CAMBRIDGE
UNIVERSITY PRESS

ARTICLE

How to pay for Social Security's Missing Trust Fund?

Alicia H. Munnell[1], Wenliang Hou[1]* and Geoffrey T. Sanzenbacher[2]

[1]Boston College, Center for Retirement Research, 140 Commonwealth Avenue, Hovey House, Chestnut Hill, Massachusetts, USA and [2]Department of Economics, Boston College, 140 Commonwealth Avenue, Chestnut Hill, Massachusetts, USA
*Corresponding author. Email: Houw@bc.edu

Abstract

Decisions made early in Social Security's history resulted in benefits in excess of contributions for early cohorts. This approach gave away the Trust Fund and the resulting interest that could have accumulated, which has increased the size of the payroll tax required to finance the program. This paper finds that, for the Old-Age and Survivors portion of Social Security, the Missing Trust Fund of $29.5 trillion is driven by the excess benefits given to early cohorts. Should tax increases be considered to improve the program's finances, a broad tax – such as the income tax – could be appropriate since these early payments benefitted all of society.

1. Introduction

According to the *2019 Social Security Trustees Report*, Social Security's Old-Age and Survivors Insurance (OASI) Trust Fund is projected to run out in 2034. The gap between the program's income and costs can be closed by decreasing benefits, increasing revenue, or some combination of both. By definition, the burden of decreased benefits falls on Social Security's beneficiaries. But, revenue increases could be structured in ways that fall only on program participants – through the payroll tax – or more broadly, e.g., through the income tax. Therefore, if policymakers want to consider raising program revenues as part of a package to improve Social Security's finances, then they face a choice as to how to do it – concentrated on program participants only or spread across the economy. Understanding why Social Security requires a higher payroll tax to provide a given level of benefits than a funded program is a crucial first step in informing this discussion.

This paper will show that the current 'pay-as-you-go' approach is the result of policy decisions made decades ago that led to benefits far in excess of total lifetime contributions for early cohorts of workers. Due to this decision, the nation essentially gave away the Trust Fund that would have accumulated and, importantly, the interest on those contributions. This paper addresses the size and implications of this 'Missing Trust Fund' to inform discussions around raising program revenue. Throughout the paper, the discussion is limited to the implications of the Missing Trust Fund on the funding of the Social Security program itself. This focus means that the paper ignores the effect on the real capital stock of having a pay-as-you-go retirement system, and more broadly on the macroeconomy.[1]

The contribution of this paper is two-fold. The first contribution is to quantify the 'Missing Trust Fund' and break it down into two portions: (1) the portion due to early beneficiaries who contributed little to the program – the so-called 'Legacy Debt' – and (2) the portion due to those who contributed

---

[1]For an excellent discussion of these issues and citations to other relevant work, see Leimer (2016).

for their whole careers but received more in benefits. This paper is not the first to quantify the Legacy Debt. However, these papers are either dated (Leimer, 1994; Geanakoplos *et al.*, 1998, 1999, 2000; Diamond and Orszag, 2005; Leimer, 2007), or rely on somewhat outdated data (Leimer, 2016). Because the Trustees Report does not contain estimates of the Legacy Debt, this update offers a valuable way to inform discussions of improving program finances. The second contribution of the paper is to discuss how various methods of putting the program on firm financial footing reflect the realities of the Missing Trust Fund and the Legacy Debt and to quantify the distributional effects.

The discussion proceeds as follows. The first section reviews the literature and history of the Missing Trust Fund and discusses how it relates to the concept of Legacy Debt. The second section provides estimates of both the Missing Trust Fund and the Legacy Debt that can be easily updated each time the *Social Security Trustees Report* comes out. The third section lays out alternative paths forward – namely, either putting Social Security on firm financial footing by increasing taxes permanently but maintaining a balanced pay-as-you-go system or increasing taxes by a higher amount temporarily to get to a fully funded system with lower long-term costs. This section also discusses three alternatives for raising taxes – increasing the payroll tax rate alone; increasing the payroll tax rate along with eliminating the payroll tax cap; or increasing the income tax. The fourth section explores the distributional and welfare implications of the various approaches. The final section concludes that the distributional impacts and political implications of using the income tax to cover the 'missing interest' merit society-wide discussion, since the need for future beneficiaries to contribute more to the program is the result of past decisions that benefitted the whole of society.

2. The origins and nature of the Missing Trust Fund

In general, Social Security has existed without a sizable Trust Fund. The primary reason goes back to decisions made early in the program's history. In particular, three decisions are worth noting.[2] The first decision relates to the benefit formula. Under the 1935 Social Security Act, benefits were based on *cumulative* covered earnings. Under such a design, early program participants would have been guaranteed only a very small payment from Social Security, since most of their earnings would have taken place before its existence. However, this benefit formula never became operational, because the 1939 Amendments made benefits based on *average* earnings before any actual payouts. This change meant that people working only a few years under the program could get much larger benefits, well in excess of what they paid in. Under a cumulative benefit formula, the Trust Fund likely would have been built up by the contributions from the first group of full-career participant, while early participants collected only small benefits.

The second decision that inhibited the buildup of the Trust Fund was that the 1939 Amendments also created dependent and survivor benefits. The original law only provided a benefit to the retired worker.

