Social Security Wage Indexing Revisited

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This paper examines the long-term impact of Congress' 1977 decision to wage index initial Social Security benefits. We use the Survey of Consumer Finances to address the question of how senior household incomes and the Social Security Trust Fund's financial status would have fared had Congress chosen different methods of indexing initial Social Security benefits. We perform a retrospective analysis of two alternative price-indexing methods. The first indexes workers' prior wage histories to the growth in prices rather than wages. The second method holds constant inflation-adjusted initial benefits for a typical recipient. We find that the objective of the 1977 Social Security legislation—namely, ensuring that seniors' living standards keep up with the rest of the population—could have been achieved by either price-indexing method. The methods would have only a minor effect on most senior household incomes, but both would have prevented Social Security's looming insolvency.

Keywords: senior incomes, retirement income, payroll taxes, wage indexing, pure price indexing, Social Security, Survey of Consumer Finances, Current Population Survey

JEL Codes: E2, H55, J14, J26

Introduction

Social Security is fast approaching financial insolvency. Unless Congress acts to alter the program's expenditure or revenue trajectories, Social Security will be unable to pay full benefits early in the next decade. The pending insolvency creates a challenge for lawmakers. Over 65 million individuals rely on the program's monthly benefits and 181 million workers pay payroll taxes to finance these benefits.[1] Thus, the policy mix chosen to put Social Security on a sound financial footing will directly and substantially affect the economic well-being of millions of Americans.

The policy choices will also have far-reaching ramifications for the state of the federal government's finances and overall economic welfare. Social Security's finances and the condition of the federal budget are intertwined as never before. The program is the federal budget's largest line item. Its annual expenditures currently account for nearly one-fourth of federal non-interest outlays and 28 percent of federal revenues. The program's growing expenditures will account for 35 percent of the projected increase in non-interest federal spending over the next decade and its annual shortfalls will add over $3 trillion to the federal deficit over the next ten years.[2]

This paper examines the long-term impact of Congress' 1977 decision to wage index initial Social Security benefits on senior citizen income and the trust fund's financial status. In an earlier paper (Cogan and Heil, 2022), we used the Survey of Consumer Finances (SCF) to document the remarkable increase in senior household incomes from 1982 to 2018. The increase far outstripped the growth among younger households. For most senior households, the growth in wage-indexed Social Security benefits played only a modest role.

This paper uses the SCF to address the question of how senior household incomes and the Social Security Trust Fund's financial status would have fared had Congress chosen different methods of indexing initial Social Security benefits. We perform a retrospective analysis of two alternative price-indexing methods.[3] The first indexes workers' prior wage histories to the growth in economy-wide prices rather than wages. This method was proposed by Hsiao (1976). It was considered and rejected in favor of wage indexing during the congressional deliberations in 1976–77. For the typical worker, Hsiao's method allows real initial benefits to rise over time with the growth in workers' wages, though not as rapidly as wage indexing when average wage growth is positive. The second method holds constant the inflation-adjusted value of initial benefits for a typical

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[1] See table IV.B3 in OASDI Trustees (2023) supplemental single-year tables.
[2] Authors calculations based on CBO (February 2023).
[3] Biggs, Brown, and Springstead (2005) completed a similar forward-looking analysis for the same indexing methods.

recipient; we call this method pure price indexing.[4] This method was one of three options for determining initial benefits recommended by the 2001 President's Commission to Strengthen Social Security (henceforth referred to as the 2001 Commission).[5]

We find that the objective of the 1977 Social Security legislation—namely, ensuring that seniors' living standards keep up with the rest of the population—could have been achieved by either price-indexing method rather than the wage-indexing method. The adoption of either price-indexing method would have had only a minor effect on most senior household incomes. From 1982 to 2018, inflation-adjusted median senior household income would still have risen by 77 percent under the Hsiao method and 74 percent under pure price indexing compared to 85 percent under wage indexing. The former increases would still be over two times greater than the growth in median inflation-adjusted incomes among working-age households.

Similar results hold for households in other parts of the income distribution. Neither price-indexing policy would have materially affected incomes of low- or high-income senior households until the middle of the last decade. By 2018, relative to wage indexing, the Hsiao method would have resulted in a 7.0 percent reduction in median incomes for low-income senior households and a 3.3 percent reduction for high-income seniors. Similarly, pure price indexing would have reduced median income among low-income senior households by 9.2 percent and 4.9 percent among high-income households in 2018.

Under wage indexing, Social Security has been running annual cash deficits for over a decade and it is on a certain path to insolvency. Despite their small impact on senior incomes, both price-indexing methods would have prevented Social Security's looming insolvency. The Hsiao method would have avoided the program's insolvency, but the program would have faced annual cash shortfalls from 2024 to 2043. While under pure price indexing, Social Security would now be running annual cash surpluses.

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[4] Strictly speaking, real benefits are held constant over time for retirees with the same average indexed monthly earnings (AIME) as a share of the national average wage index when retirees reach age 60.
[5] See https://www.ssa.gov/history/reports/pcsss/pcsss.html for an overview of the 2001 Commission.

1 A Brief History of Social Security Wage Indexing

> "We never had any problem with Social Security financing, short-range or long-range, until we adopted this idea of an automatic increase whenever the cost of living goes up…Looking back on it, it was a bad idea."[6]
>
> Senate Finance Committee Chairman Russell Long

Social Security benefits were not automatically indexed until 1975. Instead, starting in 1950, Congress regularly enacted legislation increasing monthly benefits. Nine of the thirteen Congresses from the 81st (1949-50) to the 93rd, increased monthly Social Security benefits. The ostensive goal of these legislative changes was to compensate Social Security recipients for the loss of purchasing power caused by rising consumer prices since the previous benefit increase.

During these years, Congress also regularly increased *initial* benefits, *i.e.*, the benefits a worker is entitled to when they reach the program's full retirement age. These increases were roughly designed to ensure that benefits for new recipients in the near term did not fall behind the growth in economy-wide average wages. Since Social Security benefits were linked to past earnings, initial benefits did automatically increase over time as earnings increased, but not as fast as average wage growth.[7] The legislated *initial* benefit increases were typically larger for lower wage workers than for higher wage workers. Thus, between 1950 and the early 1970s, the Social Security benefit schedule became more progressive.[8]

Figure 1 shows the trend in the average *initial* monthly benefit after adjusting for inflation (the blue line and left-vertical scale) and the trend in initial benefits as a percent of average wages (the orange line and right-scale) from 1950 to 2019.[9] We use the Bureau of Economic Analysis' Personal Consumer Expenditure Price Index (PCE) to adjust for inflation.[10] The growth in inflation-adjusted initial Social Security benefits during the decades immediately following World War II was strong and, in fact, generally outstripped the growth in economy-wide wages. The increases from 1968 to 1973 were particularly large. During this 5-year period, the average real benefit increased by

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[6] Los Angeles Times, September 26, 1976.
[7] The automatic growth in benefits was slower than average wage growth due to the progressive design of the Social Security formula i.e., the program replaces a larger share of pre-retirement income for low-income workers than high-income workers.
[8] Under Social Security's progressive benefit schedule, benefits as a percent of workers' earnings declined as earnings increased. As Congress made the benefit schedule more progressive over time, the need for ad hoc increases in initial benefits became greater.
[9] The benefits are for a retiree with the medium-scaled earnings at age 65. For an overview of how the Social Security Administration calculates the medium-scaled earner's benefits, see Clingman and Burkhalter (2022).
[10] This index tends to grow more slowly than the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W), the price index used by the Social Security Administration when calculating annual cost-of-living adjustments.

nearly 50 percent. This was about five-times faster than the growth in wages and pushed the average initial benefit as a percent of average wages—a proxy for Social Security's replacement rate—from 27 percent to 33 percent.

Figure 1. Growth in initial benefits at full retirement age
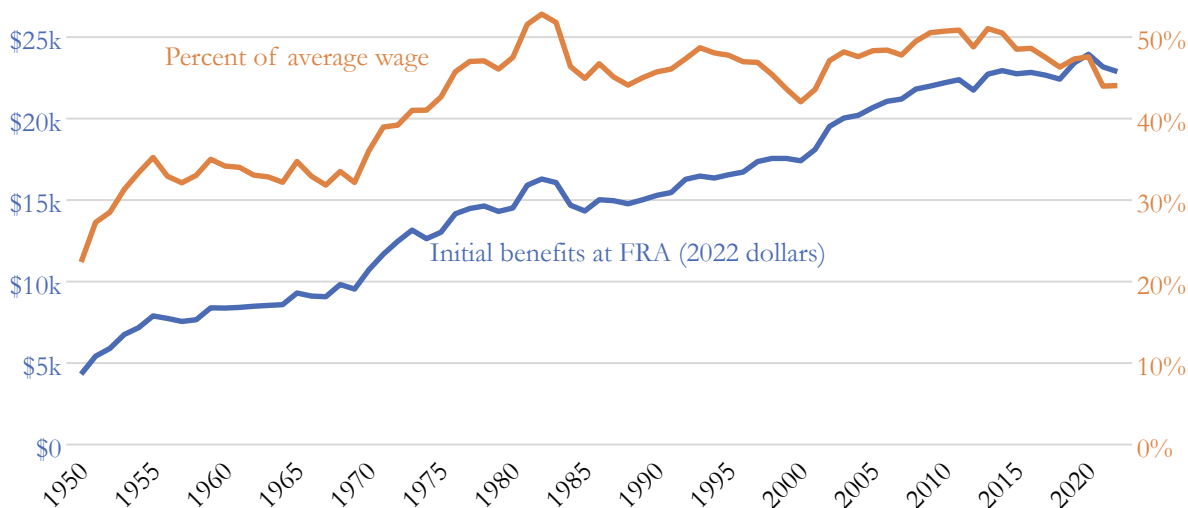
The cumulative effect of the post-World War II ad hoc increases on benefit levels was substantial. By 1973, the inflation-adjusted monthly initial benefit for the typical new recipient was more than three times the monthly benefit received by the typical new retiree in 1950. In purchasing power terms, the increase allowed new Social Security retirees in 1972 to purchase three times as many goods and services as those two decades earlier.

The period of ad hoc increases ended in 1972 when Congress automatically indexed benefits. Benefits for persons on the Social Security rolls were annually indexed to the cost-of-living as measured by the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). Initial benefits were indexed to wages by a formula that attempted to mimic the ad hoc increases. But the formula contained a grievous error. The error effectively doubly indexed initial benefits to consumer price growth, which was running at a peacetime record-high rates. In the four years from 1973 to 1977, consumer prices rose by 8 percent per year.[11]

As a result of the error, the average new retiree in 1977 received a monthly benefit that was 24 percent higher, after adjusting for inflation, than the average benefit received by the average new

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[11] Using the CPI-W price index.

retiree just six years earlier. The average replacement rate for new retirees in 1977 was 44 percent, up from 29 percent a decade earlier.[12]

As initial benefits rose, it became clear to policy officials at both ends of Pennsylvania Avenue that the flawed method for determining initial benefits was unsustainable. If the policy continued, low-wage workers would eventually receive Social Security benefits that exceeded their pre-retirement income. The 1975 Quadrennial Social Security Advisory Council recommended a new wage-indexing policy to replace the flawed initial benefits method.

The wage-indexing policy used a two-step method to calculate a worker's initial benefit. First, a measure of lifetime earnings, termed the Average Indexed Monthly Earnings (AIME), was calculated for each worker. The AIME inflated each of the worker's prior year's earnings to the year in which the worker turned 60 by the growth in economy-wide average wages since the earlier year. The highest 35 years of these indexed earnings were then averaged and expressed as a monthly amount.[13]

Second, a schedule of "replacement rate" factors that expresses initial benefits as a percentage of AIME was applied to the worker's particular AIME to obtain the initial benefit. The schedule of replacement factors contained higher replacement rates at low AIME levels and lower replacement rates at high AIME levels. This feature imparted a certain degree of progressivity to initial benefits in the sense that workers with lower lifetime earnings (AIME) would receive benefits that were larger in relation to their lifetime earnings than workers with higher lifetime earnings. Over time, the bend points, the AIME levels at which replacement rates change, were increased on an annual basis by the growth in economy-wide average wages.

Under the new policy, initial benefits would automatically grow over time at the same rate as economy-wide average wages. If average wages increased by 4 percent per year, initial Social Security benefits paid to average workers when they reach Social Security's full retirement age would grow by 4 percent per year. The Council recommended no change in the previously enacted automatic COLAs to benefits for persons after they started receiving Social Security.

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[12] Initial benefits and replacement rates are for the medium-scaled worker from table V.C7 in OASDI Trustees (2023) supplemental single-year tables.

[13] Most recipients from 1982 forward in time received benefits under Social Security's "new start" policy in which only earnings after 1950 were counted in computed the workers' AIME. Workers reached age 65 from 1982 to 1993 did not have 35 years of earnings. To address this issue, the 1977 law specified that for workers who reached Social Security's retirement age from 1982 to 1988, the lowest five years of indexed earnings would be discarded in calculating their AIME. For workers who reached age 65 in 1989, the lowest four years of earnings would be discarded and so on until workers who reached age 65 in 1994 had 35 years of earnings available.

