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An Equitable and Affordable Solution to the Retirement Savings Crisis

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"Catch-Up Contributions" An Equitable and Affordable Solution to the Retirement Savings Crisis

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Social Security replacement rates are projected to fall in coming decades due to the increase in the Full Retirement Age (which is equivalent to a 13.3 percent cut in benefits for a worker retiring at age 65), increasing Medicare Part B and D premiums, and increased taxation of benefits. The cut in benefits will impose hardship on low-and moderate-wage workers who are often ineligible to participate in employer sponsored retirement plans and have few financial assets. Workers in their forties and fifties may be particularly hard hit as they would often need to save infeasibly large shares of their income to achieve replacement rates that would permit them to maintain their pre-retirement standards of living.

To address the needs of these two overlapping groups – low and moderate wage workers and workers in their 50s with no or inadequate retirement wealth – we propose a program of cost-neutral voluntary (at least initially) Social Security catch-up contributions, into which all workers would be defaulted, starting at age 40 or 50. The program would use the progressivity of the Social Security benefit formula to target low-wage workers and to prevent adverse selection.

The age-50 catch-up contribution would be 3.1 percent of salary in addition to the existing 6.2 percent contribution rate. To avoid exacerbating labor market discrimination against older workers, the employer contribution would not be increased.

We calculate the additional worker benefit workers in the 1949 birth cohort would have earned had they participated in this program. It would have increased the monthly benefit of a scaled low earner by $119, from $1,012 to $1,131, and that of a scaled high earner by $199, from $2,214 to $2,413. These amounts increase replacement rates (income in retirement divided by average pre-retirement earnings) by 7.2 and 3.4 percentage points to 67.9 and 40.7 percent, respectively. The increased Social Security benefits will be insufficient to provide households with the 70-80 percent replacement rates that are often deemed appropriate (Palmer, DeStefano, Schachet, Paciero & Bone, 2008). But they would significantly reduce the shortfall that must be made up with income from employer sponsored retirement plans and private saving.

Using cohort population mortality tables, we calculate that low- and high earning men in the 1949 birth cohort would have earned real returns of 3.59 and minus 0.39 percent a year on their catch-up contributions. Adjusting for socioeconomic mortality differentials, low- and high-earners would have earned 2.98 and 0.18 percent a year respectively. Women would have earned higher returns, due to their greater longevity. Subsequent birth cohorts would also earn higher rates of return because the reduction in mortality rates more than offsets the effect of legislated increases in the Full Retirement Age.

Rate of return calculations do not take account the value of the longevity insurance provided by Social Security. We construct an intertemporal optimization model and show that for plausible coefficients of risk aversion, both high and low earning men would have a positive willingness-to-pay for the right to participate in the catch-up program, even at an assumed real risk-free rate of return on financial assets of three percent. Although stocks offer higher expected returns, the assumption of an alternative investment in risk-free assets is appropriate for almost all households because Social Security, with bond-like investment characteristics, substitutes for bonds in the household's portfolio.

We calculate that catch-up contributions would be almost precisely actuarially neutral over a 75-year investment horizon. They would reduce the shortfall if the participation rate were higher among low lifetime earners. Conversely, they would increase the shortfall if high lifetime earners opted out. But as indicated above, our calculations indicate that the program would increase the expected utility of high lifetime earners, and thus incent them to participate, notwithstanding the modest investment return.

DYNASIM simulations show that the program would have only a modest impact on the share of individuals over 65 with incomes below 200 percent of the Federal Poverty Level (FPL), $24,120 in 2017. The impact would increase over time, but even by 2055, the share of individuals with incomes below 200 percent of the FPL would drop by only 10 percent or 1.9 percentage points.

The remainder of the paper is organized as follows. Section 1 describes the proposed program. Section two discusses who would benefit, and by how much.[1] Section three considers alternative design features, specifically, whether contributions should start earlier, at age 40, whether they should be mandated, whether insurance companies could offer a better deal, and whether steps should be taken to strengthen the credibility of the government's promise. Section 4 concludes.

1. The proposed program

Current law

Under current law, Social Security Social Security benefits are calculated as follows. First, subject to an earnings cap of $127,200 in 2017, each year's earnings are indexed by the increase in the Average Wage Index (AWI).[2] Second, the top 35 indexed earnings are summed and divided by 420 to yield Average Indexed Monthly Earnings (AIME). Third, the worker's Primary Insurance Amount (PIA), the dollar amount of Social Security benefits payable at a worker's Full Retirement Age (FRA), is calculated by summing three separate percentages of portions of AIME, in 2017, 90 percent of the first $885, 32 percent of the next $4,451, and 15 percent of any remainder. Finally, benefits are subject to an actuarial adjustment for workers who retire before or after their FRA.[3] These benefits are financed by a payroll tax of 6.3 percent of earnings up to the earnings cap, payable by both workers and employers.

Households are not permitted to purchase additional Social Security benefits. Policy analysts have proposed allowing households to purchase additional benefits at retirement.[4] These proposals have failed to gain traction because of concerns that 1) they would do nothing to help those most in need, households with no

[1] We do not consider macroeconomic effects such as the impact on the capital stock. Increases in the Trust Fund might increase aggregate savings. Conversely, catch-up contributions might crowd-out private savings. We hypothesize that any such effects will be small. The proposal will increase the Trust Fund by $842 billion in 2025, a tiny amount in relation to the nation's capital stock, or even the total stock of financial assets.

[2] Earnings are indexed to the year the worker attained age 60. Subsequent years' earnings are entered at their dollar amount.

[3] The program also provides survivor, spousal, and other benefits.