The third decision was a pushback of originally scheduled payroll tax increases. Under the original law, payroll taxes were supposed to be 6% of payroll by 1950 – instead, they were just 3% in that year. Indeed, even 6% would likely have not been high enough, since contemporaneous estimates in 1939 suggested that a payroll tax of 6.6% was required to keep the program in balance.[3] In any case, the combination of these three decisions prevented the buildup of a large Trust Fund. In fact, the prevention of such a buildup was one of the goals of these decisions. Some lawmakers feared that the government would not truly 'save' the money, and would instead use it to finance other government programs.[4]

Whatever the motivation, the beneficiaries received more than they put into the program and this 'excess' amount (which includes interest) is often referred to as the Legacy Debt.[5] The size of the

---

[2]Much of the discussion in the following two paragraphs comes from Martin and Weaver (2005) and DeWitt (2007).

[3]DeWitt (2007). The length of time considered in the calculation (e.g., whether the calculation was for the standard 75-year span) was not provided.

[4]In particular, Martin and Weaver (2005) note Senator Arthur Vandenberg (R-MI) as a proponent of this view.

[5]Whether the Legacy Debt exists in real terms, i.e., whether it has resulted in future generations having less income or a lower capital stock, is unclear because the transfers to earlier generations could have generated extra economic activity that

Legacy Debt varies based on the birth cohorts used in the calculation – for example, Leimer (2016) estimates a Legacy Debt of $24.4 trillion as of 2014 for birth cohorts born through 1931 and $20.9 trillion for those born through 1949. The lower number through 1949 reflects the fact that cohorts born between 1932 and 1949 are expected to make positive net transfers to the program under current law. Estimates of the Legacy Debt also change with time as the interest that would have accrued on the early cohorts' contributions to the Trust Fund grows. For example, Leimer (2007) found lower Legacy Debt estimates of $13.0 and $11.2 trillion through the 1931 and 1949 birth cohorts respectively, as of 2001; and the only difference between his 2007 and 2016 estimates is the accumulated interest.[6]

However, a Trust Fund has existed in the more recent history of the program, in the decades since the passage of the Social Security Amendments of 1983. At the time of their passage, these amendments were designed to address an immediate shortfall in the program – they were passed in April 1983 and revenue would have been unable to cover benefits as soon as July 1983. Among other changes, the amendments accelerated a scheduled increase in the Social Security payroll tax and reduced future benefits through increases in the Full Retirement Age.

In the decades following these changes, income from payroll taxes exceeded the costs of the program – including for the 1932–1949 birth cohorts mentioned above – and a modest Trust Fund was accumulated. This reserve is available if income (including interest from the growing Trust Fund) falls short of costs. According to the 2019 Trustees Report, this point was expected to be reached in 2020, which means that the accumulated Trust Fund will begin to be drawn down to allow the payment of full benefits. In 2034, the Trust Fund is estimated to be depleted and the pay-as-you-go nature of the program will take over. Given the current payroll tax, the money coming into the program will not be enough to pay out full benefits, requiring an across-the-board reduction in benefits absent any policy changes. In any case, the Trust Fund that built up in the wake of the 1983 amendments was still much smaller than would have existed without early program decisions – a large portion of it was still missing.

So, how to measure the Missing Trust Fund? One implication of the above discussion is that the Legacy Debt is not identical to the Missing Trust Fund, because later birth cohorts can replace some of that missing fund if they contribute more into the program than they are projected to receive (as did those born between 1932 and 1949). Or, they can add to the deficit. A concept that reflects these later additions or subtractions is the 'Closed Group Unfunded Obligation,' calculated each year by Social Security's Office of the Chief Actuary.[7]

The Closed Group Unfunded Obligation equals the difference between the present value of projected program costs and the present value of projected contributions for all current participants minus the size of the existing Trust Fund. In other words, the Closed Group Unfunded Obligation is calculated in the same way as the Legacy Debt, but simply includes any birth cohort with individuals still under age 116 (the maximum age of life Social Security assumes) and over age 15.[8] The Closed Group Unfunded Obligation is our measure of the Missing Trust Fund, since it reflects the money that would need to be transferred to the Trust Fund to offset the entirety of the Legacy Debt plus (or minus) the amounts for any subsequent birth cohorts where the present value of benefits paid exceeded (or fell short of) that cohort's contributions.[9]

---

offsets the debt. Leimer (2016) provides a discussion of this issue, but as noted above, this current paper is strictly focused on the implications of the Legacy Debt as an actuarial construct on the program's finances.

[6]Other estimates are available in Leimer (1994), Geanakoplos *et al.* (1998, 1999, 2000), and Diamond and Orszag (2005).

[7]The most recent estimate from Nickerson and Burkhalter (2019) is $35.2 trillion for the OASDI program. Nickerson and Burkhalter do not provide estimates separately for OASI only.

[8]In practice, the Closed Group Unfunded Obligation reported by the Social Security Administration also includes Trust Fund components other than contributions and benefits, such as administrative costs, whereas Legacy Debt calculations typically do not. Also, even though cohorts born before 1900 are not explicitly included in the calculation of the Closed Group Unfunded Obligation, their net receipt from the program shows up through the fact that the Trust Fund is smaller than it would be otherwise.