President Ford embraced the 1975 Advisory Council's recommendation. But his proposal languished in Congress. By 1977, when President Carter took office, the flawed indexing policy had put Social Security well on its way toward insolvency. The Social Security Trustees predicted that the fund would be exhausted by early 1983, a scant six years away.[14]

President Carter made restoring Social Security finances to soundness a priority. The Speaker of the House of Representatives, Democrat Thomas P. "Tip" O'Neil, made his party's priority clear by saying, "If I've ever seen an issue that's a Democratic issue, it's this."[15] President Carter's restoration plan used wage indexing to slow the growth in Social Security benefits and proposed a substantial increase in the payroll tax to raise revenues. In December 1977, Congress passed a modified version of the president's plan into law.[16]

The new wage-indexing policy applied only to future Social Security recipients, *i.e.,* those who were age 62 or younger in 1979. Current recipients and workers over age 62 in 1979 continued to receive the benefits to which they were entitled under the flawed 1972 method. To smooth changes from one method to the other, the law created a 5-year transition period for persons age 57 to 62 in 1979.[17] Figure 2 shows the percentage of senior households with Social Security income whose monthly benefits were affected by the 1977 law.[18] The percentage grows rapidly from 39 percent in 1988 to 90 percent or higher in 2003.

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[14] Other factors including the poorly performing economy and changing demographics. In addition to the large initial benefit increases granted by the flawed benefit formula, these factors had combined to create the trust fund's bleak outlook. For example, see U.S. Senate, 94th U.S. Senate, 94th Congress, 2nd Session and Report of the Panel on Social Security Financing to the Committee on Finance, 1st Session, February 1975, and The Committee on Finance and the Ways and Means Committee Report of the Consultant Panel of Social Security to the Congressional Research Service, 94th Congress, 2nd Session, August 1976.

[15] Congressional Quarterly Almanac, 1977.

[16] President Carter's proposal and the law enacted by Congress also raised payroll taxes sharply, increased the current and future ceiling on taxable wages, moved forward in time the previously scheduled payroll tax rate increases, and scheduled the payroll rate to increase to its current rate of 12.4 percent in 1990.

[17] Upon becoming eligible for benefits, they would receive the higher of either the new wage-indexed benefits or benefits based on a modified and slightly less generous version of the 1972 flawed method.

[18] Most Social Security recipients who received higher benefits under the transition provisions than they would have received under wage-indexing, were those born before 1917 and, therefore reached Social Security's normal retirement age in 1981 or earlier. By 1982, 60 percent of recipients who turned age 65 in 1982 received the wage-indexed benefit rather than the transitional guarantee. By 1986, 98 percent of recipients who were born in 1921 received the wage-indexed benefit (see footnote 34 in the Notch Commission Report).

Figure 2. Share of senior household SS recipients affected by 1977 law
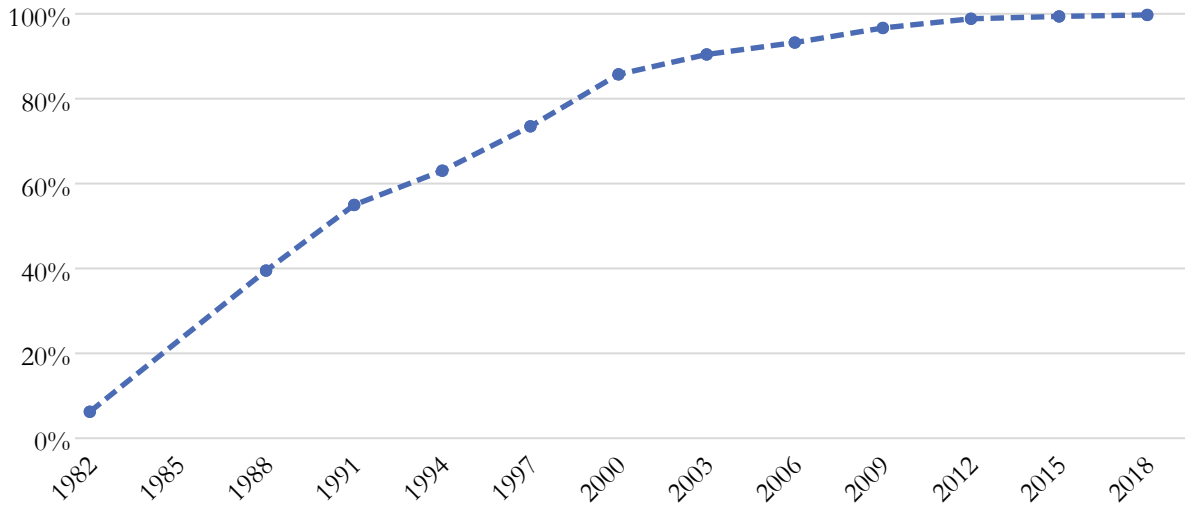
Notes: Data are from SCF. Affected recipients include those age 62 or younger in 1979 who began collecting Social Security in 1979 or later.

The wage-indexing policy set the initial benefit for the average new retiree at about 42 percent of the average economy-wide monthly earnings of covered workers. The statute's overarching goal was to "stabilize" this "replacement rate" over time, a euphemism for stopping the unsustainable rise in benefits that was taking place under the flawed method. As figure 1 shows, wage indexing was successful in achieving this goal.

There was little analysis behind the choice of the average initial benefit level. The level was about 5 percent below the projected level in 1979 under the flawed method.[19] This level, measured either in dollar terms or as a replacement rate was, at that point in time, the highest in Social Security's history.[20] The average inflation-adjusted initial monthly benefit in 1977 was 24 percent higher than it had been six years earlier. Thus, by choosing to set new initial benefits at 5 percent below the projected 1979 level, the new policy built a large portion of the flawed indexing method's impact into benefit levels for all future Social Security recipients.

Nevertheless, under the new law, initial benefits for persons age 60 and younger in 1977 were lower than the significantly higher benefits scheduled under the flawed formula. At the time of enactment, the initial monthly benefit of a typical 60-year-old worker who planned to retire in five

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[19] U.S. Senate, Committee on Finance, Social Security Amendments of 1977, Conference Report, 95th Congress, 1st Session, S. Rept. 95-612, page 67.

[20] U.S. Senate, Committee on Finance, Social Security Amendments of 1977, S. Rept. 95-572, 95th Congress, 1st Session. The table on page 20 reports projected initial benefits under the flawed 1972 formula and the actual benefit level in 1970. The calculation in the text uses 95% of the reported 1979 benefit level.

years was projected to be 10 percent below the previously scheduled benefit. The same worker who planned to take early retire at age 62 would receive the same percentage reduction and had even less time to prepare for the change.[21]

Stabilizing the replacement rate meant that initial benefits would automatically grow at the rate of growth of economy-wide average wages over time. Rising real wages would produce rising real benefits. As critics noted at the time, wage indexing would thereby lock-in benefit increases, which, given demographic realities, would inevitably require dramatically higher taxes. According to estimates at the time, wage indexing would require raising the payroll tax rate from its current rate of 11.7 percent to 18.0 percent to finance benefits to the baby-boom generation.[22]

The conclusion that wage indexing would require substantially higher payroll tax rates was as close to a mathematical certainty as population demographics allow. This can be easily seen with the aid of a simple formula. Under Social Security's pay-as-you-go financing, the equality between annual revenues and expenditures can be written as:

$$\bar{b} * R = t * \bar{y} * P \tag{1.1}$$

where, $\bar{b}$ is the average monthly benefit, R is the number of Social Security recipients, t is the Social Security payroll tax rate, $\bar{y}$ is the average monthly wage that is subject to the payroll tax, and P is the number of workers. Equation 1.1 can be rearranged as:

$$\frac{\bar{b}}{\bar{y}} = t * \frac{P}{R} \tag{1.2}$$

Equal proportionate increases in monthly benefits and economy-wide average earnings meant that the ratio of benefits to wage earnings, $\bar{b}/\bar{y}$, would remain constant over time. As long as the number of workers relative to the number of Social Security recipients (P/R) did not fall, the payroll tax need not increase. But it was well known at the time that the number of workers per

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[21] In reality, primarily because inflation turned out to be lower than projected, the reductions in benefits from their projected level, turned out to be much larger. The monthly benefit received by a typical 59-year-old in 1977, who would retire in 1983, was 26 percent lower than the amount promised under the 1972 law. Younger persons received monthly benefits that were between 28 percent and 30 percent lower than those promised under the 1972 law. For a brief period immediately after the law took effect in 1982, the new wage-indexing formula unexpectedly produced initial benefits that were below the initial benefits received by persons who had retired during the latter half of the 1970s. Although this temporary reduction lasted only three years, it spawned the creation of interest groups of affected retirees, called "notch babies", who for a decade or more railed against the "unfairness" of these reductions, claimed that they amounted to a "violation of Social Security's social contract," and lobbied to undo the 1977 law. Their efforts came to naught in part because the benefits under the new law were still relatively generous compared to all earlier retirees except those that had benefited from the unstainable benefit bonanza produced by the flawed 1972 law.
[22] Committee on Finance, Social Security Amendments of 1977 S. Rept. 95-572, 95th Congress, 1st Session, October 29, 1977, page 61. The projected expenditures as a percent of payroll of 17.86 in 2030 is used for this calculation.

recipient would begin to decline when the baby-boom generation reached retirement age. When this happened, payroll taxes would have to rise *pari passu* to maintain Social Security's pay-as-you-go policy.[23]

During the debate over wage indexing, a committee of Social Security experts, led by William Hsiao, questioned the fairness of a policy that required higher future taxes. As the Hsiao Committee put it, "[t]his panel gravely doubts the fairness and wisdom of now promising benefits at such a level that we must commit our sons and daughters to a higher tax rate than we ourselves are willing to pay."[24] Although not explicitly mentioned by the Hsiao Committee, the automatic wage-indexing method would make it more difficult to restrain Social Security spending. Wage indexing established a new budget baseline in which inflation-adjusted Social Security benefits would rise over time. Any subsequent attempt to slow the growth in benefits below the new baseline growth would be perceived by Congress and the public as a cut.[25]

The policy's predicted consequences are now coming to pass. As figure 3 shows, the number of workers has been steadily falling relative to the number of recipients for two decades and it will continue to do so for the foreseeable future. The OASI Trust Fund has run consecutive cash shortfalls since 2010 and its balance can now finance only 2.5 years of benefits. During these years real initial benefits at full retirement age have risen by 15 percent. Yet, Congress has been unwilling to slow the growth in initial benefits because it would be perceived as a benefit cut. As a consequence, in 11 years, the balance will have been exhausted and the federal government will be unable to pay promised benefits.[26] To meet the benefit levels promised by wage indexing, payroll taxes would need to be increased by over 20 percent a decade from now.
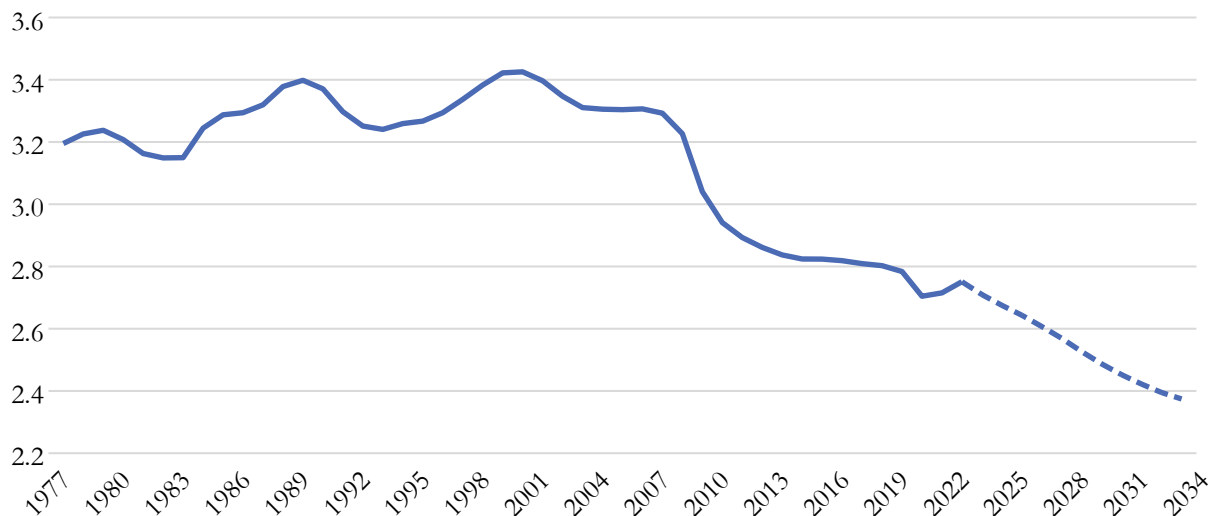
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[23] According to actuarial estimates in 1978, the higher payroll taxes contained in the 1977 law would avert the trust fund's impending insolvency. Together with wage indexing, the 1977 changes would allow Social Security to run cash surpluses until the first decade of the 21st century and to operate without higher taxes or additional reductions in promised benefits until the early 2030s. Because of high inflation and back-to-back economic recessions in 1980 and 1981, the tax increases and benefit reductions were unable to avert near term insolvency. The long-run estimates, on the other hand, proved remarkably accurate.

[24] Congressional Research Service, "Report of the Consultant Panel on Social Security to the Congressional Research Service," 94th Congress, 2 session, August 1976, page 8.

[25] We thank Andrew Biggs for highlighting this phenomenon.

[26] The Social Security Trustees' 2023 intermediate estimates project the OASI Trust Fund to be insolvent in early 2034.

