How might earnings patterns and interactions among certain provisions in OASDI solvency packages affect financing and distributional goals?

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HOW MIGHT EARNINGS PATTERNS AND INTERACTIONS AMONG CERTAIN PROVISIONS IN OASDI SOLVENCY PACKAGES AFFECT FINANCING AND DISTRIBUTIONAL GOALS?

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Abstract

Analysts often compile packages of Social Security changes based on publicly available projections of the effects of individual provisions. Such analyses may neglect issues of whether and how the provisions might interact to alter intended outcomes, thwarting the proposal's financing and distributional goals. To inform policymakers about the importance of such interactions in examining the cost and distributional implications, we catalog a range of possible interactions, including some that are subtle and not well understood. Using data on U.S. workers from the *Survey of Income and Program Participation* matched to administrative records, we document important patterns in work and benefit histories to show how several commonly discussed Social Security proposals would affect different population groups. We then use DYNASIM, the Urban Institute's dynamic microsimulation model, to measure how accounting for interactions among a few of these provisions changes projections of distributional effects.

The study found that:

- Interactions between Social Security parameters and between Social Security and personal income taxes can be significant.
- Modelers may thus wish to display incremental analyses of combinations of provisions and gross and net Social Security benefits in their distributional analyses.

The policy implications of the findings are:

- Social Security packages are best evaluated holistically. The whole does not always equal the sum of its parts, either in terms of costs or distributional effects.

Acronyms

AGI	Adjusted Gross Income
AIME	Average Indexed Monthly Earnings
ATRA	American Tax Relief Act of 2012
AWI	Average Wage Index
BLS	Bureau of Labor Statistics
CBO	Congressional Budget Office
C-CPI-U	Chained Consumer Price Index for All Urban Consumers
CRSPS	Commission on Retirement Security and Personal Savings
COLA	Cost-of-Living Adjustment
CPI	Consumer Price Index
CPI-E	Experimental Consumer Price Index for Americans 62 and Older
CPI-U	Consumer Price Index for All Urban Consumers
CPI-W	Consumer Price Index for Urban Wage Earners and Clerical Workers
CRFB	Committee for a Responsible Federal Budget
DER	Detailed Earnings Record
DI	Disability Insurance
DRC	Delayed Retirement Credit
DRTF	Debt Reduction Task Force
DYNASIM	Dynamic Simulation of Income Model
EEA	Early Eligibility Age
FRA	Full Retirement Age
GDP	Gross Domestic Product
GED	General Equivalency Diploma
GPO	Government Pension Offset
MBR	Master Beneficiary Record
MINT	Modeling Income in the Near Term
OACT	Office of the Chief Actuary
OASDI	Old-Age Survivors and Disability Insurance
OASI	Old-Age and Survivors Insurance
PIA	Primary Insurance Amount
PPI	Progressive Price Indexing
PRA	Personal Retirement Accounts
RET	Retirement Earnings Test
RF	Reduction Factor
SER	Summary Earnings Record
SIPP	Survey of Income and Program Participation
SMI	Supplementary Medical Insurance
SOI	Statistics of Income
SSA	Social Security Administration
SSI	Supplemental Security Income
SSR	Supplemental Security Record
UI	Unemployment Insurance
WEP	Windfall Elimination Provision
YOC	Years of Coverage

Introduction

Many analysts have recently proposed changes to the Old-Age Survivors and Disability Insurance (OASDI) program, commonly known as Social Security,[1] that combine various individual provisions that the U.S. Social Security Administration's Office of the Chief Actuary (OACT) and the Congressional Budget Office (CBO) have scored.[2] For example, sources like Reno and Lavery (2009), and Sass, Munnell, and Eschtruth (2014) present a menu of possible choices from which readers can choose. The Committee for a Responsible Federal Budget (CRFB) has compiled an online tool that allows users to combine provisions into packages.[3] Similarly, Rockeymoore and Lui (2011) combine four revenue-increasing provisions with seven benefit-increasing provisions, and Altman and Kingson (2014) combine seven benefit-increase provisions with two benefits outside of Social Security plus four revenue-increasing provisions and Trust Fund diversification. Most authors who compile such packages or tools acknowledge that many of these provisions interact with one another; they sometimes address the cost implications by ad hoc approaches such as raising more revenue than required to pay for the sum of the provisions in isolation.

Considering cost changes is prudent. As researchers from OACT at the Social Security Administration point out, combining provisions that will reduce benefits frequently leads to changes in the incremental effects of some of the provisions relative to current law (SSA OACT 2017; see section I on page 34). Similarly, combining provisions that increase benefits under current law could change the incremental effects of each provision.

As important as cost is, considering cost alone when designing packages can promote an ineffective use of scare resources for this program. If benefit reductions compound more than expected because of interactions, a vulnerable beneficiary group may be placed at higher risk

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[1] Throughout this document, we use the terms Social Security and OASDI interchangeably. When we want to focus on a specific component of the larger program, like disability insurance (DI), we do so explicitly.

[2] The OACT website has separate pages for packages (http://www.ssa.gov/OACT/solvency/index.html), and provisions (http://www.ssa.gov/OACT/solvency/provisions/index.html). The provisions are also compiled into a summary document (http://www.ssa.gov/oact/solvency/provisions/summary.pdf). The CBO periodically provides estimates for various provisions (for example, CBO 2015). Social Security's Office of Retirement Policy provides detailed distributional estimates from SSA's Modeling Income in the Near Term (MINT) at the following locations:
http://www.ssa.gov/retirementpolicy/projections/benefit-formula.html,
http://www.ssa.gov/retirementpolicy/projections/colas.html,
http://www.ssa.gov/retirementpolicy/projections/coverage.html,
http://www.ssa.gov/retirementpolicy/projections/increases-fra.html,
http://www.ssa.gov/retirementpolicy/projections/taxation.html

[3] See http://crfb.org/socialsecurityreformer/. This page contains a link to the calculator's methods.

than developers intend, and additional revenue may be required to bring the package of changes closer to the original goal. Analogously, if a relatively well-off group receives highly enhanced benefits due to poorly understood interactions from increases that are financed by raising payroll taxes on young, low-wage workers, the program could become less progressive and could lower overall well-being over the life course.

Interactions between Social Security provisions become increasingly relevant with each passing year. As more and more members of the relatively large baby boom cohort leave the labor force and begin collecting their Social Security benefits, the chances decline that they can meaningfully contribute to narrowing OASDI's long-range financing gap, either through increases in payroll tax, income tax, or other contributions to the program or through benefit reductions.[4] When analysts from the CBO produced their compendium of Social Security options seven years ago (CBO 2010), nearly a third of the 30 options they examined could eliminate at least half of the 75-year OASDI fiscal imbalance. In their most recent report in which they replicate many of the prior analyses and add some new provisions (CBO 2015), they find that it is no longer the case that a single provision that is widely discussed can extend OASDI solvency by more than five years.[5] Analogously, examining the provisions scored by SSA OACT (2016), one sees few silver bullets. Of 148 provisions scored,[6] 106 of which improve actuarial balance, just 25 would reduce the long-range (75-year) deficit by at least half—and 12 of these 25 are variants of increases in payroll taxes for those earning over Social Security's current law taxable maximum, seven are variants of either price indexing or progressive price indexing (PPI), introduced by Pozen (2005), or reduce upper PIA factors, four are increases in the payroll tax rate (not changing the taxable maximum), and the remaining two are reductions in the Cost-of-Living Adjustment (COLA). In other words, many of the listed tax and benefit parameters that would achieve savings of at least half the long-range deficit are certainly mutually exclusive. A package that will eliminate—or even sizably reduce—the Social Security financing gap is thus likely to incorporate several provisions, and, recent political developments notwithstanding, likely to contain at least some provisions from both the revenue

[4] Historically, many changes to Social Security have been phased in gradually. For example, the increase in the full retirement that was included in the 1983 Social Security amendments did not start until 2000 and will not be fully phased in until the 1960 birth cohort reaches age 62 in 2022.

[5] Several separate factors drive this, including the larger deficit, a closer Trust Fund depletion date, and their choice to incorporate more gradual phasing in of proposals (rather than imposing sudden benefit reductions) when implementing the projected changes.

[6] In these counts, we exclude those options listed in category G, which examine Trust Fund investments in equities.

and benefit sides of the program. The likelihood of combining multiple provisions arguably increases as time passes, Trust Fund reserves are drawn down, and years with relatively larger trust Fund imbalances replace years with smaller imbalances.

The first part of this paper catalogs a range of possible interactions, including some that are subtle and not well understood. For example, the taxation of Social Security benefits is projected to become increasingly important both in revenue and distributional terms in coming decades because the thresholds for taxing benefits are not indexed for inflation, while initial OASDI benefits grow with wages (Purcell 2015, Shakin and Seibert 2015, Technical Panel 2011). Changing OASDI benefits would thus affect many beneficiaries' tax liabilities. CBO analysts thus report changes to net—rather than gross—projected Social Security benefits (e.g., CBO 2015) and in some reports use alternative tax baselines, but many other analysts do not. Neglecting such changes can lead to incomplete projections, as these spillovers can reduce cost savings and change the effect's distribution. Specifically, net benefits will usually change differently than gross benefits for those paying income taxes on their benefits, but remain unchanged for those exempt from taxes. This could potentially result in a different distribution of benefit changes than some developers may have intended.

The second stage of the project measures how accounting for such interactions changes distributional outcomes. It draws from some of the more common provisions from prominent proposals (for example, Debt Reduction Task Force 2010; National Research Council and National Academy of Public Administration 2010; National Commission on Fiscal Responsibility and Reform 2010, also known as Simpson-Bowles; and Larson 2015), focusing on those interactions among provisions that have striking effects—for example, because their effects are not distributionally neutral.

We begin with a brief background on Social Security financing and a description of recent developments in financing proposals. We then briefly discuss data sources and methods. We follow this with descriptions of earnings and OASDI benefits using nationally representative data, before moving on to describe interactions and illustrating how they work with some simulation model results. We close with caveats, policy recommendations, and conclusions.

Background

The motivations for considering alternative Social Security proposals have been well-documented. As has been anticipated for decades, the U.S. population is aging, and so the ratio of Social Security beneficiaries to workers is expected to decline from 3 to 1 to 2 to 1 in coming decades. Benefit payouts from Social Security have exceeded the program's non-interest income since 2010. This trend is expected to continue indefinitely, leading to drawn down of the reserves in Social Security's Trust Funds.

The OASDI Trustees project that the program's combined Trust Fund will be exhausted in 2034, at which point they estimate that the program could pay about 77 percent of scheduled benefits, declining to 73 percent in 2091 (OASDI Board of Trustees 2017).[7] The Trustees estimate that the long-range deficit amounts to 2.83 percent of payroll or about 0.9 percent of Gross Domestic Product (GDP).[8] The Congressional Budget Office uses different assumptions and methods and projects a markedly higher long-range deficit level (4.68 percent of taxable payroll and 1.55 percent of GDP), earlier Trust Fund exhaustion date (2029 for the combined OASDI Trust Funds), and lower level of benefits that would be payable upon exhaustion (about 71 percent, declining to 66 percent in 2090) (CBO 2016).[9] However, despite the differences, both forecasts show the same general patterns, with non-interest revenues indefinitely falling short of benefit payments under current law schedules. With each year that passes, as a year with a relatively modest cash deficit is replaced by a year with a more significant deficit, this long-range deficit is likely to increase all else equal.

Both the OASDI Trustees and CBO point out that holding current or near beneficiaries harmless, sometimes known as "grandfathering," and using extended phase-ins to prevent rapid changes increase the severity of the required changes to restore long-range fiscal balance to the Social Security program. For example, the Trustees point out that although permanent and immediate benefit reduction of 17.0 percent would restore balance to OASDI, the required change increases to a benefit reduction of about 20 percent if changes only apply to new beneficiaries from 2017 and later. Analogously, the required adjustments from the payroll tax size grow if there is a phase in rather than if they are permanent and immediate.

[7] OACT projects that the OASI trust fund will be exhausted in 2034 and the DI trust fund in 2028.
[8] Long-range is defined using a 75-year horizon.
[9] Among the notable differences in assumptions is a more aggressive longevity decline in the CBO analyses, differences in earnings inequality and labor force participation, differing fertility assumptions, and different assumptions about interest rates (Hall 2016).

Besides these financing challenges, there are other generally persuasive reasons to consider changes to Social Security. Sometimes the program treats similar individuals quite differently based on factors such as the timing of their earnings or their marriage (see, for example, discussions in Favreault and Steuerle 2007). Given the OASDI program's larger financing difficulties, some question the benefit of focusing on such adjustments. However, an extensive literature suggests that even on a cost-neutral basis the program could do a better job on other grounds, including horizontal equity (treating individuals with the same circumstances), as well. In a sense, because of long-range underfunding, the obligation to use all Social Security resources effectively may be especially compelling.

A Recent History of Social Security Financing Proposals

Several review pieces have summarized many of the prominent proposals to change OASDI that various legislators, commissions, and thought leaders have advanced in recent years (Social Security Advisory Board 2010) and many other studies look at specific provisions (U.S. Government Accountability Office 2015). Tables 1A and 1B summarize the components of an array of recent legislative and other proposals, differentiating between provisions that increase revenues, reduce benefits, or do other things. Some provision types appear in the tables in two places, both under the revenue enhancements and the benefit reductions. For example, changes to the Cost-of-Living Adjustment (COLA) that would reduce benefits, for example a shift to the chained Consumer Price Index (C-CPI-U) or a simple percentage point reduction to the COLA, are included under benefit reductions, while COLA changes that would likely increase benefits, for example a shift to the experimental CPI (CPI-E), are classified under "other." Income taxation of OASDI benefits is challenging to classify. Clearly, subjecting a larger share of Social Security benefits to taxation (e.g., proposals to treat OASDI like an employer-sponsored pension for tax purposes) would raise revenues. At the same time, it would reduce net OASDI benefits (but not necessarily gross benefits). We thus classify such changes in between benefit reductions and revenue increases. In contrast, those proposals that would reduce the effects of taxation of benefits, for example increasing the thresholds, appear in the "other/benefit increase" column.

Proposals developed and supported by legislators or analysts from both major parties working in collaboration have tended to integrate a combination of revenue increases and benefit reductions (Table 1A). Proposals developed by major bipartisan commissions have typically had

a split between revenue increases/benefit reductions ranging from 33 and 67 percent to 67 and 33 percent. The National Research Council and National Academy of Public Administration (2010) used this one-third/two-thirds breakdown in developing several illustrative packages.[10]

In recent years, Social Security proposals advanced by legislators from a single party have tended to follow a different pattern (Table 1B). Proposals sponsored by Republican legislators without Democratic co-sponsors tend to fill the long-range deficit solely through benefit reductions and proposals sponsored by Democratic legislators without Republican co-sponsors tend to fill the deficit solely through revenue increases, including base-broadening, frequently through increases in the earnings and benefit base but also sometimes through taxing some income or benefit sources that are not currently taxed for Social Security.[11] Legislators and analysts from both major parties frequently incorporate provisions from the "other" column also, sometimes to address perceived limitations in Social Security under current law, and sometimes as a means to make other changes that will likely be politically unpopular more palatable (sometimes referred to as "sweeteners"). Earlier proposals from a single side of the aisle have tended to have more of a mixture, though often with a preponderance of savings on the revenue side for Democrats and Democratic-leaning independents on the benefit reduction side for Republicans and Republican-leaning independents.[12]

Tables 1A and 1B reveals that certain provisions appear more commonly than others in proposals. For example, in recent years increasing the earnings and benefit base has been a mainstay in both bipartisan plans and packages sponsored by Democratic legislators. Similarly, COLA shifts and retirement ages increases are mainstays of both bipartisan and Republican packages. Several studies have attempted to gauge popular preferences for modifying Social Security (see, for example, Gallup various; Lake Research Partners 2014; Taylor, Parker, Motel, and Patten 2012; Tucker, Reno, Bethell 2013; Walker, Reno, and Bethell 2014; Washington Post-Kaiser Family Foundation 2012).[13]

[10] See their packages two and three.
[11] For example, Democrats Deutch (2015; 2010), Harkin (2013), Larson (2015), Moore (2013), and Sanders (2015) rely entirely on increased revenues while Republicans Chaffetz (2011), Coburn (described in Goss 2011), Hutchison (2011) and Lummis (2011) rely entirely on benefit reductions.
[12] For example, Aaron and Reischauer (1998) and Diamond and Orszag (2005), all of whom have been appointed to key government positions by Democrats, developed packages that relied more heavily on revenues than benefits.
[13] Results from such studies can depend on question wording, range of alternatives offered, and many other factors. Among the more popular alternatives are those that would increase taxes on higher earners.