[9]The Open Group Unfunded Obligation is a related measure and includes the projected gap between benefits and payments for all future workers as well. Due to increasing life expectancies without a corresponding increase in the Full Retirement Age, this measure is slightly higher than the Closed Group Unfunded Obligation. This paper focuses on the

The simplest way to see the implications of Social Security's Missing Trust Fund is to consider the contribution rate required to finance Social Security retirement benefits under a funded retirement plan compared to a pay-as-you-go system (this paper excludes discussion of Disability Insurance (DI)). Under a stylized model of a funded retirement system, with the Social Security Trustees' intermediate assumptions on mortality and on the real interest rate (2.5%), to achieve a replacement rate of approximately 36% (the projected Social Security replacement rate for the average earner claiming at age 65 once the Full Retirement Age equals age 67), the typical worker would have to contribute about 10.6% of earnings.[10] Under a pay-as-you go system with a projected ratio of about two workers for each retiree and annual real wage growth of 1.2%, a 36% replacement rate would require a contribution rate of roughly 14%.[11] The resulting difference in the required payroll tax in these two stylized models is due to the presence of assets that can pay interest in a fully funded system, but that is 'missing' in the current system.

3. Creating an easily updated tool for the Legacy Debt and the Missing Trust Fund

The two components of the Missing Trust Fund – the Legacy Debt and the net transfers by more recent cohorts – can be linked through a 'tool' to illustrate the role that the Legacy Debt plays in today's Missing Trust Fund. The output of this tool can be easily updated each time a *Social Security Trustees Report* is released and can serve as the basis for a discussion of various approaches for improving Social Security's finances with a clear view of the financial shortfall's origin.

For each birth cohort, the tool requires two values: (1) the net present value of the cohort's contributions to Social Security through the payroll tax; and (2) the net present value of the cohort's Social Security benefits. Social Security provides projections of both contributions and benefits paid, but it does not provide these data by birth cohort. Cohort data could be calculated with individual data on earnings and benefits paid, but that information is difficult to access and thus hard to use to update calculations regularly. Furthermore, even if the actual individual-level data were available, estimates of any Missing Trust Fund will change each year as the projected contributions and benefits of today's participants are updated. Given these difficulties, the sections below discuss how these quantities can be calculated from readily available data and projections.

3.1 Net present value of contributions

To calculate the net present value of a birth cohort's contributions, the starting point is Social Security's historical data and projections for payroll contributions.[12] The next step is to divide these contributions up among the relevant birth cohorts. This task is accomplished by using data on annual taxable earnings from the *Current Population Survey* (CPS) and calculating the share of total earnings in the sample due to individuals from each birth cohort. For example, in 1980, taxable payroll contributions to OASI were just over $103 billion. If in the 1980 CPS, 25-year-olds represented 2% of taxable payroll, then the 1955 birth cohort (1980 – 25) would be assigned contributions of $2.1 billion ($103.0 × 0.02). In this way, each birth cohort is assigned its estimated share of total contributions. For future contributions, the share of payroll coming from each age is held constant at the 2019 level with the level of payroll based on Social Security's projections. Figure 1 shows the estimated present value of
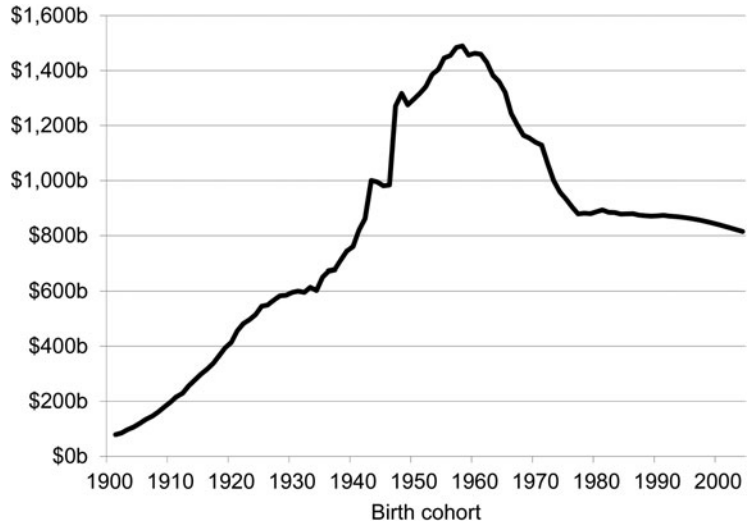

Figure 1. Present value of payroll tax contributions by birth cohort under current law, 2019 dollars. *Source*: 2019 Social Security Trustees Report; and authors' calculations.

payroll contributions by birth cohort.[13] Lifetime contributions were low for early program participants before ramping up for birth cohorts that spent the entirety of their working lives contributing.

3.2 Net present value of benefits

Calculating the net present value of benefits for a given cohort is slightly more complicated. Once again, the starting point is Social Security's historical data on benefits and its projections. The benefits of any one birth cohort are based on the aggregate difference in benefits paid from 1 year to the next.[14] If no new cohort entered the program, then the benefits paid would grow (or shrink) based on the original cohorts' cost-of-living adjustments and rate of mortality.[15] Any upward departure from this calculated trend would reflect the new benefits being paid to the entering birth cohort.[16] The next year, this process can be repeated for the next entering cohort. This iterative process requires a starting point where the contributions of a given birth cohort are known with certainty. For this starting point, we use the 1901 birth cohort for which Leimer (2007) had individual-level data. Figure 2 shows the estimated present value of benefits received by birth cohort.[17]

3.3 The current size and composition of the Missing Trust Fund

The discussion above makes clear that the data contained in Figures 1 and 2 can be differenced to calculate the net transfer for any given birth cohort. For example, the 1910 birth cohort made lifetime contributions with a net present value of about $196 billion (in 2019 dollars) but received benefits of about $1,200 billion. The result is a net transfer of about $1,004 billion.

---

[13]Appendix B offers more detail and a discussion of how these estimated contributions compare to those of Leimer (2007), who used individual-level historical data combined with *Trustees Report* projections.

