THE CASE FOR USING SUBSIDIES FOR RETIREMENT PLANS TO FIX SOCIAL SECURITY

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Introduction

The U.S. Treasury estimates that the tax preference for employer-sponsored retirement plans and IRAs reduced federal income taxes by about $185-$189 billion in 2020, equal to about 0.9 percent of gross domestic product. Other estimates of the costs are even larger.[1] However, the best evidence suggests that the federal tax preferences do little to increase retirement saving. While this dismal assessment may sound like bad news, it actually offers policymakers an opportunity to strengthen the nation's retirement income system. Revenues saved from repealing the retirement saving tax preferences could be reallocated to address the majority of Social Security's long-term funding gap, strengthening a program that is crucial for the retirement security of older Americans while bypassing a decades-old debate about raising taxes or reducing Social Security benefits.

This study reassesses the favorable tax treatment of retirement plans and explores an opportunity to use taxpayer resources more productively. The first section addresses the revenue loss, considering the impact not only on the personal income tax but also the payroll tax, concluding that the revenues forgone are significant no matter how they are measured. The second section examines who receives these tax expenditures, concluding that the bulk goes to high earners. The third section explores what taxpayers get for their money, finding that the favorable tax treatment has failed to significantly increase national saving. Given the enormous federal deficits and overwhelming demands on the federal budget, the fourth section explores ways to recoup all or some of the tax subsidies currently accorded retirement saving. The fifth section explores how the savings from eliminating or reducing the tax subsidies could be applied to Social Security.

The final section concludes that it makes little sense to throw more and more taxpayer money at employer plans and IRAs. In fact, the case is strong for eliminating the current tax expenditures on retirement plans, and using the increase in tax revenues to address Social Security's long-term financing shortfall.

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[1] Analysts use two different approaches for measuring tax expenditures under the federal income tax system: present value and cash flow. The Treasury has estimates for both measures: $185 billion for present value and $189 billion for cash flow in 2020. The Congressional Budget Office has a present value estimate of $202 billion (0.9 percent of GDP) for 2019, and the Joint Committee on Taxation has a cash flow estimate of $292 billion (1.4 percent of GDP) for 2020. As discussed below, revenue losses from tax expenditure policies also extend to federal payroll taxes; the CBO estimated that this amount was $74 billion in 2019.

Current Tax Treatment of Retirement Plans

As far back as the 1940s, federal pension policy has provided tax incentives that would both encourage retirement saving and, in conjunction with nondiscrimination rules that prohibited firms from offering retirement plans only to highly-paid employees, support employer retirement plans that cover the rank and file.[2]

The tax incentives, under the personal income tax, arise because employees can defer taxes on compensation that they receive in the form of retirement savings. In traditional defined contribution (DC) plans, employees are not taxed either on their own or their employer's contributions in the current year or on the investment earnings on their balances. Instead, participants are allowed to defer taxes until benefits are received in retirement, at which time both contributions and investment earnings are taxed as ordinary income. Similarly, participants in traditional defined benefit (DB) pensions are not taxed on the annual increase in the value of their accrued benefits but rather defer paying taxes until they receive benefits in retirement. Relative to saving through an ordinary investment account, the tax treatment for employer-sponsored retirement plans significantly reduces the lifetime taxes of participating employees.

Some might argue that the treatment of retirement saving is consistent with a consumption tax, which exempts savings from taxation; this point is accurate but of little relevance. True, the United States has something of a hybrid system, but its commitment to the income tax was reaffirmed in the Tax Reform Act of 1986. Indeed, the Treasury itself, with the apparent concurrence of Congress, classifies the treatment of retirement saving as a deviation from the "normal" tax structure.

This deviation from the normal tax structure results in lower tax revenues. The tax revenue foregone can be measured in two ways. Historically, the federal government estimated the lost revenue on a cash basis. Under this concept, the revenue loss is calculated as the net of two figures: 1) the revenue that would be gained, in a given year, from the current taxation of annual contributions and investment earnings; and 2) the amount that would be lost in that year

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[2] The exemption from taxation of income accrued in trust to provide defined benefit pensions actually dates from 1921. The big expansion of defined benefit plans, however, occurred during World War II because, with price and wage controls, employers needed another way to increase worker compensation.

from not taxing benefits in retirement, as is done currently. In 2020, this approach produced a revenue loss of $189 billion.[3]

While the cash-flow approach is meaningful for permanent deductions and exclusions, it does not correctly account for tax concessions when tax payments are deferred. Its limitations can be seen clearly by assuming for a given year that aggregate contributions to plans and pension fund earnings exactly equal aggregate benefit payments to workers. Under this assumption, the revenue loss would equal zero, yet participants in retirement plans would continue to enjoy the advantage of deferring taxes on employer contributions and investment income until retirement.[4]

A better approach to measuring the cost of the favorable tax provisions is to calculate the difference in the net present value of the revenues from contributions in a given year under two tax rules – the rules for saving outside a retirement plan and the current favorable rules for saving in a retirement plan. The revenue loss is the difference between: 1) the present value of the revenue from the current taxation of contributions and accruals over the employee's working life; and 2) the present value of the future taxes collected when the employee receives benefits in retirement. The Treasury's 2020 estimate for this present value concept was $185 billion (see Table 1).

Table 1. *Present Value of Tax Expenditures for Retirement Plans, 2020*

Provision	Billions of dollars
Defined contribution employer plans	$120.6
Defined benefit employer plans	46.0
Exclusion of contributions and earnings for self-employed plans	7.6
Exclusion of Roth earnings and distributions	6.6
Exclusion of IRA contributions and earnings	2.9
Exclusion of non-deductible IRA earnings	0.8
Total	$184.6

Source: Office of Management and Budget (2021).

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[3] Tax expenditure estimates are available through 2022 (see Appendix Table A1), but this analysis focuses on 2020 because it is the last year for which Form 5500 retirement plan contribution data are available (see Appendix Table A2).

[4] Moreover, the cash-flow approach compares the taxes paid this year by retirees to the taxes foregone this year with regard to those saving for retirement. The net cost on a cash-flow basis depends upon the relative sizes of the working-age and retiree populations, the amounts they saved and chose to withdraw, and other assumptions that are distinct from the value of the tax preference to any given individual saving for retirement.

In addition, most states effectively offer a similar tax incentive, as state incomes taxes are generally levied upon income as defined under federal law. As of 2020, state income taxes were equal to about 22 percent of federal income taxes, which implies an additional tax expenditure from states equal to about $41 billion.[5]

Revenue losses also extend to the payroll tax for Social Security and Medicare. In the case of DC plans, employee contributions are taxed as earnings, but employer contributions are not. Thus, calculating the revenue loss involves applying only the employer portion of the payroll tax – 7.65 percent – to employer contributions. With respect to DB plans, the annual increase in the value of accrued benefits is excluded from the payroll tax base for both employers and employees, so the revenue loss estimate applies the full 15.3-percent payroll tax here. For 2020, our total estimate of the payroll tax revenue loss is $68 billion.[6] This is a permanent loss, not a deferral, because no payroll taxes are imposed at a later time.[7] Nevertheless, the loss has never been considered a "tax expenditure" because of the subsequent budget implications – namely, broadening the payroll tax base would lead to higher Social Security benefits. The evidence, however, suggests that the budgetary impact of higher benefits would be substantially less than the increase in revenue, so expanding the revenue base would still contribute to reducing Social Security's 75-year deficit.[8]

In short, the tax preferences for retirement plans cost the Federal Treasury, state treasuries, and Social Security a significant amount of money. Who gets these preferences, and what do we receive in exchange?

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[5] Figures for state and federal revenues are drawn from the U.S. Census Bureau (2020).

[6] The $68.2-billion estimate is the sum of three components: a) $15.8 billion from applying the 7.65 percent employer's portion of the FICA tax to $196 billion in employer contributions to private sector DC plans and $11.1 billion in federal government contributions to the Thrift Savings Plan; b) $23.3 billion by applying the full employer/employee 15.3-percent FICA tax to the $106 billion in private sector contributions to DB plans and the $46 billion in contributions to the Civil Service Retirement Fund; and c) $29.1 billion from applying the 15.3-percent FICA tax to 75 percent of the $238.8 billion contributions to state and local employer DB plans (to reflect the portion of state and local workers covered by Social Security) and applying only 2.9 percent in Medicare taxes for the remaining 25 percent without Social Security. For details on federal and state/local government retirement plan contributions, see Appendix Tables A3 and A4, respectively. Our estimate for the revenue loss from payroll taxes is very close to the CBO estimate for 2019.