Figure 3. Ratio of covered workers to Social Security recipients

Early in the debate over fixing the flawed double-indexing method, Congress briefly considered but rejected an alternative price-indexing approach developed by the Hsiao Committee. The committee proposed calculating initial benefits in a similar fashion to wage indexing, except that consumer prices instead of economy-wide wages would be used to adjust a workers' lifetime earnings. Specifically, each prior year of a workers' earnings were to be updated to the present by the growth in overall consumer prices (measured by the CPI-W) since that year. Like the wage-indexing formula, the replacement rate schedule would impart progressivity to benefits. Over time, the bend points in the replacement rate schedule formula would increase on an annual basis by the growth in consumer prices instead of economy-wide wages.

At one level, the early debate over wage versus price indexing was a technical one about how to automatically grow initial benefits over time. But there was a far more important issue at stake: the basic goal of Social Security. As noted above, the stated goal of wage indexing was to stabilize the fraction of workers' pre-retirement earnings that Social Security would replace, *i.e.,* the "replacement rate." As a practical matter, this meant that Social Security benefits would rise over time with the growth in economy-wide average wages. In this respect, the goal of wage indexing was to help ensure that the standard of living of retirees kept pace over time with the rising standard of living of workers. Since average wages typically rise faster than consumer prices, this also meant that the purchasing power of Social Security benefits would rise over time.

On the other hand, the policy also introduced an intergenerational unfairness: retirees at a more distant point in time would receive higher inflation-adjusted benefits than retirees at a more recent point time even if they had the same real wages and Social Security payroll tax contributions over their lifetimes.[27]

Price indexing, in contrast, guaranteed only that Social Security benefits would rise over time at least as fast as consumer prices. This would, at a minimum, preserve the purchasing power of Social Security benefits for future recipients at the level provided to recipients at the time the policy was established. Thus, the goal of price indexing was to help ensure that future retirees would enjoy the same standard of living as current retirees at the time. Future retirees would be guaranteed to receive the same inflation-adjusted benefits as more recent retirees who had the same lifetime real wages and Social Security contributions. Importantly, if real wages grew over time as expected, the Hsiao method would increase the purchasing power of benefits, albeit not as rapidly as wage indexing.

The Hsiao Committee recognized that price indexing would cause average replacement rates to decline over time. However, they pointed out that future Congresses could raise benefits, as they had in the past, if circumstances of retirees and overall financial conditions warranted. As the committee put it, price indexing would properly leave it "to future generations to decide what benefit increases are appropriate and what tax rates to finance them are acceptable."[28] According to estimates in 1976, the benefits promised by the Hsiao Committee's price-indexing plan could be financed without raising the long-run level of taxes above their current level. Thus, Social Security would not impose a greater burden on future workers than it did on current workers.

The wage-indexing policy adopted in 1977 has remained virtually unchanged since its inception. The 1983 Social Security reforms, enacted after it became clear that the 1977 reforms would not avert insolvency, left the recently enacted wage indexing untouched. All subsequent Social Security amendments since then have done the same.

Changes to the wage-indexing policy were considered seriously by President George W. Bush's Commission to Strengthen Social Security in 2001. While the Commission's recommendations for personal Social Security accounts received most of the public's attention, the Commission also proposed significant changes to how *initial* benefits for future retirees were

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[27] For an overview of current policy issues with the traditional replacement rate calculation, see Robinson (2022).
[28] Congressional Research Service, "Report of the Consultant Panel on Social Security to the Congressional Research Service," 94th Congress, 2 session, August 1976, page 5-8.

determined. One of the Commission's recommendations was to replace wage indexing with a form of price indexing which ensured that the average inflation-adjusted *initial* Social Security benefit remained at the level that prevailed at the time of the Commission's work.

This form of price indexing differed from the Hsiao Committee plan. The 2001 Commission's so-called "Model 2" plan was designed to hold the average inflation-adjusted value of *initial* benefits in any given year to the average payable in a base year for workers with average earnings.[29] In computing a worker's initial benefits, the Commission's plan retained the wage-indexing approach, but applied an adjustment to remove the increase in initial benefits that was due to the growth in the average economy-wide level of real wages since the base year, leaving only the increase due to prices.[30] We call this method "pure price indexing."

The differences among the indexing methods will, in turn, have correspondingly different consequences for the long-run financial health of the program's trust fund. Both price-indexing methods will, under normal economic conditions, be more favorable than wage indexing, and the 2001 Commission's method will be the most favorable.

In sections 3 and 4, we examine how the Hsiao method and the 2001 Commission's pure price indexing method, respectively, would have impacted benefits and the program's trust fund had they been adopted in 1977. We begin, though, with a stylized model showing how the methods would yield different benefit levels over time.

2   Stylized Differences Among Wage Indexing, the Hsiao Method, and Pure Price Indexing

Let us first consider comparing the Hsiao and wage indexing methods. There are two key differences between these methods that affect the level and growth in benefits: the calculation of a worker's average indexed monthly earnings (AIME) and the index used to grow the benefit formulas' bend points over time.

A typical worker's average indexed monthly earnings under wage indexing, $AIME_w$, is the monthly mean of the worker's highest 35 years of covered earnings after indexing each year by the

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[29] Specifically, the adjustment yields the same real benefits over time to individuals with the same relative wage-indexed earnings history (e.g., retirees with career earnings equal to 50 percent of the average wage index over their career will receive the same real benefit regardless of when they retire). Note, this method will mean replacement rates will fall over time.

[30] See President's Commission to Strengthen Social Security (2001), page 120. The price-indexed initial benefit in any year is obtained by multiplying the wage-indexed benefit by the ratio of the growth in prices (using the CPI-W) relative to growth in economy-wide average wages from the base year to the year in question. The adjustment reduces the replacement rate factors each year by the growth in the average real wages since the base year. The Congressional Budget Office calls this method "pure price indexing." See option 16 in CBO (2015) for more details.

economy-wide growth in wages from the earning's year to when the individual reaches age 60.[31]
Assuming that the worker's highest earnings occur in the 35 years prior to age 60, the worker's
AIME can be written as

$$AIME_w = \frac{1}{35} \sum_{i=26}^{60} y_i * \frac{\overline{W}_{60}}{\overline{W}_i} \tag{2.1}$$

Where y_i is the worker's nominal monthly earnings at age i, $\overline{W}_i$ is the economy-wide average
monthly wage when the worker is age i, and the $\overline{W}_{60}$ is the economy-wide average monthly wage
when the worker is age 60. If all wages grow at a constant rate w, then for retirees with average
wages through their careers, equation 2.1 simplifies to:

$$AIME_w = y_{60} \tag{2.2}$$

Where y_{60} is the worker's nominal monthly wage at age 60. If a worker's wage growth is different
than the economy-wide average, then the worker's wage-indexed AIME will depend not only the
worker's own wage history but also on economy-wide wage growth.

The Hsiao AIME ($AIME_h$) is the mean of each year's monthly covered earnings increased
by the growth in prices from the year of earnings to when the individual reaches age 60. This is
shown in equation 3.1:

$$AIME_h = \frac{1}{35} \sum_{i=26}^{60} y_i * \frac{CPI_{60}}{CPI_i} \tag{3.1}$$

Assuming wages grow at a constant rate w and prices grow at a constant rate p, equation 3.1
becomes:

$$AIME_h = \frac{y_{60}}{35} \sum_{i=26}^{60} \frac{(1+p)^{60-i}}{(1+w)^{60-i}} \tag{3.2}$$

Unlike the wage-indexed AIME, the Hsiao AIME depends solely on the worker's own wage
history and not on economy-wide wages. All workers with the same real earnings histories have the
same real AIME—and thus the same real benefit—regardless of when they retire. This
intergenerational equity feature is not present in the wage-indexing method.

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[31] This applies to individuals who retire at age 62 or older. Note, for early cohorts, fewer than 35 years of earnings were
included in their AIME formula.

If wage growth is faster than price growth, the Hsiao AIME will always be less than the wage-indexed AIME. This can be seen in the ratio of the AIMEs:

$$\frac{AIME_h}{AIME_w} = \frac{1}{35} * \sum_{i=26}^{60} \frac{(1+p)^{60-i}}{(1+w)^{60-i}} \tag{4}$$

When wages rise faster than prices, the price-indexed AIME will be lower and hence the Hsiao initial benefits will be below wage-indexed initial benefits (assuming equal replacement rates). Thus, a policy of replacing wage indexing with price indexing must contain a transition period if policymakers wish to avoid a sudden drop in initial benefits.

Importantly, the ratio in equation 4 is not impacted by the year a worker retires; as long as two workers experience the same growth in wages and prices, the ratio of their Hsiao AIME to their wage-indexed AIME will be the same regardless of the level of earnings. This has important implications for the growth in benefits over time under the different indexing methods. Abstracting for the moment from the existence of bend points so that there is only a single replacement rate, r, a worker's wage-indexed primary insurance amount (PIA_w) is equal to:

$$PIA_w = AIME_w * r \tag{5.1}$$

As shown in equation 2.2, the $AIME_w$ is equal to the wage at age 60 for workers with average wage growth. Equation 5.1 can then be rewritten as:

$$PIA_w = y_{60} * r \tag{5.2}$$

The percent change in the wage-indexed PIA is then:

$$\%\Delta PIA_w = \frac{PIA_{w,1}}{PIA_{w,0}} - 1 = \frac{y_{60,0} * (1+w) * r}{y_{60,0} * r} - 1 = w \tag{5.3}$$

Where $PIA_{w,0}$ is the wage-indexed PIA for a retiree reaching age 60 in year 0, $PIA_{w,1}$ is the PIA for a retiree reaching age 60 in year 1, and $y_{60,0}$ is the wage at age 60 for the retiree in year 0. Thus, as shown in equation 5.3, the percent change in PIA from one age-60 cohort to another is simply the growth in wages, w. Similarly, the Hsiao primary insurance amount (PIA_h) is equal to:

$$PIA_h = AIME_h * r \tag{6.1}$$

Substituting equation 3.2 for the $AIME_h$ yields:

$$PIA_h = y_{60} * r * \frac{1}{35} \sum_{i=26}^{60} \frac{(1+p)^{60-i}}{(1+w)^{60-i}} \tag{6.2}$$

Similar to equation 5.3, the percent change in the Hsiao PIA from one age-60 cohort to another can be written as:

$$\%\Delta PIA_h = \frac{PIA_{h,1}}{PIA_{h,0}} - 1 = \frac{y_{60,0} * (1 + w) * r * \frac{1}{35}\Sigma_{i=26}^{60}\frac{(1 + p)^{60-i}}{(1 + w)^{60-i}}}{y_{60,0} * r * \frac{1}{35}\Sigma_{i=26}^{60}\frac{(1 + p)^{60-i}}{(1 + w)^{60-i}}} - 1 = w \qquad (6.3)$$

As shown in equation, 6.3, the percent change in the Hsiao PIA is, again, the growth in wages. Thus, absent bend points, initial benefits under Hsiao and wage indexing will grow at the same rate, *w*, over time. Stated alternatively, with constant wage and price growth, price-indexing workers' earnings histories alone does not cause initial price-indexed benefits to grow less rapidly than wage-indexed initial benefits.

Introducing bend points into the analysis, however, will cause the growth in initial benefits between the two indexing methods to diverge. We show this rigorously in Appendix A. Intuitively, if, as is assumed, prices grow less rapidly than wages, price-indexed bend points will rise less rapidly than wage-indexed bend points. Consequently, under price indexing, a greater proportion of worker earnings will be subject to lower replacement rate factors. Under wage indexing, this does not occur because bend points grow at the same rate as wages. Thus, price-indexed initial benefits will grow less rapidly than wage-indexed initial benefits, and this is due to the differential indexing of bend points as opposed to earnings histories.

Under the 2001 Commission's pure price indexing method, real initial benefits remain constant for the average earner over time. Under this method, a retiree's AIME is still based on the wage-indexed approach and bend points still grow with wages. To offset the wage growth, though, the pure price indexing PIA ($PIA_{p,t}$) uses replacement rates (r_p) that are equal to product of the wage-indexed replacement rates (r_w) and the ratio of the cumulative growth in prices to wages since a base year (1977 in our analysis):

$$r_p = \frac{(1 + p)^t}{(1 + w)^t} * r_w \qquad (7)$$

Where *t* is the number of years since the base year. Since bend points under the Commission's plan are identical to those under wage-indexing and all replacement rate factors are altered by the same percentage, the Commission's initial benefits will be uniformly different between the two methods by the same percentage. If, as is assumed, prices grow less than wages, the growth in the Commission's initial benefits will be lower than the growth under wage-indexing and the

difference will be the growth in real wages. However, the distribution of benefits will be the same under the two methods.[32]

Figure 4. PIAs for high-income retirees by different indexing methods (with constant growth rates)
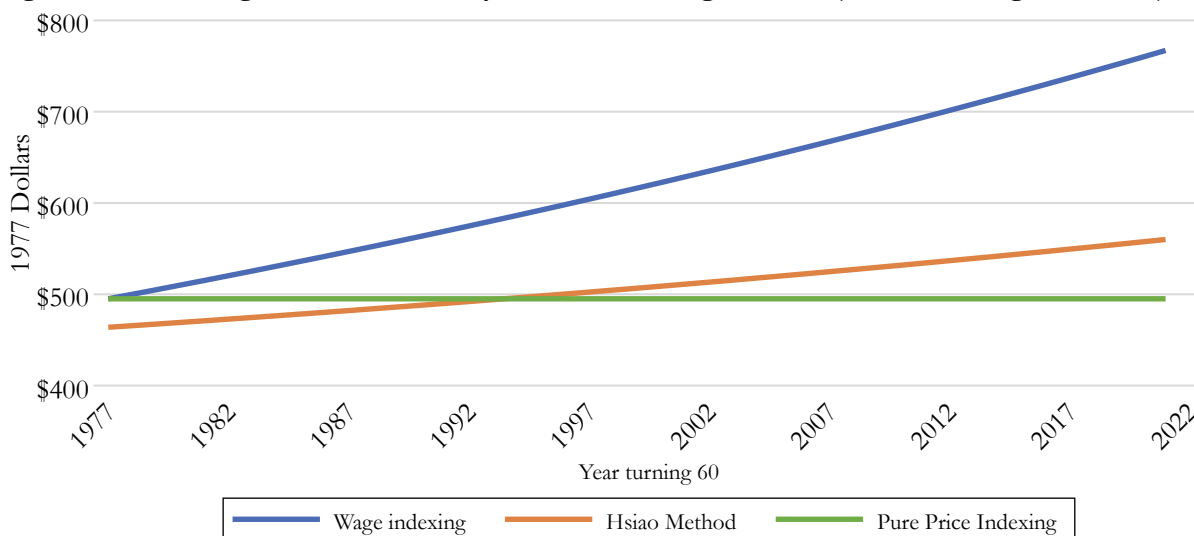
Notes: The stylized example assumes a constant 1 percent growth in real wages. All formulas use the 1977 law's bend points and replacement rates. The initial wage-indexed AIME is set to Social Security's taxable maximum in 1977 and then grows with economy-wide wage growth.