[4] For example, Munnell, 2013.

annuitizable wealth, and 2) Social Security would suffer from adverse selection, with low-mortality households being disproportionately likely to participate because they are more likely to possess annuitizable wealth.

Our proposal

We propose instead to default workers into Social Security "catch-up" contributions. In our base case, we assume that catch-up contributions would start at age 50. But we also consider an alternative in which they start at age 40. The contribution rate would be 3.1 percent of salary, one half of the existing 6.2 percent contribution rate. To avoid worsening labor market discrimination against older workers, the employer contribution would not increase. We propose starting with a default rather than a mandate, because we want the program to be perceived not as a tax increase but as the purchase of valuable future benefits. Experience with 401(k) plans has shown that defaults can achieve high participation rates, even among low-wage workers.[5] In Section 3, we consider the potential benefits of a mandate. We propose age 50 because that is an age at which the saliency of retirement increases. Many workers enjoy reductions in expenditure around that age, as the mortgage is repaid and children leave home. The government also signals, by permitting 401(k) and IRA catch-up contributions for those age 50 and over, that this is an appropriate age to increase retirement saving. But low-wage workers often experience declines in earnings in middle age (Guvenen, Karahan, Ozkan, and Song, 2015), and we evaluate an alternative in which catch-up contributions start at age 40, but at a lower rate.

A worker participating in the catch-up program would be credited with 50 percent bonus earnings in his earnings record for the years he participated. Thus, a worker earning $50,000 would be credited with earnings of $75,000 instead of $50,000, and a worker earning $200,000 would be credited with earnings of $190,800 (1.5 times the taxable maximum of $127,200) instead of $127,200. AIME would be calculated on wages inclusive of the 50 percent bonus, and PIA would be

[5] See Choi, Laibson, Madrian, and Metrick, 2001, Clark, Utkus, and Young, 2015, Madrian and Shea, 2001, and Belbase and Sanzenbacher, 2017).

based on the new AIME. Thus, any catch-up increments to AIME would yield smaller increments to Social Security benefits for workers with higher lifetime earnings, whose PIA increments will lie on the 32 or 15 percent segments.

2. Who would benefit and by how much

How the catch-up program targets low lifetime earners

The catch-up program exploits the progressivity of the Social Security benefit formula to target workers with low lifetime earnings. This is because workers with high lifetime earnings will be on the 15 percent segment of the PIA formula, whereas low lifetime earnings will be on the 32 percent segment, and workers with extremely low lifetime earnings will be on the 90 percent segment.

Who would not benefit?

Regardless of current earnings, workers will not benefit from paying catch-up contributions if their catch-up contribution does not form part of the top 35 years in their earnings record. They will receive only partial benefit if the catch-up contribution only partially displaces another year's earnings. For example, a worker who earned a wage-indexed $40,000 a year from 20 to 55 and who participated in the catch-up program at age 56 when he earned $20,000 would receive no benefit because 1.5 times $20,000 was not one of his top 35 years, whereas a worker making $28,000 would see an entry of $40,000 replaced by one of $42,000 (1.5 times $28,000), a negligible increase. This may be a significant issue for low-wage workers whose earnings often peak around age 40 (Guvenen, Karahan, Ozkan, and Song, 2015).

How much will the catch-up program increase benefits?

Table 1 reports the effect of catch-up contributions and benefits for scaled very low, low, medium, high, and maximum earners retiring in 2016, assuming that the program had been in existence from the year 2000, when they turned 50. The scaled earnings are constructed by Clingman and Burkhalter (2013) and reflect

typical age-earnings profiles. The AIMEs of the five scaled earners correspond to the 8th, 16th, 39th, 70th, and 100th percentiles of the distribution of AIMEs.[6]

Maximum earners enjoy the largest dollar increase in benefits – their higher earnings more than offset the lower benefit accrual rate resulting from being on the 15 percent segment of the PIA formula. Very low, low, and medium earners all enjoy increases in replacement rates of around seven percentage points, whereas high and maximum earners enjoy increases in replacement rates of 3.4 and 3.8 percentage points respectively. Even the scaled very low earner is on the 32-percent segment of the PIA formula, and thus receives a similar percentage increase in benefits to the low earner. In all cases, the Social Security replacement rates fall far short of the 70 percent many financial planners deem appropriate. But the catch-up benefits significantly reduce the shortfall that must be filled with income from employer based retirement plans and private savings.

To put these increases in replacement rates in perspective, at 8.6 to 15.4 percent of existing benefits they are of a similar order of magnitude to the 13.3 percent reduction in benefits resulting from the increase in the Full Retirement Age from 65 to 67. They do no more that enable succeeding birth cohorts to match the replacement rates of previous birth cohorts. To go further, catch-up contributions would need to start at younger ages, a point we return to when we report the results of DYNASIM simulations, or at a higher level.

We also report the real rate of return on catch-up contributions, the rate of interest at which the expected present value of additional benefits equals the expected present value of catch-up contributions (top panel of Table 2). It provides an indication of the overall attractiveness of the program and the extent to which it redistributes from high to low earners. But it is an imperfect measure because it ignores gender and socioeconomic mortality differentials, taxes on benefits, and the extent to which retired worker benefits might displace spousal benefits and increase survivor benefits. Importantly, it disregards the value of the insurance

[6] The "career-average earnings levels" are 25 percent, 45 percent, 100 percent, and 160 percent of the AWI for the very low, low, medium, and high hypothetical workers, respectively.

Social Security provides against both outliving one's wealth and experiencing bad labor market outcomes.