[7] Note, however, that the revenues from income taxes levied on Social Security benefits are redirected to fund the Social Security and Medicare programs.

[8] See Smith and Toder (2014) for analysis of the inclusion of health insurance premiums. In 2020, employer contributions to private health plans were $520 billion (Centers for Medicare & Medicaid Services (2023)); some employee contributions are also excluded from the tax base. Social Security actuaries estimate that including health insurance contributions in the payroll tax base – even after adding health insurance contributions to the worker's earnings history for determining benefits – would eliminate 31 percent of the program's 75-year deficit (see Social Security Administration 2023a).

Who Gets the Tax Expenditures?

Tax expenditures for retirement saving are much more likely to benefit high earners than their low-earning counterparts, for a number of reasons.[9] Upper-income taxpayers are more likely to have access to employer-sponsored retirement plans, are more likely to participate in their employer's plan, and contribute more when they do participate.[10] Indeed, simulations from the Urban-Brookings Tax Policy Center suggest that 59 percent of the current tax expenditures for retirement saving flows to the top quintile of the income distribution (see Table 2).[11] Virtually none of it is received by households in the bottom forty percent of incomes, who face the greatest risk of inadequate resources in old age.

Table 2. *Share of Revenue Gain by Income Quintile from Eliminating Tax Expenditures for Retirement Saving, 2020*

Quintile	Share of revenue gain
Top	59.2%
4th	25.3
3rd	11.8
2nd	3.4
Lowest	0.3

Source: Tax Policy Center, Urban-Brookings Tax Policy Microsimulation Model (2020).

It is commonly argued that high-income households receive the lion's share of the tax expenditure due to the progressive rate structure of the federal income tax. However, this argument ignores the impact of income taxes on savings withdrawn in retirement. Indeed, if tax rates decline more in retirement for low earners than for high earners, the tax preference per dollar of retirement plan contributions tends to be larger for low than high earners.[12] Regardless

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[9] For a detailed discussion of how tax preferences for retirement saving have been skewed towards high earners, see Doran (2022).

[10] One reason high earners save more in employer-sponsored plans is that they receive lower replacement rates from Social Security than low earners. When retirement saving is measured as the value of accrued Social Security benefits coupled with balances and accrued benefits in employer-sponsored retirement plans, high- and low-wealth households reach retirement age with similar ratios of total retirement wealth to annual earnings (Devlin-Foltz, Henriques, and Sabelhaus, 2016). It is the composition of wealth that differs dramatically, with low-wealth households dependent almost entirely on Social Security and high-wealth households relying mainly on savings in employer plans.

[11] For details on the methodology underlying these calculations, see Toder and Khitatrakun (2020) and Toder, Khitatrakun, and Boddupalli (2020).

[12] Brady (2016).

of the tax break per dollar, high-income households receive most of the tax expenditure because they save dramatically more for retirement than do low-income households.

Over time, Congress has made changes that result in the top quintile receiving an increasing proportion of tax expenditures, by introducing and then expanding so-called catch-up contributions (see Appendix Table A5). The contribution limits have long been adjusted for inflation but in 2001 lawmakers increased the limits at a faster rate through 2005 and established a much higher contribution limit for those ages 50 and over. Moreover, the SECURE 2.0 Act further increased the catch-up limits for those 60-63 to the greater of $10,000 or 50 percent more than the regular catch-up limit (effective in 2025).

While policymakers may believe that raising contribution limits enhances retirement saving, higher limits benefit only households that are constrained by the existing cutoffs. But the vast majority of Americans are not contributing the maximum amount. In 2022, only 16 percent of participants in Vanguard plans took advantage of the catch-up feature and these were overwhelmingly high earners (see Table 3).

Table 3. *Percentage of Participants Making Catch-up Contributions by Income, 2022*

Income group	Percentage
< $50,000	<1%
$50,000 -$74,999	2
$75,000- $99,999	5
$100,000-$149,999	20
$150,000+	56
All	16%

Source: Vanguard (2023).

Another set of changes that principally benefits high-income households is the increase in the age for taking required minimum distributions from DC plans. Prior to January 2020, minimum distributions were required to begin at age 70½.[13] The 2019 SECURE Act raised the age to 72, and the 2022 SECURE 2.0 Act further increased it to 73 in 2023 and 75 in 2033. Increasing the age requirement to 75 allows participants to take advantage of 4½ more years of

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[13] The Coronavirus Aid, Relief, and Economic Security (CARES) Act waived required minimum distributions during 2020 for IRAs and retirement plans, including for beneficiaries with inherited IRAs and accounts inherited in a retirement plan.

tax-free growth. However, generally only the wealthiest can take advantage of this provision; most taxpayers need to start tapping their accounts well before 75.[14]

What Do the Tax Expenditures Buy Us?

Given that the tax expenditures go overwhelmingly to upper-income households, who face almost no risk of poverty in old age, it is worth asking whether these expenditures accomplish broader social goals such as increasing national saving or expanding the share of workers covered by a retirement plan.

Do the Tax Expenditures Increase Saving?

The tax subsidy for retirement saving may be justified if it promotes national capital formation. The increase in national capital formation is the sum of government saving – meaning, revenues less expenditures – and saving by individuals. Since the loss of revenues produced by the tax expenditure reduces government saving, the question is whether people covered by retirement plans increase their saving by enough to make up for this loss. The weight of the evidence indicates that they do not.

It might initially seem that tax preferences do indeed increase national saving. After all, the tax preferences make retirement saving more attractive to the savers and massive amounts have been accumulated in retirement plans. But the economists' lifecycle model suggests that people may simply shift their saving from ordinary taxable investment accounts to tax-favored retirement accounts in order to reap the benefits of the tax preference.[15] If we assume that 65 to 70 cents of each dollar of retirement plan savings otherwise would have been saved in taxable investment accounts,[16] about $644 billion of the $954 billion in annual retirement plan contributions would have occurred regardless, leaving a net increment to savings of $310

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[14] Earlier evidence on IRA holders – from when the required minimum distribution age was 70½ – indicated most people did not begin withdrawing until the required age (Doran 2022). However, these data reflect a past era when the required age was lower and retirees were much more likely to have DB plans. Looking ahead, most retirees with retirement savings will be reliant solely on DC plans, so they will need to withdraw this money well before 75; see, for example, Siliciano and Wettstein (2021).

[15] See Attanasio and DeLeire (2002) and Attanasio, Banks and Wakefield (2004).

[16] This estimate is consistent with the results in the academic literature. For example, Munnell (1976) found an offset of $0.62 per dollar. In a more recent paper, Card and Ransom (2011) found an offset of $0.60 to $0.80 per dollar for employee contributions and half that for employer contributions.

billion.[17] With the Treasury's revenue loss estimate of $185 billion, it seems that the bulk of the increase in private saving may have been offset by the reduction in government saving.

Similarly, recent studies of automatic saving policies such as 401(k) defaults have found they are quite effective at increasing participation in retirement plans, but it remains unclear whether they raise total household saving. For instance, a 2022 study found that automatic enrollment of Department of Defense employees in the federal government's Thrift Savings Plan significantly increased plan balances, but had little or no effect on participants' net worth.[18] In such cases, national saving would decrease due to the budgetary cost of the tax preference.

Alternatively, households might save more for retirement because the tax expenditure increased their after-tax incomes, but these savings would be insufficient to offset the costs of the tax preference for the government.[19] For total saving to increase, somebody – be it households or the government – must consume less. It is not clear that is occurring.

For some individuals, other factors besides the tax preference may dictate how much they save. For instance, many employees who are automatically enrolled in a 401(k) plan will continue to save at whatever default contribution rate is set by their employer, which may be more or less than they would have saved on their own.[20] Other employees may contribute to the level at which they maximize the employer match, if available.

Likewise, if a household targeted a specific figure for their retirement saving, such as a dollar amount at retirement or the ability to replace some percentage of their pre-retirement earnings, a tax preference for retirement saving could cause the household to save less. Since the tax preference effectively increases the after-tax return on retirement plan investments, households might reason that they could reach their retirement saving goals while contributing less to their retirement accounts.