Figure 4 offers a stylized example of the differences in benefits among the three indexing methods, assuming real wages grow at 1 percent per year. We use the 1977 law's actual bend points and replacement rates, and we assume the retiree's wage-indexed AIME matches Social Security's taxable maximum for 1977.[33] Thus, as discussed above, benefit levels would initially be lower under Hsiao than under wage indexing if bend points and replacement rates begin at the same level.

The assumptions underlying the stylized model obscure important differences among the indexing methods. First, our examples have focused on earners at the extremes: those with AIMEs always below the first bend points and those with AIMEs always above the highest bend points. With multiple replacement rate factors, however, the Hsiao bend points would rise from year-to-year at a slower rate than wages. As result, over time more new retirees would have AIMEs that are subject to lower replacement rate factors, resulting in Hsiao benefits growing even more slowly than predicted in the stylized example.

Second, the model does not account for changes in wage and price growth over time. The 1970s and early 1980s were marked by a period of rapid inflation and little real wage growth. Figure 5 shows the growth in nominal wages and prices from 1977 forward. From 1977 to 1991, the

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[32] See Appendix A for a rigorous treatment of this issue.
[33] This ensures the Hsiao and wage-indexed AIMEs are above the highest bend points for each indexing method.

cumulative growth in prices exceed wage growth. The result is that differences among the indexing methods is initially smaller than predicted in our stylized example. In fact, in the early years, the direction of the effect changes; with negative real wage growth, the price-indexing methods deliver higher real benefits than wage indexing.

Figure 5. Growth in wages and prices since 1977
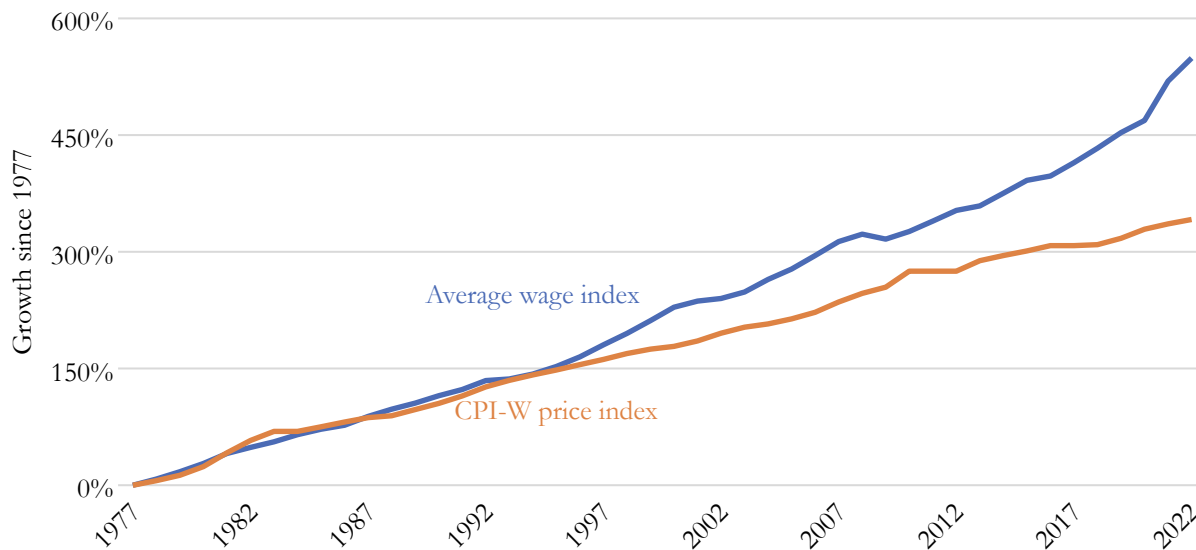
Notes: Authors' calculations from OASDI Trustees Report (2023).

In the sections below, we use survey data on benefits, prices, and wages to estimate the effects of the price-indexing methods on Social Security. We first examine the effects of the Hsiao method before turning to pure price indexing.

3   A Backward Glance at the Hsiao Method

This section analyzes the effects of the Hsiao report's price-indexing method on Social Security benefits, senior household incomes, and the combined Social Security OASI and DI Trust Funds' financial status. The retrospective analysis uses the Survey of Consumer Finances (SCF) to assess how these outcomes would have fared had the 1977 Congress adopted a price-indexing method similar to the Hsiao Report's method in lieu of wage indexing.

The policy considered here, like the actual wage-indexing policy enacted by Congress in 1977, is assumed to begin with workers who reach Social Security's full retirement age of 65 in 1982. Like the actual policy, persons older than 65 in 1982 are unaffected by the policies. The SCF identifies whether each survey respondent and spouse received Social Security benefits at the time of the survey, each recipient's age, and the number of years that each recipient has been receiving Social Security benefits. Information on an individual's age and Social Security tenure allows us to

determine whether the person was age 65 or younger in 1982 and was not previously enrolled in Social Security's disability program, and hence, would have been affected by the policies. The information on age and how long the recipient had been receiving Social Security benefits allows determination of whether each recipient retired at Social Security's normal retirement age, chose early retirement benefits, or opted to retire later and receive delayed retirement credits. We use this information and the Social Security benefit formulas to estimate each recipient's initial wage-indexed Social Security benefit. [34]

For the Hsiao price-indexing method, the life-cycle pattern of a recipient's wages is required to calculate benefits. Unfortunately, the SCF does not provide wage histories, so we must assume one for each recipient. We assume a nominal wage path for each recipient that matches the Social Security Administration's "scaled factors for hypothetical earnings." [35] These factors relate the earnings of workers who are age 60 in 2022 at each age of their working life to the Social Security Administration's average economy-wide earnings in that year. By using the 2022 index we have assumed that the life cycle of earnings of workers with respect to the average wage index who reached age 60 in earlier years is the same across all age cohorts.[36] We then inflate each year of the recipient's earnings to the present by the growth in the CPI-W from the year of earnings to the year in which the recipient reached age 60.

Figure 6 compares the estimated AIMEs for retirees in the SCF who retired at age 65 under the Hsiao method and the wage-indexed method over time.[37] The Hsiao method typically yields lower AIMEs, except for those reaching age 65 in the late 1980s. This reflects the decline in real average wages in the late 1970s and early 1980s, the period in which those retiring in the late 1980s would have been at or near their peak earning level.

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[34] Our policy assumes that benefits for all persons who reached age 65 in 1982 to 1987 were determined by the wage-indexing formula. As discussed above, the 1977 law contained a five-year transition period that allowed workers born between 1917 and 1922 to receive the higher of their wage-indexed benefit or the benefit they would have received under the prior law after a modest downward adjustment. Thus, for a small portion of senior households, our approach overstates the actual benefit change. Even in 1982, however, more than half of those turning age 65 received higher benefits under the wage-indexing method than under the transitional guarantee (see footnote 34 in the Notch Commission Report).

[35] See Clingman and Burkhalter (2022) for more details.

[36] Specifically, a recipient's estimated nominal earnings at a particular age and year is equal to the product of the age-specific scaled factor, the average wage index in that year, and the ratio of the recipient's wage-indexed AIME and the average wage index in the year the recipient is 60 years old. The effects of using common scaled factors for all birth cohorts is discussed in Appendix C. Ultimately, our conclusions are not sensitive to different age-earnings profiles.

[37] The change in AIME among workers with career earnings that follow the scaled factors is effectively the same regardless of earning level.

Figure 6. Percent difference between Hsiao AIME and wage-indexed AIME
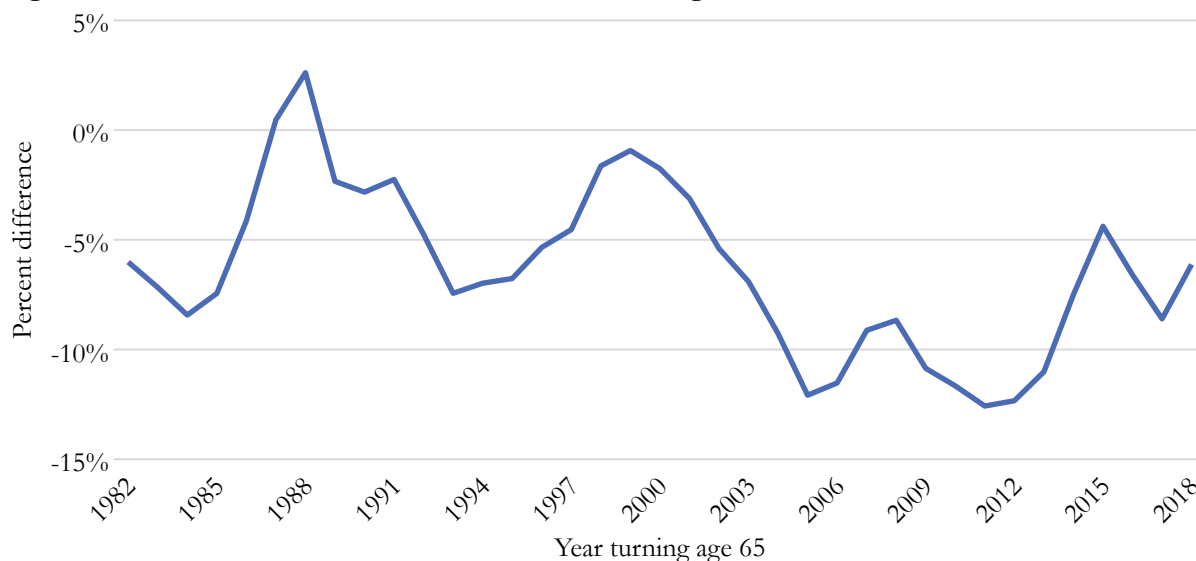
Notes: Authors' calculations using the SCF and the OASDI Trustees Report (2023).

The Hsiao Committee's choice of replacement rate factors and bend points were set such that, under economic conditions assumed at the time, the median initial benefit for persons reaching age 65 in late 1976 would be approximately the same as the median benefit under the leading wage-indexing proposal at the time. Under the Hsiao committee's assumptions, price-indexed benefits were expected to grow less rapidly over time. Actual changes in wages and prices, however, between the report's release and when the 1977 law was enacted differed markedly from the assumptions. As a result, the Hsiao Committee's replacement rate factors and initial bend points would have produced an average initial benefit level that would have initially been substantially higher than the average produced by the 1977 law's wage-indexing policy.[38] Thus, rather than use the Hsiao report's bend points and replacement rates as given we develop our own that more closely reflect the economic conditions that prevailed in the years between the Hsiao analysis and the 1977 law's enactment.

To compare the wage and price indexing policies, we set workers' price-indexed initial benefits equal to their wage-indexed benefits at the outset of the policy; specifically, we set price-indexed benefits equal to wage-indexed benefits for workers who reached age 65 in 1982. This is achieved by using the wage-indexed replacement rates and bend point levels and adjusting workers' price-indexed AIME upward by the ratio of the 1982 cohort's wage-indexed AIME to their price-

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[38] For more details, see Appendix B.

indexed AIME. The adjustment factor is 5.5 percent.[39] This specification preserves both the distribution and the level of initial benefits in 1982 that existed under wage indexing. We then provide for a five-year transition from wage-indexed earnings histories to price-indexed earnings histories by reducing the 5.5 percent adjustment factor incrementally by one-fifth per year. During the transition, as in each year thereafter, the bend points are increased by the growth in prices.

3.1 Impact of Hsiao Method on Social Security Benefits in the SCF

We now turn to our estimates the impact of the Hsiao method on our SCF sample. Table 1 shows the absolute and percent change in benefits among affected senior households by income group.