[14]Historical benefits are available in Table VI.A.1 of the *2019 Social Security Trustees Report,* 'Operations of the OASI Trust Fund, Calendar Years 1937–2018.' Projections on benefits are available from Table IV.B.1 of the *2019 Social Security Trustees Report,* 'Annual Income Rates, Cost Rates, and Balances, Calendar Years 1990–2095.'

[15]This figure focuses on Social Security retiree and spousal benefits, and ignores auxiliary benefits to children.

[16]In practice, this calculation requires an assumption on claiming, which is assumed to occur at age 65. Because the actuarial adjustment is approximately fair at today's interest rate, this assumption is not critical. It is also worth noting that this approach implicitly incorporates immigration. A birth cohort that experienced growth due to immigration would have a bigger increase in benefits than a birth cohort with a similar native population but less immigration.

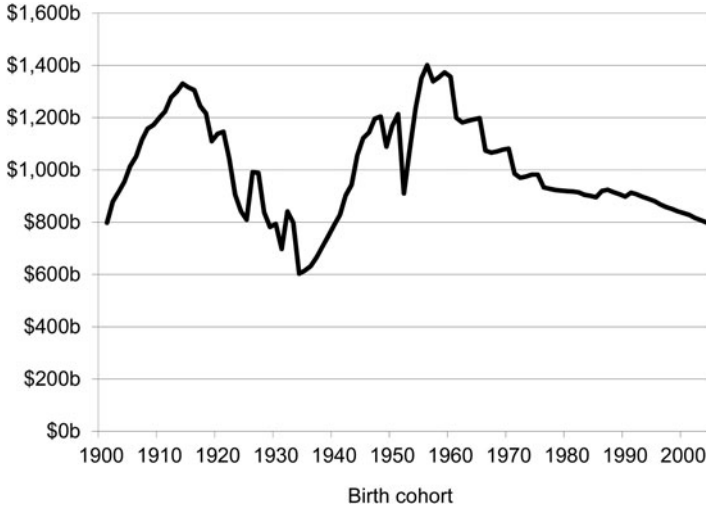[17]Appendix B offers more detail and a comparison to Leimer (2007).

Figure 2. Present value of benefits by birth cohorts under current law, 2019 dollars.
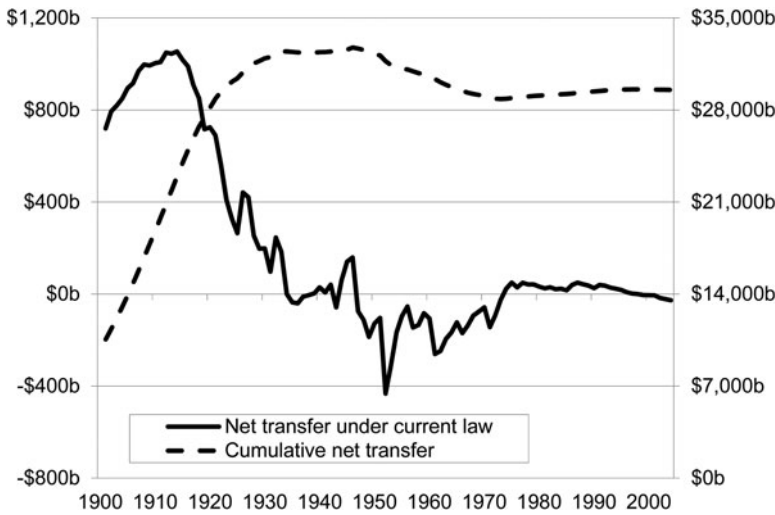*Source*: 2019 Social Security Trustees Report; and authors' calculations.

Figure 3. Net transfer and cumulative net transfer under current law by birth cohort, 2019 dollars.
Note: 'Cumulative net transfer' includes $9.8 trillion to pre-1901 birth cohorts.
Source: 2019 Social Security Trustees Report; and authors' calculations.

In turn, these net transfers can be added together to get estimates of the Legacy Debt Component of the Missing Trust Fund or of the Missing Trust Fund in its totality.[18] Figure 3 shows the net transfer (benefits minus contributions) for each birth cohort between 1901 and 2004 (the last birth cohort included in the closed group), as well as the cumulative sum of all of these net transfers.[19] The figure clearly illustrates that early birth cohorts received large positive transfers and that birth cohorts affected most by the 1983 Amendments are projected to receive negative net transfers, even under

---

[18]Excluding Trust Fund components aside from benefits and contributions, like administrative costs. In practice, these costs are quite low – they have been less than 2% of total OASI expenditures since 1970, and in 2019 were just 0.4% of those expenditures. See U.S. Social Security Administration (2020).

[19]Birth cohorts prior to 1901 contributed $9.8 trillion of negative, cumulative net transfers.

current law. For more recent birth cohorts, it is hard to read too much into the net transfers, since current revenues are inadequate to pay promised benefits over the next 75 years.

