 0.0145 * wages reported on Form 8919	Medicare tax withheld on Form W-2
Payroll taxes	*OASDI taxes + HI taxes* + 0.5 * self-employment tax reported on Schedule SE	*OASDI taxes + HI taxes*
Federal income taxes	Total tax reported on Form 1040 – self-employment tax reported on Schedule SE – payroll taxes on earnings not reported on Form W-2	Federal income tax withheld on Form W-2

Continued next page (notes at end of table)

Table A.2 (continued)

Definitions of Income and Tax Measures

Income/tax type[a]	Definition for filers	Definition for non-filers
Work-related federal income taxes	*Federal income taxes * (work-related income / total income)*	*Federal income taxes*
Total taxes	*Payroll taxes + federal income taxes*	*Federal income taxes + payroll taxes*
Total work-related taxes	*Payroll taxes + work-related federal income taxes*	*Federal income taxes + payroll taxes*
Net total income	*Total income – total taxes*	*Total income – total taxes*
Net work-related income	*Work-related income – total work-related taxes*	*Work-related income – total work-related taxes*

[a] The presence of income from any source is determined at the return level and the amount of income from any source is calculated on a per capita basis. That is, for married individuals filing a joint return, an individual would be categorized as receiving income from a given source if either the individual or the spouse received the income, and each spouse would be allocated half of the return level income.

[b] Qualified charitable distributions (QCDs) are otherwise taxable distributions from IRAs directly sent by the IRA trustee to a charitable organization. The presence of a QCD is recorded on the tax form, but not the amount, so the amount is calculated as the amount required to match the taxable 1040 distribution amount with the taxable 1099-R amount up to the QCD limit.

[c] OASDI taxes are bounded at 6.2% of the maximum taxable earnings for Social Security in any given year.

Table A.3
Comparison of Sample of Interest and Subsample Used for Analysis

	Sample of Interest[1]	Subsample Used for Analysis[2]
Sample size		
Population (thousands)	12,493	7,335
Number of observations	10,830	5,696
Sample Composition (percent of the sample)		
Birth year		
1938	11.5	16.3
1939	11.5	16.1
1940	11.7	17.3
1941	13.0	15.6
1942	12.3	14.6
1943	17.8	10.9
1944	16.5	9.4
1999 income group		
Negative	0.3	0.3
1st quintile	19.7	20.7
2nd quintile	20.0	21.6
3rd quintile	20.0	20.3
4th quintile	20.0	19.2
80th to 95th percentile	15.0	14.0
95th to 99th percentile	4.0	3.0
Top 1 percent	1.0	0.8
1999 filing status		
Nonjoint	27.7	30.1
Joint	72.3	69.9
Gender		
Male	51.7	58.5
Female	48.2	41.5
Unknown	0.1	0.0
Retirement year		
2000	2.9	4.7
2001	4.4	7.3
2002	5.8	9.3
2003	9.4	15.7
2004	9.2	15.2
2005	10.7	17.9
2006	10.1	16.5
2007	8.0	13.2
2008	7.9	N/A
2009	7.9	N/A
2010	6.1	N/A
Had not claimed by 2010	17.6	N/A

[1] The sample of interest consists of all working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999. Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income.

[2] The subsample used for analysis include individuals from the sample of interest who claimed Social Security retirement benefits between 2000 and 2007 and were alive three years after claiming Social Security.

Table A.4
Median Replacement Rate Regression Results
Work-related income replacement rate in year t + 3*, percent*

Dependent variable	Ratio of inflation-adjusted net work-related earnings three years after first claiming of Social Security retirement benefits (t + 3) to net work-related earnings the year before first claiming (t - 1)					
Median value of dependent variable	103.3		Number of observations		3,572	
	Median regressions					**Percentage of**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**sample**
Intercept	121.5*	122.9*	106.9*	108.4*	108.3*	
1999 per capita total income quintile						
Negative	24.3	23.7	-57.9	-54.9	-51.9	0.3
Second	-16.5*	-16.1	-6.2	-7.1	-7.9	21.8
Middle	-18.7*	-18.4	-4.6	-4.2	-4.2	20.6
Fourth	-23.0*	-22.7*	-9.0*	-8.0*	-9.0*	19.2
Highest	-28.6*	-29.2*	-17.0*	-16.9*	-18.7*	18.1
Claiming year						
2000		-1.8	0.5	-1.6	-1.4	4.8
2001		-3.3	-3.9	-5.2	-4.7	7.3
2002		1.9	1.9	2.1	1.2	9.4
2003		5.7	2.7	4.0	2.5	15.7
2005		-1.2	-2.2	-2.2	-2.4	18.1
2006		2.5	1.8	2.6	2.6	16.5
2007		6.2*	5.8*	6.3*	6.2*	13.1
Claiming age						
63 to 64		-6.5*	-6.9*	-9.2*	-8.7*	28.8
65 to 66		-3.0*	-7.5*	-9.8*	-10.3*	30.2
67 to 69		-6.8*	-10.2*	-12.4*	-12.8*	3.6
Continued to work in year t + 3			30.9*	28.8*	28.3*	46.1
Work $_{t+3}$ interactions						
1999 income quintile						
Negative			68.1	63.3	-38.0	0.2
Second			-18.2*	-17.8*	-18.3*	9.6
Middle			-26.7*	-27.0*	-26.8*	8.6
Fourth			-21.0*	-21.8*	-22.6*	8.8
Highest			-25.1*	-24.9*	-23.9*	8.5
Claiming age						
63 to 64			2.0	5.4	5.7	11.8
65 to 66			11.4	13.9	15.1	15.8
67 to 69			8.7	10.1	12.1	1.1
Filing status						
Non-joint in year t - 1				-2.7	-5.0	28.4
Change in filing status						
Joint$_{t-1}$ to non-joint$_{t+3}$				24.8*	37.3*	4.1
Non-joint$_{t-1}$ to joint$_{t+3}$				-13.2	-10.1	2.2
Female					0.9	41.3
Female interactions						
Non-joint in year t - 1					1.9	17.4
Joint$_{t-1}$ to non-joint$_{t+3}$					-26.1	2.3
Non-joint$_{t-1}$ to joint$_{t+3}$					-4.7	0.8
1999 income quintile						
Negative					98.7	0.1
Second					2.4	9.3
Middle					0.2	8.5
Fourth					1.9	7.7
Highest					5.4	6.3

* = Significant at the 95% confidence level.

Note: Only individuals on tax returns in the continuous work history sample (CWHS) portion of the 1999 cross-section were used for the regression analysis. The CWHS portion of the 1999 cross-section includes all tax returns for whom the primary taxpayer has a Social Security number in which the last four digits are one of five different combinations (yielding a random 0.5% sample of tax returns). All other restrictions on the sample apply to the 1999 CWHS returns. That is, the sample consists of working taxpayers aged 55 to 61 in 1999 who did not receive Social Security benefits (retirement or disability) in 1999 and who claimed Social Security retirement benefits between 2000 and 2007 and were alive three years after claiming Social Security. Working taxpayers include individuals who were the primary filers on a non-joint return or who were either the primary or secondary filer on a joint tax return with some combination of: Form W-2 wage and salary income; Form W-2 allocated tips; wage and tip income not reported on Form W-2; and self-employment income. Year t denotes the year Social Security benefits were claimed; year t -1 is the year before; and year t + 3 is three years after.

Source: Author's analysis of tax return data