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[17] The $954 billion estimate is the sum of four components : a) $632.4 billion in employer and employee contributions to private sector DB and DC plans (see Appendix A2); b) $36.4 billion in federal employer and employee DC contributions to the Thrift Savings Plan (see TSP Financial Statements in CliftonLarsonAllen LLP (2022)); c) $46.0 billion in federal employer and participant DB contributions to the Civil Service Retirement Fund (see CSRDF Financial Statements in U.S. Office of Personnel Management (2021)); and (d) $238.8 billion in state and local employer and employee DB contributions (see U.S. Census Bureau, *Annual Survey of Public Pensions* (2020).

[18] Beshears et al. (2022).

[19] Antón, Muñoz De Bustillo, and Fernández-Macías (2014).

[20] Clark, Utkus, and Young (2015).

In short, theory does not provide a strong basis to assume that the federal tax preferences must increase net total saving. Thus, the question must be resolved empirically. In the mid-1990s, two prominent studies came to conflicting conclusions regarding the efficacy of the retirement saving tax preference.[21] Since that time, however, additional studies using new data and methods have largely concluded that the net effects of the tax preference are small.[22] But research focusing on the United States has been impeded by the lack of high-quality data on saving and wealth.

As a result, economists turned to Danish tax data, which track the income, saving, and wealth of over 4 million people.[23] To test the effect of tax subsidies, they used responses to a 1999 reduction in the subsidy for retirement contributions for those in the top tax bracket. The results show that, for some, pension contributions declined. But the decline was nearly entirely offset by an increase in other types of saving. The tax subsidy, in other words, had primarily induced individuals to shift their saving from taxable to tax-advantaged retirement accounts, not to increase overall household saving. The response was also highly concentrated, with most individuals doing nothing and only about 15 percent shifting their saving. The authors concluded that tax incentives had virtually no impact on retirement saving.

The results of this study have been well received and broadly accepted. The weight of the evidence indicates that tax incentives do not increase total saving in a meaningful way.

Do the Tax Expenditures Improve Coverage?

It is possible that, even if the tax incentive does not induce high-income households to increase their total retirement saving, the incentive does encourage firms to offer retirement plans. In the process, workplace retirement plans would be offered to lower-paid employees, who currently lack a convenient way to save for retirement.[24] However, little research has produced any evidence of a relationship between tax expenditures and retirement plan coverage.

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[21] See, for example, Engen, Gale and Scholz (1996) and Poterba, Venti and Wise (1996), who come to diametrically opposite conclusions.

[22] For instance, one 2003 study estimated that only about one quarter of 401(k) balances represent net saving to the economy (Benjamin 2003). For each dollar of savings inside of 401(k) accounts, about 25 cents are offset by the cost of the federal tax incentive and about 50 cents are offset by lower household saving in other areas, such as taxable investment accounts. A separate 2002 study published by the Federal Reserve reached similar conclusions (Pence 2002).

[23] Chetty et al. (2014).

[24] For more details on policy goals and coverage shortfalls, see Halperin and Munnell (2005).

For instance, if the retirement saving tax expenditure accruing to high-earners increased the availability of workplace retirement plans to low- and middle-earners, one might expect retirement plan coverage to be higher in states that levy high state income taxes on high earners, as the federal tax expenditure serves to reduce state income tax liabilities as well. However, after controlling for a variety of demographic and labor force characteristics, no statistically significant relationship exists between the maximum income tax rate levied by a state and the percentage of employees offered a retirement plan at work.[25]

Moreover, the percentage of workers participating in a retirement plan has not increased over time (see Figure 1). On the other hand, neither have tax expenditures as a percentage of GDP. Thus, it is possible that coverage is higher than it would have been in the absence of the tax expenditures, but, again, no evidence supports such a contention.

Figure 1. *Percentage of Workers Ages 25-64 Participating in an Employer-Sponsored Retirement Plan, 1989-2022*
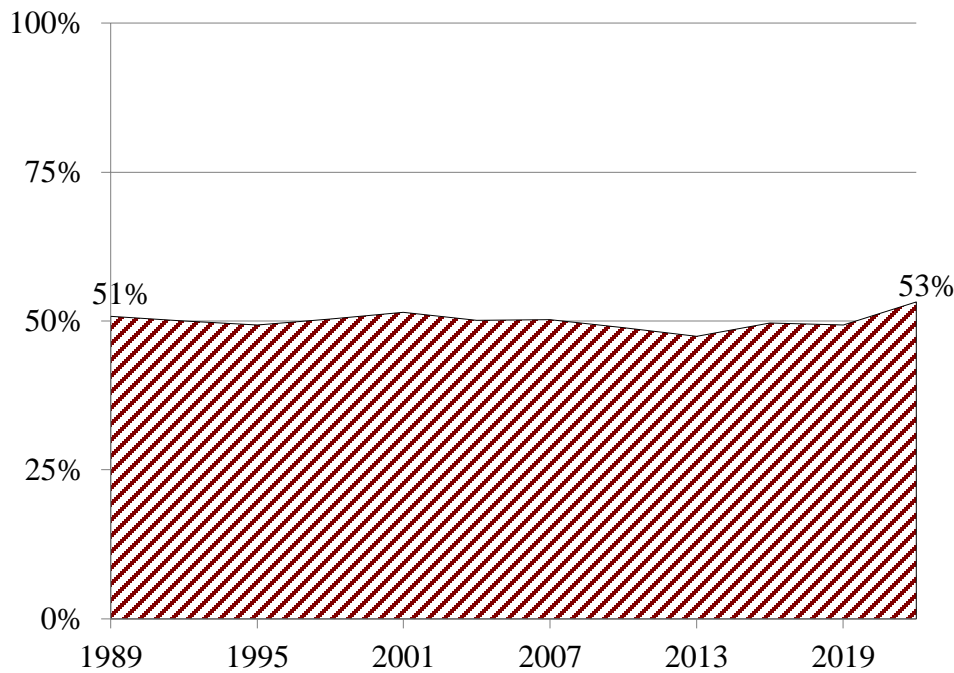
Source: U.S. Board of Governors of the Federal Reserve System*, Survey of Consumer Finances* (SCF) (1989-2022).

Even if the retirement tax expenditure did increase retirement plan coverage, far less expensive means exist to achieve this goal, such as a government mandate to enroll employees in

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[25] This finding is from a preliminary analysis; we intend to conduct a more in-depth investigation into this issue.

a retirement plan.[26] For instance, in 2008 the United Kingdom established a system that requires all private sector employers to auto-enroll their workers in a retirement savings plan. The employer can choose between adopting its own plan or using the National Employment Savings Trust (NEST), a DC plan run by a public corporation. The UK does require that employers partially match employees' contributions, but this aspect of the program is distinct from the provisions that achieved nearly universal retirement plan coverage.[27]

In the United States, however, the private-sector retirement system is strictly voluntary, with no room for mandates. Without a mandate or a subsidy via tax expenditures, though, would employers still offer plans?[28] It is important to remember that retirement plans existed before the income tax, so tax benefits are clearly not the only reason employers sponsor retirement plans. At the end of the nineteenth century, long before the enactment of the federal personal income tax in 1916, a handful of very large employers – such as governments, railroads, utilities, universities, and corporations – had set up DB pension plans. They did so because the pension was a valuable tool for managing their workforce. These plans provided benefits based on final pay and years on the job. As a result, the value of pension benefits increased rapidly as job tenure lengthened, which motivated employees to stay with the firm. DB plans also encouraged employees to retire when their productivity began to decline.

While the contribution of DC plans to personnel management may appear less compelling – they have no penalty for changing jobs and no retirement incentives – economists contend that DC plans help employers attract and retain high-quality workers who have low discount rates and value saving.[29] Employer-sponsored plans also tend to have cost and convenience advantages over do-it-yourself IRA plans, making such plans an attractive benefit for employees. Moreover, employers have a real interest in making sure their employees have the resources to retire once their productivity falls off.

While employers have economic incentives to offer plans, it may be time to ask whether employer-centered arrangements make the most sense. In fact, the ERISA Industry Committee, an organization representing the employee benefit plans of America's largest employers, issued a

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[26] This mandate applies to all employees who are: 1) ages 22 or older, up to the "state pension age" (66 in 2023); and 2) earn at least £10,000 ($12,600) per year.
[27] NEST does not impose any administrative costs on employers, as such costs are borne by employees through fees.
[28] Some have suggested that, without tax incentives, employers would not offer retirement plans. See, for example, VanDerhei (2011).
[29] Ippolito (1997).

report in 2007 suggesting "a new benefits platform for life security." The new benefit offerings would be administered by competing third-party Benefits Administrators, with employers and individuals providing the funding. The structure would also enable individuals without an employer relationship to contribute to a retirement plan. Combining the new benefits platform with automatic enrollment might produce a much better retirement system.