The major point is that, under current law, although more recent birth cohorts have tended to have negative or zero net transfers, these transfers have only offset a small portion of the Legacy Debt. By this paper's estimates, the Legacy Debt through 1934 for the OASI program stands at $32.4 trillion.[20] The net negative transfer experienced by the 1935–2004 birth cohorts under current law was just $2.9 trillion, leading to a Closed Group Unfunded Obligation of $29.5 trillion for the OASI program ($32.4 trillion−2.9 trillion). In other words, more than the entirety of the Missing Trust Fund is due to the 'Legacy Debt.'[21]

Before continuing, it is worth tying the concepts of Legacy Debt and the Missing Trust Fund reported here to the $43.2 trillion infinite-horizon financing gap reported in the 2019 Trustees Report. This $43.2 trillion differs from the $29.5 trillion Missing Trust Fund in two ways. First, it includes the DI portion of Social Security, whereas our estimates include only OASI. Second, and more importantly, it represents the infinite-horizon open-group unfunded obligation, which includes the balance of past and future net transfers. Unlike the closed-group, the open-group unfunded obligation includes birth cohorts yet to enter the program. Adding the future cohorts of participants increases the unfunded obligation, as these participants are projected to receive more in benefits than they contribute to the program, mostly because they are scheduled to live longer than current workers. Thus, the $43.2 trillion is higher than the closed-group unfunded liability, or as we label it, the Missing Trust Fund of $29.5 trillion.

In any case, this Missing Trust Fund makes the program more costly than it otherwise would be, as current participants are forced to contribute towards both benefits and the missing interest. How much it would cost to deal with this Missing Trust Fund is the subject of the next section.

4. Dealing with the Missing Trust Fund

Broadly, two ways exist to increase revenues to deal with Social Security's financial shortfall.[22] The first is simply to replace the missing interest, roughly holding constant the present value of the Missing Trust Fund going forward. To implement this approach, the revenue coming into the program would need to be increased permanently. Under a missing interest approach, future cohorts of participants would receive negative net transfers from the program due to the lack of interest in their own contributions accrue. However, some might argue that a negative transfer is fair because of the various forms of insurance Social Security provides (e.g., wage and longevity), which are not available from other assets people can buy on their own.

An alternative approach would be to increase taxes by a higher amount but only temporarily until a Trust Fund consistent with a fully-funded program is built up. This buildup could be accomplished over a short time horizon with a larger tax increase or over a longer period with a smaller tax increase. In any case, once this Trust Fund is built up, the accrued interest will allow a return to roughly today's level of the payroll tax, which – as discussed earlier – is consistent with a fully funded system given the current level of benefits. Birth cohorts who face the tax increase will receive negative net transfers from the program, but future cohorts will experience a lower-cost program due to the existence of a Trust Fund that generates interest on contributions.

Within these two broad approaches, alternatives exist for implementing the required tax increases. The most obvious way is simply to increase the payroll tax by the required amount, maintaining the

---

[20]Leimer (2007) found that the Legacy Debt of the OASI program hit a maximum at the 1931 birth cohort. The 1934 birth cohort was chosen in this paper as the last cohort included in the Legacy Debt calculation based on more recent data.

[21]Again, ignoring other Trust Fund components like administrative costs.

[22]As was stated in the introduction, while benefit reductions are another way to deal with the shortfall, by definition those fall on beneficiaries. The point of this paper is to focus on whether it is appropriate to place some of the burden of reducing the shortfall on the society writ large. Therefore, the paper focuses on revenue, which can be targeted narrowly on the wage base through the payroll tax or broadly on the income base through the income tax.

Table 1. Required percentage-point increases in taxes to finance Missing Trust Fund

	Payroll tax (%)	Eliminate cap (%)	Income tax (%)
Pay back interest only	3.4	2.8	2.2
Replace missing Trust Fund in:			
150 years	4.4	3.7	2.9
125 years	4.9	4.0	3.2
100 years	5.5	4.6	3.6
75 years	6.6	5.5	4.3

Source: 2019 Social Security Trustees Report; and authors' calculations.

2019 cap of $132,900 (adjusted annually for wage growth). A second approach is to combine a payroll tax increase with an expansion of the tax base by eliminating the payroll tax cap completely. (The calculations below assume that contributions made over the current cap do not generate benefits.) A third approach is to shift some reliance from the payroll tax to the income tax to reflect the fact that the Missing Trust Fund is a function of the policy decision to pay early beneficiaries more than they contributed. One could argue that these additional costs should not be borne solely by program beneficiaries, and could be borne both by individuals who earn their income from their labor as well those who earn it from other sources.

Table 1 shows how large these tax increases would have to be to pay for the missing interest or replace the Missing Trust Fund entirely over a time horizon of 75–150 years. The table makes clear that replacing the Missing Trust Fund requires a larger tax increase than does simply paying the missing interest and that expanding the tax base – either by taxing earnings over the cap or by using the income tax requires a smaller rate increase. For example, the required increase in the capped payroll tax is 3.4 percentage points to pay the missing interest indefinitely and 6.6 percentage points to replace the Missing Trust Fund in 75 years, compared to 2.8 and 5.5 percentage points, respectively, if the cap is eliminated. Expanding the tax base even further and using the income tax lowers these amounts to 2.2 percentage points and 4.3 percentage points, respectively.

An expansion of the income tax could be viewed as appropriate given that the lack of a sizable Trust Fund today is not due to the failure of today's beneficiaries to pay an appropriate amount for their own benefits. Instead, it results from society's decision in the 1930s. And, aside from the smaller level of taxation required under an income tax approach, the various approaches would affect individuals across the income distribution differently. The next section turns to this issue.