A growing literature documents the distributional effects of different provisions to modify Social Security. A few prominent sources of such projections include Congressional Budget Office (2010, 2015), Congressional Research Service (Haltzel et al. 2007), Social Security Administration (2015), and the Urban Institute (2016).[14] Tables 2A, 2B, and 2C briefly summarize some of the distributional effects of selected prominent provisions, drawing on this work and other earlier analyses. Table 2A focuses on the effects of benefit reductions, Table 2B discusses the effects of revenue increases, and Table 2C describes benefit increases. The tables show that certain provisions have age- or cohort-specific effects, while others' effects vary by lifetime earnings, marital status, state of residence and employment sector, or other important characteristics. Our question is the extent to which such effects are offset—or compounded—when the provisions in question are combined with other provisions.

Data and Methods

We begin our investigation by describing how earnings and benefit levels currently vary among workers and beneficiaries. To do this, we tabulate data from the 2008 panel of the Survey of Income and Program Participation (SIPP) matched to administrative records.[15] The administrative records include the Detailed Earnings Record (DER) and Summary Earnings Record (SER), the Master Beneficiary Record (MBR), the Supplemental Security Record (SSR), and the Numident file, which includes information on mortality and immigration history. These records are extremely valuable, as they include essentially complete histories of Social Security-covered earnings from 1951 through 2012 and total earnings from 1978 through 2012.[16] This enables us to understand how lifetime earnings, and thus the Social Security computations of Average Indexed Monthly Earnings (AIME) and Primary Insurance Amount (PIA), are evolving over time.[17] We draw from these data to show outcomes for special subgroups and to describe lifetime earnings. We have a special focus on how these have changed across cohorts, including work years over the taxable maximum given the frequency with which changes to the maximum

[14] Other examples include American Academy of Actuaries (2012).
[15] One advantage to using the 2008 SIPP data, rather than pooling the 2004 and 2008 panels, is that there was a high match rate to the administrative records.
[16] The first few years of DER data on total earnings are relatively low quality, so most of our tabulations of uncapped earnings start a few years later.
[17] We also use the matched SIPP data to validate DYNASIM parameters. For example, most survey data poorly measure OASDI coverage, but matched data can measure it well. We use simple cross-tabs from SIPP to insure that DYNASIM's coverage algorithms are accurate enough to simulate changes to OASDI coverage.

are included in packages. We also use the records to help understand who has low Social Security benefits, informing which types of adequacy adjustment might be most cost effective.

The study also relies on the Urban Institute's Dynamic Simulation of Income Model (DYNASIM), which we have used extensively for distributional analyses of Social Security proposals (for example Commission on Retirement Security and Personal Savings 2016, Favreault and Karamcheva 2011). DYNASIM's starting sample is pooled panels of the Survey of Income and Program Participation; the models aging parameters come from a wide range of cross-sectional and longitudinal data sources.[18] Dynamic microsimulation models like DYNASIM provide an important supplement to hypothetical worker analyses, as they show full distributions that account for the complexity of earnings and benefit experiences, including details of complex benefit and personal income tax calculations. Validation tests reveal that DYNASIM projections of costs closely track CBO and OACT projections when using consistent assumptions.

We examine the full distribution of workers and beneficiaries at several points in time in the simulations.[19] We do not integrate behavioral responses into the projections of any of the policy simulations; our focus here is on the simpler question of the extent to which parameters would interact even in the absence of behavioral change.

Selected Social Security Interactions

Many parameters automatically respond to changes to Social Security worker benefits. Similarly, the program's payroll tax and benefit sides frequently interact in proposals. Examples, which we organize by the type of change, include the following:[20]

[18] See Favreault, Smith, and Johnson (2015).

[19] Because Social Security benefit computations can be extremely complex, at times we use stylized calculations and combinations to keep the analyses tractable and accessible. We occasionally exclude a small number of cases for whom additional parameter interactions lead to counterintuitive results. For example, we sometimes exclude cases where individuals would be subject to the retirement earnings test under current law but not under an option. Such results, while fully possible, are exceptional but can distort results in ways that distract readers from the most important distributional effects. These interactions are themselves worthy of further study, but distract rather from some of the points we wish to make here.

[20] We focus in this list on incremental changes to Social Security. Larger, more structural changes to OASDI would potentially bring even more complex interactions between provisions. For example, proposals that integrate carve-out personal accounts with offsets to the traditional Social Security benefit. Similarly, earnings sharing proposals could have any number of interactions, for example with the taxable maximum and other parameters (Favreault and Steuerle 2007, Iams, Reznick, and Tamborini 2009, Schwabish, Simpson, and Topoleski 2007).

Benefit Formula

- Shifting the COLA to an alternative inflation measure like the chained Consumer Price Index (C-CPI-U), or experimental CPI (CPI-E) affects the distribution of benefits by age and duration of receipt relative to current law scheduled, and will interact with enhancements for long-term beneficiaries.
- COLA adjustments are among the few widely discussed Social Security provisions that would have the potential to affect current and relatively near term–and not just future–beneficiaries.
- Spouse and survivor benefits automatically react to changes to formula elements such as the PIA replacement percentages (sometimes known as the PIA factors, bend factors or bend percentages) or number of computation years, and do so differentially for families based on spouses' earnings divisions.
- Some have proposed deficit neutral tradeoff between spouse and survivor benefits (Burkhauser and Smeeding 1994; Hurd, and Wise 1991; Iams and Sandell 1998). Recent projections of how on-going changes in marriage and relative earnings of spouses have affected the distribution of Social Security benefits suggest that evaluation of such proposals should be regularly evaluated to account for changing levels of receipt of the respective benefit types (Iams and Tamborini 2012).
- Depending on phase-ins, minimum benefits in solvency packages with substantial benefit reductions may primarily mitigate the benefit reductions for certain sets of workers, rather than increase base benefits relative to current law for long-term, low-wage workers.
- Similarly, proposed minimum benefits are sometimes expressed as the percent of some threshold, like poverty, that they would replace for a given number of qualification years, usually work years but sometimes also including care years. However, because minimum benefits are often expressed as an adjustment to PIA and the benefit, which is based on PIA, is subject to actuarial reductions for early retirement (see the detailed discussion of benefit computation sequencing, below), individuals would frequently not qualify for the full minimum benefit payable for their work history. Individuals with low benefits are disproportionately early claimants (i.e., they often take up Social Security at age 62), and their benefits subject to an actuarial adjustment, as much as 30 percent for those born in

1960 or later. See Favreault, Mermin, and Steuerle (2006), Herd (2005), and Springstead, Whitman, and Shoffner (2014) for discussion of minimum benefits' sensitivity to various parameters.

    - Whether and how a minimum benefit would be indexed is also important to its effects across cohorts. For example, the poverty threshold grows with prices rather than wages, so a benefit level tied to poverty alone would erode relative to the economy more broadly.

- The effects of proposals that tie a parameter, such as a benefit boost or benefit cap, to the "average benefit for a worker" depend on definition of the average worker benefit. For example, results would differ depending on whether the average benefit is based on current law scheduled benefits or the alternative policy package. Likewise, results will differ if the calculation is made based upon average worker benefit payments, which reflect the distribution of actuarial reduction factors and delayed retirement credits (DRCs), or PIA which does not.
    - Similarly, Waldron (2012) points out that proposals that tie benefit formula changes to a certain percentile of the lifetime earnings distribution will lead to markedly different shares receiving worker benefit reductions among men and women. She notes that tying to men's earnings distribution may be more in keeping with some proposal developers' intentions to shield household benefits below a certain point in the benefit distribution.
- The family maximum can limit Social Security benefit increases, especially for families of DI beneficiaries (Romig and Shoffner 2015).

Retirement Ages and Retirement Earnings Test

- Changes to the OASI early eligibility age (EEA) could potentially affect a number of aspects of Social Security given the historical tie between EEA and other parameters. For example, AIME is computed indexing to age 60, two years before EEA, and other parameters similarly tie to EEA (Vinkenes, Wade, Sarney, and Kelley 2007). Olsen (2012) calls for special attention to the gap between FRA and EEA.

- Full retirement age increases differ from longevity adjustment to the PIA factors in how they affect the eligibility period for DI and the interval over which the Retirement Earnings Test (RET) applies.
- The RET itself, and the corresponding benefit recomputation to compensate for benefit withholding among beneficiaries with earnings, is a source of complex interactions. Although its objective is to equalize payments on a lifetime basis by making up for benefit withholding while earning above certain thresholds through higher benefits later in life, its effects can appear surprising and counterintuitive at a point in time. RET interactions are complicated by the fact that they can apply to auxiliary benefits and can apply to workers and dependent benefits in different ways.
- Hardship exemptions from retirement age increases for workers meeting certain requirements can interact with minimum benefit provisions.

Provisions That Raise Revenues, Including Increases in the Earnings and Benefits Base

- Revenue effects from increasing the contribution and benefit base, also known as the taxable maximum or maximum taxable earnings, could vary by as much as 100 percent depending on whether and how workers accrued benefits based on these contributions.[21]
    - Distributional effects will similarly depend on the extent to which the newly taxed earnings contribute to benefits. In many proposals, such earnings would be replaced at a lower level than the highest replacement rate under current law (15 percent). Favreault and Haaga (2013) describe how replacement rates for Social Security could change depending on how earnings are counted under an assumption of retrospective implementation of a proposal to raise the taxable maximum. They find that the skewed nature of the distribution of earnings over the maximum implies that effects could vary a lot, with relatively modest changes to replacement rates for those earning over the taxable maximum for a small number of years and large effects for those earning for many years.

[21] Compare, for example, OACT's projections of eliminating the taxable maximum and applying the full 12.4 percent payroll tax rate without providing benefit credit (option E2.1) and with providing credit (option E2.2). The difference between these options in long-range actuarial balance amounts to about 0.46 percent of taxable payroll (0.86 of taxable payroll in the 75th year), or roughly 16.3 percent of projected 75-year underfunding. (See http://www.ssa.gov/oact/solvency/provisions/payrolltax_summary.html).

        - When Social Security does replace these earnings, up to 85 percent of the associated new benefits are likely to be subject to personal income taxes, in some cases at relatively high rates (see discussion of taxation of benefits below).
- Earnings and benefit base increases can also lead to consequential spouse and survivor benefit increases, for example under proposals that uncap the base entirely and pay full scheduled benefits on these earnings.
    - Other base increases, like coverage of state and local workers, would also affect spouse and survivor benefits.
- Increases in the OASDI payroll tax rate that include an increase in the employer share of the tax are likely to reduce cash wages under an assumption of constant total compensation (CBO 2015). Reduced cash wages would have several effects. It would reduce the amount of payroll tax collected, so that a one percentage point increase would lead to less than one percentage point in revenue. This would then affect benefit levels for those for whom the year with the higher employer payroll tax is one of the highest 35 years. This in turn could affect the taxation of Social Security benefits.
- Any changes that markedly alter work incentives, employment levels, or the composition of the labor force (e.g., proportionately more higher- or lower-earners) could also have important secondary effects through the Average Wage Index (AWI).
    - For example, Burtless (2009) discusses how immigrants have affected the average wage and Pattison (2003) describes the effects of women's increased employment and wages on AWI. Some speculate that AWI changes in turn change the incentives for DI claiming (e.g., Autor and Duggan 2006; Muller 2008).

Taxation of Benefits

- Since 1984, part of the Social Security benefits may be subject to personal income tax.[22] Unmarried individuals with income less than or equal to $25,000 and married individuals with income less than or equal to $32,000 do not need to pay tax on benefits. When incomes fall between these lower thresholds and $34,000 for single filers or $44,000 for a couple, beneficiaries may pay tax on up to half of their Social Security payments. Those

[22] See DeWitt (2001) for the history and rationale of current law preferential tax treatment of Social Security.

taxpayers with modified adjusted gross income above these higher thresholds may pay personal income tax on up to 85 percent of Social Security benefits.

- About half of Social Security beneficiaries paid income tax on their benefits in 2014 (Shakin and Seibert 2015).
- In 2016, personal income tax rates vary from 10 to 39.6 percent.[23] In 2014, about 32 percent of units either do not need to file or owe no tax. Nearly half of units that pay income tax on OASDI benefits fall in the 15 percent tax bracket.[24] But as Burman et al. (2014) point out, effective rates can be significantly higher than the statutory rates individuals face. Purcell (2015) and others point out further that these figures are likely to rise in coming decades.

Other Base Broadening

- Similarly, as Smith and Toder point out (2014), increases in the payroll tax base, for example, removing the exclusion on employer sponsored health insurance benefits, could have important effects on the benefit distribution. Effects would differ for individuals depending on where they fall in the earnings distribution, whether they are covered through their own job or their spouse's job, and other factors.
- The effects of expanding OASDI coverage to state and local workers now outside the system will depend on the extent to which the Windfall Elimination Provision (WEP) and Government Pension Offset (GPO) would have affected such individuals under current law. Gustman, Steinmeier, and Tabatabai (2014) point out that under current law the WEP and GPO reductions in benefits can be quite substantial for those affected. They estimate that in the cohorts they examine, about 3 percent are affected and those who are affected averaged a 20 percent reduction in their benefits. Brown and Weisbenner (2013) point out that WEP and GPO effects fall disproportionately on lower lifetime earners.
- Policies that would offer a path to citizenship and OASDI coverage for unauthorized workers, could also materially change OASDI benefit and tax distributions.

[23] See Tax Policy Center descriptions at http://www.taxpolicycenter.org/taxfacts/content/pdf/individual_rates.pdf.
[24] See Tax Policy Center estimates at http://www.taxpolicycenter.org/numbers/displayatab.cfm?DocID=3919.

Another aspect of complex interactions is the interplay between Social Security and other government programs such as Supplemental Security Income (SSI),[25] Workers' Compensation, and Unemployment Insurance.[26] For individuals receiving SSI, changes to Social Security may often lead to a one-to-one swap through the SSI guarantee. If Social Security benefits go down, for example through a retirement age increase, SSI benefits will generally go up for those who qualify. If, in contrast, Social Security benefits go up, for example through an enhanced special minimum benefit, SSI benefits would generally go down.[27] Another dimension of cross-program effects is the automatic deduction of Medicare part B premiums, including interactions with the hold harmless provision (Kotlikoff 2012).

Processing Sequence under Current Law: A First Step in Understanding the Arithmetic of Social Security Interactions

Computing a Social Security benefit requires completing a series of steps. Figure 1, developed by Social Security Administration analysts (Sarney and Shoffner 2015), illustrates the computation sequence in a stylized way. First one's earnings are indexed, sorted from highest to lowest, and then the top years are averaged to calculate AIME. Then one uses AIME and the PIA factors to calculate PIA. Next, it is necessary to compare the conventional PIA to other alternative PIAs (for example, for WEP) and then to the Special Minimum PIA.[28] One next applies the COLA to the PIA up to age 62/present. The next step is to apply actuarial reductions and delayed retirement credits to those claiming benefits before and after their full retirement age, respectively. Figure 2) shows a next set of steps, involving comparing one's own and then one's spouse's benefits for those who have been married for the requisite time period (generally

[25] The SSI program provides unmarried individuals with low incomes and low assets who meet other eligibility criteria a guaranteed monthly benefit of $735 in 2017. On an annual basis, this translates into about 73.1 percent of poverty. (This calculation uses the poverty guideline from the Department of Health and Human Services, given federal poverty levels from the Census are not yet available for this year.) For married couples, the 2017 monthly SSI benefit guarantee equals $1,103, about 81.5 percent of poverty when annualized. In August of 2017, about 4.5 percent of Social Security beneficiaries, including 2.7 percent of those ages 65 and older and closer to 16.0 percent of disabled individuals under age 65 were receiving concurrent OASDI-SSI benefits.

[26] Unemployment insurance interactions have received recent attention. For example, Rep. Johnson and Senator Hatch proposed legislation (H.R.918 and S. 499 of the 114th Congress, the "Social Security Disability Insurance and Unemployment Benefits Double Dip Elimination Act") that would address UI and DI interactions. The bill would require SSA to treat any month in which an individual receives unemployment insurance payments as a month in which the individual engages in substantial gainful activity for purposes of Social Security benefit eligibility, and thus could not count toward the DI program's 5-month waiting period.

[27] SSI excludes $20/per month in unearned income.