In any case, the current approach of offering tax expenditures is expensive and does not appear to work. Thus, the following section explores alternatives for curtailing these tax preferences.

Reducing Tax Expenditures for Retirement Plans

The case for getting rid of tax expenditures for retirement plans is strong. Employers would want the plans even without the enormous subsidy to retirement saving, and no theoretical or empirical evidence exists that the large tax expenditure has significantly increased national saving or expanded coverage. The most straightforward approach is to simply end the tax expenditure and use the foregone revenues to restore balance to Social Security – the backbone of the nation's retirement system.

If complete elimination is not politically acceptable, numerous options exist for cutting back. Even if one believed that the government should encourage retirement saving beyond Social Security, it is hard to argue that the encouragement should be limitless. Perhaps the tax preferences should stop once the individual's account exceeds $1 million or perhaps tax-favored contributions should be limited to $20,000 per year rather than the current $66,000. The following section explores different ways of reducing tax expenditures for retirement plans.

The discussion focuses on traditional DC plans, which account for about two-thirds of the retirement-related revenue loss. However, any recommendation adopted for DC plans would require a comparable change for DB plans, or else many employers would switch from DC to DB. Moreover, the focus is on conventional plans, where neither the original contribution nor the investment returns are taxed until they are withdrawn as benefits in retirement, as opposed to Roth plans, where the initial contribution is taxed but investment earnings and withdrawals are tax-free. Despite this difference in the mechanics, their benefits are equivalent (see Box). Again, any change adopted for traditional DC plans would require an equivalent change for Roths.

> *Conventional and Roth Plans Offer Equivalent Tax Benefits*
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> Conventional and Roth retirement plans – whether 401(k)s or IRAs – provide equivalent tax benefits. Unfortunately, the easiest way to demonstrate this point is with equations. Assume that t is the individual's marginal tax rate and r is the annual return on the assets in the plan. If an individual contributes $1,000 to a conventional plan, then after n years, the balance would have grown to $1,000 $(1+r)^n$. When the individual withdraws the accumulated funds, both the original contribution and the accumulated earnings are taxable. Thus, the after-tax value of the plan in retirement is $1,000 $(1+r)^n$ (1-t).
>
> Now consider a Roth. The individual pays tax on the original contribution and puts (1-t) $1,000 into the account. (Note the original contribution in this example is smaller than for the conventional 401(k).) After n years, these after-tax proceeds would have grown to (1-t) $1,000 $(1+r)^n$. Since the proceeds are not subject to any further tax, the after-tax amounts under the Roth and conventional plans are identical.[30]
>
> $$\underset{\text{Conventional}}{\$1,000\,(1+r)^n\,(1\text{-}t)} \;=\; \underset{\text{Roth}}{(1\text{-}t)\,\$1,000\,(1+r)^n}$$
>
> Of course, the preceding exercise assumes that the tax rate that people face in retirement is the same as that when they are young. If their tax rates decline after retirement when they withdraw the funds, then they will pay less tax and have more after-tax income with the conventional plan than with the Roth.

Establishing a Benchmark

To get a rough idea of the size of the tax expenditure, which can serve as a base for scaling it back, requires only a few pieces of information: the amount contributed to DC plans, the rate of return earned on investments, the rate used to discount future values to the present, the length of time the money is held in the plan, and the average marginal tax rate before and after

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[30] While the arithmetic says the tax treatment is the same, the two plans differ in terms of both perception and legalities. The most obvious issue of perception is that contributions to conventional 401(k)s produce an immediate tax cut. Roth 401(k)s do not provide tax relief today and therefore may not seem as appealing to the typical taxpayer. On the other hand, since no further taxes are required on a Roth 401(k), the individual knows that all the money in the account is available for support in retirement. Funds in a conventional account will be taxed upon withdrawal, so the amount available for support is always less than the account balance. In terms of legalities, the primary difference between the two types of 401(k)s is that the Roth 401(k) is more generous in terms of contribution amounts. This factor is not obvious given that individuals could contribute $22,500 under either plan in 2022. But for the individual in, say, the 25-percent personal income tax bracket, a $22,500 after-tax contribution is equivalent to $30,000 before tax. Thus, in effect, the contribution limit is higher under the Roth 401(k). The Roth 401(k) also allows the individual to defer all distributions to after his death because Roth accounts do not have Required Minimum Distributions.

retirement. The calculation then involves comparing Treasury receipts if the saving occurred outside the retirement plan to receipts when the money is accumulated inside a plan.[31]

Assume – like the Treasury – that all money in DC plans is invested in bonds. (Beyond that, all other Treasury assumptions are top secret.) The assumptions used here are that the bonds yield a real return of 2.5 percent and that the rate of return equals the discount rate.[32] Contributions to private sector DC plans ($526 billion) and the Federal Thrift Savings Plan ($36 billion) in 2020 totaled $562 billion.[33] If contributors are age 40, the entire account is liquidated and the remaining untaxed portion is taxed in full at age 80, and the average marginal tax rate is 25 percent, then the tax expenditure for 2020 would be $92 billion. However, substantial evidence suggests that people face lower tax rates in retirement than when working. Assume then that the tax rate drops to 20 percent between ages 70 and 80, so the revenue loss increases to $116 billion – very close to the Treasury estimate for 2020 (see Table 4).

Table 4. *Tax Expenditures for Defined Contribution Plans Invested in Bonds, Estimates from Simple Model Compared to Treasury, 2020 (Billions of Dollars)*

Tax rate assumption	Age		
	35	40	45
Constant tax rate	$102	$92	$81
Decreasing tax rate	126	116	105
Treasury estimate		$121	

Sources: Authors' calculations and Office of Management and Budget (2021).

In fact, all DC money is not invested in bonds; rather, about 70 percent is in equities.[34] Equities outside of retirement plans are taxed more favorably than ordinary income under the federal income tax (see Table 5). This tax differential alone would reduce the estimated tax expenditure for saving in retirement plans. At the extreme, if the tax on investment income outside of retirement plans were set at zero, participants would gain nothing by saving in a

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[31] For details on our methodology, see Appendix B. For an earlier analysis, see Munnell, Quinby, and Webb (2012).
[32] Our assumed returns for both bonds and equities are historic averages from Damodaran (2022). Using the same value for the rate of return and the discount rate avoids the possibility of tax arbitrage in which either the federal government or the taxpayer can earn greater returns by investing themselves. See the response of Auerbach, Gale, and Orszag (2003) to Boskin (2003).
[33] Form 5500 Bulletin (U.S. Department of Labor (2022)) and Thrift Savings Plan Financial Statements (in CliftonLarsonAllen LLP (2022)).
[34] See Holden, Bass, and Copeland (2022) and Vanguard (2021).

retirement plan. On the other hand, equities have higher returns than bonds, and our calculations and those of other researchers show that a higher return – even with a comparable increase in the discount rate – produces a higher tax expenditure.[35] The question is the extent to which the two effects – more favorable treatment outside the plan and higher returns – offset each other.

Table 5. *Top Rates on Ordinary Income, Realized Capital Gains, and Dividends, 1988-2023*

Regime	Top rate		
	Ordinary income	Realized capital gains	Dividends
1988-1990	28.0%	28.0%	28.0%
1991-1992	31.0	28.0	31.0
1993-1996	39.6	28.0	39.6
1997-2000	39.6	20.0	39.6
2001	39.1	20.0	39.1
2002	38.6	20.0	38.6
2003-2012	35.0	15.0	15.0
2013-2017	39.6	15.0/20.0	15.0/20.0
2018-present	37.0	15.0/20.0	15.0/20.0

Notes: Capital gains are only taxed above 15 percent if the filer earns more than $553,850 and files as married filing jointly or earns more than $523,050 and files as head of household. In 1988-1990, the top rate on regular income over $31,050 and under $75,050 was 28 percent. Income over $75,050 and under $155,780 was taxed at 33 percent. And any income over $155,780 was taxed at 28 percent.
Sources: Tax Policy Center (2023); and U.S. Department of the Treasury, Office of Tax Analysis (various).