5. The distributional effect of dealing with the Missing Trust Fund

To analyze the distributional effect of various policies to deal with the Missing Trust Fund, this paper uses NBER's TaxSim program in conjunction with the *Survey of Consumer Finances* (SCF). The TaxSim program calculates tax liabilities from US Federal and State income tax laws.[23] Researchers can either enter the characteristics (e.g., age, marital status) and income sources (e.g., W-2 wages, interest, dividends) of an individual into an online portal to obtain their estimated tax liability and marginal tax rate, or upload data appropriately formatted from a survey dataset (as this paper does). The TaxSim program is updated each year and attempts to incorporate changes to tax law. Currently, the federal tax law is up to date through 2019 and is updated through 2017 for state tax law. Using TaxSim allows this paper to determine various strategies to pay for the Missing Trust Fund – including raising the income tax in response to the observation of the Missing Trust Fund's origin in the Legacy Debt – are distributed across the population.

For purposes of the analysis, households are divided into quartiles based on their current income and their taxes calculated under the scenarios described above.[24] Table 2 shows how the incremental

---

[23]See Feenberg and Coutts (1993) for an introduction to the program.

[24]To run the SCF data through the TaxSim program, it is necessary to code 22 variables into the required format. These include standard variables like age, the state of residence, marital status, and the number of dependent children under age 19.

Table 2. Share of tax increases paid, by income quartile under policy alternatives

	Payroll tax (%)	Eliminate cap (%)	Income tax (%)
Top quartile	54	65	84
Second quartile	29	22	12
Third quartile	13	10	4
Lowest quartile	4	3	1

Source: 2019 Social Security Trustees Report; and authors' calculations using the 2016 SCF and Feenberg and Coutts ('TaxSim').

Table 3. Share of household income used to pay tax increases, by income quartile

	Payroll tax		Eliminate cap		Income tax	
	All sample (%)	Workers (%)	All sample (%)	Workers (%)	All sample (%)	Workers (%)
Missing interest						
Top quartile	1.0	1.6	1.4	2.0	1.8	1.8
Second quartile	2.9	3.3	2.2	2.5	0.8	0.9
Third quartile	2.5	3.2	1.9	2.4	0.3	0.4
Lowest quartile	0.0	2.8	0.0	2.1	0.0	0.0
Replace missing Trust Fund in 75 years:						
Top quartile	2.0	3.1	2.8	3.9	3.5	3.5
Second quartile	5.6	6.4	4.2	4.8	1.6	1.7
Third quartile	4.9	6.2	3.7	4.7	0.5	0.9
Lowest quartile	0.0	5.5	0.0	4.2	0.0	0.0
Replace Missing Trust Fund in 150 years:						
Top quartile	1.4	2.1	1.9	2.7	2.4	2.4
Second quartile	3.8	4.3	2.9	3.3	1.1	1.1
Third quartile	3.3	4.2	2.5	3.2	0.4	0.6
Lowest quartile	0.0	3.8	0.0	2.8	0.0	0.0

Source: 2019 Social Security Trustees Report; and authors' calculations using the 2016 SCF and Feenberg and Coutts ('TaxSim').

taxes paid are distributed by income quartile under the three approaches. The capped payroll tax increase tends to be the most evenly distributed, the uncapped payroll tax next, and the income tax brings in the highest share from the top quartile.

But while the share of taxes paid is uniformly higher for the highest income quartile, the actual burden of the taxes on households' budgets tends to fall more heavily on households further down the economic ladder for the two types of payroll tax increases (see Table 3).[25] An increase in the payroll tax falls hardest on the working households in the two middle quartiles because most of their income comes from earnings and all of their earnings falls under the payroll tax cap. For workers in the top quartile, the effect of the payroll tax increase is roughly half as large, since much of their income from work lies above the cap and many have sources of income beyond work. The pattern is similar both for paying missing interest and for replacing the Missing Trust Fund.

Expanding the payroll tax by eliminating the cap spreads the burden more equally for working households. The highest quartile is the only group to see an increased share of their household income devoted to the tax increase under this policy compared to the alternative of simply raising the capped payroll tax. By comparison, the income tax shifts more of the burden to the highest quartile. Under an increase in the income tax that would pay for the missing interest, the median household (including those households with and without wage and salary workers) in the top quartile would pay about 1.8%

The program also requires information on the respondents' and their spouses' income from wages and salary. Several other sources of household income must be included as well, including: dividends, property income, income from pensions, income from Social Security benefits, and income from transfers. Adjustments are allowed for rent paid (which affects property tax rebates), medical expenses, child care expenses, mortgage interest, and capital gains and losses. Once these variables are appropriately coded, they can be run through the program, which then outputs the individual's income and FICA tax liability.

[25]The results for other time horizons are similar, but proportionally higher, than the result for 75 years.

Table 4. Median reduction in utility for tax increases, by income quartile ($\gamma = 2$)

	Payroll tax		Eliminate cap		Income tax	
	All sample (%)	Workers (%)	All sample (%)	Workers (%)	All sample (%)	Workers (%)
Missing interest						
Top quartile	1.3	2.0	1.8	2.5	2.2	2.2
Second quartile	3.2	3.6	2.4	2.7	0.9	0.9
Third quartile	2.5	3.3	1.9	2.5	0.3	0.4
Lowest quartile	0.0	2.4	0.0	1.8	0.0	0.0
Replace Missing Trust Fund in 75 years:						
Top quartile	2.6	4.0	3.5	4.9	4.4	4.4
Second quartile	6.5	7.2	4.8	5.4	1.8	1.8
Third quartile	5.0	6.6	3.8	4.9	0.5	0.9
Lowest quartile	0.0	4.9	0.0	3.6	0.0	0.0
Replace Missing Trust Fund in 150 years:						
Top quartile	1.8	2.7	2.4	3.3	3.0	2.9
Second quartile	4.3	4.8	3.2	3.6	1.2	1.2
Third quartile	3.4	4.4	2.5	3.3	0.4	0.6
Lowest quartile	0.0	3.3	0.0	2.5	0.0	0.0

Source: 2019 Social Security Trustees Report; and authors' calculations using the 2016 SCF and Feenberg and Coutts ('TaxSim').

of their income to the payroll tax, the second quartile 0.8%, the third quartile just 0.3%, and the median household in the lowest quartile would pay nothing. Again, the results are proportionately higher for tax increases that would replace the Missing Trust Fund but they follow a similar pattern.