[28] Feinstein (2013) describes the limited reach of the special minimum benefit. All recent beneficiaries of the special minimum PIA were also affected by WEP.

ten years if a marriage ends in divorce, less if it is on-going or ends in widowhood). Subsequent steps include implementation of the RET. Finally, a beneficiary's actual check amount usually differs from the computed Social Security benefit because of payments for Medicare Supplementary Medical Insurance (SMI), more widely known as Part B, premium.

Depending on an individual's circumstances, this process can be quite complicated. Complications are few for an unmarried person filing for retired worker benefits with only OASDI-covered employment, no post-entitlement employment, and no disability spells. But when an individual is married, divorced, or widowed, works part-year after entitlement, spends part of their career in uncovered employment for a state and local government for which they accrue entitlement to a pension, or has received DI benefits, the calculation can be very complicated.

The sequencing of these steps is important for understanding interactions in Social Security proposals. Whether a provision is early or late in the sequence can materially affect how it changes costs and the distribution of benefits. For example, consider a proposal that reduces the AIME and/or PIA and while also reducing the COLA and increasing the full retirement age (many such plans are present in Table 1). Because the retirement age change increases actuarial reduction factors, then the incremental effects of both the COLA change and increasing the full retirement age increase will be reduced proportionately to the PIA change. Conversely, a proposal that increases the PIA relative to current law scheduled and increases the COLA (to CPI-E) would increase the COLA change's marginal effect relative to the score of the two provisions on their own.

Results: Estimated Evolution of Earnings Histories and Social Security Benefits in the SIPP Matched Data

As policymakers consider various changes to Social Security parameters, data on recent patterns in work and earnings histories and Social Security beneficiary characteristics can inform their deliberations by helping them to anticipate distributional effects and potential interactions. We thus include an appendix which displays data on several key aspects of lifetime earnings and Social Security benefits that are not readily available in government statistics. These include the extent to which men's and women's labor force participation and lifetime earnings are converging, how caregiving affects women's lifetime earnings, the distribution of work years,

which reveals how increasing computation years or "flexibilization" of retirement ages could differentially affect workers from different points in the earnings distribution, the prevalence and distribution of earnings over the taxable maximum, and how uncovered workers differ from covered workers, useful for understanding proposals that would expand coverage to newly hired state and local workers or that would change parameters such as the WEP or GPO. We also systematically examine those who have low Social Security benefits to try to understand circumstances that lead to their low benefit entitlement in order to aid policymakers in designing adjustments to promote adequacy (or vertical equity). For these analyses, we define a benefit of less than the federal poverty level for a person age 65 or older (using the couple's threshold for married people) as a low benefit.

Some of these tables focus on longitudinal metrics, taking advantage of the unique strengths of the 2008 SIPP matched data, which pair high-quality earnings benefit receipt and mortality and nativity information with detailed self-reported information on characteristics like education, marriage and fertility experiences, and race/ethnicity.[29] Several tables replicate or update tables and graphs shown in earlier Urban Institute work. For example, the tables on the extent to which men's and women's earnings are converging update and expand upon Favreault and Steuerle's 2008 analyses, which used data through 2004. The tables on the distribution of years of earnings over the taxable maximum update Favreault and Haaga's 2013 work, which used data through 2010. The tabulations on low Social Security benefits and how these relate to low lifetime earnings update an early study by Favreault (2010), which focused on data from 2003. Waldron (2013) provides similar estimates on analogous metrics, which we replicate and update. Regular updates are important, because rapid changes in women's work years over time can make cohorts entering or currently in retirement unrepresentative of their successors (Blau and Kahn 2016, Goldin 2014). For the taxable maximum statistics, lifetime measures are less censored now, given the 1981 start for reliable data above the maximum (we can now see a 31-year history with the current policy in place).[30]

[29] We are thus able to compare total lifetime earnings by these characteristics for those entering retirement today. We supplement some of these full cohort analyses with synthetic cohort analyses which combine information on each of the cohorts reaching each age. Jacobsen, Khamis, and Yuksel (2014) give one recent example of similar analyses of synthetic cohorts to understand the evolution of women's earnings relative to men's.

[30] Uncapped earnings are available in administrative records only from about 1978, making it impossible to observe a full lifetime in the period since the taxable maximum was indexed to wage growth.

These tabulations are geared at better understanding the potential distributional implications of changes like increases in the taxable maximum earnings, changes to computation years, caregiver credits, minimum benefits, and spouse and survivor benefits and can shed insight into potential parameter interactions.

Appendix Table 1A shows average years of work at five-year age intervals for every fifth single-year birth cohort, separately for men and women. The table reveals that while men's employment continuity has remained quite stable, women's increased steadily. Appendix table 1B considers the median work years to each age for men and women. For both men and women, the medians tend to be higher than the means. Appendix Table 1C shows the 75th percentile. The gap between men's and women's median is narrower than the gap in means, and non-existent at younger ages.

Appendix Table 2 shows the relationship between work years through age 60 for the 5 cohorts that reached that age by 2012 and their highest annual earnings to that age. It specifically displays the mean, median, 25th and 75th percentiles, separately for men and women. When we look within groupings of people by their highest observed earnings, gaps between men and women's work years narrow (i.e., men whose earnings never exceed the lowest value displayed work far fewer years than men reaching higher earnings categories). Women are more likely to work more years without reaching high earnings than men. These results are not surprising given the roll of experience in earnings growth.

Appendix Table 3 considers some of the birth cohorts that have most recently reached age 62 (the 1946 to 1950 birth cohorts). It shows the full distribution of years worked, by sex, using three different definitions of a work year: any earnings, earnings of at least four Social Security covered quarters (equal to about $4,880 in 2015), and earnings of at least half time, half-year at the federal minimum wage (equal to about $7,250 in 2015). The table shows estimates for four separate populations: a) all people; b) population A, excluding any immigrants who arrived to the US later in adulthood (after at least 10 years); c) population B, excluding anyone who received DI worker benefits; and d) population C excluding those who spent a substantial share of their career in uncovered employment. The table reveals that a large share of workers earn for more than the 35 years on which Social Security bases benefits, even with the more stringent definitions of earnings. This is true for both men and women, but especially so for men. The table also underscores the importance of sample definitions. Policymakers

wishing to target only those who receive retired worker benefits who have lived in the US a long time may wish to target adjustments differently than those interested also in the DI population or uncovered workers.

Appendix Table 4 aims to account for some of the differences in work experience between men and women. It repeats the Table 1 analyses, but focuses on those who reached each of the focal ages in the last five years for which we have complete administrative data (2008-2012).[31] It also classifies women by the number of children they report having had at the time of the SIPP survey interview (in topical module 2). It reports a clear association between the number of children women have had and the average number of years that they worked to each age. It's important to note that many of those women with 3 or more children have very substantial work histories. In recent years, women without children only worked on average one or two years fewer than men.

Appendix Table 5 shows how these work years differences for women with different numbers of children play into their lifetime earnings. We define lifetime earnings by summing annual earnings which we have converted into real dollars ($2015) and accumulated using the real interest rate from the OASDI Trustees report. We round all values to the nearest $1,000 to discourage inappropriately precise interpretation. We display both median and mean values and show five separate five-year birth cohorts to attempt to gauge how these accumulated earnings are changing across birth cohorts. For each successive cohort, five fewer years are included in the earnings computation due to censoring. For this table, and many of the subsequent appendix tables, we restrict our sample to those who spent fewer than 10 working age years outside of the United States to help limit confounding of immigration with the variables of interest (fertility, race/ethnicity, education). Such issues—and their implication for Social Security policy—are well explored elsewhere (Favreault and Nichols 2011, Gustman and Steinmeier 2000). The gaps between means and women's cumulative earnings to date are larger than the gaps in work years, underscoring that convergence in men's and women's employment prevalence has not lead to as much of a narrowing in total earnings, reflecting important differences in hours of work and wages.

Appendix Table 6 shows this same lifetime earnings measure, but this time classifying people by education, once more looking by sex and cohort. For both men and women, the

[31] This is a synthetic cohort of sorts.

earning-education gradient is quite steep. At the same time, highly educated women's earnings more closely track the earnings of less educated men. Appendix Table 7 displays differences in lifetime earnings by race and ethnicity, again by sex and cohort. It reveals enormous differences in the experiences of those from different groups. Mean lifetime earnings of non-Hispanic Asian or Pacific Islanders often track those of their non-Hispanic white counterparts. Non-Hispanic blacks and Hispanics tend to have much lower lifetime earnings than non-Hispanic whites.

Appendix Table 8 combines information on educational attainment and number of children for women to try to ascertain the extent to which women with different skill levels and thus with different earnings potential are affected by raising children. Highly educated women with three or more children on average earn significantly more than less educated women with no children.

Shifting gears, appendix Tables 9A and 9B show persistent high earnings—defined as earnings over Social Security's current law taxable maximum—are, and how this varies by gender and education, for a cohort that recently reached the EEA: those born from 1946 to 1950. About 40 percent of the men in this cohort earned over the taxable maximum at least one time since 1981, compared to about 10 percent of the women (appendix Table 10). Roughly one fifth of those who earned over the maximum did so for just one year—about a third for women. At the other extreme, about a quarter of men did so for at least 20 years, as did about 9 percent of women. The pattern by education for these same cohorts is quite striking (appendix Table 10). Majorities of men with college or advanced degrees will exceed the maximum once, compared to closer to a quarter or fifth of women.

The Social Security Administration translates lifetime earnings into OASDI benefits using complex calculations. Appendix Table 10 replicates Waldron's earlier work and considers a few more characteristics to help readers develop intuition about how various changes to the Social Security formula might affect various demographic groups. It specifically shows the brackets of the PIA formula into which workers in various demographic groups fell in the most recent cohorts reaching age 62 for which we have data. To validate our work against Waldron's, we have used the same analytic strategy, focusing on those who are eligible for retired worker benefit and who have not claimed DI benefits.

The table reveals that most people qualifying for retired worker benefits in these cohorts will have a PIA that falls into the second—32 percent—bracket of the benefit formula. Men in

this cohort are more closely split between the middle and upper—15 percent—brackets, with 52 percent in the middle bracket and 42 percent in the upper bracket. Women are more solidly concentrated in the middle bracket, with 73 percent of those who qualify as workers with earnings falling there. The remaining women who qualify as worker beneficiaries are more likely to have earnings in the lowest—90 percent—bracket than in the highest bracket. The relationship between education and lifetime earnings brackets is very strong. Nearly half of those with more than a college degree fall in the highest bracket, compared to just six percent of those with less than a high school diploma. Looking just at men, the share of those with more than a college degree in the highest bracket jumps to nearly two thirds. For women, having more children leads to greater chances of falling into a lower PIA bracket. For example, 25 percent of those with three or more children who qualify as workers fall into the lowest bracket, compared to less than half that share among those with zero children or just one child. A larger share of women than men do not qualify as worker beneficiaries, but rather as spouses or survivors, so that context should be considered when interpreting these results.

Appendix Table 11 displays the intersection of median work years using three different definitions of a work year by AIME deciles, again for the most recent cohorts to turn age 62 in our data and once more excluding those who received DI or would not qualify for Social Security worker benefits. This helps us to understand how policies that depend on work years could affect retired workers at various points in the benefit distribution. We see that in this sample of current and potential retired worker beneficiaries, the median person in each of the top five deciles (deciles six through ten) of the unisex AIME distribution has more than 40 work years regardless of the definition of a work year that we use. Examining sex-specific AIME deciles, we find that even in some of the low deciles work years can be significant. For example, in the third decile of the men's AIME distribution, the median man worked for 40 years using a definition of a work year based on any earnings and worked for 36 years using the more stringent definition of earnings of at least half time work at the minimum wage (as defined in appendix Table 3). The analogous median woman in the third decile using women's AIME as a classifier worked for 29 years using any earnings to count work years and 23.5 years when counting earnings of at least half time at the minimum wage.

Appendix Tables 12 and 13 turn to Social Security benefits, specifically trying to examine who has low Social Security benefits, and thus high poverty risk.[32] The goal for these tables is to inform those trying to reduce or eliminate poverty what groups they might wish to target and what technical approaches might be more or less successful.[33] The tables display two separate columns: one that displays worker benefits alone and one that describes the couple benefit for those who are married.[34] For the sake of brevity, we focus on those ages 62 and older in 2009, the year in which we have the cleanest measurement of their characteristics in SIPP so that the results will be minimally affected by attrition. (Tabulations including DI beneficiaries or looking at just ages 65 and older are also available.) Appendix Table 12A clearly reflects many of the same patterns that we see with lifetime earnings earlier in the appendix. Women, African-Americans, Latinos, and the foreign born are at high risk of having low Social Security benefits.[35] When we look within the foreign-born population, those arriving in the US relatively late in their careers and those from less economically developed countries are far more vulnerable than those arriving earlier from more economically developed countries.[36] DI beneficiaries, especially those with early disability onset have higher rates of sub-poverty benefits. Because women have much higher rates of low benefits, we consider how effects of other characteristics may vary by gender (appendix Table 12B). The effects of most of the demographic characteristics are especially powerful for women. For example, there is an 18-

[32] Clearly, family-size adjusted income better reflects economic well-being than Social Security benefits alone. But given Social Security's status as the sole, inflation-protected source for so many disabled and older adults, this statistic gives an important indication of vulnerability, for example, once a person spends down his or her wealth later in life and income sources outside Social Security may be very limited. Information on income relative to poverty for 2014 beneficiaries is available in Social Security Administration (2016).

[33] Appendix figure 1 shows the distribution of retired and disabled worker benefits in 2015.

[34] For individuals who do not match to the administrative records, we use self-reported Social Security benefits.

[35] An important related question is who never receives Social Security benefits. Whitman, Reznik, and Shoffner (2011) explore this issue, and conclude that many of the same groups as shown here having low benefits are likely to have no benefits.

[36] We reclassify place of origin into a single binary classification for more- and less-economically developed countries, using GDP per capita of the reported country of origin as a rough indicator. We use a cutoff of 15,000 in international dollars GDP per capita, based on based on ranking of the World Bank (2010). This dividing line falls between Russia and Mexico, with Russia considered more developed and Mexico less developed. This concept is similar to "Global North" and "Global South" employed in other literature. For convenience, we sometimes drop the modifier economically developed. The line between more and less economically developed is of course arbitrary (and thus limited). The measure is not as accurate we would like because SIPP aggregates country of origin, especially in 2008, and national boundaries change (for example, transitions in Eastern Europe like the break-up of the former Yugoslavia into several countries, some of which are not included in SIPP codes and which differ in their relationship to the threshold). It also may not reflect the country's relative economic level at the time the immigrant came to the United States (i.e., it typically better reflects relative economic development for those who have arrived more recently).

point gap in sub-poverty benefits between non-Hispanic white and non-Hispanic black men, but a 23-point gap for the corresponding women. Being unmarried is far more consequential for women than for men. Education is highly protective for both men and women, but much more so for men, even after including family benefits.

Appendix Table 13 turns to how low Social Security benefit prevalence relates to work histories. One goal of the tables is to inform issues like minimum benefit design. Such benefits are often tied to years of work, sometimes referred to as years of coverage (YOCs). Consistent with our prior work from earlier years (Favreault 2010), low benefits are most prevalent among those with very limited work (13A). Again, we see important patterns when we consider gender and work experience together (13B). At very low work years, women are better protected than men; no doubt this arises due to their entitlement to spouse and survivor benefits from Social Security. At all other levels, men appear to be better protected than women, likely reflecting greater within-group earnings.

Appendix Table 14 presents the prevalence of employment that is fully uncovered by Social Security by selected characteristics.[37] About 4 percent of the earners in our sample did not have any OASDI-covered earnings in the year. In 2008, the Social Security Office of the Chief Actuary estimated that about 94 percent of workers were covered by Social Security (Table 1, Special Committee on Aging 2010). Distributionally, such earners are bit more likely to be women and enrolled in some form of schooling. They are less likely to be foreign born than native born. Perhaps most compelling is the strong educational gradient for the prevalence of fully uncovered employment. This translates into higher prevalence among higher earners.

Results: Interactions among Two Parameters with Age-Graded Effects

Given this context about earnings and benefits stand under current law, we return to the question of how interactions between Social Security parameters could play out if Congress were to enact changes to the program. We begin with the combination of a COLA reduction and a long-term beneficiary bump-up. As Table 1 indicates, both are commonly mentioned parameters, and they frequently occur in the same package. It is well documented that a COLA reduction leads to compounding reductions relative to current law that will disproportionately

[37] We additionally considered those with partially uncovered employment. Many who work uncovered jobs also have OASDI-covered employment. We hope to further analyze such cases and release these tabulations in future work.

reduce the benefits of long-term beneficiaries (e.g., Olsen 2008). The long-term beneficiary bump-up, in contrast, applies only to those who have either reached a certain age or have received Social Security for a given number of years. No doubt, awareness of these patterns has led many to consider combining them when developing packages.