Table 6 shows the tax expenditure estimates when DC balances are invested 70 percent in equities and 30 percent in bonds. The assumed return on equities is 6.5 percent – 2.5 percent in dividends and 4 percent in appreciation. By law, dividends are taxed annually, and the assumed rate is 15 percent – although for high earners ($553,850 for a married couple) the rate is 20 percent. Since gains are taxed only when recognized, we assume that 50 percent of the capital gains are realized and taxed annually and 50 percent are held until age 80 and taxed at 25 percent upon withdrawal. A separate estimate assumes that the tax rate declines to 20 percent in retirement, which yields a somewhat larger estimate. In both cases, the tax expenditure for the equity/bond portfolio turns out to be very close to that for the all-bond scenario.

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[35] See Lurie and Ramnath (2011).

Table 6. *Estimates of Tax Expenditures for Defined Contribution Plans Invested 70% Equities/30% Bonds, 2020 (Billions of Dollars)*

Tax rate assumption	Age		
	35	40	45
Constant tax rate	$113	$103	$93
Decreasing tax rate	140	130	120

Source: Authors' estimates.

The question is what baseline to use for analyzing the impact of proposed changes on the tax expenditure. While the estimates are very similar regardless of the assumed portfolio, the following analysis is based on the Treasury's all-bond scenario – the assumption underlying the official metric. And to avoid carrying too many numbers, the average age for contributors is assumed to be 40.

Reducing the Tax Expenditure

The only way to completely eliminate the tax expenditure for retirement saving is to include both employee and employer contributions in taxable income and, in the all-bond scenario used for this exercise, to tax the earnings as they accrue. According to our estimates, this change would save $92 billion per year if tax rates do not decline after retirement and $116 billion if they do. Taxing future contributions to DC plans on a current basis is a totally feasible alternative.[36] The Internal Revenue Service already has the information on employee and employer contributions and could require companies to report earnings on equities and bonds and realized capital gains from these new contributions on an annual basis. That is the most direct approach.[37]

In the absence of eliminating the tax expenditures altogether, the most realistic approach may be limiting the amount of money that goes into a plan, and thereby the share of the subsidy going to high earners. One option is to limit combined employee-employer contributions to, say,

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[36] Fairness would require that the new rules apply only to new contributions and not to the income on assets already in participants' accounts.

[37] One problem is that participants would be assessed a tax on income earned within a plan that they cannot access before age 59½, so levying a tax at the plan level might be a more workable option.

$10,000 or $20,000 per year.[38] An alternative would limit total accumulations in tax-favored retirement plans to, say, $500,000 or $1 million.[39] The 2019 *Survey of Consumer Finances* provides data on the share of contributions above these proposed caps (see Appendix Table A6), and Table 7 shows the amount that the tax expenditure would be reduced under each option, assuming that either the tax rate remains constant or decreases after retirement.

Table 7. *Estimated Reduction in Tax Expenditures for Defined Contribution Plans from Various Reforms, 2020 (Billions of Dollars)*

Proposal	Tax rate	
	Constant	Decreasing
Cap contributions at:		
$10,000	-$40	-$51
$20,000	-22	-28
Cap accumulations at:		
$500,000	-25	-32
$1,000,000	-13	-17

Note: The calculations are based on an all-bond portfolio and an average contributor age of 40.
Source: Authors' estimates.

The estimates in Table 7 inevitably understate the savings because they assume a base tax rate of 25 percent. In fact, placing a cap on the deferral amount reduces the contribution of the higher paid who face the higher marginal rates, which would lower the effective tax rate. If the average effective tax rate dropped to 20 percent, the savings would increase from $40 billion to $47 billion ($92 billion - $45 billion); with a 15-percent rate, the savings become $55 billion ($92 billion - $37 billion) (see Figure 2).

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[38] If a limited approach is adopted, it would make sense to have a specific rationale for the amount chosen. For example, a $20,000 limit could be justified as allowing enough saving for someone earning the Social Security maximum wage to achieve roughly a 75-percent replacement rate.

[39] One approach would be a taxable mandatory required distribution following any year when the size of the account exceeds the limit (but with no extra penalty for withdrawals before age 59½).

Figure 2. *Estimates of Total Tax Expenditure for Defined Contribution Plans when Capping Deduction at $10,000 with Changes in Tax Rate, 2020 (Billions of Dollars)*
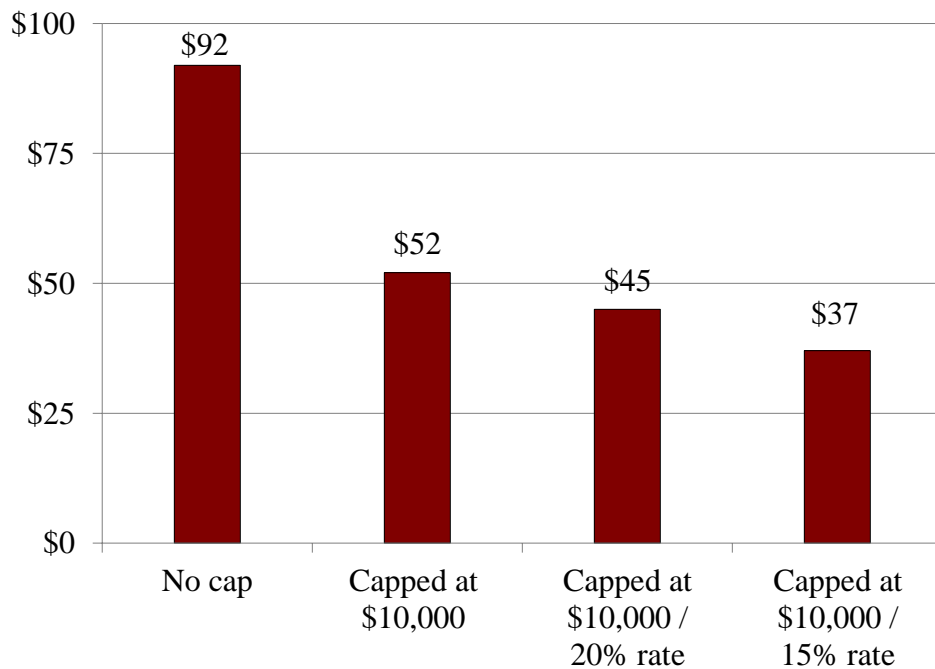
Note: The calculations are based on an all-bond portfolio, an average contributor age of 40, and a constant tax rate before and after retirement.
Source: Authors' estimates.

Another approach to reducing the tax expenditure is to allow an immediate deduction for the initial contribution but tax the "inside buildup."[40] The original contribution would also be taxed in retirement at the 25-percent rate. Taxing earnings each year produces $34 billion in savings (see Figure 3). The reduction in tax expenditures from taxing the inside buildup is modest because the return on the all-bond portfolio is modest.

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[40] This approach is used in Denmark, Greece, Italy, and Sweden (see OECD 2022).

Figure 3. *Estimates of Total Tax Expenditures for Defined Contribution Plans When Taxing the Inside Buildup and Untaxed Withdrawals at 25 Percent, 2020 (Billions of Dollars)*
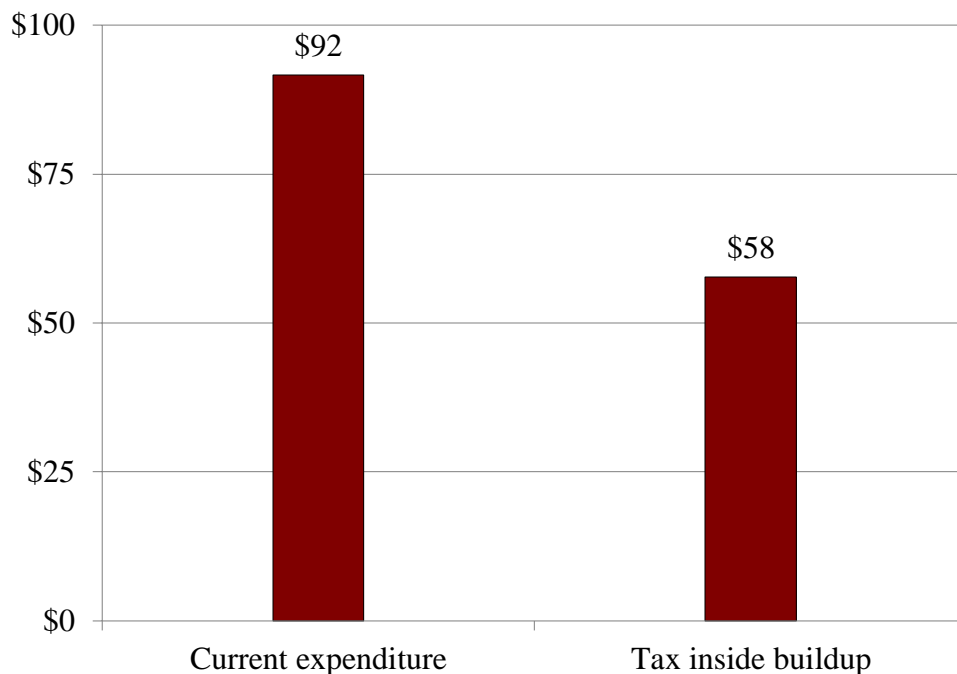

Note: The calculations are based on an all-bond portfolio, an average contributor age of 40, and a constant tax rate before and after retirement.
Source: Authors' estimates.