Assuming male population mortality for the 1949 birth cohort low-and very low earners retiring in 2015 at age 66 would have received the highest real return – 3.59 percent a year, whereas high earners would have received the lowest real return – minus 0.39 percent. Women and people in subsequent birth cohorts would receive higher returns.

But mortality varies significantly with socio-economic status. Using the mortality factors estimated by Brown, Liebman, and Pollet (2002), we calculate rates of return for socioeconomic sub-groups. Adjusting for socio-economic mortality differentials, a black male very low lifetime earner with less than a high school education would have earned 1.8 percent (vs 3.59 percent using population mortality tables), and a white male maximum earner with a college education 0.36 percent (vs minus 0.23 percent).

Incorporating longevity insurance

The above calculations understate the benefit of catch-up contributions because they ignore the value of the insurance provided by Social Security. The program provides benefits in the form of an inflation-indexed lifetime annuity, a valuable benefit to households facing the problem of drawing down their wealth over an uncertain lifetime. A substantial literature has documented the value of this insurance (Mitchell, Poterba, Warshawsky, and Brown, 2000, Brown and Poterba, 2000, Dushi and Webb, 2004).[7] It may be particularly valuable to high earners who, if they are not covered by defined benefit pensions, hold relatively little of their wealth in annuitized form.[8]

The annuitization literature measures the value of annuities in terms of annuity equivalent wealth, the percentage increase in unannuitized wealth that

[7] Social Security also insures against labor market risk and the risk of premature death. Workers with low lifetime earnings receive higher replacement rates than those with higher earnings. Thus, the program insures workers against the risk of having a bad labor market draw. It also provides benefits to the children of retired or deceased workers and to widows over age 60. We exclude the value of these protections from our analysis.

[8] Assuming a constant relative risk aversion utility function, the marginal value of annuitization is decreasing in the share of wealth that is already annuitized.

would leave the household indifferent between annuitizing and undertaking an optimal drawdown of unannuitized wealth. This measure is difficult to apply to our proposal, and we therefore use an alternative measure, the "equivalent contribution rate," the contribution rate that would leave the individual indifferent between participating and not participating. When the equivalent contribution rate exceeds 3.1 percent, the individual is better off participating. When it falls short, the individual is better off not participating.

We solve the model for single men and women using numerical optimization.[9] We consider very low, low, medium, high, and maximum earners, and assume coefficients of risk aversion of two and five.[10] In each period from 22 to 66, participants receive labor market income, pay Social Security taxes, and decide how much to consume. In our base case, savings are invested in a risk-free asset yielding a three-percent real return.[11] In our alternative, we assume a one-percent real return. In retirement, participants receive Social Security benefits and undertake an optimal drawdown of unannuitized wealth.

The results reported in this paper assume population mortality. Brown (2000) shows that socioeconomic differences in mortality have very little effect on willingness to pay for an annuity.[12] Our analysis abstracts from labor market risk and therefore understates willingness-to-pay. One of the less well-appreciated benefits of Social Security is that it provides insurance against bad labor market outcomes by providing workers with low lifetime earnings with higher rates of return on contributions. But there is considerable heterogeneity in labor market

[9] We treat the program as risk-free. In reality, participants face the risk that benefits might be cut or benefits increased if aggregate wages grew more slowly than expected, due to lower population or wage growth, or mortality rates declined more rapidly than expected.

[10] These figures rests towards the low end of the range reported in the literature, which tends to cluster between 2 and 10 depending in part on whether the estimates are derived from portfolio theory, purchases of insurance, economic experiments, or preferences over lotteries (Chetty, 2003).

[11] In theory, households might decline participation in the catch-up program to invest in stocks, offering a higher expected return. Both in theory and in practice, most households hold at least part of their financial wealth in risk-free assets, and the catch-up contributions would substitute for this part of the household's portfolio.

[12] Although low socioeconomic status individuals face a relatively low risk of surviving to advanced old age, they nonetheless value insurance against old age poverty. In results that are available on request, we find that our estimates of willingness-to-pay are little affected by incorporating socioeconomic differences in mortality.

risk, and therefore the value of this insurance, and modeling both the distribution of risk and its effect on equivalent contribution rates is beyond the scope of this paper.

Table 3 reports equivalent contribution rates. At a coefficient of risk aversion of five, and assuming a real return of three percent, equivalent contribution rates exceed 3.1 percent for both men and women at all income levels. Workers at all income levels would be better-off participating. At a coefficient of risk aversion of two, high earning men have an equivalent contribution rate of 3.0 percent and would be better off not participating. But all other groups are still better off in the program, some by large amounts. For example, at a coefficient of risk aversion of five, female medium earners would be willing to pay a contribution rate of 8.4 percent of income. [13] A three percent real is very considerably higher than the current interest rate on risk-free assets. At an assumed return of one percent, still higher than the January 2017 0.42 percent yield on 10-year Treasury Inflation Protected securities, the program is attractive to both men and women at all income levels and at both assumed coefficients of risk aversion.[14]

DYNASIM Analysis

The above analysis of prototypical workers provides an incomplete picture of the costs, benefits, and distributional consequences of the proposed reform. It focuses on how it would have affected workers approaching retirement had it been implemented 20 years ago, rather than on how it might affect succeeding birth cohorts. It abstracts from program interactions, for example the effects on spousal and survivor benefit, and on eligibility for Supplementary Security Income (SSI) and Medicaid. It disregards behavioral responses, and fails to capture the rich variety of demographic and economic events households experience over their lifetimes.

We therefore report the simulated impact of the program estimated using the Urban Institute DYNASIM microsimulation model (Faverault, Smith, and Johnson,

[13] The equivalent contribution rate is somewhat lower for low and very low earners reflecting our assumption of a constant relative risk aversion utility function, and these individuals' larger shares of pre-annuitized wealth.