Here we explore the effectiveness of the combination. We consider a COLA reduction of 0.004 percentage points annually (corresponding roughly with a shift to chained CPI) and an old-age benefit increase that phases in gradually over five years, from age 81 through age 85. The benefit bonus equals one percent of one's own benefit at 81, increasing to 5 percent by age 85. Figure 3 shows how the two act on their own and in combination at two points in time, 2030 and 2050. In 2030, the old-age benefit adjustment cushions most of the COLA reduction. By 2050, however, the effect of the benefit enhancement in offsetting the COLA reduction is less significant in relative terms.

Results: Taxation of Benefits

The taxation of Social Security benefits is an important interaction in this context for several reasons. A first is that its effects are projected to grow over time. OACT projects that taxation of benefits comprised about 3.8 percent of revenue from payroll tax and benefit taxation in 2014, but that by 2031 it will comprise closer to 6 percent of the total. Also, its effects vary by many important distributional characteristics, like lifetime earnings and marital status, and by benefit size (i.e., because the tax is levied on a percentage of one's benefits, those with lower benefits can have higher tax liabilities as a share of benefits than those with higher benefits but the same total taxable income). Further, many legislative and commission proposals over the years have included modifications to the taxation of benefits (e.g., Aaron-Reischauer 1998, Larson 2015, Chaffetz 2011, Warshawsky 2009). Some analysts contend that the taxation of benefits may be superior to AIME/PIA-based approaches because legislators can better target those with low resources (e.g., Herd 2009). Post-tax benefits may measure economic well-being more comprehensively than gross Social Security benefits. Large changes to benefits may be offset by changes to taxes. Another important aspect of revenues from taxation of benefits is that they can be sensitive to fluctuations in non-OASDI income, like capital gains and asset income.[38]

[38] I thank David Pattison of SSA for emphasizing this point.

Figure 4 juxtaposes DYNASIM projections of pre- and post-tax Social Security benefits at three different points in time.[39] When describing personal income taxes paid on Social Security benefits, we include both taxes on benefits that are directed to the OASDI Trust Fund and those that are directed to the HI Trust Fund.[40] We see that throughout our projection period, taxation of benefits falls more heavily on those in upper percentiles of the poverty-adjusted income distribution.[41]

We next see how the taxation of benefits interacts with provisions to change Social Security benefits or taxes to reduce the program's long-range fiscal imbalance. We juxtapose three alternative scenarios: one with a proportional (6 percent) reduction in benefits, one with a reduction in benefits that falls more highly on those with moderate to high earnings (the 32 percent replacement percentage in the PIA formula drops to 30 and the 15 percent replacement percentage drops to 6 percent), and a third that falls only on those with relatively high earnings (the 15 percent replacement percentage drops to 1 percent). Figure 5 shows the percent of the benefit reduction that is offset by decreased income taxation of Social Security benefits by income decile in 2045. With the reduction solely to the highest replacement percentage, income tax liabilities fall proportionately more, especially in the middle of the poverty-adjusted income distribution. The option with the reductions in the second and highest bracket closely follows, also leading to significant offsets. The more uniform change instead leads to greater offsets for those with higher incomes. It is thus important to bear in mind that any change to the benefit formula, for example through the bend percentages, is not the only relevant reduction: there can be important and highly differential changes to personal income tax liabilities.

[39] DYNASIM's tax calculator uses annual projected tax unit income and assets from the SIPP panels matched to a Statistics of Income (SOI) data file that includes itemized deductions and other variables needed to calculate personal income taxes. The tax calculator uses current law federal income tax rules, including provisions of the American Tax Relief Act of 2012 (ATRA). Tax provisions affecting the treatment of Social Security benefits have not changed since 1993, but the share of Social Security benefits included in taxable income is continually increasing under current law partly because the threshold levels for including benefits in taxable income are not indexed for inflation. The tax calculator requires information about future tax law. With the exception of the Social Security thresholds, which are assumed to remain constant over time, DYNASIM inflates thresholds in the tax calculations—such as those used to set progressive tax rates—by projected changes in the Consumer Price Index (CPI) through 2024 and by wage growth thereafter.

[40] When discussing financing issues, it may be useful to disentangle these two separate revenue streams. We do this in other work (Favreault and Johnson 2016).

[41] Another aspect of taxation of benefits, which we do not address here, is the exclusion of employer payroll taxes from income tax (see Coe, Karamcheva, Kopcke, and Munnell 2011).

Recommendations

As our methods section noted, we have used stylized simulations of benefit provisions and a few very simple combinations to facilitate clear illustration. However, the process of determining a Social Security benefit can be quite complex for individuals in selected circumstance (for example, earners below RET who have dependents). This complexity evolved with good reason. Members of Congress and program administrators wanted to prevent and/or discourage certain payments/behaviors not consistent with objectives: they wanted working beneficiaries and those covered by public pensions not to be treated as workers with low AIMEs without pension coverage. However, when viewed comprehensively the sum total of these provisions is an enormously complex system that is not always transparent, even to fairly sophisticated participants.

In this context, some simplification could be warranted to improve transparency. The Congress recently removed the "file and suspend" option for Social Security claiming for new entitlement cohorts. This strategy, one of many complexities in the claiming decision,[42] was arguably at odds with the law's intentions. This experience shows that it is possible to simplify Social Security rules in ways that promote equity.

Another area that might improve Social Security's ability to target current and future beneficiaries as efficiently as possible is to facilitate and promote greater data sharing across different segments of the federal government.[43] Such sharing could increase the range of design options under consideration, including care credits or options based on Adjusted Gross Income (AGI).

Caveats

We have just scratched the surface of possible combinations and interactions in Social Security proposals. Our goal for these analyses is to illustrate interactions that policymakers should consider and describe special features of the earnings and benefit distributions, rather than to provide a comprehensive catalog of their cost and distributional effects.

As with any projection exercise, our analyses provide a best guess under some stylized assumptions. How any future Social Security changes play out will depend on many factors.

[42] Kotlikoff, Moeller and Solman (2015) catalog a range of strategies for maximizing family benefits. Mahaney and Carlson (2007) and Kotlikoff (2012) provide additional discussion.
[43] I am grateful to SSA colleagues for their emphasis of this point.

These include how well the economy does, the extent to which economic growth and life expectancy increases are shared across the population, how Congress modifies the tax code in the future, and the extent to which future beneficiaries change their work and savings behaviors as these changes phase in. Modelers can consider estimates of how past changes (for example, the gradual increase in the full retirement age from 65 to 66 for the 1938 to1954 birth cohorts, with the continuation to age 67 for those born from 1955 to 1960) have changed behavior from the literature and integrate these estimates (for example Song and Manchester 2007), but past experience may not adequately predict future responses.

Conclusion

As we approach the point at which the Social Security Trust Fund will be exhausted, it becomes increasingly likely that any change to restore the program to 75-year fiscal balance will include multiple, interacting components. Policymakers can produce more effective policy proposals when they take into account interactions. This will help to reduce unintended distortions and improve Social Security's adequacy, equity, and efficiency.

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Detail: http://www.washingtonpost.com/wp-srv/politics/polls/postkaiserpoll_20120805.html

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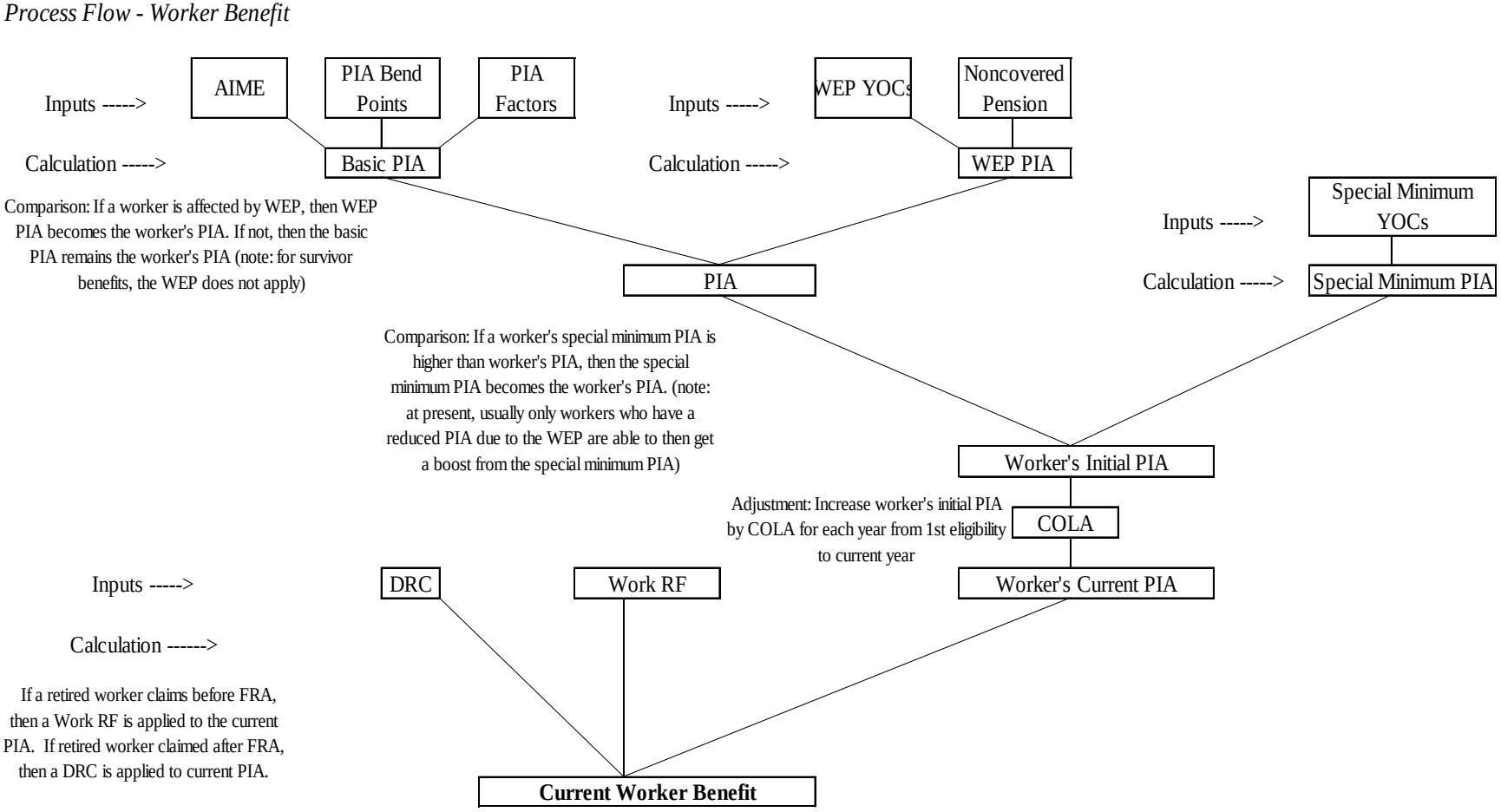
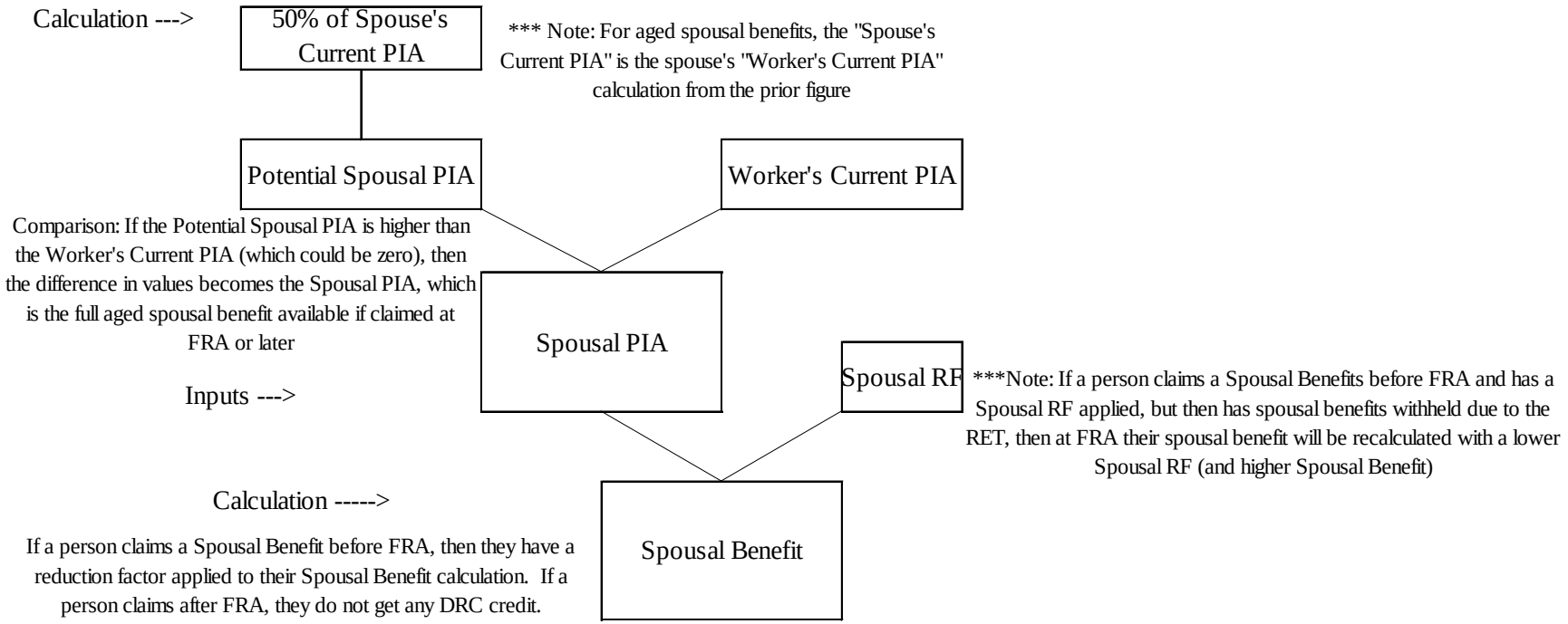
Figure 1. *Order of Operations for Computing a Social Security Worker Benefit*



Source: Sarney and Shoffner (2015).
Notes: Note that RET-related adjustments may also apply in some circumstances.

Figure 2. *Order of Operations for Computing a Social Security Spousal Benefit*

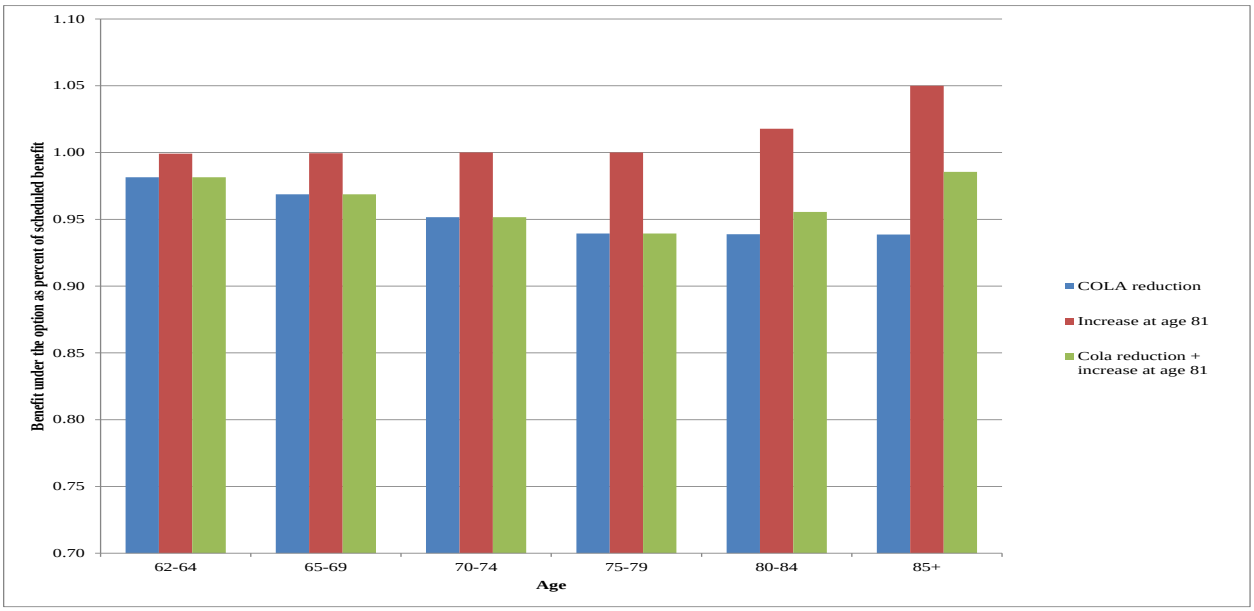


Note: For dually entitled spouse beneficiaries, who receive a work benefit and a spousal benefit, if they claim each of these benefits at different ages, this can lead to interesting results from policy changes, since the work RF that is applied to the work benefit can be a different value than the spousal RF that is applied to the spousal benefit. For example, if a person claims a work benefit at age 62 and then a spousal benefit at FRA, if a policy change boosts this person's work benefit (such as through an increase in the minimum PIA), this person may ultimately have a smaller total benefit, because their work benefit would be a bigger portion of their total benefit, and the work benefit would have the work RF applied from claiming at age 62, while the spousal benefit component would not have a spousal RF applied to it due to claiming at FRA.