While numerous options exist for cutting back on the current level of tax expenditures in DC plans, these plans account for only two-thirds of retirement-related tax expenditures. Comparable changes would be required for DB plans and other arrangements.[41]

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[41] To completely eliminate the tax expenditure for DB plans would require including employer and employee contributions and pension fund earnings in the income of individual participants. (Even this calculation is an imperfect measure in the increase in value of accrued benefits, because the ultimate increase depends on the future work pattern of the participant. The increase will be much larger for a worker who stays with their employer to 65 compared to the worker who switches jobs at 50.) A less cumbersome approach would be to levy the tax at the fund level (see Munnell 1991). One problem, of course, is that of those covered by DB plans, a majority are covered by state and local plans, which raises constitutional problems in terms of the ability to tax. Mechanisms would have to be devised to work around constitutional constraints. One possibility would be to enact an alternative tax whereby contributions and earnings would be attributed to individual employees and taxed at a rate greater than if the tax were not paid at the fund level. If some partial elimination of the tax expenditure – limiting the contributions or taxing inside buildup – were adopted for DC plans, comparable changes would have to be made for DB plans to avoid a wholesale shift in plan type to retain the tax advantages.

Applying the Tax Savings to Social Security

The *2023 Social Security Trustees Report* projects that, over the next 75 years, Social Security faces an actuarial deficit of 1.3 percent of gross domestic product.[42] Over the same period, the Congressional Budget Office estimates a larger shortfall of 1.7 percent of GDP.[43] Both groups project that Social Security's combined trust funds will be exhausted in the early to mid-2030s, an event that without increased revenues will trigger reductions to retirement, disability and survivors benefits. As discussed, the U.S. Treasury estimated in 2020 that, in net present value, the retirement tax expenditure reduced income tax revenue by an amount equal to 0.9 percent of GDP, and the CBO's estimate for 2019 was similar. In addition, including the effects of foregone payroll tax revenues would bring the total up to 1.3 percent of GDP, according to the CBO.[44] Thus, rollbacks of the ineffective retirement saving tax preference could fill a substantial portion of Social Security's long-term funding gap.

In the shorter term, the revenue gains from eliminating or reducing the retirement tax preference would exceed the net present value figures estimated by Treasury and the CBO, because even if the tax preference were immediately eliminated today, the federal government would continue to collect income taxes on retirement plan benefits that were subject to the tax preference at the time the contributions were made. Specifically, in 2020 public and private retirement plans paid out benefits and withdrawals equal to $1.5 trillion.[45] If these were taxed at a 20-percent rate, the federal government would collect revenues of $300 billion. Similarly, taxable distributions from IRAs paid to Americans 65 and over in 2020 were equal to $212 billion, which at a 20-percent assumed tax rate would yield an additional $42 billion in revenues.[46] Together, these would generate federal revenues nearly twice the net present value cost of the retirement tax preference for 2020. Over time, as the new tax regime matured, increased revenues would decline to a steady state that more closely resembles the 2020 figure of $185 billion, adjusted for the expected growth of retirement contributions over time.

For context, Social Security in 2020 faced a cash flow deficit of about $65 billion, which was made up via the redemption of bonds held in the program's trust funds.[47] But by 2035,

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[42] U.S. Social Security Administration (2023b).
[43] Congressional Budget Office (2023).
[44] Congressional Budget Office (2021).
[45] U.S. Department of Commerce (2021).
[46] Internal Revenue Service (2023).
[47] U.S. Social Security Administration (2021).

when the trust funds are projected to be exhausted, annual deficits will reach $379 billion in 2023 dollars, with increasing shortfalls in following years.[48]

Reallocating the proceeds from eliminating or reducing the retirement tax expenditure to Social Security could help Democrats and Republicans bridge the decades-long divide over whether to maintain Social Security's solvency by raising taxes or reducing benefits. Redirecting the tax expenditure to Social Security would reallocate existing federal resources that do not significantly improve retirement income security to a program that indisputably does. The front-loaded nature of savings from reducing the tax expenditure also could provide time for other changes to Social Security to be phased in. Finally, linking reductions to the tax expenditure to maintaining Social Security's solvency could overcome the legislative inertia that has for years delayed action on Social Security reform.

Conclusion

Tax expenditures for employer-sponsored retirement plans are expensive – costing about $185 billion in 2020. And, strikingly, they appear to be a very bad deal for taxpayers. The current tax preferences primarily benefit high earners, and the tax expenditure has failed at its broader policy goals of increasing national saving or expanding plan coverage. Therefore, the case is strong for curtailing these tax breaks.

To reduce retirement tax expenditures, the government could limit contributions or accumulations in tax-favored plans or tax the earnings on these plans each year. While reducing these tax incentives could, perhaps, somewhat reduce interest in offering work-based savings plans, alternative arrangements could be made to ensure that *all* workers have an organized way to save for retirement.

Ultimately, reducing tax expenditures for retirement plans could be an effective way to help address other pressing demands on the federal budget, such as Social Security's financing shortfall.

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[48] U.S. Social Security Administration (2023b).

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Appendix Table A1. *Present Value Estimate of Tax Expenditures Attributable to Retirement Plans, 2000-2022 (Billions of Dollars)*

Year	Plan type						Total
	Defined Benefit	Defined Contribution	Traditional IRA	Roth IRA	Non-deductible IRA	Self-employed	
2000	$121.1	--	$5.9	--	--	$4.3	$131.4
2001	97.3	$70.0	6.1	--	--	9.8	183.1
2002	90.6	81.0	10.7	--	--	9.3	191.5
2003	102.5	81.6	11.0	--	--	9.5	204.6
2004	85.0	82.4	3.5	--	--	3.0	173.9
2005	81.2	102.6	4.5	$8.2	$0.4	3.2	200.0
2006	75.7	110.0	4.1	8.4	0.4	7.6	206.2
2007	74.1	121.0	4.3	9.2	0.5	8.6	217.7
2008	71.3	132.0	4.9	0.5	9.2	8.3	226.2
2009	74.3	113.0	4.0	11.2	0.5	6.3	209.3
2010	73.8	134.0	3.8	11.3	0.5	5.7	229.2
2011	82.9	89.2	1.3	3.6	0.1	3.4	180.5
2012	92.6	64.2	1.0	3.2	0.1	2.5	163.6
2013	21.9	66.6	1.7	3.4	0.2	3.2	96.9
2014	22.3	69.0	1.5	4.1	0.3	4.2	101.3
2015	25.0	67.2	1.4	4.7	0.4	5.0	103.6
2016	30.5	72.1	1.4	4.5	0.5	5.1	114.1
2017	29.7	79.3	1.6	5.3	0.5	5.5	121.9
2018	41.9	88.8	1.8	4.8	0.6	5.6	143.5
2019	36.3	95.1	2.3	5.2	0.6	6.0	145.4
2020	46.0	120.6	2.9	6.6	0.8	7.6	184.6
2021	48.1	119.1	2.9	8.1	0.7	7.7	186.6
2022	81.1	184.6	2.4	0.4	0.4	7.7	276.5

Note: From 2000-2011, DC is 401(k) contributions and DB is pension contributions. From 2000-2009, self-employed plans are Keogh plans.
Source: Office of Management and Budget (2001-2023).