[14] Federal Reserve Bank of St. Louis Economic Data.

2015).[15] DYNASIM is parameterized using data from the Survey of Income and Program Participation (SIPP). The model "ages" the data year by year, the model simulating demographic events, such as births, deaths, marriages, and divorces, and economic events, such as labor force participation, earnings, hours of work, disability onset, and retirement. The model simulates Social Security coverage and benefits, calculates SSI eligibility, participation, and benefits, and allows researchers to simulate the distributional effects of policy interventions by year and by a variety of socioeconomic characteristics.

Urban Institute ran four sets of simulations on our behalf, assuming a 50 percent increase in contributions starting at age 50, a 30 percent increase at age 40, that current law benefits continue to be paid, and that on exhaustion of the Social Security Trust Fund, benefits are limited to payroll tax receipts.[16] Reflecting the theoretical calculations of willingness-to-pay referred to above, and the empirical evidence that defaults can achieve high 401(k) participation rates (Beshears, Choi, Laibson, and Madrian, 2006), we assume 100 percent participation. We further assume zero crowd-out of retirement and non-retirement savings.[17] Table 4 reports the impact of catch-up contributions starting at age 50, assuming current law benefits continue to be paid. It shows the percentage point impact on the share of individuals age 62 or over with incomes below 200 percent of the Federal Poverty Level ($24,120 in 2017 for a single individual) for years 2015, 2025, through to 2065, analyzed by gender, education, ethnicity, and shared lifetime earnings quintile.[18] The impact of the program increases over time, reflecting the fact that those currently near or in retirement will have limited or no opportunity to participate. By 2055, the share of elderly individuals with incomes less than 200 percent of the FPL will have decreased by 1.9 percentage points relative to a

[15] The simulations were run by Karen Smith of the Urban Institute. We gratefully acknowledge her advice and assistance.
[16] The full set of results is available from the authors on request.
[17] Crowd-out will be zero among those currently saving nothing for retirement. We hypothesize that the 401(k) contributions of other households are influenced by social norms and the desire to earn an employer match, rather than by a desire to smooth the marginal utility of consumption, so that 401(k) contribution rates may change slowly, if at all.
[18] Shared lifetime earnings includes half the couple's earnings in years a person is married and own earnings in years a person is unmarried.

baseline of 19.8 percent, a 10 percent decline. The percentage point reduction in poverty is only slightly greater for women than for men.

The percentage point decline in the share of individuals with incomes below 200 percent of the FPL declines with both educational attainment and lifetime income quintile, except for those with less a high school education and above, and in the lowest shared lifetime income quintile. The explanation for the limited impact on the share in poverty of those in the lowest shared lifetime income quintile is that although they enjoy similar percentage increases in per-capita net cash income to the second quintile (5.2 vs 5.6 percent by 2055), their dollar increase is much smaller ($613 vs $1,301 a year), reflecting their much smaller projected pre-catch up Social Security benefits ($9,039 vs $15,251).[19] A similar explanation holds for those with less than a high school education. We conclude that this, and perhaps other similar proposals to expand Social Security coverage will be of only marginal benefit to workers who are marginally attached to the labor force.

Impact on the Trust Fund

Table 5 reports the impact on the Trust Fund over 25, 50, and 75-year horizons. Over a 25-year horizon, the reform narrows the actuarial shortfall from 1.45 percent to 0.93 percent of payroll, reflecting additional payroll tax receipts that are not matched by additional benefit payments. Over a 75-year horizon, the reform is almost exactly actuarially neutral, increasing the shortfall from 2.82 to 2.83 percent of payroll. Thus, the program will not contribute to bridging the actuarial shortfall. But this was not its objective, and other policy instruments are available for that purpose. However, the program will postpone exhaustion of the Trust Fund from 2034 to 2037, reflecting increased payroll tax receipts.[20]

3. Alternative design features

Should catch-up contributions start earlier than age 50?

[19] Urban Institute calculations based on DYNASIM model.
[20] The DYNASIM projected exhaustion date matches the 2016 Social Security Trustees' Report projection.

Our base case assumes that catch-up contributions start at age 50. We choose age 50 because it is the age at which 1) the need to save for retirement may become more salient, 2) workers become eligible to make catch-up IRA and 401(k) contributions, and 3) many households enjoy increases in disposable income as children leave home and the mortgage is paid off (Scholz, Seshadri, and Khitatrakun, 2006).

But low wage workers, the primary target of our intervention, often exit the labor market at relatively young ages and experience earnings declines in their 50s, and might therefore benefit little from the additional contributions. Figure 1, reproduced from Guvenen, Karahan, Ozkan, and Song (2015) shows all but the highest percentiles of the distribution of lifetime earnings experience earnings declines from age 45 to 55. The pattern reported in the above paper is captured in differences between the age earnings profiles of our stylized very low, low, medium, high, and maximum earners.

We therefore model an alternative in which contributions begin at age 40, but contributions are increased by 30 percent, rather than the 50 percent in our base case. Table 6 reports the impact on the share of individuals age 62 and over with incomes below 200 percent of the Federal Poverty Line. The reductions in poverty are similar to those achieved with catch-up contributions starting at age 50. The reductions are smaller in the early years (0.2 vs 0.3 percent) reflecting the smaller impact on workers currently close to retirement. By 2065 it has a slightly larger effect on the second shared lifetime income and an identical effect on the bottom quintile. We conclude that starting contributions at age 40 does not achieve the goal of targeting workers with very low lifetime earnings, while delaying build-up of programmatic benefits.