Table 1. Change in mean benefits under wage and Hsiao-indexing among affected households

	All senior households		Low-income households		High-income households	
	Change (2022 dollars)	Change (%)	Change (2022 dollars)	Change (%)	Change (2022 dollars)	Change (%)
1982	-$250	-1.2%	-$250	-1.1%	-$250	-1.2%
1988	-$350	-1.9%	-$250	-2.0%	-$400	-1.9%
1991	-$350	-2.0%	-$350	-2.9%	-$350	-1.6%
1994	-$400	-2.2%	-$300	-2.5%	-$450	-2.1%
1997	-$600	-3.2%	-$450	-3.5%	-$700	-3.0%
2000	-$600	-3.1%	-$450	-3.0%	-$750	-3.1%
2003	-$800	-3.8%	-$600	-3.5%	-$1,000	-3.9%
2006	-$1,050	-5.0%	-$700	-4.3%	-$1,400	-5.3%
2009	-$1,650	-7.0%	-$1,100	-5.8%	-$2,200	-7.7%
2012	-$2,050	-8.6%	-$1,300	-7.1%	-$2,800	-9.5%
2015	-$2,500	-9.5%	-$1,650	-8.2%	-$3,350	-10.3%
2018	-$2,900	-10.7%	-$1,950	-10.0%	-$3,800	-11.1%

Notes: Data are from SCF. Income groups are based on the senior income distribution. Dollars are adjusted for inflation using the PCE price index.

The Hsiao method would have resulted in lower benefits among affected households in all years. The change is initially small. From 1982 to 2000, the reduction would be no more than 3.2 percent for affected senior households. The reduction in benefits in the early years is a consequence of the initial level change in benefits from using price-indexed AIMEs, which reduces Hsiao benefit levels by about 5 percent in any year after the transition period. Absent the initial reduction from the

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[39] We use the Social Security Trustees' definition of "medium scaled worker." The worker has career average earnings at about 100 percent of the national Average Wage Index. See Table V.C7 in the Social Security Trustees Report Supplemental Single-Year Tables.

change in AIMEs, the Hsiao method would have yielded slightly higher benefits in these years. This surprising result reflects the fact that from 1977 to 1991, the cumulative growth in prices exceeded the cumulative growth in wages. Following 2000, the average benefit change begins a more rapid decline. By 2018, the mean Social Security benefit under the Hsiao price-indexing method would be 10.7 percent below the wage-indexed levels.

The right half of table 1 shows the change in mean Social Security benefits for senior households with incomes below median senior household income (low-income households) and for those above the senior household median income (high-income households). Initially, the proportionate reduction in benefits would be approximately the same for both groups, although the high-income households would experience a larger absolute drop in the benefits. The greater absolute drop reflects both the fact that individual benefits are higher for the high-income group and that the high-income group has a disproportionate number of married households with both spouses receiving Social Security benefits. In more recent years, the relative decline in benefits under the Hsiao method would be larger for high-income households. The difference in Hsiao's impact on low- and high-income households is due to the fact that low-income household heads tend to be older and, hence, have reached Social Security's full retirement age earlier than high-income household heads, and thus are less affected by the growing divergence in the cumulative growth of wages and prices since 1977.[40]

Inflation-adjusted benefits would have still increased substantially across the income distribution. Figure 7 shows the real increase in benefits by income group under wage indexing and the Hsiao method. Under the Hsiao methods, mean benefits among all senior households would have still risen by 57 percent from 1982 to 2018. Benefits would have risen by 44 percent for low-income senior households and 68 percent for high-income households.

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[40] In addition to the age of the household head, high-income senior households are also more likely to be married and spouses in the SCF are, on average, younger than the household head.

Figure 7. Mean benefits under wage and Hsiao method for senior households
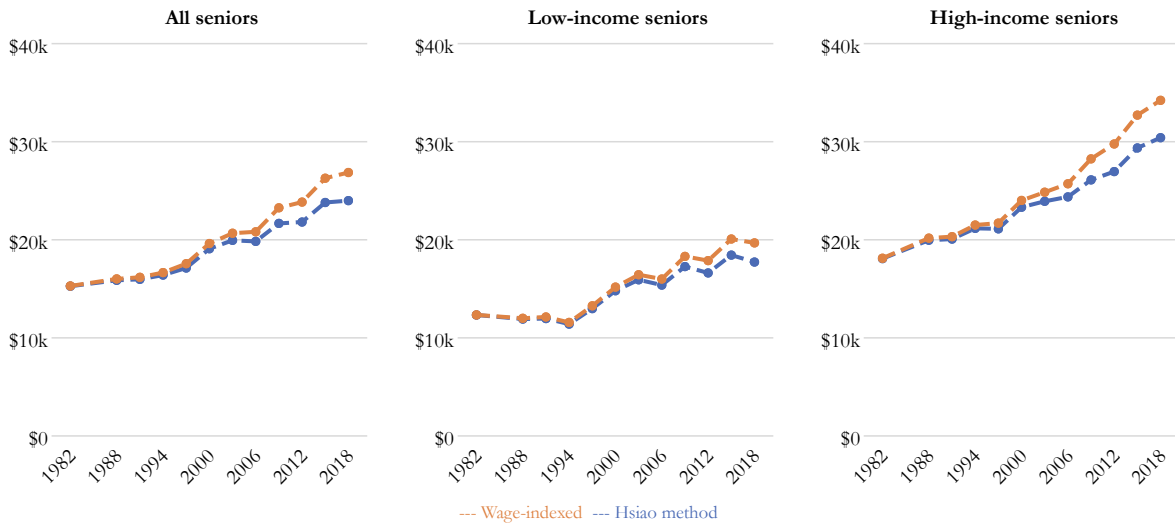
Notes: Data are from SCF. Data are inflation-adjusted using the PCE price index.

3.2   Impact of Hsiao Method on Senior Household Income

The impact of the Hsiao method on median senior household incomes in 2018 is shown in table 2. The effect on senior household incomes under the Hsiao method is modest. In 2018, the Hsiao method would have resulted in a 7 percent reduction in household incomes from their level with wage-indexed benefits among the low-income group and 3.3 percent reduction among the high-income group.

Table 2. Median incomes among senior households by year (2022 dollars)

	Wage Indexing	Hsiao Method	Change ($)	Change (%)
All seniors	$51,900	$49,800	$2,150	-4.1%
Low-income	$28,400	$26,400	$2,000	-7.0%
High-income	$98,600	$95,300	$3,300	-3.3%

Notes: Data are from SCF. Income groups are based on the senior income distribution.

Figure 8 compares real growth under the Hsiao price-indexing method to wage-indexing from 1982 to 2018 among three groups of seniors: the median income household, and the mean income among households that are below and above the overall median income. Also shown for comparison is the median income of households headed by persons under age 65.

Figure 8. Real growth in median household income under wage indexing and Hsiao method
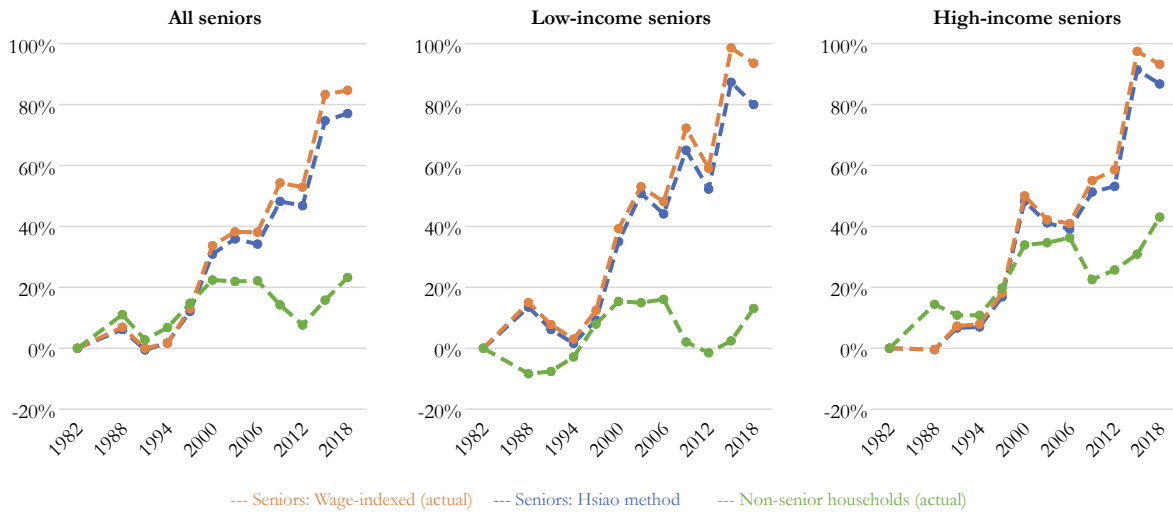
Notes: Data are from SCF. Data are inflation-adjusted using the PCE price index.

The overall median income of senior households would have increased by 77 percent under the Hsiao method, down only slightly from its actual 85 percent under wage indexing. The median income among low-income senior households (the 25th percentile of the senior household income distribution) would have grown 80 percent compared to 94 percent under wage indexing. Among high-income senior households (the 75th percentile), the median would have grown by 87 percent, slightly lower than the 93 percent under wage indexing. Consequently, the Hsiao method would have had only a negligible effect on the distribution of income relative to wage indexing. In comparison, non-senior households experience a 23 percent increase in median incomes over the same period.

3.3   Impact of Hsiao Method on the Social Security Trust Fund

As we noted earlier, during the Social Security debates of the 1970s, experts warned that a wage-indexing policy was not financially sustainable. If adopted, they argued, wage indexing would put Social Security on a path to insolvency. The expert predictions proved prescient. In every annual Social Security Trustees Report issued since 1985, the trustees have declared that the program's trust fund would be depleted. Since 2010, the Social Security trust fund has run annual deficits on a cash basis—by far the longest string of consecutive cash deficits in its history. Annual deficits, including receipts of interest payments from the treasury, are projected to continue without interruption in the

future. Unless Social Security taxes are increased or benefits are reduced, the Social Security program is projected to be insolvent in 2034.[41]

Although the effect of the Hsiao method on household incomes would have been modest, its impact on the Social Security program's financial status and outlook would have been substantial because the number of Social Security recipients is large. To calculate its impact, we aggregate the effect the Hsiao method would have on Social Security benefits across all SCF households (including those currently enrolled in the Social Security Disability Insurance program). We then apply the aggregate reduction in each survey year from 1982 to 2018 to official Social Security outlays and net revenues from the taxation of Social Security benefits. Estimates for the years in between surveys are obtained by linearly extrapolating the results from each pair of adjacent surveys. We extend the estimates to future years to determine the long-term effect of price indexing on the trust fund's solvency.[42]

Figure 9. OASDI cash surpluses under wage and price indexing
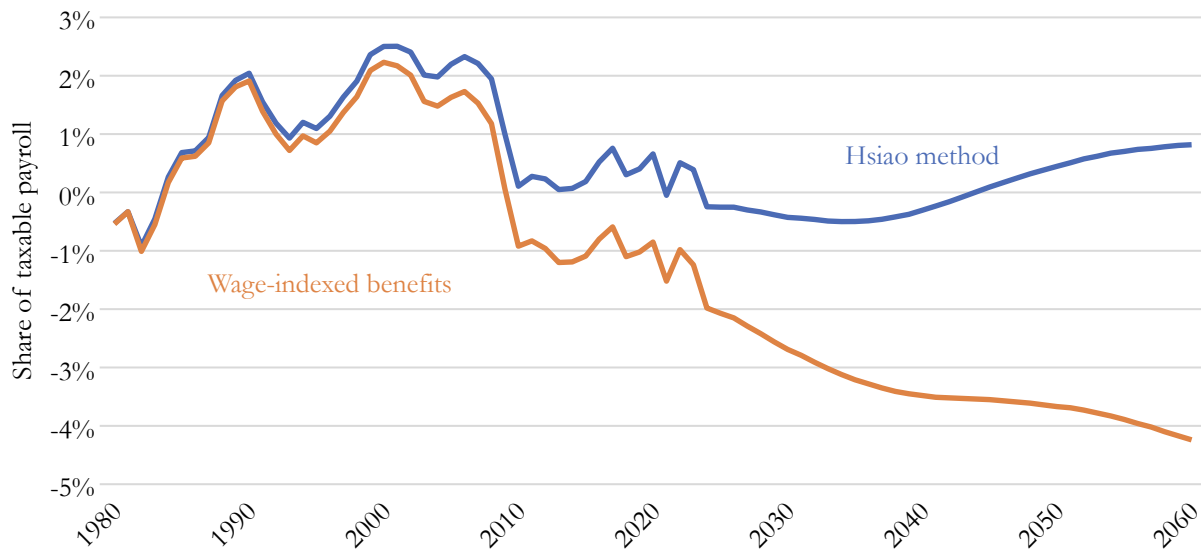
Notes: Authors' calculations from the SCF and the OASDI Trustees Report (2023).

The Hsiao method would have reduced trust fund outlays in recent years relative to wage indexing. Figure 9 shows the combined cash surplus and deficits of the OASDI Trust Funds as

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[41] Using the intermediate estimates of the 2023 Social Security Trustees' Report.
[42] To project future years, we create a synthetic sample that estimates the mean reduction in benefits at each age (62 to 100) by year. We then estimate the weighted mean change in benefits by year, where the weight is the share of total benefits in the year that would go to each age level. We use U.S. Census Bureau population projections to estimate the annual Social Security population by age and the Current Population Survey to estimate the share of people enrolled in Social Security. To estimate benefits at each age and year, we use the OASDI Trustees Report real scheduled benefits at full retirement for the medium-scaled earner.

percent of taxable payroll under the wage-indexed method and the Hsiao method. We estimate that the Hsiao method would have permanently avoided insolvency. With the exception of 2021, the program would have run cash surpluses every year from 1982 to 2023. Beginning in 2024, the Hsiao method would have still resulted in cash shortfalls, but these would have been far smaller than under wage-indexing and, importantly, the shortfalls would be temporary. By 2044, the Hsiao method would again run permanent cash surpluses.