Of course, looking at the reduction in household income is only one way to consider the distributional effects of this kind of policy. Economists generally assume that households are risk averse, with one consequence being that reductions in income are more costly when income is low. A commonly used utility function that captures the notion of risk aversion is:

$$u(c_h) = \frac{c_h^{1-\gamma}}{1-\gamma}$$

where c_h indicates a household's consumption and γ is the coefficient of relative risk aversion. The higher γ, the more extreme is the lost utility relative to the gain for similar-sized reductions or increases in income.

Tables 4 and 5 show the reduction in household utility across the three tax increases for the commonly used values of $\gamma = 2$ and $\gamma = 3$, respectively. In either case, the results show the disproportionate effect of a payroll tax increase on the middle two quartiles. Put simply, a payroll tax increase disproportionately burdens households with at least one worker in the bottom three quartiles, particularly when the utility is considered instead of simply income. With an income tax, the effect is moderated greatly for the bottom three quartiles, with the highest quartile paying a larger share of its income than under any of the other tax schemes.

5.1 Cohort effects

The analysis above examined a single point in time and showed that replacing the Missing Trust Fund has a higher impact on household budgets than simply paying for the missing interest. Two points that relate to the cost of these tax increases over time also merit consideration. Paying the missing interest requires a smaller increase today but that increase lasts forever while replacing the Missing Trust Fund requires a larger increase today but for a limited period of time. Using the example of a capped payroll tax increase, Figure 4 shows how these two approaches affect the net transfer received by birth cohorts going forward. Paying off the missing interest (see 'Interest only' plot) starting today means birth cohorts currently working receive a reduction in their net lifetime transfer related to their remaining

Table 5. Median reduction in utility for tax increases, by income quartile ($\gamma = 3$)

	Payroll tax		Eliminate cap		Income tax	
	All sample (%)	Workers (%)	All sample (%)	Workers (%)	All sample (%)	Workers (%)
Missing interest						
Top quartile	2.7	4.1	3.6	5.0	4.5	4.4
Second quartile	5.1	7.3	4.9	5.5	1.9	1.9
Third quartile	6.1	6.7	3.8	5.0	0.6	0.9
Lowest quartile	0.0	5.0	0.0	3.7	0.0	0.0
Replace Missing Trust Fund in 75 years:						
Top quartile	5.3	8.2	7.2	10.1	9.0	8.9
Second quartile	13.4	15.0	9.9	11.0	3.6	3.7
Third quartile	10.3	13.6	7.7	10.0	1.1	1.7
Lowest quartile	0.0	10.0	0.0	7.4	0.0	0.0
Replace Missing Trust Fund in 150 years						
Top quartile	3.6	5.5	4.8	6.7	6.0	5.9
Second quartile	8.9	9.9	6.6	7.3	2.5	2.5
Third quartile	6.9	9.0	5.1	6.7	0.7	1.2
Lowest quartile	0.0	6.6	0.0	5.0	0.0	0.0

Source: 2019 Social Security Trustees Report; and authors' calculations using the 2016 SCF and Feenberg and Coutts ('TaxSim').
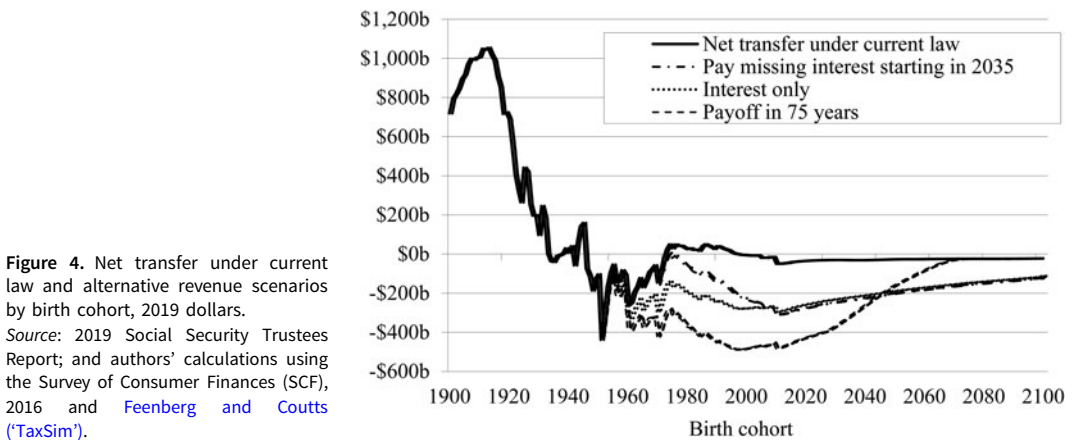

Figure 4. Net transfer under current law and alternative revenue scenarios by birth cohort, 2019 dollars.
Source: 2019 Social Security Trustees Report; and authors' calculations using the Survey of Consumer Finances (SCF), 2016 and Feenberg and Coutts ('TaxSim').

time in the workforce (e.g., a 25-year-old gets a bigger reduction than a 55-year-old), with birth cohorts after 2004 experiencing the largest impact because they spend their entire career under the higher payroll tax.[26]

On the other hand, replacing the Missing Trust Fund in 75 years has an immediately larger effect on current workers, with the most substantial effect on birth cohorts born between 2005 and 2030 who spend their entire careers in the higher payroll tax regime. The birth cohort born in 2031 would be working in 2095 at age 64, when taxes can be reduced to 10.6%, with every birth cohort after that spending an increasingly smaller share of their careers in the higher tax regime. Eventually, future cohorts exist in a 'fully funded' system where net contributions and transfers are essentially equal.