Relative to the base case, DYNASIM simulations show that starting contributions at age 40 slightly reduces the 75-year actuarial shortfall, by 0.11 percent of payroll, because it takes longer for the program to mature. Starting at age 40 also slightly reduces the rate of return on contributions, and thus the attractiveness of the program, because the time interval between the payment of contributions and receipt of benefits increases. Thus, the returns to scaled low and

high earners decline 2.92 and 3.60 percent to -0.11 and 0.72 percent for males and females, respectively.

Why not a mandate?

A mandate may be politically difficult to pass and is unnecessary if a voluntary opt-out program would otherwise achieve close to universal participation. If participation is less than universal, the economic case for a mandate depends on who is opting out, and why. If policy-makers believe that households are acting myopically in opting out, they might choose to mandate participation for paternalistic reasons. The paternalistic case for a mandate might be even stronger if low-earners, who are often at highest risk of poverty in old age, were opting out.

But some households may be acting rationally by choosing to opt out. Risk-tolerant high earners might believe they can earn higher returns elsewhere. Low earners who own their home, anticipate receiving income from a defined benefit pension plan, or experience a reduction in needs when the children leave home, may already be saving sufficient for retirement (Pang and Schieber, 2014). Mandating participation will decrease their expected discounted lifetime utility.

The impact of opt-outs on the financial sustainability of the proposal depends on who is opting out. Opt outs by low earners will generally improve sustainability, because low earners will enjoy high returns. Conversely, opt outs by high earners will reduce sustainability, create pressure to reduce the generosity of catch-up benefits, and lead to a "death spiral" in which an increasing share of workers opt out.

A mandate avoids risk of both a death spiral and opt-outs by vulnerable populations. It would also be within the spirit of Social Security and other social insurance programs that use mandates to both broaden the risk pool and protect it against adverse selection.

The credibility of the government's promise

In contrast to 401(k) and IRA plans that confer clear property rights on the participant, Social Security benefits may be reduced if tax receipts and Trust Fund balances are insufficient to pay scheduled benefits (Morton and Liou, 2016). The program currently faces an actuarial shortfall, and fear of a benefit cut might deter

workers from participating. The government should consider accompanying the reform by measures designed to restore actuarial balance.

Why not leave the problem to the market

Insurance companies currently offer inflation indexed immediate annuities. In theory, they could also offer deferred inflation indexed annuities, with premiums payable at ages 50-66 and benefits starting at age 66, exactly mimicking Social Security catch-up contributions.[21] A potential concern is that were the catch-up program to be successful, insurance companies might disrupt the risk pool by offering more attractive terms to high earners, who would earn low real return in the catch-up program. We proceed as follows. First, we identify the highest-paying male single life inflation-indexed immediate annuity, with benefits starting at age 66.[22] Using annuitant mortality tables and projection scales, we calculate the real rate of interest at which the expected present value of benefits equals the premium.[23] Then, using the same real rate of interest and annuitant mortality tables, we calculate the premium, expressed as a percent of salary, that an insurance company would need to charge a high-income worker to provide the same benefits he would obtain under the catch-up program. If the premium is less than 3.1 percent of salary, the worker is better off buying the annuity. If it is greater than 3.1 percent of salary, the worker is better off staying in the catch-up program. For the 1949 birth cohort, an insurance company would need to charge men and women 4.0 and 4.4 percent of salary, respectively, and for the 1965 birth cohort, 3.9 and 4.3 percent of salary, considerably more than 3.1 percent. Thus, the catch-up program can both target low earners and offer high earners a return that is better than could be offered on the financial markets.

How do federal and state taxes affect the results?

[21] A deferred annuity allows workers to benefit from mortality credits (the increment to returns resulting from the reallocation of income from those who die to those who survive) from age 50 rather than from the age benefits commence.

[22] On 5 December 2016, the highest-paying company offered a monthly benefit of $389.63 for a $100,000 premium.

[23] We use the Society of Actuaries 2012 Individual Annuity Mortality Basic Table and Projection Scale G2 (American Academy of Actuaries, 2011). The tables can be downloaded at mort.soa.org

The above analyses disregard federal and state income taxes. Employee Social Security contributions are payable out of after tax income. The Social Security benefits of low and moderate-income retirees are not taxed. Only part of the benefits of higher income retirees is taxed.[24] The economic policy rationale for partial exclusion from tax of Social Security benefits is to create symmetry between the tax treatment of Social Security taxes and benefits.[25] The employer's share of the payroll tax is excluded from tax (the employer deducts it as a business expense, but the contribution is not included in the employee's taxable income), but the employee's share is paid out of taxable income. As catch-up contributions would be paid out of taxed income, it would be consistent to exempt from income tax the share of Social Security benefits attributable to catch-up contributions.

4. Conclusions

The United States faces a retirement savings crisis (Munnell, Rutledge, and Webb, 2014).[26] Working longer is, at best, only a partial solution (Munnell and Sass, 2008). Nor is saving more a solution for households approaching retirement with little wealth. They would have to save implausibly large amounts to hit conventional replacement rate targets (Munnell, Golub-Sass, and Webb, 2011).

Low-wage workers would benefit most from catch-up contributions, but theoretical calculations show that even workers with high lifetime incomes would benefit from participation once account is taken of the value of the additional longevity insurance provided by the program. Importantly, high earners are better

[24] The taxation treatment of Social Security benefits is as follows. First, the household's "combined income" is calculated. This equals regular taxable income plus 50 percent of Social Security income. The amount of Social Security income that is taxable is the minimum of three tests: 1) 50 percent of combined income over the first threshold ($25,000 for singles and $32,000 for married couples), plus 35 percent of combined income over the second threshold ($34,000 for singles and $44,000 for married couples); 2) 50 percent of benefits plus 85 percent of combined income over the second threshold; 3) 85 percent of benefits. For a fuller discussion, see Mahaney and Carlson (2007).