4   A Backward Glance at the Pure Price Indexing Method

This section compares the impact of the aforementioned 2001 Commission's price-indexing approach to the wage-indexing method. Like our Hsiao calculations, the retrospective analysis uses the SCF to assess how these outcomes would have fared had the 1977 Congress adopted a price-indexing method similar to the 2001 Commission's method in lieu of wage indexing.

The policy considered here, like the actual wage-indexing policy enacted by Congress in 1977 and the Hsiao method discussed in section 3, is assumed to begin with workers who reach Social Security's full retirement age of 65 in 1982. Like the actual policy, persons older than 65 in 1982 are not affected by the policies. We set the average initial benefits for persons age 65 in 1982 at the same level as the average payable under the 1977 law. Unlike the 1977 law, however, our method does not contain a phase-in period.

To obtain the Commission's price-indexed initial benefit, we adjust the recipient's wage-indexed initial benefit by the cumulative growth in prices, as measured by the CPI-W, relative to the cumulative growth in Social Security's national average wage index from 1977 to the year in which the recipient reached age 60.[43]

4.1   Impact of Pure Price Indexing on Social Security Benefits

Table 3 shows the impact of pure price indexing on the Social Security benefits among the subset of households with seniors whose benefits would have been impacted by the policy. The average affected senior household would have experienced slightly higher benefits under price indexing through 2000. This result reflects the unusual fact that from 1977 to any year up to and including 1991 the cumulative growth in prices exceeded the cumulative growth in wages. Price indexing would have resulted in lower benefits compared to wage-indexed benefits after 2000, but that reduction would have remained small through most of the 2000s. Price indexing's impact becomes more substantial by 2009, when the average benefit reduction begins to exceed $1,500 (in

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[43] If respondents reported enrolling in Social Security prior to age 60 (typically DI recipients), we use the ratio of price growth to wage growth from 1977 to two years before their reported enrollment year.

2022 dollars) annually.[44] By this point in time, over 95 percent of all Social Security recipients would have been affected by the policy, and most of this group would have retired after the point where price-indexed initial benefits would have been below wage-indexed benefits (in 1991). By 2018, pure price indexing would have reduced the mean Social Security income among recipient households by 14.3 percent from its wage-indexed level.

Table 3. Change in mean benefits under pure price indexing among affected households

	All senior households		Low-income households		High-income households	
	Change (2022 dollars)	Change (%)	Change (2022 dollars)	Change (%)	Change (2022 dollars)	Change (%)
1982	$50	0.2%	$50	0.3%	$50	0.2%
1988	$600	3.3%	$450	3.5%	$650	3.2%
1991	$550	3.0%	$400	3.1%	$650	2.9%
1994	$350	2.0%	$250	2.3%	$450	1.9%
1997	$150	0.9%	$200	1.3%	$150	0.7%
2000	$50	0.3%	$150	1.1%	-$50	-0.2%
2003	-$300	-1.5%	-$50	-0.2%	-$550	-2.2%
2006	-$800	-3.7%	-$300	-1.9%	-$1,250	-4.8%
2009	-$1,700	-7.2%	-$950	-5.0%	-$2,400	-8.5%
2012	-$2,350	-9.9%	-$1,350	-7.5%	-$3,350	-11.2%
2015	-$3,100	-11.8%	-$2,000	-10.0%	-$4,250	-13.0%
2018	-$3,850	-14.3%	-$2,600	-13.1%	-$5,100	-15.0%

Notes: Data are from SCF. Income groups are based on the senior income distribution. Dollars are adjusted for inflation using the PCE price index.

The impact of pure price indexing at different points in the income distributions merits attention. Pure price indexing alters initial benefit levels of all workers who reach Social Security's full retirement age in a given year by the same ratio of the growth in prices relative to the growth in wages since a base year. The size of this alteration in any year will differ, however, because the year in which they reached the full retirement age differs among them. The right half of table 3 shows the change in mean Social Security benefits senior households in the lower and upper halves of the senior income distribution (hereafter termed low- and high-income senior households). Pure price-indexed benefits would have been higher than wage-indexed benefits until 2000 for the low-income group and 1997 for the high-income group. Thereafter, pure price indexing would have resulted in

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[44] To adjust for inflation, we use the PCE price index rather than CPI-W. Because the CPI-W tends to rise faster than the PCE, we still project real annual Social Security benefits for the medium-scaled worker would rise under pure price indexing.

lower benefits for both groups, ultimately to a substantial 13.1 and 15.0 percent among low- and high-income senior households, respectively.

As noted in our discussion of the Hsiao method, the difference in pure price indexing's impact on low- and high-income households is due to the fact that low-income household heads tend to be older and, hence, have reached Social Security's full retirement age earlier than high-income household heads. From 1982 to 2012, low-income household heads were on average 2.9 years older than those in high-income household heads. Consistent with table 3, the gap has narrowed in recent years; in 2015 and 2018 the average age difference falls to 1.8 years.

To illustrate the distributional impact of the Commission's price-indexing policy, figure 10 compares the growth in inflation-adjusted mean benefits (in 2022 dollars) under pure price indexing and under wage-indexing for all senior households, lower-income senior households and upper income senior households.

Figure 10. Mean benefits under wage and pure price indexing for senior households
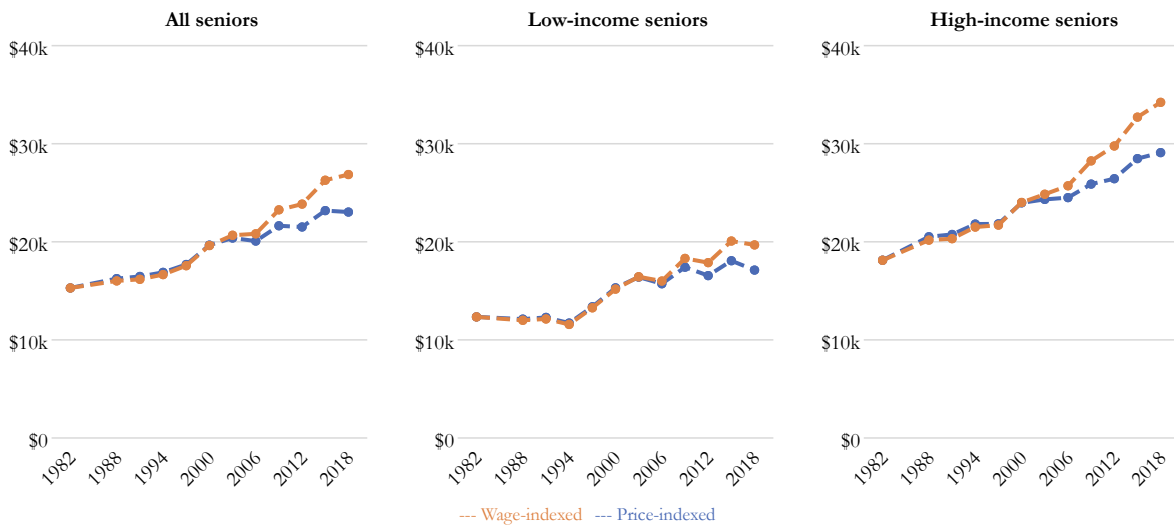
Notes: Data are from SCF. Data are inflation-adjusted using the PCE price index.

The real benefit growth among all three groups under both indexing methods is relatively slow during the years prior to the mid-1990s and then rises thereafter at a sharply faster rate. The similar rise in benefit levels during the years to the beginning of the 21st century is primarily a consequence of the same factor that caused the nearly identical benefit levels among all the indexing policies, namely, that the cumulative growth in wages was only marginally faster during the early years than the cumulative growth in prices during the early years of the policy. By 2018, the mean price-indexed benefits among all senior households would still have been 51 percent higher than it

was in 1982. Mean price-indexed benefits would have been 39 percent higher among low-income senior households and 61 percent higher among high-income households.

The fact that the mean inflation-adjusted pure price indexed benefit grows at all is due primarily to an increase in households with more than one Social Security recipient. As we noted in Cogan and Heil (2022), the years from 1982 to 2018 witnessed a sharp increase in the proportion of households in which both spouses were receiving benefits. Also, over time, the additional spouses received higher real benefits. Finally, the growth in real mean benefits reflects the use of different price indexes. We use the CPI-W to calculate benefits under pure price indexing, but we use the slower-growing PCE price index to inflate dollars to 2022 levels.

4.2   Impact of Pure Price Indexing on Senior Household Income

Given the small changes in benefits in the earlier years of our analysis, the impact of pure price indexing on income would have been negligible through 2003; thereafter, the impact begins to grow. Table 4 shows the impact of pure price indexing on seniors' median incomes in 2018.

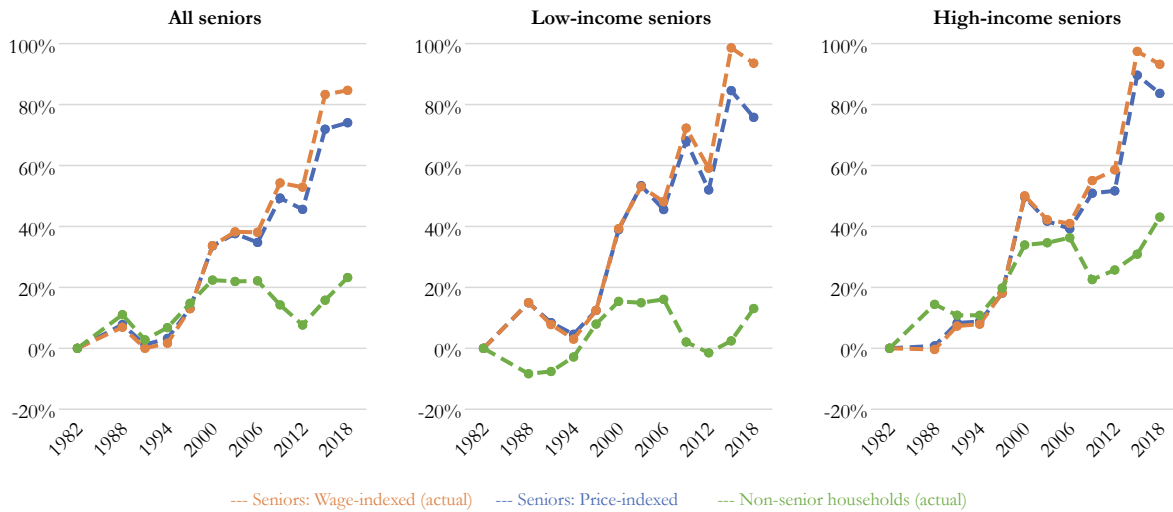Table 4. Median incomes among senior households by year (2022 dollars)

	Wage Indexing	Pure Price Indexing	Change ($)	Change (%)
All seniors	$51,900	$48,950	$3,000	-5.8%
Low-income	$28,400	$25,800	$2,600	-9.2%
High-income	$98,600	$93,750	$4,850	-4.9%

Notes: Data are from SCF. Income groups are based on the senior income distribution.

By 2018, the median senior income would have been 5.8 percent lower under pure price-indexing. The effect, however, would have been substantially different across income groups. By 2018, pure price indexing would have reduced incomes in the high-income senior household by an average of 4.9 percent. The impact on low-income senior households would have been nearly twice as large, at 9.2 percent. This is despite the fact that, as shown in table 3, high-income senior households would have seen a larger absolute dollar decline in their benefit levels. The differential impact of the policy is due to the relative importance of Social Security to those in the lower half of the senior income distribution. In 2018, Social Security accounted for 18 percent of income for the high-income senior households and 63 percent for the low-income group.

The reduction in household incomes from the pure price-indexing policy would have only modestly altered the substantial growth in senior household income over the last three decades. Figure 11 shows the growth in the overall median income of senior households and for the median income among low- and high-income senior households under wage indexing and pure price indexing.

Figure 11. Real growth in median household income under wage indexing and pure price indexing

All seniors | Low-income seniors | High-income seniors

--- Seniors: Wage-indexed (actual)   --- Seniors: Price-indexed   --- Non-senior households (actual)

Notes: Data are from SCF. Data are inflation-adjusted using the PCE price index.

Table 5. Median income by year under different indexing methods (2022 dollars)

All senior households			
	Wage Indexing	Hsiao Method	Pure Price Indexing
1982	$28,100	$28,100	$28,100
2018	$51,900	$49,800	$48,950
1982 to 2018 Change	$23,800 (84.7%)	$21,650 (77.1%)	$20,800 (74.0%)
Low-income senior households			
	Wage Indexing	Hsiao Method	Pure Price Indexing
1982	$14,650	$14,650	$14,650
2018	$28,400	$26,400	$25,800
1982 to 2018 Change	$13,750 (93.6%)	$11,750 (80.0%)	$11,100 (75.8%)
High-income senior households			
	Wage Indexing	Hsiao Method	Pure Price Indexing
1982	$51,050	$51,050	$51,050
2018	$98,600	$95,300	$93,750
1982 to 2018 Change	$47,550 (93.2%)	$44,250 (86.8%)	$42,700 (83.7%)

Notes: Data are from SCF. Income groups are based on the senior income distribution.

Table 5 compares the growth in median senior income under the three different indexing methods. Under pure price indexing, the median would have increased by 74 percent from 1982 to 2018, down only slightly from its actual 85 percent increase and only slightly lower than the 77 percent under the Hsiao method. Over the same period, the median among low-income senior households (the 25th percentile of the senior income distribution) would have also risen by 76 percent, down from 94 percent under wage indexing and 80 percent under Hsiao. The high-income

median (the 75th percentile) would have risen by 84 percent compared to 93 percent under wage-indexing and 87 percent under Hsiao. Consequently, pure price-indexing would have modestly widened the distribution of senior incomes relatively to wage indexing. Having said that, these increases over time are far larger than the 23 percent increase in the median income of all non-senior households.