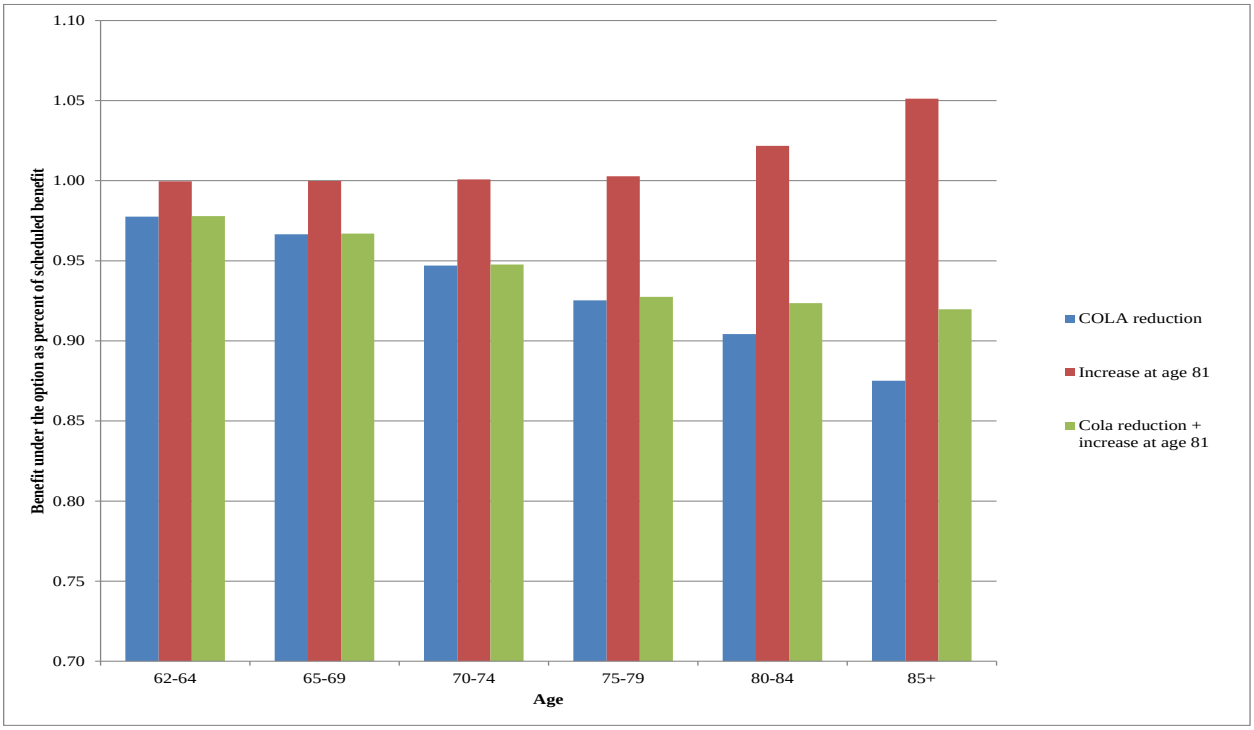
Source: Sarney and Shoffner (2015).

Figure 3. *Social Security Benefits as a Percent of Current Law Scheduled Benefits under 3 Options: A Reduction in a COLA, a Benefit Increase for Those Ages 81 and Older, and the Combination of the COLA Reduction and the Benefit Increase at Older Ages, 2030 and 2050*

A. 2030



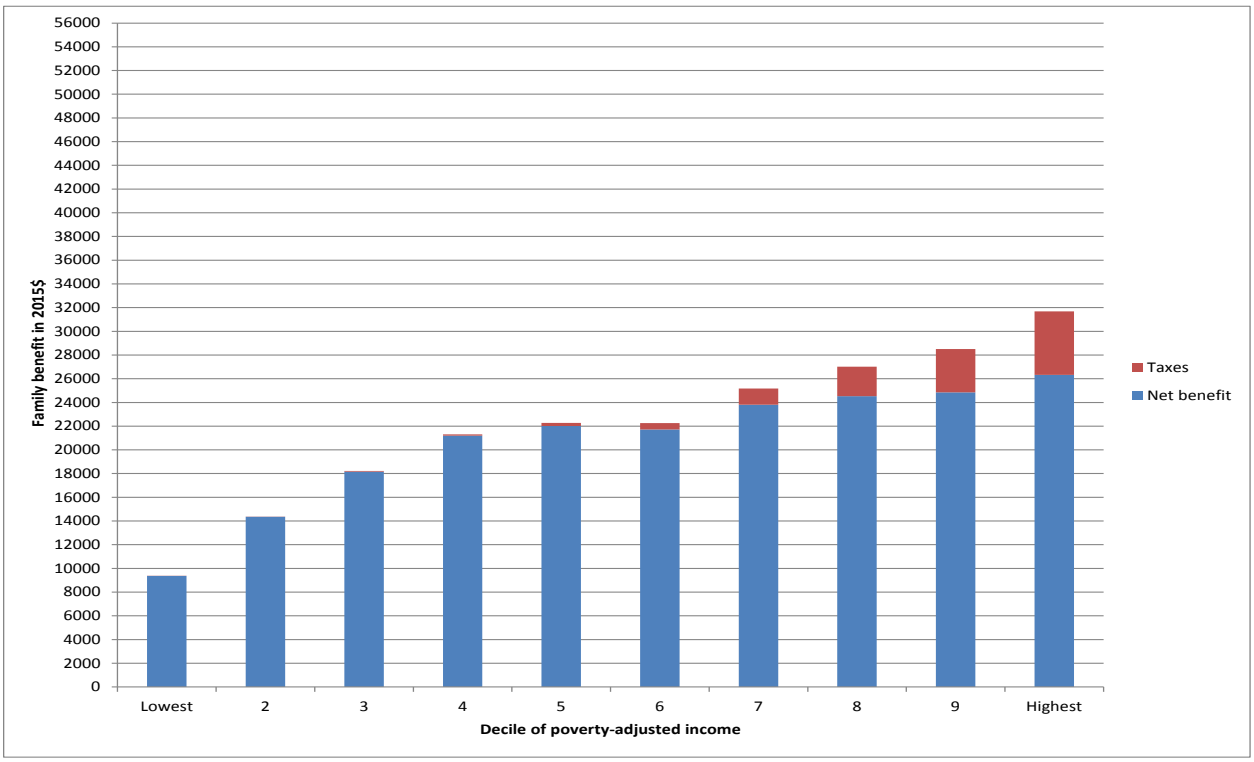
B. 2050



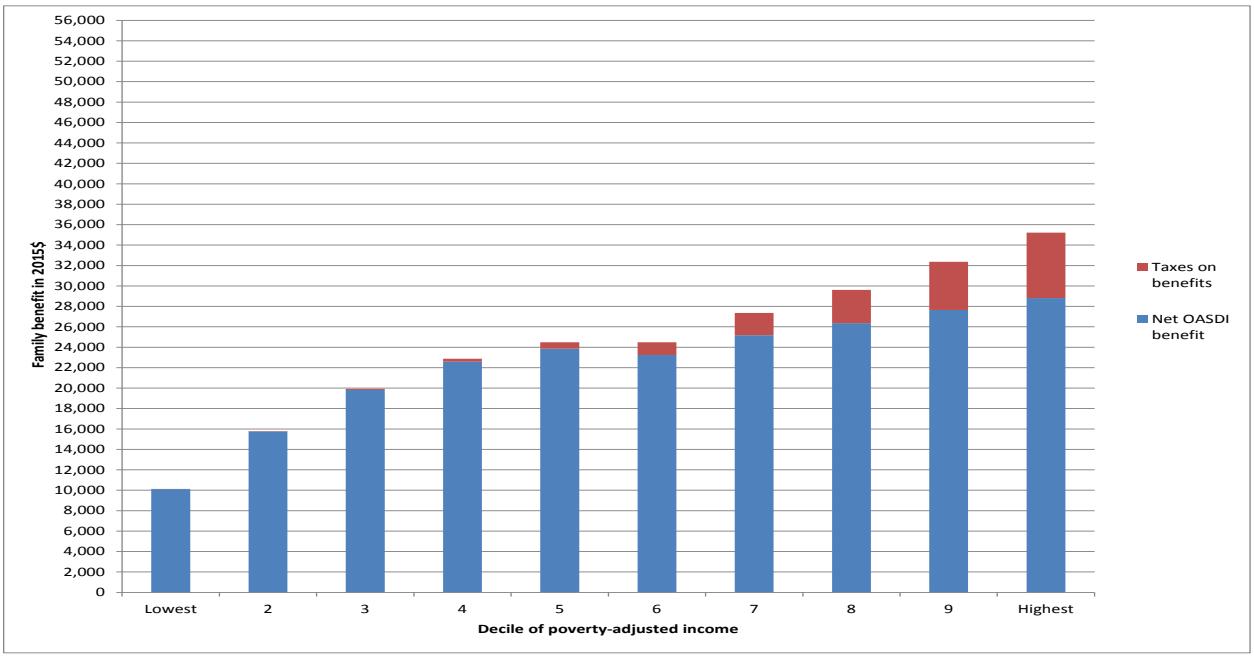
Note: Vertical axis does not start at zero.
Source: Author's tabulations from DYNASIM (run 919).

Figure 4. *Mean Pre- and Post-tax Social Security Benefits and Personal Income Taxes on Benefits by Poverty-Adjusted Income Decile, 2015 Dollars, in 2015, 2025, 2045, and 2065*

A. 2015



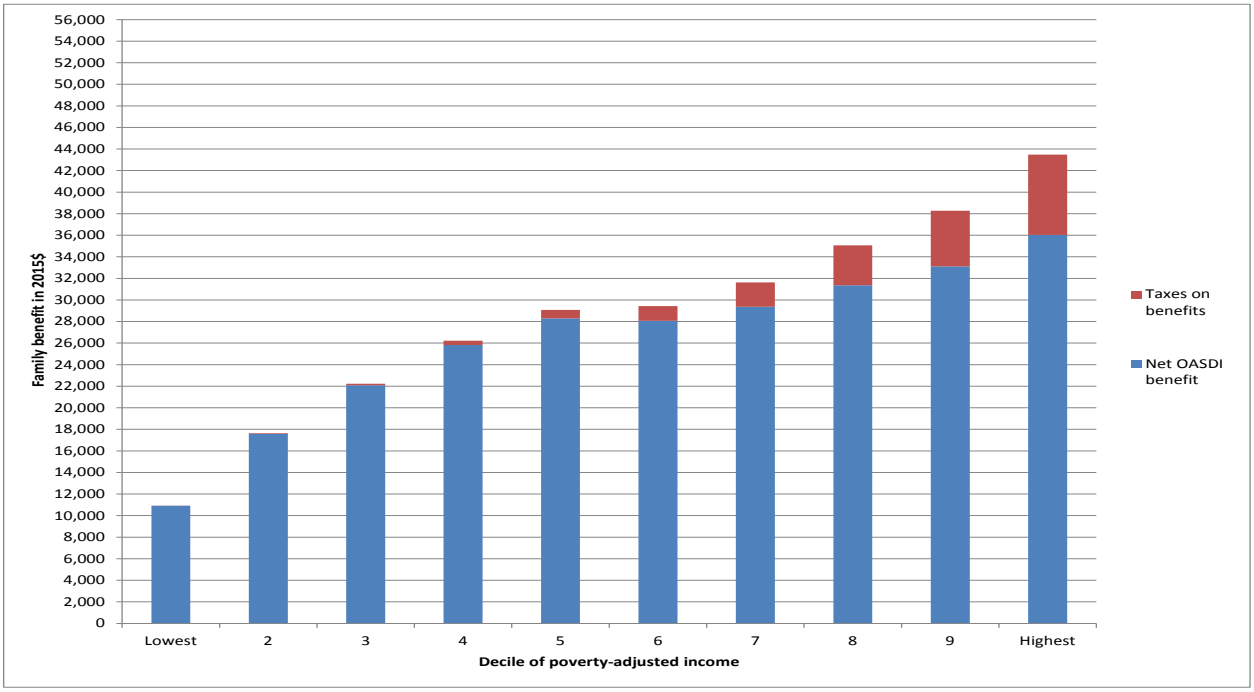
B. 2025



Source: Author's tabulations from DYNASIM (run 918).

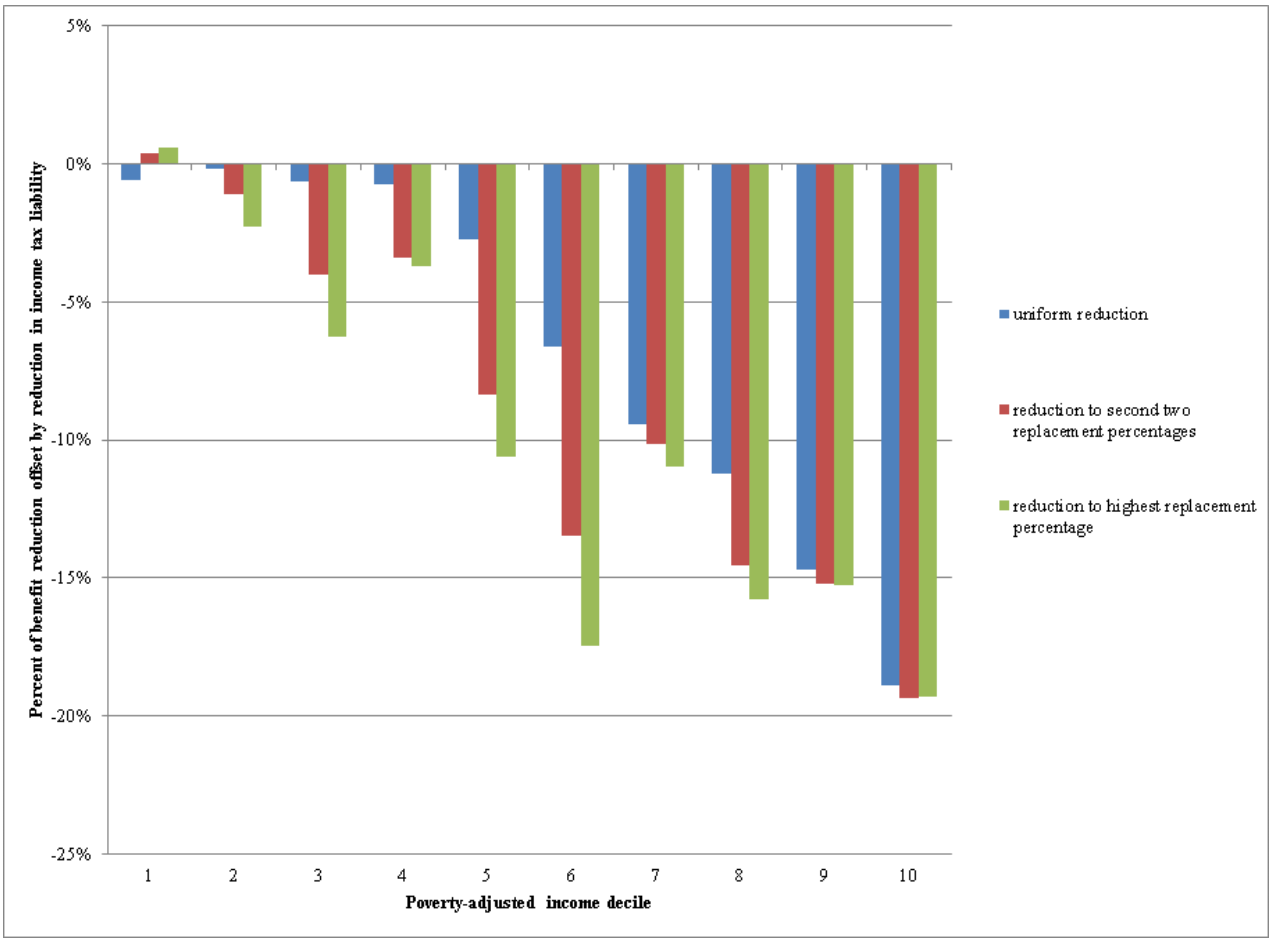
Figure 4. *Mean Pre- and Post-tax Social Security Benefits and Personal Income Taxes on Benefits by Poverty-Adjusted Income Decile, 2015 Dollars, in 2015, 2025, 2045, and 2065* (continued)

C. 2045



Source: Author's tabulations from DYNASIM (run 918).