[25] The tax treatment of IRAs is also symmetric. Regular IRA contributions are tax deductible and withdrawals taxable, whereas Roth IRA contributions are payable out of taxed income, but withdrawals are not taxable.

[26] A notable dissenting voice is Scholz and Seshadri (2006). They argue that households are, in general, doing a good job of smoothing the marginal utility of consumption. But their results depend on their assumed preference parameters.

off making catch-up contributions than purchasing even an optimally-designed annuity from an insurance company. The DYNASIM model shows that, over a 75 year horizon, the program has almost no effect on the Social Security actuarial shortfall. However, it was not one of our goals to address the shortfall, and other policy instruments exist for that purpose.[27]

The DYNAMSIM model shows that the program will have only a modest effect on the shares of the elderly population with incomes below the FPL, or below 200 percent of the FPL. By 2065, it will reduce the share below 100 percent of the FPL from 5.7 to 5.3 percent, almost all in the bottom shared lifetime income quintile. The Social Security program links benefit entitlement to payroll tax contributions. The progressivity of the benefit formula notwithstanding, it provides only limited protection to those only marginally attached to the labor force. Other policy instruments, such as Supplementary Security Income, a means tested non-contributory benefit, may be more effective means of targeting this group.

This study shows that Social Security catch-up contributions would reduce, but not eliminate the gap between retirement savings and the amounts required to maintain pre-retirement consumption. Absent an unprecedentedly large increase in Social Security benefits and taxes, most workers will continue to need employment-based pensions to maintain their standard of living in retirement. However, the current 401(k) system fails the majority of workers. Many are ineligible to participate, not all eligible workers participate, savings often leak out through pre-retirement withdrawals, excessive fees erode retirement savings, plans earn sub-par returns, and workers lack a cost-effective way of converting accumulated wealth into post-retirement income.

[27] The Social Security Fix-It Book (2014) published by the Center for Retirement Research outlines reform options. www.crr.bc.edu

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Tables and Figures

Table 1: Impact of catch-up contributions on benefits

	Lifetime earnings				
	Very low	Low	Medium	High	Maximum
Existing benefits	775	1,012	1,660	2,214	2,695
Additional benefits	*66*	*119*	*255*	*199*	*345*
Benefits with catch-up contributions	841	1,131	1,915	2,413	3,040
Existing replacement rate	83.8%	60.8%	45.0%	37.4%	29.5%
Addition to replacement rate	*7.2%*	*7.2%*	*6.9%*	*3.4%*	*3.8%*
Replacement rate with catch-up contributions	91.0%	68.0%	51.9%	40.8%	33.3%
PIA segment	32	32	32	15	15
Average wage-indexed earnings	925	1,665	3,689	5,921	9,126

Source: Authors' calculations.

Notes: All dollar amounts in 2015 dollars. Replacement rate denominators are average wage-indexed earnings.

Table 2: Rate of Return on Catch-Up Contributions

	Lifetime earnings				
	Very low	**Low**	**Medium**	**High**	**Maximum**
1949 birth cohort					
Men	3.59%	3.59%	3.52%	-0.39%	-0.23%
Women	4.61%	4.61%	4.54%	0.75%	0.94%
1965 birth cohort					
Men	3.97%	3.96%	3.89%	0.03%	0.20%
Women	4.86%	4.85%	4.78%	1.03%	1.22%
1949 birth cohort by SES					
Men					
White less than high school	2.98%	2.98%	2.91%	-0.99%	-0.85%
White high school	3.59%	3.59%	3.52%	-0.39%	-0.23%
White College	4.20%	4.20%	4.12%	0.18%	0.36%
Black less than high school	1.80%	1.79%	1.72%	-2.10%	-1.98%
Black high school plus	2.62%	2.62%	2.55%	-1.30%	-1.16%
Hispanic	4.22%	4.21%	4.14%	0.21%	0.40%
Women					
White less than high school	4.29%	4.28%	4.21%	0.43%	0.61%
White high school	4.66%	4.66%	4.59%	0.77%	0.97%
White College	4.93%	4.93%	4.86%	1.05%	1.25%
Black less than high school	3.46%	3.46%	3.39%	-0.31%	-0.15%
Black high school plus	4.15%	4.14%	4.07%	0.36%	0.54%
Hispanic	4.94%	4.94%	4.87%	1.09%	1.29%

Source: Authors' calculations.

Table 3: Equivalent Contribution Rate by Lifetime Earnings

	Lifetime Earnings				
	Very low	**Low**	**Medium**	**High**	**Maximum**
Rate of return = 3%					
Men					
CRRA = 2	3.92%	5.15%	5.83%	2.99%	3.29%
CRRA = 5	4.50%	6.27%	7.77%	4.09%	4.60%
Women					
CRRA = 2	4.63%	5.76%	6.43%	3.26%	3.56%
CRRA = 5	5.11%	6.81%	8.37%	4.35%	4.85%
Rate of return = 1%					
Men					
CRRA = 2	3.96%	6.11%	7.30%	3.86%	4.40%
CRRA = 5	4.59%	8.14%	10.30%	5.72%	6.66%
Women					
CRRA = 2	4.65%	6.97%	8.23%	4.32%	4.87%
CRRA = 5	5.35%	9.08%	11.38%	6.26%	7.23%

Source: Authors' calculations.