4.3   Impact of Pure Price Indexing on the Social Security Trust Fund

Like the Hsiao method, the relatively small impact of pure price indexing on senior household incomes obscures its larger impact on the solvency of Social Security's finances. Figure 12 shows how pure price indexing would have affected the OASDI Trust Funds' annual surplus as a percent of taxable payroll.

Figure 12. OASDI cash surpluses under wage and price indexing
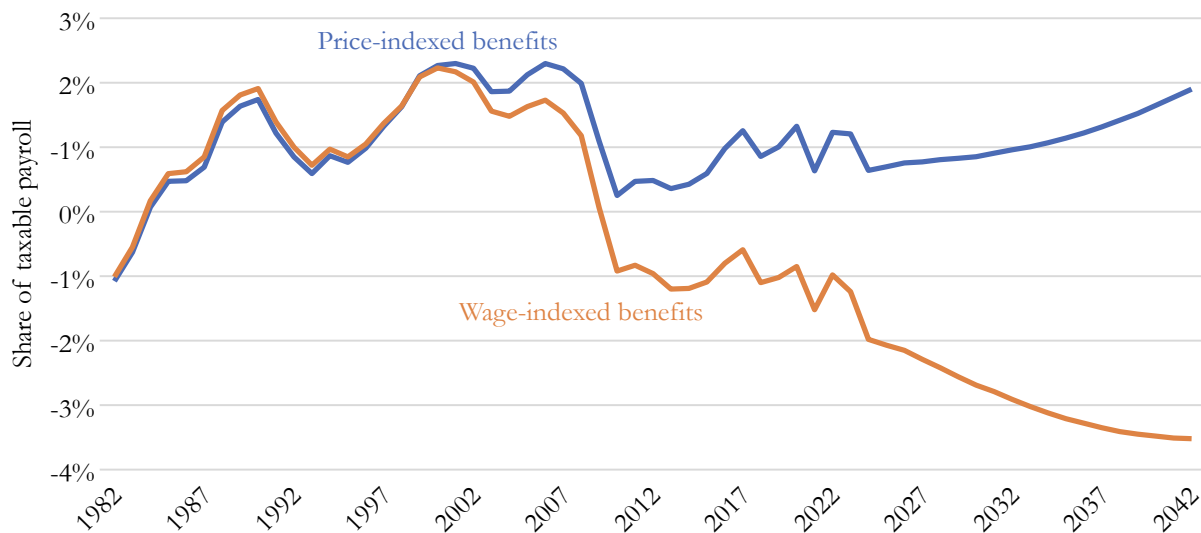
Notes: Authors' calculations from the SCF and the OASDI Trustees Report (2023).

As shown, the policy would have had little impact on the aggregate annual surplus until the beginning of the last decade. Each year thereafter, its impact would have been material and would have grown larger over time. Instead of incurring annual cash deficits in each year since 2010 as has been the case with wage indexing, the program would have generated annual tax revenue surpluses. As a result, this year the trust fund balance would have been nearly twice its current level and would have been rising, instead of declining, in future years. The Social Security Trustees would have declared the trust fund to be solvent and Social Security's looming financial crisis would have been averted.

5   Summary and Conclusion

In 1977, Congress made a fateful decision to automatically index initial Social Security benefits for future retirees to the growth in economy-wide average wages. It did so with the knowledge that, given demographic trends, this decision would put Social Security on a path to certain insolvency. Under current projections the insolvency date is 2034. Congress had clear alternatives, including price indexing initial benefits, as had been recommend by the Hsiao Committee, or freezing initial benefits at their current inflation-adjusted level for the typical worker, as was later suggested by President George W. Bush's Social Security Commission. This paper has analyzed the consequences of these two price-indexing methods for the growth in senior household income and for the financial health of the Social Security trust fund.

Our principal findings are that, on one hand, senior household incomes would have been only modestly impacted over time by either of the alternative price-indexing methods. Under the Hsiao method, the median income of senior households in 2018 would have been only 4.1 percent lower than the actual median under the prevailing wage-indexing. Under the 2001 Commission's pure price indexing method, the median would be only 5.8 percent lower. Under both price-indexing policies, the growth in median senior household income would have still far outstripped the growth in the median among younger households. These findings are not sensitive to alternative assumptions about life-cycle path of recipients' wage earnings.

On the other hand, both price-indexing policies would have slowed the growth in the real value of Social Security benefits sufficiently to prevent the trust fund's impending insolvency. The 2001 Commission's method would have even prevented the combined trust fund from running the cash deficits it has experienced since 2010. The Hsiao Committee method would have delayed cash shortfalls by 15 years and would have permanently prevented insolvency.

Comparisons of the impact of alternative wage- and price-indexing methods on Social Security benefits depend critically on the degree of real wage growth. The greater the growth in wages relative to prices, the greater the differences in the growth in Social Security benefits. Moreover, the differential impact of real wage growth on initial benefits under each indexing method occurs with lag. The relatively low real wage growth during the early years of the time period covered by our analysis, and the years immediately preceding it, caused little divergence between initial benefits levels generated by the different indexing methods until the early 2000s. It is only after real wages had been increasing for a sufficiently long period of time that initial benefits among the three indexing methods began to diverge from one another. Policy makers contemplating

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changes to Social Security's benefit formula need to keep the inherent variability and uncertainty about real wage growth in mind when judging the efficacy of alternative indexing policies, or of the wisdom of indexing initial benefits at all.

Today's policy makers face a similar challenge to the one faced by their predecessors in the late 1970s. At that time, Congress responded to rising cash shortfalls in Social Security with higher payroll tax rates, cuts in scheduled benefits for those nearing retirement, and a new benefit formula for future retirees. The combination of wage indexing and changing demographics, however, meant the 1977 law would eventually lead to the program's insolvency. It was left to future policy makers to find a solution. While today's projected growth in Social Security benefits isn't as pronounced as it was during the 1970s, the program's growing shortfalls mean today's policy makers must soon find that solution. They would be well-served by revisiting the debates of the 1970s, which included solutions to the problem—like the Hsiao Report—that would have delivered permanent solvency to the program.

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Appendix A. Growth in benefits under different indexing methods with bend points

We showed in section 2 that in absence of bend points, i.e., the rate of growth in benefits for those with earnings histories equal to the economy-wide average would be the same under the Hsiao and wage-indexing methods. If we introduce bend points the relative growth in benefits diverge. Under wage indexing, the bend points grow with wages. A retiree's wage-indexed bend point can be written as:

$$BP_{w,0} = BP_{w,0} * (1 + w)^t \tag{A.1}$$

Where t is the number of years from the year the bend points are initially set (*i.e.*, 1977) to two years before the retiree is eligible for Social Security (*i.e.*, age 60 for the typical retiree). Under the Hsiao method, benefits grow at the rate of price growth and can be expressed as:

$$BP_{h,t} = BP_{h,0} * (1 + w)^t \tag{A.2}$$

If there is only one bend point, the benefit formulas become:

$$PIA_{w,t} = \min(AIME_w, BP_{w,t}) * r_1 + \max(0, AIME_w - BP_{w,t}) * r_2 \tag{A.3}$$

$$PIA_{h,t} = \min(AIME_h, BP_{h,t}) * r_1 + \max(0, AIME_h - BP_h * BP_{h,t}) * r_2 \tag{A.4}$$

Where r_1 and r_2 are the first and second replacement factors. To make the system progressive, the first replacement rate must be larger than the second ($r_1 > r_2$). For retirees with Hsiao and wage-indexed AIMEs below their respective bend points, the PIA formulas reduce to equations 5 and 6 in section 2. As noted above, in this case, benefits grow at the same rate under the Hsiao method and wage indexing. For retirees with AIMEs above the bend points, equations A.3 and A.4 simplify to:

$$PIA_{w,t} = BP_{w,t} * (r_1 - r_2) + AIME_w * r_2 \tag{A.5}$$

$$PIA_{h,t} = BP_{h,t} * (r_1 - r_2) + AIME_h * r_2 \tag{A.6}$$

If we assume that the methods' bend points began at the same level, then PIA formulas become:

$$PIA_{w,t} = (1 + w)^t * BP_0 * (r_1 - r_2) + AIME_w * r_2 \tag{A.7}$$

$$PIA_{h,t} = (1 + p)^t * BP_0 * (r_1 - r_2) + AIME_h * r_2 \tag{A.8}$$

Where $BP_0 = BP_{w,0} = BP_{h,0}$. As shown above, in the first year of the reform ($t = 0$), the difference in benefits is simply the ratio of the AIMEs. In the subsequent years, the wage-indexed PIA will grow faster when $w > p$.

Thus, under normal economic conditions in which wages rise faster than prices, the average worker's real initial wage-indexed benefits will increase over time at the same rate as real economy-

wide wages. Under the Hsiao method, real initial benefits will also rise, but not as rapidly as under the wage-indexing method.

The pure price indexing PIA for individuals with wage-indexed AIMEs above the wage-indexed bend point is equal to:

$$PIA_{p,t} = (1 + p)^t * BP_{w,0} * (r_1 - r_2) + AIME_w * \frac{(1 + p)^t}{(1 + w)^t} * r_2 \tag{A.9}$$

Since the wage-indexed AIME grows with wages, $AIME_{w,t} = AIME_{w,0} * (1 + w)^t$, and equation A.9 can be simplified to:

$$PIA_{p,t} = (1 + p)^t * [BP_{w,0} * (r_1 - r_2) + AIME_{w,0} * r_2] \tag{A.10}$$

Where $AIME_{w,0}$ is the nominal wage-indexed AIME in the first year of the reform. The component, $BP_{w,0} * (r_1 - r_2) + AIME_{w,0} * r_2$, is the wage-indexed PIA in the first year of the reform. Thus, under pure price indexing, benefits grow at the rate of prices for retirees with average earnings through their careers.

Appendix B. Hsiao Report Bend Points and Factors

As discussed in section 3, the Hsiao Report's benefit levels and distributions were materially different than the 1977 law. This would have resulted in significantly higher benefits for most retirees in 1982. The Hsiao Report's proposed bend points were set at $200 and $600 for a retiree reaching age 65 "in late 1976 or early 1977," with replacement factors of 80 percent, 35 percent, and 25 percent.[45] Adjusting for inflation, the Hsiao bend points would have been $272 and $1,089 for retirees reaching age 65 in 1982. In comparison, the 1977 law called for bend points of $180 and $1085 with replacement factors of 90 percent, 32 percent, and 15 percent. The interactions among differing AIMEs, bend points, and factors mean the change in benefit levels would vary depending on a retiree's earnings.

Figure A1 offers a stylized estimate of how PIAs would change from their wage-indexed levels depending on the earning level and the year a Social Security recipient reaches age 65. We consider four earning levels that follow Social Security's scaled earning levels: very low, low, medium, and high.[46]

Figure A1. Percent change in PIAs using Hsiao AIMEs with Hsiao bend points and factors
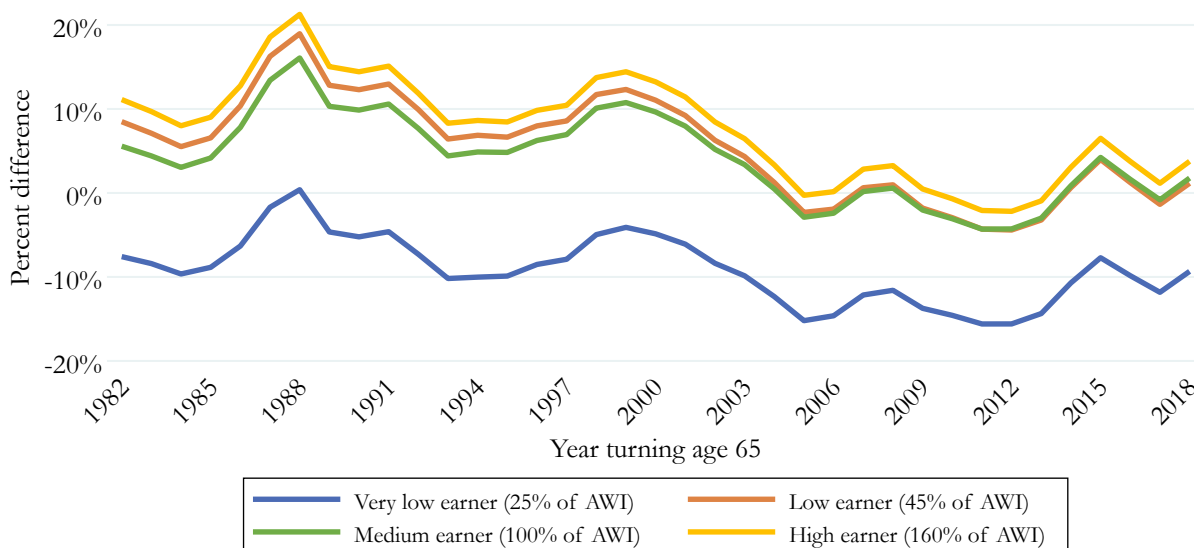
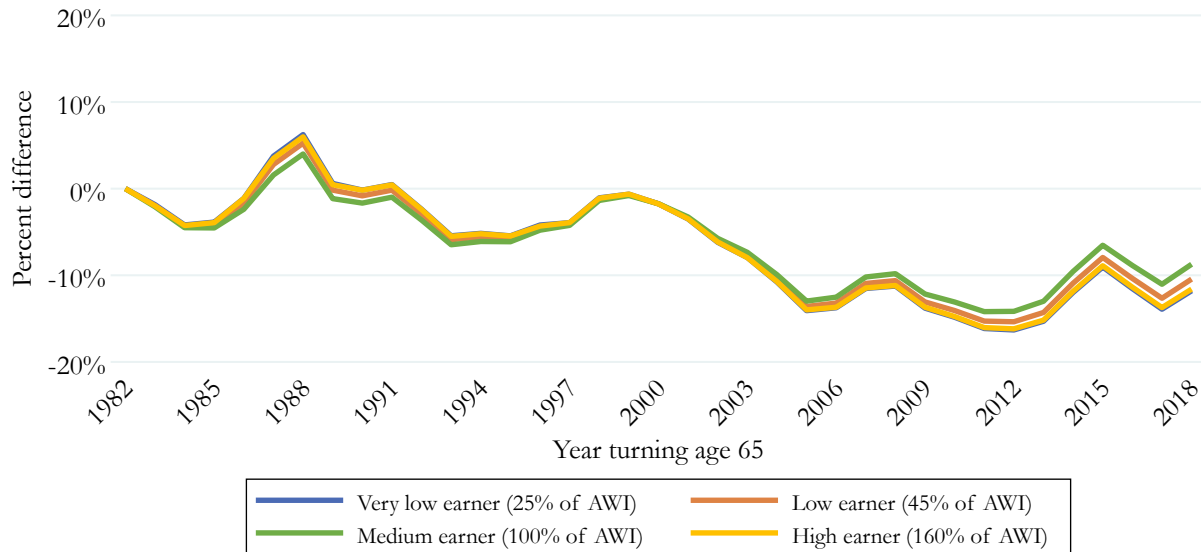Notes: Authors' calculations from the OASDI Trustees Report (2023).