Figure 5. *Percent of Social Security Benefit Change that is Offset by a Reduction in Income Taxes, by Income Decile, under Three Options that Reduce Benefits*



Source: Author's tabulations from DYNASIM (run 919).

Table 1A. *Selected Proposals to Modify Social Security: Summary of Selected Provisions, Focusing on Proposals with Benefit Reductions and Increases in Revenue*

Author/Sponsor (year)	Increase revenues (rates or base)				Payroll reduce/ exempt	Income tax (incl means test)	Reduce benefits							Other, including benefit increases								
	Payroll	Tax max	Other taxes	State & local			FRA/lngindx	EEA	Reduce PIA/ growth: PI/PPI	COLA lower	Computyrs	PIA by year	Spousal	Long-term	Survivor/sp	Hardship	WEP/GPO	COLA CPI-E	PRA	Income tax	Minimum	First bend
Social Security proposals with benefit reductions and increases in revenue																						
Aaron-Reischauer (1998)				X		X	X	X		X	X		X		X							
Commission on Retiremnt Sec Pers Savings (CRSPS) (2016)	X	X				X	X		X he	X		X			X		X				X	X
Diamond-Orszag (2004/2005)	X	X	X	X			X		X he												X	
DRTF (Rivlin-Domenici) (2010)		X	X	X			X		X he	X				X							X	
Kolbe-Boyd (2007)		X					X		X	X	X		X		X				X		X	
Liebman, MacGuineas, Samwick (2005)		X					X		X										X			
NCFRR/Bowles-Simpson (2010)		X		X			X	X	X	X				X		X					X	
NRC/NAPA (2010): Option 2	X								X													
NRC/NAPA (2010): Option 3	X	X							X													
Ribble (2016)		X					X		X he	X	X			X							X	
Warshawsky (2009)		X		X	X	X	X*	X	X		X								X			

Notes to Table 1A and 1B: Table does not include proposals that are not geared at substantially improving long-range fiscal balance. For brevity and simplicity, we do not necessarily include every provision in every plan. There are often very large differences in specification within any single provision in the table. The goal is to identify in a high-level way the general types of provisions that have appeared in proposals in recent years, not to provide specific details, which are available elsewhere. Please consult the proposed legislation or reports, cited in the references, for more precise description. See glossary on page 44.

Table 1B. *Selected Proposals to Modify Social Security: Summary of Selected Provisions, Focusing on Proposals with Benefit Reductions or Increases in Revenue*

Author/Sponsor (year)	Increase revenues (rates or base)				Payroll reduce/ exempt	Income tax (incl means test)	Reduce benefits							Other, including benefit increases								
	Payroll	Tax max	Other taxes	State & local			FRA/lngindx	EEA	Reduce PIA/ growth: PI/PPI	COLA lower	Computyrs	PIA by year	Spousal	Long-term	Survivor/sp	Hardship	WEP/GPO	COLA CPI-E	PRA	Income tax	Minimum	First bend
Social Security proposals with increases in revenue and limited or no benefit reductions																						
Crist (2017)		X				X																
Larson (2015)	X	X																X		X	X	X
Lawson (2017)		X													X			X			X	
Deutch (2010)		X																X				
Deutch/Hirono (2017)		X																X				
Harkin (2013)		X																X				X
Moore (2013)	X	X												X							X	
Sanders (2015)			X**			X												X			X	X
Sanchez (2016)		X													X			X				X
Social Security proposals with benefit reductions and limited or no increases in revenue																						
Christie (2015)						X	X	X		X				X								
Chaffetz (2011)						X	X		X	X	X			X					X		X	
Coburn (described in Goss 2011)							X		X	X			X									X
Hutchison (2011)							X	X		X												
Johnson (2016)						X-	X		X	X		X	X	X	X						X	
Lummis (2011)							X	X														
Ryan (2010)			X+				X		X										X			

Notes to Table 1A and 1B: Table does not include proposals that are not geared at substantially improving long-range fiscal balance. For brevity and simplicity, we do not necessarily include every provision in every plan. There are often very large differences in specification within any single provision in the table. The goal is to identify in a high-level way the general types of provisions that have appeared in proposals in recent years, not to provide specific details, which are available elsewhere. Please consult the proposed legislation or reports, cited in the references, for more precise description. See glossary on page 45.
+=apply OASDI tax to employer health insurance

Glossary for Tables 1A and 1B:

Payroll: Provisions that would increase the OASDI payroll tax rate.
TaxMax: Provisions that would increase the Social Security earnings and benefit base, sometimes known as taxable maximum or abbreviated to "taxmax," or apply surtaxes to earners over the taxable maximum. Some such proposals pay benefits on the newly covered earnings, others do not.
Other taxes: Provisions that would raise revenues outside the payroll tax.
State and local: Provisions that would extend OASDI coverage to newly hired state and local workers.
Income tax (incl means test): Provisions that would increase taxation of benefits (e.g., treat Social Security like a private pension.)
FRA/Indxing: Provisions that would either increase or index the full retirement age.
EEA: provisions that would increase the earliest eligibility age.
COLA: Provisions that would reduce COLA or shift to chained CPI.
Reduce PIA growth / PPI: Provisions that would reduce rate of growth of benefits or reduce upper bend percentages ("he" refers to changes in bend percentages for the highest earners).
He: see "Reduce PIA growth" immediately above.
Computyrs: Provisions that would increase the base for computing AIME from the highest 35 years.
PIA by year: Provisions that would apply the PIA formula annually and then average, rather than averaging years and then applying the PIA formula.
Spousal: Provisions that would modify spousal benefits.
Long-term: Provisions that would boost benefits of older and/or long-term beneficiaries.
Survivor: Provisions that would boost survivor benefits, for example by basing them on combined benefits before the death of a worker.
Hardship: Provisions that would protect lower earners in event of an EEA increase.
COLA CPI-E: Provisions that would shift COLA to CPI-E, which accounts for expenses of the elderly (likely to increase COLA).
PRA: Provision to institute Personal Retirement Accounts.
Income tax: Provisions that would increase thresholds for taxation of benefits.
Minimum: Provisions that would boost benefits for low lifetime earners.
First bend: Provisions that would boost replacement percentages below the first bend point.
WEP/GPO: Provisions that reconfigure the Windfall Elimination Provision or Government Pension Offset.

Table 2A. *Distributional Effects of Selected Provisions that Reduce Social Security Benefits*

Provisions	Distributional features
Change to COLA	Could affect current beneficiaries at time of implementation (as opposed to only future beneficiaries). Compounds over time, so tends to affect older beneficiaries or long-term DI beneficiaries proportionately more. Follows computation of PIA, so magnitude of a marginal change depends on PIA changes (Olsen 2008).
FRA increase	Cohort-specific proportionate reduction in cross-section benefits. On a lifetime basis, may keep benefits more consistent across cohorts. Exempts disabled workers unless otherwise specified, leading to an increasing gap between DI benefit and early benefits, for example at the early eligibility age. Ties to RET.
Longevity indexing	Similar to FRA increase, except typically does include DI beneficiaries when reducing benefits and does not tie to RET.
Progressive price indexing	Cohort-specific benefit reductions that grow with each successive cohort that also vary by lifetime earnings, growing with lifetime earnings within cohort. Typically those below a given percentile in the PIA distribution are exempt from reductions. Eventually, benefits become flat as upper PIA factors fall.
Computation years increases	Those groups with more intermittent work histories (for example, women with children, those with lower educational attainment) are likely to see proportionately larger reductions, though spouse and survivor benefits can offset to some degree. Effects may depend on treatment of disabled workers and survivors. See tables 2 and 3 in the appendix.
EEA increase	May impose hardship on those who have left the labor force prior to age 62 who are not eligible for or do not receive DI benefits, a group that is often economically vulnerable. Many speculate that such a change could increase labor supply among those with work ability.

Note: Taxation of Social Security benefits is included in Table 2B, with proposals that increase revenue, though one can think about increases in personal income taxes as reducing net benefits.

Table 2B. *Distributional Effects of Selected Provisions that Increase Social Security Revenues*

Provisions	Distributional features
Increase payroll tax rate	Likely to affect those in lounger/future cohorts proportionately more because more of their careers will occur under the higher tax rates (e.g., Shoffner 2010). Within cohorts at a point in time, affects those above the taxable maximum proportionately less than other workers unless combined with a provision that broadens the base. Likely to reduce cash wages when implemented through increase in employer rate (e.g., CBO 2015).
Increase taxable maximum	Affects approximately 6 percent of earners in a given year, far more men than women. Over a lifetime, closer to 17-25 percent are likely to be affected (Favreault and Haaga 2013; see also tables 11A and 11B in the appendix), assuming current patterns continue. Most who ever earn over taxable maximum do so for less than 10 years, but about 40 percent exceed the maximum for 20 or more years. Distributional effects on benefits will depend greatly on whether and if so, how, the new revenues are counted toward benefits. If they are counted, taxation of benefits could have important effects on net benefits.
Surtax on earners substantially over taxable maximum (e.g., $300,000)	In 2014, about 1.83 percent had net compensation >= $200,000, about 1.17 percent had net compensation >= $250,000, about 0.82 percent had net compensation >= $300,000, about 0.47 percent had net compensation >= $400,000, and about 0.30 percent had net compensation >= $500,000 (see http://www.ssa.gov/cgi-bin/netcomp.cgi?year=2014); the share earning over one high threshold doubles over a longer period (Favreault and Haaga 2013).
Taxation of Social Security benefits	Exempts individuals with low modified Adjusted Gross Income. Effects projected to increase over time because thresholds not indexed. Can be viewed as a form of means testing. When current law approach is combined with benefit reductions, especially those that target those with higher lifetime earnings, can partially offset benefit reductions.
Extend OASDI coverage to newly-hired state and local workers	Will disproportionately affect beneficiaries in a small number of states (for example Massachusetts, Ohio, Nevada, and Colorado) and more educated workers. See appendix Table 14.

Notes: Broad summary; effects may vary substantially depending on specific parameterization.

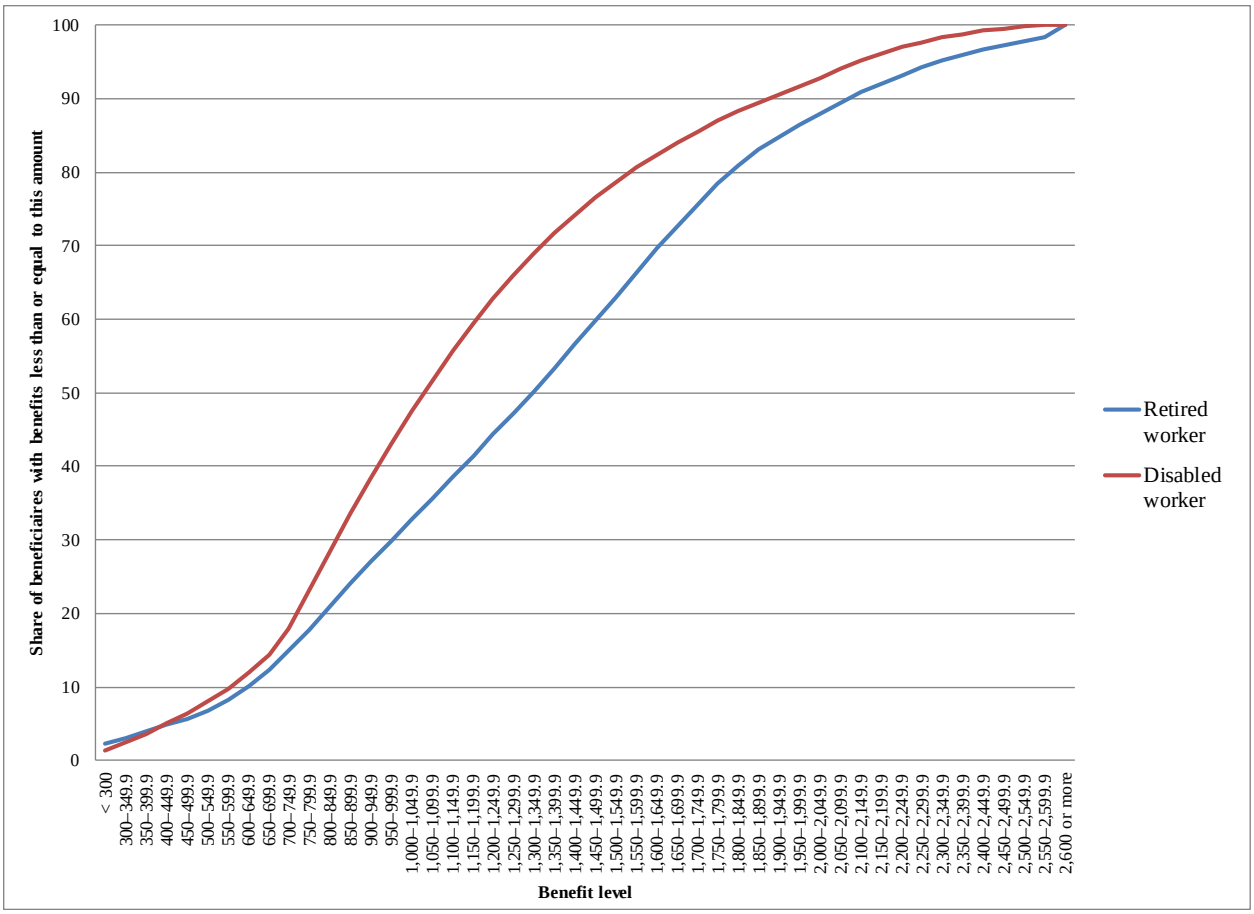
Table 2C. *Distributional Effects of Selected Provisions that Increase Social Security Benefits to Address Adequacy Gaps*

Provisions	Distributional features
Caregiver credits	Targets well those who had children outside of marriage or whose marriages did not last the required duration for OASDI spouse benefits, who do not qualify for spouse or survivor benefits under current law.
CPI-E shift	Will compound for older and longer-term beneficiaries.
First bend point increases	May have advantages for alleviating need relative to minimum benefits with work years requirements, given those with the lowest lifetime earnings tend also to have limited work years.
Income tax reductions	Will tend to target higher-income beneficiaries.
Long-term beneficiary increases	Varies depending on whether long-term--and thus includes DI beneficiaries--or based on attaining a certain age. Sensitive to whether capped, flat, or proportional (Whitman and Shoffner 2013). Can lead to discontinuities.
Lower required marriage duration for spousal/survivor	Would affect a relatively modest share of divorced retirees (Tamborini and Whitman 2010). Those affected would receive large changes, and many would be removed from poverty.
Minimum benefit	Often well-targeted to long-term low-wage workers. Poverty alleviation affects depend heavily on the benefit level and requirements. High work years requirements and interactions with actuarial reductions can lead to many with benefits below poverty even when the benefit targets poverty. Results will be sensitive to whether and how the benefit is indexed. See Favreault, Mermin, and Steuerle (2006), Herd (2005), and Springstead, Whitman, and Shoffner (2014)
Spouse/survivor increases/ tradeoffs (e.g., increase survivor to 67/75 percent combined benefit when both spouses are alive)	Can reduce poverty and increase equity between families with more and less evenly divided earnings. Will exclude those without the requisite marriage history. Sensitive to whether the potential benefit increase is capped.

Notes: Broad summary; effects may vary substantially depending on specific parameterization.

Appendix

Appendix Figure 1. *Cumulative Distribution of Social Security Worker Benefits, by Type of Worker, December 2016*



Source: Social Security Administration (2016, Tables 5.B6 and 5.D2).