Appendix Table A2. *Private Sector Retirement Plan Contributions, 2000-2020 (Billions of Dollars)*

Year	Defined Benefit plan contributions				Defined Contribution plan contributions				Total (DC+DB)
	Employer	Employee	Other	Total (DB)	Employer	Employee	Other	Total (DC)	
2000	$32	$1	$0	$33	$74	$110	$15	$199	$232
2001	47.5	0.6	1.6	49.7	75.8	115.2	13.0	204.0	253.8
2002	83.5	0.7	4.9	89.2	78.5	118.4	12.8	209.7	298.9
2003	117.2	0.8	0.4	118.4	79.9	119.0	13.1	212.1	330.5
2004	92.8	0.8	0.8	94.4	84.9	129.3	14.4	228.6	323.0
2005	89.8	0.8	2.1	92.7	92.8	139.9	16.1	248.8	341.5
2006	88.4	0.9	0.5	89.8	101.2	156.2	19.4	276.8	366.6
2007	67.1	0.8	0.4	68.3	110.0	168.1	21.7	299.8	368.1
2008	104.0	1.0	2.3	107.3	120.3	172.6	18.9	311.8	419.0
2009	112.1	1.0	1.8	114.8	110.5	172.2	15.9	298.7	413.5
2010	127.4	0.8	2.9	131.1	118.1	175.8	20.4	314.3	445.3
2011	133.8	0.9	0.5	135.2	122.1	185.8	22.4	330.2	465.4
2012	127.0	0.7	0.8	128.4	129.1	196.7	26.9	352.8	481.2
2013	112.6	0.6	0.4	113.7	137.0	208.7	31.3	376.9	490.6
2014	96.8	0.6	0.4	97.9	144.9	221.4	37.2	403.5	501.4
2015	106.0	0.9	1.7	108.6	153.2	239.3	42.2	434.6	543.2
2016	124.1	0.7	0.6	125.5	161.4	251.8	45.8	459.0	584.4
2017	156.9	0.6	1.5	159.0	171.5	267.9	53.2	492.7	651.7
2018	97.3	0.7	0.5	98.4	183.1	291.1	57.7	531.9	630.3
2019	100.7	0.6	1.3	102.6	194.4	313.9	61.9	570.2	672.8
2020	105.4	0.6	2.2	108.2	196.0	330.4	59.5	586.0	694.2

Source: U.S. Department of Labor, *Form 5500 Bulletin* (2002-2022).

Appendix Table A3. *Federal Government Plan Contributions, 2000-2022 (Billions of Dollars)*

Year	Civil service retirement plan contributions				Thrift Savings Plan contributions			Total
	Employer	Employee	Special[a]	Total (DB)	Employer	Employee	Total (DC)	(DC+DB)
2000	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--
2002	--	--	--	--	--	--	--	--
2003	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	--
2005	--	--	--	--	--	--	--	--
2006	--	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--	--
2009	--	--	--	--	$6.3	$16.4	$22.7	--
2010	--	--	--	--	7.0	17.5	24.5	--
2011	$23.8	$3.5	$31.3	$58.7	7.4	17.9	25.2	$83.9
2012	24.5	3.3	33.1	60.8	7.6	18.0	25.6	86.4
2013	24.6	3.1	33.5	61.2	7.6	18.1	25.7	86.9
2014	24.7	3.0	35.0	62.8	7.9	18.5	26.4	89.2
2015	28.0	3.2	36.8	68.1	8.3	19.5	27.8	95.9
2016	29.8	3.5	36.0	69.3	8.6	20.0	28.6	97.9
2017	33.3	3.7	41.3	78.4	9.0	20.9	29.8	108.2
2018	33.3	4.1	42.3	79.7	9.7	22.2	31.9	111.5
2019	34.4	4.4	43.7	82.5	10.3	23.3	33.6	116.1
2020	41.2	4.8	45.9	91.9	11.1	25.3	36.4	128.3
2021	45.4	5.2	46.1	96.7	11.8	27.5	39.3	136.0
2022	50.0	5.7	46.4	102.1	12.3	27.9	40.3	142.4

[a] Special Contribution. The combined 14.0 percent of pay does not cover the service cost of a CSRS benefit. To lessen the shortfall, the Fund receives an annual contribution from the U.S. Treasury that includes amounts that (a) amortize, over a 30-year period, increases in the actuarial present value of accumulated plan benefits resulting from new or liberalized benefits, increases in pay, or extension of coverage to new employee groups; (b) pays 5.0 percent interest on the unfunded portion of the actuarial present value of the static actuarial liability; and (c) reimburses the Fund for the cost of benefits attributable to military service credit and certain survivor annuities.
Sources: TSP Financial Statements (2010-2022); and CSRDF Annual Reports (2012-2022).

Appendix Table A4. *State and Local Government Retirement Plan Contributions, 2000-2023 (Billions of Dollars)*

| Year | Defined Benefit plan contributions | | |
	Employee	Government	Total (DB)
2000	$25	$40	$65
2001	26.4	38.8	65.3
2002	27.7	39.5	67.2
2003	28.8	46.2	75.1
2004	30.8	61.0	91.8
2005	31.0	60.6	91.6
2006	32.7	64.5	97.2
2007	34.3	73.8	108.1
2008	37.2	82.4	119.6
2009	39.3	84.9	124.2
2010	39.3	86.5	125.8
2011	40.2	96.3	136.5
2012	42.9	100.6	143.4
2013	44.5	108.3	152.8
2014	45.3	119.9	165.2
2015	47.9	132.1	179.9
2016	51.0	139.6	190.6
2017	54.4	156.3	210.7
2018	55.3	162.3	217.6
2019	56.6	168.0	224.7
2020	57.8	181.0	238.8
2021	58.3	186.2	244.5
2022	61.9	221.4	283.3

Source: U.S. Census Bureau (2000-2022).

Appendix Table A5. *Maximum 401(k) Contribution Limits, 2000-2023*

Period	Employee contribution	Total contribution	Catch-up contribution	Percentage of salary	Annual compensation
2000	$10,500	$30,000	N/A	25%	$170,000
2001	10,500	35,000	N/A	25	170,000
2002	11,000	40,000	$1,000	100	200,000
2003	12,000	40,000	2,000	100	200,000
2004	13,000	41,000	3,000	100	205,000
2005	14,000	42,000	4,000	100	210,000
2006	15,000	44,000	5,000	100	220,000
2007	15,500	45,000	5,000	100	225,000
2008	15,500	46,000	5,000	100	230,000
2009-2011	16,500	49,000	5,500	100	245,000
2012	17,000	50,000	5,500	100	250,000
2013	17,500	51,000	5,500	100	255,000
2014	17,500	52,000	5,500	100	260,000
2015-2016	18,000	53,000	6,000	100	265,000
2017	18,000	54,000	6,000	100	270,000
2018	18,500	55,000	6,000	100	275,000
2019	19,000	56,000	6,000	100	280,000
2020	19,500	57,000	6,500	100	285,000
2021	19,500	58,000	6,500	100	290,000
2022	20,500	61,000	6,500	100	305,000
2023	22,500	66,000	7,500	100	330,000

Notes: People ages 50 and older have an increased total contribution limit by the amount of the catch-up contribution. For example, in 2023, people ages 50+ have a total contribution limit of $66,000 + $7,500 = $73,500. The total contribution limit is the lesser of the maximum set by the tax code or 100 percent of an employee's salary (see Munnell and Sundén (2005). The total contribution limit since 2002 has been 20 percent of the annual compensation limit, which is adjusted each year for increases in the cost of living.
Sources: Urban-Brookings Tax Policy Center (2017); and Internal Revenue Service (2018-2023).

Appendix Table A6. *Percentage of DC Plan Contributions Exceeding Certain Thresholds, 2019*

	Individual Level	Household Level
Contributions in excess of:		
$10,000	43.7%	51.0%
$20,000	24.2	30.8
Contributions from participants with balances in excess of:		
$500,000+	27.6	35.1
$1,000,000+	14.4	19.4

Source: Survey of Consumer Finances (2019).