Notes: We assume population mortality for the 1949 birth cohort. The catch-up program requires a contribution rate of 3.1 percent of salary. The table reports the contribution rates at which a risk-averse single individual would be indifferent between participating and not participating in the program, assuming the same benefit level. When the contribution rate exceeds 3.1 percent, a worker is willing to pay more than the cost of the program to participate.

Table 4: Impact of Reform on Share of Elderly Below 200% of FPL, Age 50 Option

	Year	2015	2025	2035	2045	2055	2065
All	Current law	28.4%	24.4%	23.2%	22.3%	19.8%	16.9%
	Reform	28.4%	24.1%	22.2%	20.7%	17.9%	15.1%
	Difference	***0.0%***	***-0.3%***	***-1.0%***	***-1.6%***	***-1.9%***	***-1.8%***
Men	Current law	24.1%	23.2%	22.6%	22.0%	19.4%	16.5%
	Reform	24.1%	22.7%	21.5%	20.5%	17.6%	15.0%
	Difference	***0.0%***	***-0.5%***	***-1.1%***	***-1.5%***	***-1.8%***	***-1.5%***
Women	Current law	32.0%	25.5%	23.8%	22.6%	20.1%	17.1%
	Reform	32.0%	25.2%	22.7%	20.9%	18.2%	15.2%
	Difference	***0.0%***	***-0.3%***	***-1.1%***	***-1.7%***	***-1.9%***	***-1.9%***
Less than High School	Current law	55.1%	51.0%	49.4%	47.5%	42.4%	37.3%
	Reform	55.1%	50.7%	48.2%	45.3%	40.1%	35.3%
	Difference	***0.0%***	***-0.3%***	***-1.2%***	***-2.2%***	***-2.3%***	***-2.0%***
High School	Current law	32.2%	30.0%	29.6%	28.3%	25.2%	22.2%
	Reform	32.2%	29.5%	28.3%	26.2%	22.8%	20.0%
	Difference	***0.0%***	***-0.5%***	***-1.3%***	***-2.1%***	***-2.4%***	***-2.2%***
Some College	Current law	21.6%	18.2%	17.9%	18.3%	17.4%	14.6%
	Reform	21.6%	17.8%	16.6%	16.4%	15.3%	12.8%
	Difference	***0.0%***	***-0.4%***	***-1.3%***	***-1.9%***	***-2.1%***	***-1.8%***
Lifetime earnings quintile 1	Current law	80.0%	76.0%	73.8%	70.2%	65.2%	60.2%
	Reform	80.0%	75.5%	72.1%	68.1%	63.0%	57.7%
	Difference	***0.0%***	***-0.5%***	***-1.7%***	***-2.1%***	***-2.2%***	***-2.5%***
Lifetime earnings quintile 2	Current law	41.7%	33.1%	31.7%	30.8%	24.6%	17.3%
	Reform	41.7%	32.3%	29.4%	26.5%	19.5%	12.8%
	Difference	***0.0%***	***-0.8%***	***-2.3%***	***-4.3%***	***-5.1%***	***-4.5%***

Lifetime earnings quintile 3	Current law	13.9%	9.2%	7.2%	7.5%	6.3%	4.7%
	Reform	13.9%	8.8%	6.3%	6.1%	4.7%	3.5%
	Difference	***0.0%***	***-0.4%***	***-0.9%***	***-1.4%***	***-1.6%***	***-1.2%***
Lifetime earnings quintile 4	Current law	4.5%	2.8%	2.5%	2.3%	2.0%	1.5%
	Reform	4.5%	2.7%	2.2%	1.8%	1.6%	1.1%
	Difference	***0.0%***	***-0.1%***	***-0.3%***	***-0.5%***	***-0.4%***	***-0.4%***
Lifetime earnings quintile 5	Current law	2.0%	1.1%	1.0%	0.9%	0.7%	0.6%
	Reform	2.0%	1.0%	0.9%	0.8%	0.6%	0.6%
	Difference	***0.0%***	***-0.1%***	***-0.1%***	***-0.1%***	***-0.1%***	***0.0%***

Source: Authors' calculations based on DYNASIM model.
Notes Calculations assume current law benefits, and universal participation in catch-up contributions starting at age 50.

Table 5: Impact of Reform on Social Security Actuarial Balance, Age 50 Option

	Valuation period		
	25 years	**50 years**	**75 years**
Current law			
Income rate	14.59%	13.99%	13.85%
Cost rate	16.04%	16.32%	16.67%
Actuarial deficit	*-1.45%*	*-2.34%*	*-2.82%*
Proposal			
Income rate	15.62%	15.08%	14.98%
Cost rate	16.55%	17.25%	17.80%
Actuarial deficit	*-0.93%*	*-2.17%*	*-2.83%*
Change in actuarial deficit	**-0.52%**	**-0.17%**	**0.01%**

Source: Authors' calculations based on DYNASIM model.
Notes Calculations assume current law benefits, and universal participation in catch-up contributions starting at age 50.