Tables Illustrating Key Characteristics of Earnings and Work Years Trends and Distributions Relevant to Social Security Proposals

Appendix Table 1A. *Average Work Years to Selected Ages by Sex and Selected Birth Cohort*

Men

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	6.9	11.3	15.8	20.1	24.4	28.4	32.6	36.4	37.7	39.3
1940	7.4	11.7	16.0	20.3	24.4	28.6	32.7	36.8	38.2	39.8
1945	7.3	11.6	15.9	20.1	24.3	28.5	32.7	36.5	37.9	39.5
1950	7.5	11.7	15.7	20.0	24.3	28.5	32.4	35.9	37.3	
1955	7.4	11.5	15.7	19.9	24.2	28.5	32.5			
1960	7.0	11.2	15.5	19.8	24.2	28.4				
1965	7.2	11.6	16.0	20.3	24.6					
1970	7.2	11.6	16.0	20.4						
1975	7.5	11.9	16.4							

Women

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	5.1	7.1	9.1	11.7	14.6	17.7	20.9	23.8	24.8	25.9
1940	5.0	7.4	9.9	12.8	15.9	19.2	22.4	25.5	26.5	27.7
1945	5.1	7.6	10.3	13.4	16.8	20.4	23.9	27.0	28.1	29.3
1950	5.9	9.0	12.3	15.8	19.5	23.2	26.8	30.1	31.3	
1955	6.2	9.5	13.0	16.6	20.5	24.4	28.0			
1960	6.3	9.8	13.2	17.0	20.7	24.3				
1965	6.5	10.2	14.1	17.8	21.6					
1970	6.7	10.6	14.4	18.3						
1975	6.9	10.7	14.4							

Notes: Describe table censoring properly.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 1B. *Median Work Years to Selected Ages by Sex and Selected Birth Cohort*

Men

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	7	12	17	22	27	31	36	40	41	44
1940	9	14	18	23	28	33	37	42	43	44
1945	8	13	18	22	27	32	37	41	42	44
1950	8	13	18	23	27	32	37	40	42	
1955	8	13	18	23	28	33	37			
1960	8	13	18	23	27	32				
1965	8	13	18	22	27					
1970	8	13	18	23						
1975	8	13	18							

Women

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	5	7	9	12	15	18	22	25	26	27
1940	5	8	10	13	16	20	24	27	29	30
1945	6	8	11	14	17	22	26	30	31	33
1950	7	10	13	17	22	26	30	33	34	
1955	7	11	15	19	23	28	31			
1960	7	12	16	20	24	27				
1965	7	12	16	20	24					
1970	8	12	17	21						
1975	8	12	16							

Notes: Describe table censoring properly.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 1C. *75th Percentile of Work Years to Selected Ages by Sex and Selected Birth Cohort*

Men

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	9	14	19	23	28	33	38	43	44	47
1940	10	15	19	24	29	34	39	44	46	48
1945	9	14	19	24	29	34	38	43	45	47
1950	10	14	19	24	29	34	39	43	45	
1955	10	14	19	24	29	34	39			
1960	9	14	19	24	29	34				
1965	10	14	19	24	29					
1970	9	14	19	24						
1975	10	14	19							

Women

	Age									
	25	30	35	40	45	50	55	60	65	70
1935	8	11	14	18	21	25	30	34	35	37
1940	8	12	15	18	23	27	32	36	37	38
1945	8	12	15	20	24	29	33	37	38	40
1950	8	13	17	22	27	31	36	41	42	
1955	9	13	18	23	27	32	37			
1960	9	14	18	23	28	32				
1965	9	14	18	23	28					
1970	9	14	19	24						
1975	9	14	19							

Notes: Describe table censoring properly.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 2. *Selected Percentiles of Work Years through Age 60 for People in the 1948 to 1952 Birth Cohorts by Sex and Highest Wage-Adjusted Earnings through Age 60*

Sex	Highest annual earnings to age 60	p25	p50	p75	Mean	N
Men						
	< half the average wage	6	14	18	13	71
	0.50-0.749 times average wage	15	22	31	23	109
	0.75-0.999 times average wage	20	29	37	28	203
	1.00-1.249 times average wage	27	36	42	33	258
	1.25-1.499 times average wage	32	39	43	36	365
	1.50-1.999 times average wage	34	41	43	37	796
	2.00-2.499 times average wage	36	41	44	38	613
	>=2.5 times the average wage	37	42	44	38	1,345
Women						
	< half the average wage	5	12	21	14	446
	0.50-0.749 times average wage	17	26	33	25	592
	0.75-0.999 times average wage	23	32	39	30	693
	1.00-1.249 times average wage	28	35	40	33	642
	1.25-1.499 times average wage	29	36	41	34	468
	1.50-1.999 times average wage	28	37	42	34	628
	2.00-2.499 times average wage	32	38	42	35	350
	>=2.5 times the average wage	34	39	42	36	390
All						
	< half the average wage	5	12	21	14	517
	0.50-0.749 times average wage	16	25	33	25	701
	0.75-0.999 times average wage	22	32	38	30	896
	1.00-1.249 times average wage	28	36	41	33	900
	1.25-1.499 times average wage	30	38	42	35	833
	1.50-1.999 times average wage	32	40	43	36	1,424
	2.00-2.499 times average wage	34	41	43	37	963
	>=2.5 times the average wage	36	42	44	38	1,735

Notes: Work year is defined as any earnings. Using the 2014 Average Wage Index (version most recently released by SSA) the top of each of the earnings intervals (rounded to the nearest $100) is as follows: $23,200, $34,800, $46,000, $58,100, $69,700, $92,900, $116,200

Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 3. *Distributions of Work Years to Age 62 for Five Birth Cohorts (1946-1950) for Survivors to at Least Age 62, by Different Work Years Definitions and Considering Different Population Characteristics (Time in the U.S., Disability, and Uncovered Work)*

Gender	Earnings threshold	Subpopulations	Work years distribution						
			<10	10-19	20-24	25-29	30-34	35-39	40+
Men									
	Any earnings	A: All	3.1	7.8	4.3	5.7	6.8	11.7	60.6
		B: Exclude late arriving immigrants	2.4	6.3	3.4	4.8	5.9	11.9	65.4
		C: B, plus exclude disabled	2.5	6.0	2.8	3.9	4.8	11.3	68.7
		D: C, plus exclude long-term uncovered	0.6	2.2	1.6	3.1	4.6	11.4	76.5
	4 CQ	A: All	4.6	8.7	4.6	6.1	8.9	13.5	53.5
	($4,880 in 2015)	B: Exclude late arriving immigrants	3.9	7.0	3.8	5.5	8.1	14.0	57.6
		C: B, plus exclude disabled	3.8	6.7	3.2	4.1	7.3	13.4	61.4
		D: C, plus exclude long-term uncovered	1.0	3.2	2.0	3.7	7.2	14.5	68.5
	Half time at	A: All	5.8	8.2	5.3	6.4	9.1	16.6	48.6
	minimum wage	B: Exclude late arriving immigrants	5.2	6.5	4.6	5.8	8.2	17.5	52.3
	($7,250 in 2015)	C: B, plus exclude disabled	5.2	6.0	3.8	4.7	7.3	17.0	56.0
		D: C, plus exclude long-term uncovered	1.5	2.9	3.2	4.1	7.5	18.4	62.5
Women									
	Any earnings	A: All	9.1	11.7	8.0	10.7	12.8	15.9	31.9
		B: Exclude late arriving immigrants	6.9	10.5	7.9	10.7	13.2	16.7	34.3
		C: B, plus exclude disabled	7.1	10.7	7.5	9.8	13.1	16.3	35.5
		D: C, plus exclude long-term uncovered	5.6	8.4	6.8	9.4	13.4	17.3	39.1
	4 CQ	A: All	13.2	15.2	9.0	10.6	12.6	16.0	23.4
	($4,880 in 2015)	B: Exclude late arriving immigrants	10.8	14.1	9.1	10.6	13.1	17.1	25.2
		C: B, plus exclude disabled	11.3	13.9	8.6	10.1	12.6	16.9	26.5
		D: C, plus exclude long-term uncovered	9.0	11.6	8.4	9.9	13.6	18.4	29.2
	Half time at	A: All	15.0	16.1	9.2	11.5	13.3	15.9	19.0
	minimum wage	B: Exclude late arriving immigrants	12.9	15.1	9.3	11.6	13.9	16.8	20.5
	($7,250 in 2015)	C: B, plus exclude disabled	13.4	14.7	8.8	11.4	13.2	17.0	21.6
		D: C, plus exclude long-term uncovered	10.7	12.5	8.6	11.5	14.2	18.5	23.9
All									
	Any earnings	A: All	6.2	9.9	6.2	8.3	9.9	13.9	45.6
		B: Exclude late arriving immigrants	4.7	8.4	5.7	7.9	9.7	14.4	49.2
		C: B, plus exclude disabled	4.9	8.5	5.3	7.0	9.2	13.9	51.2
		D: C, plus exclude long-term uncovered	3.2	5.5	4.4	6.4	9.3	14.6	56.6
	4 CQ	A: All	9.1	12.1	6.9	8.4	10.9	14.8	37.8
	($4,880 in 2015)	B: Exclude late arriving immigrants	7.5	10.7	6.6	8.2	10.7	15.6	40.7
		C: B, plus exclude disabled	7.8	10.5	6.1	7.3	10.1	15.2	43.0
		D: C, plus exclude long-term uncovered	5.3	7.7	5.4	7.0	10.6	16.5	47.6
	Half time at	A: All	10.6	12.3	7.3	9.1	11.3	16.2	33.2
	minimum wage	B: Exclude late arriving immigrants	9.2	11.0	7.0	8.8	11.2	17.1	35.7
	($7,250 in 2015)	C: B, plus exclude disabled	9.5	10.6	6.4	8.2	10.5	17.0	37.8
		D: C, plus exclude long-term uncovered	6.4	8.0	6.1	8.0	11.1	18.4	42.0

Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.
Note: Long-term uncovered workers are defined as those with five or more years in which all earnings were in a job not covered by Social Security.

Appendix Table 4. *Average Work Years to Selected Age by Sex and, for Women, Number of Children, using Three Separate Definitions of Earnings, Last Five Cohorts to Reach the Age*

A. Any earnings

	Age						
	35	40	45	50	55	60	65
All men	16.2	20.3	24.6	28.6	32.4	35.9	39.2
Women							
No children (unmarried)	16.0	20.7	22.8	27.7	30.3	32.2	33.6
No children (all)	15.8	19.8	23.4	27.2	30.1	31.7	32.1
1 child	15.4	18.9	22.3	26.4	29.5	30.8	31.8
2 children	15.1	18.6	22.1	25.2	28.2	30.6	30.6
3 or more children	13.5	16.9	20.0	22.3	24.8	27.1	26.8

B. Earnings of at least 4 covered quarters

	Age						
	35	40	45	50	55	60	65
All men	13.9	18.1	22.5	26.9	30.9	34.4	37.3
Women							
No children (all)	13.1	16.8	20.7	24.9	28.0	29.5	29.5
1 child	12.7	16.1	19.5	23.9	27.3	28.6	29.2
2 children	12.0	15.6	19.1	22.4	25.5	27.8	27.6
3 or more children	10.0	13.3	16.5	19.0	21.6	23.8	23.4

C. Earnings of at least half time, half years at the minimum wage

	Age						
	35	40	45	50	55	60	65
All men	14.1	18.3	22.3	26.3	29.9	33.3	36.3
Women							
No children (all)	13.3	17.0	20.6	24.3	26.8	28.3	28.2
1 child	13.0	16.3	19.4	23.3	26.3	27.2	27.9
2 children	12.3	15.8	19.0	21.7	24.3	26.4	26.2
3 or more children	10.3	13.5	16.5	18.4	20.6	22.4	21.9

Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 5. *Average and Median Accumulated Real Lifetime Earnings (2015$) to 2012 among Survivors to that Year by Sex and Birth Cohort and, for Women, Number of Children*

A. Mean

	Birth cohort				
	1945-49	**1950-54**	**1955-59**	**1960-64**	**1965-69**
Ages in 2012	63-67	58-62	53-57	48-52	43-47
All men	3,037,000	2,560,000	2,113,000	1,650,000	1,265,000
All women	1,489,000	1,457,000	1,243,000	1,044,000	819,000
No children	1,909,000	1,849,000	1,615,000	1,285,000	1,039,000
1 child	1,763,000	1,607,000	1,440,000	1,166,000	873,000
2 children	1,519,000	1,414,000	1,209,000	1,047,000	816,000
3 children	1,237,000	1,235,000	989,000	880,000	737,000
4 children	880,000	1,094,000	800,000	668,000	565,000
5 or more children	851,000	805,000	562,000	449,000	370,000

B. Median

	Birth cohort				
	1945-49	**1950-54**	**1955-59**	**1960-64**	**1965-69**
Ages in 2012	63-67	58-62	53-57	48-52	43-47
All men	3,128,000	2,521,000	2,007,000	1,522,000	1,191,000
All women	1,271,000	1,206,000	1,032,000	875,000	695,000
No children	1,804,000	1,739,000	1,491,000	1,205,000	939,000
1 child	1,600,000	1,520,000	1,302,000	1,017,000	787,000
2 children	1,317,000	1,195,000	992,000	886,000	718,000
3 children	1,072,000	1,018,000	800,000	687,000	568,000
4 children	647,000	859,000	543,000	516,000	368,000
5 or more children	598,000	452,000	413,000	286,000	214,000

Notes: Estimates rounded to the nearest $1,000. Excludes people outside US for more than 10 years of adulthood. Earnings are accumulated using assumed interest rates from the OASDI trustees report.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 6. *Average Accumulated Real Lifetime Earnings (2015$) to 2012 among Survivors to that Year by Completed Education, Sex, and Birth Cohort*

Sex / Education	Birth cohort 1945-49	1950-54	1955-59	1960-64	1965-69
	Ages in 2012				
	63-67	58-62	53-57	48-52	43-47
Men					
Less than high school diploma	1,936,000	1,518,000	1,325,000	866,000	777,000
High school diploma or GED	2,804,000	2,355,000	1,879,000	1,436,000	1,075,000
Some college	2,933,000	2,533,000	2,157,000	1,724,000	1,268,000
College degree	3,514,000	2,973,000	2,637,000	2,104,000	1,619,000
Graduate or professional	3,574,000	3,245,000	2,856,000	2,268,000	1,713,000
All	3,040,000	2,564,000	2,117,000	1,655,000	1,271,000
Women					
Less than high school diploma	633,000	535,000	557,000	403,000	335,000
High school diploma or GED	1,315,000	1,176,000	983,000	809,000	634,000
Some college	1,656,000	1,538,000	1,316,000	1,087,000	829,000
College degree	1,812,000	1,787,000	1,633,000	1,402,000	1,023,000
Graduate or professional	2,086,000	2,095,000	1,842,000	1,554,000	1,276,000
All	1,496,000	1,465,000	1,252,000	1,051,000	825,000

Notes: Estimates rounded to the nearest $1,000. Excludes people outside US for more than 10 years of adulthood. Earnings are accumulated using assumed interest rates from the OASDI trustees report.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 7. *Average Accumulated Real Lifetime Earnings (2015$) to 2012 among Survivors to that Year by Sex, Birth Cohort and Self-reported Race/Ethnicity*

Sex	Birth cohort				
Race/ethnicity	1945-49	1950-54	1955-59	1960-64	1965-69
	Ages in 2012				
	63-67	58-62	53-57	48-52	43-47
Men					
Non-Hispanic white	3,173,000	2,706,000	2,274,000	1,773,000	1,369,000
Non-Hispanic black	2,490,000	1,780,000	1,343,000	1,119,000	994,000
Non-Hispanic Native American	2,164,000	1,965,000	1,966,000	1,526,000	929,000
Non-Hispanic Asian or Pacific Islander	2,920,000	2,993,000	2,136,000	1,568,000	1,070,000
Hispanic any race	2,264,000	2,011,000	1,473,000	1,357,000	1,007,000
All	3,040,000	2,564,000	2,117,000	1,655,000	1,271,000
Women					
Non-Hispanic white	1,534,000	1,518,000	1,312,000	1,120,000	860,000
Non-Hispanic black	1,445,000	1,260,000	1,081,000	871,000	762,000
Non-Hispanic Native American	1,298,000	1,175,000	958,000	773,000	673,000
Non-Hispanic Asian or Pacific Islander	1,860,000	2,341,000	1,312,000	1,243,000	1,146,000
Hispanic any race	1,054,000	1,118,000	1,006,000	782,000	638,000
All	1,496,000	1,465,000	1,252,000	1,051,000	825,000