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[45] See page 17 in Hsiao. The bend points would have been for a retiree turning age 62 in 1973. Since our estimates begin with those 65 in 1982, we set the initial bend points to Hsiao's levels multiplied by the change in the CPI-W from 1973 to 1979 (the year the first affected cohort turned 62).

[46] The Social Security Trustees estimates that the "very low earner" has career average earnings at about 25 percent of the national Average Wage Index, 45 percent for the "low earner," 100 percent for the "medium earner," and 160 percent for the "high earner." See Table V.C7 in the Social Security Trustees Report Supplemental Single-Year Tables.

As shown in the figure, Hsiao's factors and bend points would have initially delivered larger benefits for the low, medium, and high earners. Very low earners would have had lower benefits under Hsiao in all years. This outcome reflects the lower first replacement factor (80 percent) for Hsiao relative to the 1977 law (90 percent versus 80 percent). Until about 2005, higher-level earners would have received more under Hsiao's formula. Benefits would be about the same or lower for all earning levels for retirees reaching age 65 in 2001 or later.

In comparison, figure A2 shows the PIAs using the 1977 law's bend points and replacement rates, *i.e.*, the specification used in our analysis of senior incomes and Social Security's finances in section 3. The figure includes the five-year transition that ensures the 1982 age-65 cohort's Hsiao benefits match their wage-indexed levels.

Figure A2. Percent change in PIAs using Hsiao AIMEs with 1977 bend points and factors

Notes: Authors' calculations from the OASDI Trustees Report (2023).

Appendix C. The Impact of the OASDI Scaled Factors

As explained in section 3, estimating Social Security benefits under the Hsiao method requires constructing a nominal wage path for each respondent. To do so, we use Social Security's "scaled factors for hypothetical earnings," which relate the earnings of workers who are age 60 in 2022 at each age of their working life to the Social Security Administration's average economy-wide earnings in that year. Unfortunately, the scaled factors do not allow for differences in the age-earnings profile by sex or birth year. This may distort our results if there are significant differences in the age-earnings profiles across birth cohort or sex. Below we discuss how the scaled factors are used to calculate an individual's price-indexed AIME. We then perform various sensitivity checks to better understand how different age-earnings profiles affect the estimated AIMEs. The results suggest that the choice of age-earnings profile does not materially alter Social Security benefits level under the Hsiao method nor the method's effect on the program's finances.

The relative difference between a price-indexed and wage-indexed AIME depends on the cumulative growth in wages and prices from each age of earnings to age 60. The scaled factors are effectively the weights assigned to each age of earnings. This can be seen in equation C.1, which calculates the ratio of price-indexed AIME ($AIME_h$) to the wage-indexed AIME ($AIME_w$):

$$\frac{AIME_h}{AIME_w} = \frac{1}{\sum_{i=26}^{60} s_i} \sum_{i=26}^{60} s_i * \frac{CPI_{60}}{CPI_i} * \frac{AWI_i}{AWI_{60}} \tag{C.1}$$

Where s_i is the scaled factor for earnings at age i, CPI_{60}, is the price index at age 60, CPI_i is the price index at age i, AWI_{60}, is the average wage index at age 60, and AWI_i is the price index at age i. As shown by the equation, the flatter the age-earnings profile, the more the ratio is affected by changes in prices and average wages in the earlier portions of a person's career. In an extreme example, where the scaled factors are constant across age (i.e., a worker earns the same percent of the average wage index at each age), equation C.1 reduces to arithmetic average of the cumulative price to wage changes:

$$\frac{AIME_h}{AIME_w} = \frac{1}{35} \sum_{i=26}^{60} \frac{CPI_{60}}{CPI_i} * \frac{AWI_i}{AWI_{60}} \tag{C.2}$$

If instead the scaled factors rise with age (as tends to be the case for the typical worker), recent changes in prices and wages will have a disproportionate effect on the ratio of the AIMEs.

To check the sensitivity of our results to differences in assumptions about individuals' age-earnings profiles, we re-estimated the mean ratio of individuals' price-indexed AIME to their wage-indexed AIME under two alternative profiles:

1. Constant Scaled Factors: An age-earning profile where respondents are assumed to earn a constant share of the average wage index during their careers (i.e., respondents' wages grow with economy-wide average wage growth).

2. Rising Scaled Factors: An age-earning profile where the scaled factors rise with age.

Figure C1 shows how these alternative age-earnings profiles differ from one based on the Social Security Administration's scaled factors. The Constant Scaled factor wage profile is constructed by using the mean of the Social Security's Administration's scaled factors for every age. The rising scaled factor profile modifies the Social Security Administration's scaled factors such a worker's earning rise monotonically with age. The two alternatives generate workers' wage-indexed earnings that equal those under the Social Security Administration's scaled factors.

Figure C1. Alternative age-earnings profiles
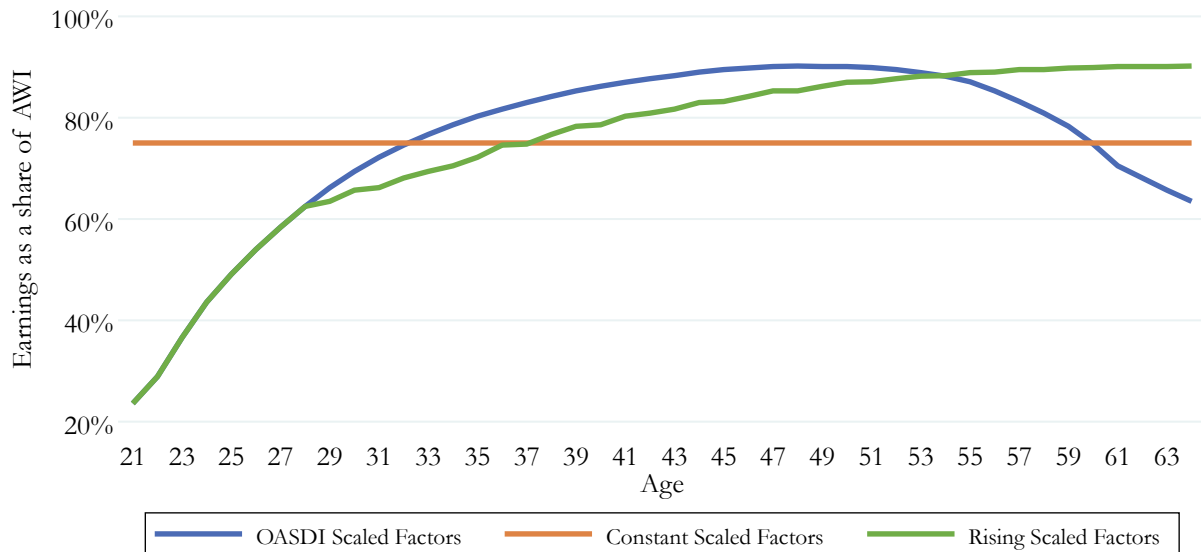
Notes: OASDI Scaled Factors from Clingman and Burkhalter (2022)

Table C1 reports the mean of the ratios of the price-indexed AIME to the wage-indexed AIME among affected recipients in the SCF. As expected, constant scaled factors produce the largest difference between the price-indexed and wage-indexed AIME (i.e., the lowest ratios). Rising scaled factors yield the smallest difference between the AIMEs. The differences are nevertheless minor in all years. Compared to the OASDI scaled factors, the largest difference is in 1982 when the

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rising scaled factors produce a mean ratio that is 0.6 percentage points larger than the OASDI scaled factors.

Table C1. Mean ratio of price-indexed to the wage-indexed AIMEs under alternative age-earnings profiles

	OASDI Scaled Factors	Constant Scaled Factors	Rising Scaled Factors
1982	90.3%	90.0%	90.9%
1988	94.6%	94.3%	94.8%
1991	94.4%	94.0%	94.7%
1994	94.7%	94.2%	94.9%
1997	94.8%	94.4%	95.1%
2000	95.2%	94.8%	95.5%
2003	94.4%	94.0%	94.6%
2006	93.7%	93.4%	93.9%
2009	92.7%	92.4%	92.9%
2012	92.0%	91.8%	92.2%
2015	92.0%	91.8%	92.3%
2018	91.7%	91.4%	91.9%

Notes: See text for description of each age-earnings profile.

As discussed above, Social Security's scaled factors do not vary over time or by sex. To account for potential differences across time or sex, we also consider age-earning profiles based on actual income and labor force participation data. Specifically, we estimate profiles based on the median income at each age by sex and birth cohort adjusted for the share of the cohort population working at that particular age.[47]

Table C2 compares the effects of the OASDI scaled factors and our cohort-specific age-earning profile.[48] The differences in the ratio of the AIMEs remain small, with the largest difference in 1982 at 1.2 percentage points. Similarly, the effects on benefit levels from our cohort-specific profile are small. Across all Social Security recipients, our cohort-specific age-earnings profile would result in, at most, a 0.46 percent change in benefits under the Hsiao method. This would have a trivial effect on estimated senior incomes and on our long-term trust fund projections.

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[47] For median incomes among covered workers, we use table 4B.6 in the Social Security Administration Annual Statistical Supplement (available at https://www.ssa.gov/policy/docs/statcomps/supplement/2022/4b.pdf). We use the Census Bureau's Current Population Survey to estimate employment-to-population ratio for each birth cohort and sex at each age (available at https://download.bls.gov/pub/time.series/ln/). To create a smooth age-earnings profile, we interpolate the median incomes and the employment-to-population ratios across age groups (using the midpoint of each age group) and across years.

[48] In some cases, the SCF data does not identify the sex of the respondent (specifically, since 1988 the SCF public use files have censored the sex variable for individuals who are not the primary respondent or their spouse). In these cases, we use median income and employment-to-population ratios for all individuals in a birth cohort.

Table C2. Ratio of the Hsiao AIME to the wage-indexed AIME using cohort-specific data

	OASDI Scaled Factors	Cohort-Specific Profiles	Pct Point Change
1982	90.3%	91.5%	1.2%
1988	94.6%	95.7%	1.1%
1991	94.4%	95.4%	1.0%
1994	94.7%	95.6%	1.0%
1997	94.8%	95.7%	0.9%
2000	95.2%	95.9%	0.7%
2003	94.4%	95.0%	0.6%
2006	93.7%	94.2%	0.5%
2009	92.7%	93.0%	0.3%
2012	92.0%	92.3%	0.2%
2015	92.0%	92.2%	0.1%
2018	91.7%	91.7%	0.1%

Notes: Cohorts are for specific birth year and sex.

Finally, we compare our findings with data from a representative sample of the 2004 Social Security population.[49] The Social Security Administration provides a public use file that includes annual covered earnings data from 1951 to 2003. The data also include variables indicating whether respondents' Social Security benefit formula is based on their AIME (rather than pre-1977 formula or the transitional guarantee method) and whether respondents' benefits are based on their own earnings (as opposed to spousal, survivor, or dependent benefits). Using these data, we calculate the wage-indexed and price-indexed AIMEs for each respondent who qualifies for Social Security through their own earnings and whose benefits are based on their AIME. We estimate that among this cohort, the average ratio of the price-indexed (Hsiao) AIME to the wage-indexed AIME is 91.6 percent in 2004. The SCF triennial survey prevents a direct comparison to 2004, but as shown in the above tables, we estimate the price-indexed to wage-indexed ratio at 94.4 percent in the 2003 SCF and 93.7 percent in the 2006 SCF. Thus, our SCF data may slightly underestimate the decline in the AIMEs, at least for the 2004 Social Security population. This would lead us to understate the benefit losses to recipients as well as the aggregate savings to the program under the Hsiao method.

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[49] The data are available at https://www.ssa.gov/policy/docs/microdata/earn/index.html.