Table 6: Impact of Reform on Share of Elderly Below 200% of FPL, Age 40 Option

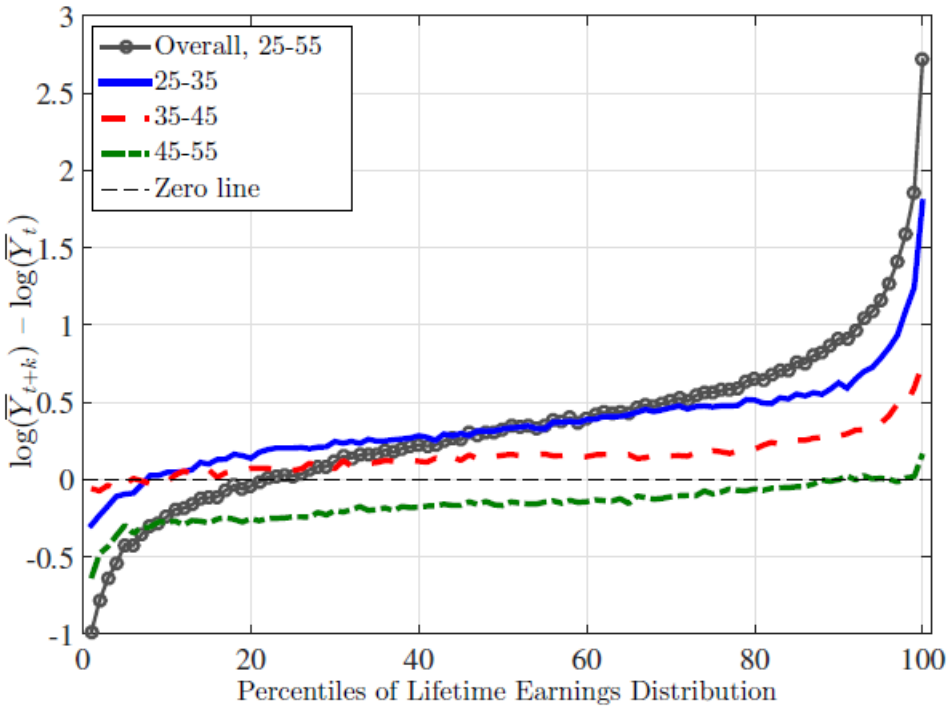
	Year	2015	2025	2035	2045	2055	2065
All	Current law	28.40%	24.40%	23.20%	22.30%	19.80%	16.90%
	Reform	28.40%	24.20%	22.50%	20.90%	18.00%	15.10%
	Difference	***0.00%***	***-0.20%***	***-0.70%***	***-1.40%***	***-1.80%***	***-1.80%***
Men	Current law	24.10%	23.20%	22.60%	22.00%	19.40%	16.50%
	Reform	24.10%	22.90%	21.80%	20.60%	17.70%	14.90%
	Difference	***0.00%***	***-0.30%***	***-0.80%***	***-1.40%***	***-1.70%***	***-1.60%***
Women	Current law	32.00%	25.50%	23.80%	22.60%	20.10%	17.10%
	Reform	32.00%	25.30%	23.10%	21.20%	18.30%	15.20%
	Difference	***0.00%***	***-0.20%***	***-0.70%***	***-1.40%***	***-1.80%***	***-1.90%***
Less than High School	Current law	55.10%	51.00%	49.40%	47.50%	42.40%	37.30%
	Reform	55.10%	50.80%	48.70%	45.60%	40.10%	35.20%
	Difference	***0.00%***	***-0.20%***	***-0.70%***	***-1.90%***	***-2.30%***	***-2.10%***
High School	Current law	32.20%	30.00%	29.60%	28.30%	25.20%	22.20%
	Reform	32.20%	29.60%	28.70%	26.60%	23.00%	19.80%
	Difference	***0.00%***	***-0.40%***	***-0.90%***	***-1.70%***	***-2.20%***	***-2.40%***
Some College	Current law	21.60%	18.20%	17.90%	18.30%	17.40%	14.60%
	Reform	21.60%	18.00%	17.00%	16.70%	15.40%	12.70%
	Difference	***0.00%***	***-0.20%***	***-0.90%***	***-1.60%***	***-2.00%***	***-1.90%***
Lifetime earnings quintile 1	Current law	80.00%	76.00%	73.80%	70.20%	65.20%	60.20%
	Reform	80.00%	75.80%	72.50%	68.30%	63.10%	57.80%
	Difference	***0.00%***	***-0.20%***	***-1.30%***	***-1.90%***	***-2.10%***	***-2.40%***
Lifetime earnings quintile 2	Current law	41.70%	33.10%	31.70%	30.80%	24.60%	17.30%
	Reform	41.70%	32.60%	30.10%	27.20%	20.00%	12.30%

	Difference	***0.00%***	***-0.50%***	***-1.60%***	***-3.60%***	***-4.60%***	***-5.00%***
Lifetime earnings quintile 3	Current law	13.90%	9.20%	7.20%	7.50%	6.30%	4.70%
	Reform	13.90%	8.90%	6.60%	6.30%	4.70%	3.50%
	Difference	***0.00%***	***-0.30%***	***-0.60%***	***-1.20%***	***-1.60%***	***-1.20%***
Lifetime earnings quintile 4	Current law	4.50%	2.80%	2.50%	2.30%	2.00%	1.50%
	Reform	4.50%	2.80%	2.20%	2.00%	1.60%	1.20%
	Difference	***0.00%***	***0.00%***	***-0.30%***	***-0.30%***	***-0.40%***	***-0.30%***
Lifetime earnings quintile 5	Current law	2.00%	1.10%	1.00%	0.90%	0.70%	0.60%
	Reform	2.00%	1.10%	0.90%	0.80%	0.60%	0.60%
	Difference	***0.00%***	***0.00%***	***-0.10%***	***-0.10%***	***-0.10%***	***0.00%***

Source: Authors' calculations based on DYNASIM model.

Notes Calculations assume current law benefits, and universal participation in catch-up contributions starting at age 40.

Figure 1: Log Earnings Growth Over Decades of the Life Cycle



Source: Reproduced from Guvenen, Karahan, Ozkan & Song (2015)