Notes: Estimates rounded to the nearest $1,000. Excludes people outside US for more than 10 years of adulthood; this is especially important for the Asian and Hispanic categories, in which proportionately more are foreign born. Earnings are accumulated using assumed interest rates from the OASDI trustees report.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 8. *Average Accumulated Real Lifetime Earnings (2015$) to 2012 among Survivors to that Year by Sex and Birth Cohort and, for Women, Number of Children*

	Birth cohort				
Education	**1945-49**	**1950-54**	**1955-59**	**1960-64**	**1965-69**
Ages in 2012	63-67	58-62	53-57	48-52	43-47
High school diploma or less					
All men	2,638,000	2,195,000	1,775,000	1,336,000	1,012,000
All women	1,190,000	1,072,000	906,000	734,000	582,000
No children	1,533,000	1,301,000	1,103,000	883,000	741,000
1 child	1,464,000	1,295,000	1,126,000	921,000	634,000
2 children	1,259,000	1,070,000	932,000	747,000	621,000
3 or more children	900,000	851,000	677,000	540,000	445,000
Some college, less than bachelors degree					
All men	2,605,000	2,132,000	1,796,000	1,407,000	1,078,000
All women	1,653,000	1,538,000	1,310,000	1,087,000	828,000
No children	2,067,000	1,845,000	1,749,000	1,341,000	1,011,000
1 child	1,777,000	1,652,000	1,492,000	1,190,000	880,000
2 children	1,774,000	1,539,000	1,236,000	1,073,000	825,000
3 or more children	1,217,000	1,264,000	951,000	872,000	699,000
Bachelors degree or more					
All men	3,174,000	2,679,000	2,300,000	1,866,000	1,451,000
All women	1,926,000	1,916,000	1,705,000	1,455,000	1,106,000
No children	2,205,000	2,298,000	1,949,000	1,599,000	1,313,000
1 child	2,255,000	1,994,000	1,946,000	1,552,000	1,153,000
2 children	1,749,000	1,768,000	1,614,000	1,419,000	1,031,000
3 or more children	1,631,000	1,639,000	1,340,000	1,252,000	992,000

Notes: Estimates rounded to the nearest $1,000. Excludes people outside US for more than 10 years of adulthood. Earnings are accumulated using assumed interest rates from the OASDI trustees report.
Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 9A. *Share Ever Earning Over the Taxable Maximum and Distribution of Years Over the Taxable Maximum among Those Ever Earning Over the Taxable Maximum, by Sex, Individuals Turning 62 in 2008 to 2012 (1946-1950 Birth Cohorts)*

			Distribution of years over the taxable maximum among those ever earning over the taxable maximum						
	Never	Ever	1	2	3-5	6-9	10-14	15-19	20+
Men	59.7	40.3	18.7	8.0	14.2	10.5	11.7	11.4	25.6
Women	89.9	10.2	33.2	11.1	13.6	12.9	12.0	8.8	8.6
All	75.4	24.6	21.8	8.6	14.1	11.0	11.8	10.8	21.9

Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 9B. *Share Ever Earning Over the Taxable Maximum and Distribution of Years Over the Taxable Maximum among Those Ever Earning Over the Taxable Maximum, by Sex and Education, Individuals Turning 62 in 2008 to 2012 (1946-1950 Birth Cohorts)*

			Distribution of years over the taxable maximum among those ever earning over the taxable	
	Never	Ever	1-5	6 or more
Men				
Less than a college degree	72.3	27.7	55.9	44.1
Bachelor's degree	45.0	55.0	31.5	68.5
Graduate or professional degree	30.0	70.0	27.2	72.8
Women				
Less than a college degree	94.1	5.9	78.2	21.8
Bachelor's degree	82.5	17.5	42.9	57.1
Graduate or professional degree	73.7	26.3	43.5	56.5

Source: Author's tabulations from the 2008 SIPP matched to Summary Earnings Records through 2012.

Appendix Table 10. *PIA Brackets at Age 62 for Members of the 1948-1950 Birth Cohorts who are Eligible for Retired Worker Benefits and who Survived to Age 62, Excluding DI Beneficiaries, by Gender, Number of Children, Education, Nativity, and Interactions*

	PIA bracket					
	Lowest (90%)	Middle (32%)	Highest (15%)	Lowest (90%)	Middle (32%)	Highest (15%)
	Percentage			*N*		
All	11.8	62.8	25.4	682	3,624	1,462
Gender						
Men	6.1	51.8	42.1	166	1,410	1,144
Women	16.9	72.6	10.4	516	2,214	318
Gender * number of children						
Men						
None	5.9	54.0	40.1	34	310	230
One	4.5	62.8	32.7	18	250	130
Two	5.6	44.2	50.2	54	426	484
Three or more	7.7	54.1	38.3	60	424	300
Women						
None	10.6	73.0	16.4	66	454	102
One	12.0	73.7	14.3	52	320	62
Two	15.8	74.5	9.7	176	828	108
Three or more	25.2	69.6	5.2	222	612	46
Education (all)						
Less than high school diploma	37.2	57.0	5.8	148	227	23
High school diploma	11.9	69.5	18.6	295	1,718	460
Some college	8.9	68.0	23.2	99	759	259
Bachelor's degree	7.3	56.6	36.1	74	576	367
Post-college (grad, prof, etc.)	8.7	45.1	46.3	66	344	353
Gender * education						
Men						
Less than high school diploma	18.1	70.0	11.9	35	135	23
High school diploma	5.4	60.2	34.4	59	663	379
Some college	5.8	54.7	39.6	29	275	199
Bachelor's degree	4.4	41.9	53.7	23	220	282
Post-college (grad, prof, etc.)	5.0	29.4	65.6	20	117	261
Women						
Less than high school diploma	55.1	44.9 *		113	92	
High school diploma	17.2	76.9	5.9	236	1,055	81
Some college	11.4	78.8	9.8	70	484	60
Bachelor's degree	10.4	72.4	17.3	51	356	85
Post-college (grad, prof, etc.)	12.6	62.2	25.2	46	227	92
Nativity (all)						
Native born	10.8	63.4	25.8	566	3,320	1,354
Foreign born	22.0	57.6	20.5	116	304	108
Gender * nativity						
Men						
Native born	5.5	50.9	43.6	134	1,242	1,064
Foreign born	11.4	60.0	28.6	32	168	80
Women						
Native born	15.4	74.2	10.4	432	2,078	290
Foreign born	33.9	54.8	11.3	84	136	28

Source: Author's computations and tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.
Notes: *=cells combined to estimate more reliably.

Appendix Table 11. *Median Work Years by AIME Decile (unisex and sex-specific) at Age 62 for Members of the 1948-1950 Birth Cohorts who are Eligible for Retired Worker Benefits and who Survived to Age 62, excluding DI Beneficiaries, by Gender, Using Three Definitions of Work Years*

	Median work years			
	Any work	4 covered quarters	Minimum wage	*N*
Decile of AIME (Unisex deciles)				
All	40	38	36	5,768
Lowest	20	14	13	580
Second	27	22	20	576
Third	33	29.5	28	576
Fourth	38	35	33	576
Fifth	41	37	36	576
Sixth	43	41	40	580
Seventh	43	42	41	574
Eighth	44	43	42	578
Ninth	44	43	42	576
Highest	45	44	43	576
Men, using men's AIME deciles				
All	43	41	40	2,720
Lowest	19	16.5	15	272
Second	34	30	28	272
Third	40	37	36	272
Fourth	43	42	41	272
Fifth	44	43	42	274
Sixth	45	43	42	270
Seventh	45	44	42	272
Eighth	44	43	42	272
Ninth	45	44	43.5	272
Highest	45	45	44	272
Women, using women's AIME deciles				
All	37	34	32	3,048
Lowest	20	13	12	308
Second	24	19	17	304
Third	29	25	23.5	304
Fourth	33.5	30	28	304
Fifth	37	34	32	306
Sixth	39	37	36	306
Seventh	41	37	36	302
Eighth	43	41	40	306
Ninth	43	42	40	304
Highest	43	42	40	304

Source: Author's computations and tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

Appendix Table 12A. *Prevalence of Sub-Poverty Social Security Benefits, 2009, by Selected Demographic Characteristics*

	Share with low benefits		
	Individual benefits	Family benefits	N
All	0.34	0.21	13,346
Sex			
Men	0.17	0.16	5,794
Women	0.46	0.24	7,552
Race/ethnicity			
Non-Hispanic white	0.31	0.17	10,913
Non-Hispanic black	0.42	0.38	1,274
Non-Hispanic Native American	0.40	0.28	299
Non-Hispanic Asian or Pacific Islander	0.58	0.43	270
Hispanic any race	0.53	0.43	590
Nativity			
Native born	0.32	0.19	12,230
Foreign born	0.52	0.38	1,116
Years of adulthood outside US (non-natives)			
<10	0.39	0.20	183
10-14	0.42	0.22	122
15-19	0.50	0.34	119
20-24	0.52	0.39	109
25+	0.59	0.49	583
Level of economic development of birth country (non-natives)			
More economically developed	0.45	0.26	471
Less economically developed	0.61	0.49	645
Education			
Less than high school diploma	0.46	0.35	2,442
High school diploma	0.38	0.19	4,510
Some college	0.29	0.18	3,752
Bachelor's degree	0.26	0.15	1,524
Graduate or professional degree	0.20	0.15	1,118
DI beneficiary history			
Never received DI	0.34	0.20	11,930
Received DI	0.33	0.29	1,416
Age of DI onset (among beneficiaries)			
<55	0.28	0.25	450
55+	0.22	0.20	643
Net worth (non-housing)			
<$2,000	0.48	0.42	1,395
$2,000-3,999	0.35	0.32	187
$4,000-4,999	0.35	0.32	67
$5,000-5,999	0.36	0.28	289
$10,000-19,999	0.38	0.29	345
>=$20,000	0.31	0.16	10,071
Current age			
62	0.40	0.26	405
63-64	0.41	0.28	996
65-69	0.33	0.20	3,587
70-74	0.35	0.18	2,787
75-79	0.35	0.21	2,327
80-84	0.31	0.19	1,828
85+	0.29	0.23	1,416
Indicator never married mother			
No	0.33	0.20	13,254
Yes	0.63	0.63	92
Indicator currently unmarried			
No	0.37	0.15	7,807
Yes	0.29	0.29	5,539
Indicator had qualifying marriage for Social Security			
No	0.39	0.36	1,042
Yes	0.33	0.19	12,304

Source: Author's tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

Appendix Table 12B. *Prevalence of Sub-Poverty Social Security Benefits, 2009, by Sex and Selected Demographic Characteristics*

	Share with low benefits					
	Individual benefits		Family benefits		N	
	Men	Women	Men	Women	Men	Women
Race/ethnicity * sex						
Non-Hispanic white	0.13	0.44	0.12	0.20	4,778	6,135
Non-Hispanic black	0.29	0.51	0.30	0.43	515	759
Non-Hispanic Native American	0.25	0.51	0.21	0.33	130	169
Non-Hispanic Asian or Pacific Islander	0.43	0.69	0.37	0.46	116	154
Hispanic any race	0.41	0.64	0.40	0.45	255	335
Nativity * sex						
Native born	0.15	0.45	0.14	0.23	5,348	6,882
Foreign born	0.39	0.60	0.36	0.40	446	670
Education * sex						
Less than high school diploma	0.29	0.60	0.28	0.41	1,067	1,375
High school diploma	0.17	0.49	0.15	0.22	1,631	2,879
Some college	0.14	0.40	0.13	0.21	1,643	2,109
Bachelor's degree	0.13	0.41	0.12	0.19	780	744
Graduate or professional degree	0.14	0.29	0.14	0.17	673	445
DI beneficiary history * sex						
Never received DI	0.17	0.46	0.16	0.23	5,055	6,875
Received DI	0.19	0.48	0.20	0.38	739	677
Number of children * sex						
0	0.24	0.38	0.24	0.26	747	899
1	0.16	0.41	0.17	0.24	685	888
2	0.14	0.44	0.13	0.21	1,577	2,002
3	0.14	0.48	0.13	0.22	1,302	1,608
4+	0.20	0.53	0.18	0.28	1,483	2,155
Indicator had qualifying marriage for Social Security* sex						
No	0.33	0.43	0.31	0.40	427	615
Yes	0.16	0.47	0.15	0.23	5,367	6,937
Current marial status* sex						
Married	0.22	0.31	0.22	0.31	1,492	4,047
Widowed	0.19	0.28	0.19	0.28	751	2,859
Divorced/separated	0.21	0.41	0.29	0.44	609	957
Never married	0.38	0.41	0.38	0.41	206	309

Source: Author's tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

Appendix Table 13A. *Prevalence of Sub-Poverty Social Security Benefits, 2009, by Work Histories using Different Earnings Thresholds*

	Share with low benefits		
	Individual benefits	Family benefits	N
All	0.34	0.21	13,346
Not matched to earnings records	0.45	0.30	501
Year with positive earnings			
<10	0.66	0.36	1,205
10-19	0.71	0.43	1,455
20-29	0.54	0.32	2,091
30-34	0.36	0.20	1,360
35-39	0.23	0.15	1,704
40-44	0.12	0.10	1,845
45+	0.06	0.05	3,185
Years earning at least half time, half year at minimum wage			
<10	0.68	0.38	1,807
10-19	0.69	0.42	1,815
20-29	0.47	0.27	2,262
30-34	0.23	0.14	1,436
35-39	0.12	0.11	1,807
40-44	0.07	0.06	1,737
45+	0.03	0.03	1,981
Year earnings at least 4 OASDI covered quarters			
<10	0.68	0.37	1,577
10-19	0.70	0.42	1,720
20-29	0.50	0.29	2,259
30-34	0.27	0.16	1,404
35-39	0.14	0.11	1,804
40-44	0.08	0.07	1,844
45+	0.03	0.04	2,237
Year with uncovered earnings			
<=4	0.31	0.19	12,073
5-9	0.47	0.34	338
10-14	0.64	0.47	200
15-19	0.68	0.51	127
20+	0.85	0.52	107

Source: Author's tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

Appendix Table 13B. *Prevalence of Sub-Poverty Social Security Benefits, 2009, by Work Histories using Different Earnings Thresholds*

	Share with low benefits					
	Individual benefits		Family benefits		N	
	Men	Women	Men	Women	Men	Women
Year with positive earnings * sex						
<10	0.88	0.64	0.74	0.34	75	1,130
10-14	0.84	0.68	0.74	0.36	277	1,178
20-29	0.52	0.55	0.46	0.27	505	1,586
30-34	0.26	0.41	0.23	0.18	462	898
35-39	0.12	0.33	0.13	0.16	786	918
40-44	0.07	0.20	0.07	0.14	1,086	759
45+	0.03	0.13	0.04	0.09	2,398	787
Years earning at least half time, half year at minimum wage * sex						
<10	0.91	0.66	0.76	0.35	131	1,676
10-19	0.84	0.65	0.72	0.34	395	1,420
20-29	0.43	0.48	0.40	0.22	604	1,658
30-34	0.15	0.29	0.13	0.14	580	856
35-39	0.07	0.19	0.09	0.14	1,026	781
40-44	0.04	0.13	0.04	0.09	1,215	522
45+	0.02	0.05	0.03	0.04	1,638	343
Year earnings at least 4 OASDI covered quarters * sex						
<10	0.90	0.66	0.76	0.35	105	1,472
10-19	0.85	0.66	0.73	0.34	358	1,362
20-29	0.46	0.51	0.42	0.24	588	1,671
30-34	0.18	0.33	0.16	0.15	557	847
35-39	0.07	0.22	0.09	0.14	967	837
40-44	0.04	0.15	0.05	0.12	1,231	613
45+	0.02	0.08	0.03	0.06	1,783	454

Source: Author's tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

Appendix Table 14. *Prevalence of Reported Employment that is Not Covered by Social Security by Selected Demographic Characteristics*

Characteristics	Prevalence	N
All	0.04	45,934
Sex		
Men	0.03	23,133
Women	0.04	22,801
Race/ethnicity		
Non-Hispanic white	0.04	33,300
Non-Hispanic black	0.04	5,078
Non-Hispanic Native American	0.03	1,386
Non-Hispanic Asian or Pacific Islander	0.04	1,888
Hispanic any race	0.03	4,282
Nativity		
Native-born	0.04	40,342
Foreign-born	0.03	5,592
Education		
Less than high school diploma	0.02	4,698
High school diploma	0.03	10,946
Some college	0.03	16,567
Bachelor's degree	0.05	8,760
Graduate or professional degree	0.09	4,963
Enrollment status		
Not in school	0.04	39,288
Enrolled in school	0.05	6,646

Source: Author's tabulations from the 2008 SIPP matched to Master Beneficiary Record and Summary Earnings Records through 2012.

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