Appendix B: A Model for Estimating Defined Contribution Tax Expenditures

Estimating the present value of tax expenditures attributable to traditional defined contribution plans (as opposed to Roth plans) involves calculating the difference between: 1) the present value of the revenue if assets in retirement plans were taxed as they accrue over the employee's working life; and 2) the present value of the taxes collected under current law, when the employee receives benefits in retirement. For this calculation, assumptions are needed for contribution amounts, income tax rates, capital gains tax rates, investment returns, the investment horizon, and the government's discount rate, which are denoted as:

(i)
$c = contributions$
$t_i = income\ tax\ rate$
$t_c = capital\ gains\ tax\ rate$
$r = annual\ rate\ of\ investment\ return$
$n = number\ of\ years\ assets\ are\ invested$
$d = government\ discount\ rate$

Model for a Constant Tax Rate

The constant tax rate model assumes plan contributors have the same income tax rate when they start contributing to their defined contribution plan as they do when they are making withdrawals from their plan. The first step is to calculate the present value of the taxes that would be collected given no tax preference for saving in defined contribution plans.

$$(ii)\quad PDVC_{savings\ account} = c\ \times\ t_i\ + \left[\frac{1}{(1+d)^n}\ \times\ c(1 - t_i)\ \times\ \left[(1+r)^n - \left(1 + r(1 - t_c)\right)^n \right] \right]$$

For simplicity the calculation is labeled "savings account" since it is taxed like one. Formula (ii) taxes the contributions (c) upfront at the income tax rate (t_i). For investment earnings, it takes the difference between the pre- and post-tax investment earnings assuming earnings are taxed in each period. Finally, it discounts the total taxes attributable to the investment earnings at rate (d) and adds them to the upfront tax. The result is the tax revenue attributable to a "savings account" over period (n).

The second step is to calculate the present value of tax revenues from defined contribution plans given the tax preference:

$$(iii)\quad PDVC_{tax\ preferred\ account} = \frac{c(1+r)^n}{(1+d)^n}\ \times\ t_i$$

Formula (iii) grows the contributions (c) at rate (r), then taxes the contributions and earnings at the income tax rate (t_i) in the last period (n), and finally discounts the taxes back to the present at rate (d). The tax expenditure is the difference between the present value of taxes attributable to the "savings account" and the present value of taxes attributable to the "tax-preferred account."

$(iv) = (ii) - (iii)$

$$= PDVC_{te} = [c \times t_i] - \left[\frac{c(1+r)^n}{(1+d)^n} \times t_i \right] + \left[\frac{1}{(1+d)^n} \times c(1-t_i) \times \left[(1+r)^n - (1+r(1-t_c))^n \right] \right]$$

When the discount rate is set equal to the investment return $(d = r)$, the result is:

$(v) \quad PDVC_{te\ B\&AS} = \dfrac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - (1+r(1-t_c))^n \right]$

Formula (v) yields the tax expenditure for accounts with assets taxed annually – that is bonds or stocks traded annually. Since the income from bonds is usually taxed at income tax rates, the only adjustment needed to make Formula (v) apply to bonds is letting the capital gains tax rate equal the income tax rate $(t_c = t_i)$. In contrast, for the "savings account," a buy-and-hold stock strategy only taxes capital gains at the capital gains tax rate (t_c) in the last period (n). The formula for the "tax-preferred account" remains unchanged. The new formula for the "savings account" is:

$(vi) \quad PDVC_{savings\ account\ BHS} = c \times t_i + \left[\dfrac{1}{(1+d)^n} \times c(1-t_i) \times \left[(1+r)^n - 1 \right] t_c \right]$

$(vii) \quad PDVC_{tax\ preferred\ account\ BHS} = \dfrac{c(1+r)^n}{(1+d)^n} \times t_i$

The tax expenditure formula for a buy-and-hold stock strategy is formula (vi) minus formula (vii):

$(viii) = (vi) - (vii)$

$$= PDVC_{te\ BHS} = [c \times t_i] - \left[\frac{c(1+r)^n}{(1+d)^n} \times t_i \right] + \left[\frac{1}{(1+d)^n} \times c(1-t_i) \times \left[(1+r)^n - 1 \right] t_c \right]$$

When the discount rate is set equal to the investment return $(d = r)$, the result is:

$(ix) \quad PDVC_{te\ BHS} = \dfrac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - 1 \right] t_c$

The constant tax rate assumption yields three primary results for computing tax expenditures:

Formula for a bond portfolio:

(x) $PDVC_{te\,B} = \dfrac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - (1+r(1-t_i))^n\right]$

Formula for an actively traded stock portfolio:

(xi) $PDVC_{te\,AS} = \dfrac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - (1+r(1-t_c))^n\right]$

Formula for a buy-and-hold stock portfolio:

(xii) $PDVC_{te\,BHS} = \dfrac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - 1\right]t_c$

Model for a Decreasing Tax Rate

The decreasing tax rate model requires three new variables: the number of years at the lower tax rate (g), the lower tax rate $(t_{i,f})$, and the higher tax rate $(t_{i,s})$. The additional savings on the contributions are added back to the formulas to account for the up-front tax being higher. The decreasing tax rate assumption yields three primary results for computing tax expenditures:

Formula for a bond portfolio:

(xiii) $PDVD_{te\,B} = c(t_{i,s} - t_{i,f}) + \dfrac{1}{(1+r)^n} \times c(1-t_{i,s}) \times \left[(1+r)^n - \left(1+r(1-t_{i,s})\right)^{n-g}\left(1+r(1-t_{i,f})\right)^g\right]$

Formula for an actively traded stock portfolio:

(xiv) $PDVD_{te\,AS} = c(t_{i,s} - t_{i,f}) + \dfrac{1}{(1+r)^n} \times c(1-t_{i,s}) \times \left[(1+r)^n - (1+r(1-t_c))^n\right]$

Formula for a buy-and-hold stock portfolio:

(xv) $PPVD_{te\,BHS} = c(t_{i,s} - t_{i,f}) + \left[\dfrac{1}{(1+r)^n} \times c(1-t_{i,s}) \times \left[(1+r)^n - 1\right]t_c\right]$

Weighting the Constant and Decreasing Tax Rate Models

To construct a portfolio of stocks and bonds, the formulas must be weighted using assumptions about asset allocation at the time of the contribution. For example, the tax expenditures attributable to the 70-percent equities/30-percent bond portfolio presented in Table 6 are constructed using weights. Since gains are taxed only when realized, we assume that 50 percent of the capital gains are realized and taxed annually and 50 percent are held until age 80 and taxed at 25 percent upon withdrawal. We assume bonds and stocks return 2.5 percent and 6.5 percent annually, respectively. The 6.5-percent stock return is assumed to be composed of a 2.5-percent dividend return and a 4-percent capital gains return. The 2.5 percent (the portion of the stock return from dividends) and 2 percent (50 percent of the 4-percent capital gains portion

of the stock return from actively traded stocks) are added together and divided by the total stock return of 6.5 percent to create a portfolio weight for the annually taxed portion. We then calculate tax expenditures for an all-bond portfolio, an actively traded stock portfolio, and a passive stock portfolio. The tax expenditures for the 70-percent equities/30-percent bond portfolio are calculated by taking 30 percent of the all-bond portfolio tax expenditure, 48.5 percent $\left[\left(\frac{4.5}{6.5}\right) \times .70\right]$ of the actively traded stock portfolio, and 21.5 percent $\left[\left(\frac{2}{6.5}\right) \times .70\right]$ of the passive stock portfolio. The result is a tax expenditure for a 70/30 portfolio such that dividends are taxed annually and half of capital gains are taxed annually.

Model for Taxing the Inside Buildup

This model assumes a constant tax rate and an all-bond portfolio. Earnings are taxed annually, in the same way as earnings in a "savings account." Contributions are taxed at the end of the last period (n). The new formulas are:

$$(xvi) \ PDVBU_{savings\ account} = c \times t_i + \left[\frac{1}{(1+d)^n} \times c(1-t_i) \times \left[(1+r)^n - \left(1+r(1-t_i)\right)^n\right]\right]$$

$$(xvii) \ PDVBU_{tax\ preferred\ account} = \frac{c}{(1+d)^n}t_i + \left[\frac{1}{(1+d)^n} \times c \times \left[(1+r)^n - \left(1+r(1-t_i)\right)^n\right]\right]$$

When the discount rate is set equal to the investment return $(d = r)$, the result is:

$$(xviii) = (xvi) - (xvii)$$
$$= PDVBU_{te\ B}$$
$$= c \times t_i + \frac{1}{(1+r)^n} \times c(1-t_i) \times \left[(1+r)^n - \left(1+r(1-t_i)\right)^n\right]$$
$$- \left[\frac{c}{(1+r)^n}t_i + \frac{1}{(1+r)^n} \times c \times \left[(1+r)^n - \left(1+r(1-t_i)\right)^n\right]\right]$$

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