Another issue worth considering is the cost of waiting until the Trust Fund runs out in 2034. At that time, the Missing Trust Fund is estimated to equal $53.8 trillion, mostly due to the accumulation of interest between now and then, which will require a payroll tax increase of 3.9 percentage points to pay for the missing interest (compared to 3.4 percentage points if enacted today). Figure 4 clearly illustrates that the actual cost of increasing taxes is nuanced – many current cohorts end up paying a

---

[26]The upward trend visible in Figure 4 across all three tax schemes has to do with projected improvements in longevity that are not made up for by an increase in the Full Retirement Age under current law.

reduced amount, but future cohorts have to pay a little bit more. While Tables 2–5 show that the type of tax used has different distributional impacts across different income groups today, Figure 4 shows that the timing and the approach of paying for the Missing Trust Fund also have distributional implications across birth cohorts.

6. Conclusion

This paper shows that the so-called 'Missing Trust Fund' is the result of 'Legacy Debt' built up during the early years of the Social Security program. These origins suggest that – if the goal were to maintain benefits at current-law levels – policymakers might want to consider a variety of ways to structure a revenue increase, ranging from an increase in the payroll tax without an expansion of its base to a smaller increase in the payroll tax with an expansion of its base, to an increase in the income tax. Taxing the society more widely – through an income tax increase – could make sense given that society as a whole benefited from having a generation of people receive benefits who did not fully contribute to the system. Any of these taxes could be raised permanently by a moderate amount, effectively paying the missing interest from the Missing Trust Fund, or by a larger amount, ultimately replacing the Missing Trust Fund before returning taxes to their current level.

The distributional effect of each policy is clear. Increasing the payroll tax tends to place a disproportionate burden on middle-class working households, whether that burden is measured by reduced household income or by the reduced utility. Getting rid of the payroll tax cap distributes some of that burden onto the top quartile, but the effect on middle-class workers is still fairly substantial. Increasing the income tax, on the other hand, places more of the burden on the top quartile. The distributional impacts of replacing the Missing Trust Fund versus simply paying for its interest also raise the question of intergenerational equity – burdening today's workers for a lower-cost program tomorrow.

But although the distributional effect of each policy is clear, deciding on the 'right' approach is well outside the scope of this paper. The political challenges of raising program revenue through either of the sources mentioned – a payroll tax increase or an income tax increase – are obviously very real. Instead, the point of this paper is simply to make clear which types of tax increases and approaches are available and what the distributional effects could be.

References

DeWitt L (2007) Financing social security, 1939–1949: a reexamination of financing policies of this period. *Social Security Bulletin* **67**(4), 51–70.

Diamond PA and Orszag PR (2005) Saving Social Security. *Journal of Economic Perspectives* **19**(2), 11–32.

Feenberg D and Coutts E (1993) An introduction to the TAXSIM model. *Journal of Policy Analysis and Management* **12**(1), 189–194.

Feenberg D and Coutts E. TaxSim. Cambridge, MA: National Bureau of Economic Research.

Geanakoplos J, Mitchell OS and Zeldes SP (1998) Would a privatized social security system really pay a higher rate of return? In Arnold RD, Graetz MJ and Munnell AH (eds), *Framing the Social Security Debate*. Washington, DC: Brookings Institution Press, pp. 137–156.

Geanakoplos J, Mitchell OS and Zeldes SP (1999) Social Security money's worth. In Mitchell OS, Myers RJ and Young H (eds), *Prospects for Social Security Reform*. Philadelphia, PA: University of Pennsylvania Press, pp. 79–151.

Geanakoplos J, Mitchell OS and Zeldes SP (2000) Would a privatized Social Security system really pay a higher rate of return. Working Paper 6713. Cambridge, MA: National Bureau of Economic Research.

Leimer DR (1994) Cohort-specific measures of lifetime net Social Security transfers. ORS Working Paper Series 59. Washington, DC: U.S. Social Security Administration, Office of Research and Statistics.

Leimer DR (2007) Cohort-specific measures of lifetime Social Security taxes and benefits. ORES Working Paper Series 110. Washington, DC: U.S. Social Security Administration, Office of Research, Evaluation, and Statistics.

Leimer DR (2016) The legacy debt associated with past Social Security transfers. *Social Security Bulletin* **76**(3), 1–15.

Martin PP and Weaver DA (2005) Social Security: a program and policy history. *Social Security Bulletin* **66**(1), 1–15.

Nickerson D and Burkhalter K (2019) Unfunded obligation and transition costs for the OASDI Program. Actuarial Note 2019.1. Baltimore, MD: U.S. Social Security Administration, Office of the Chief Actuary.

U.S. Social Security Administration (2020) Social Security Administrative Expenses. *Statistical Tables: Trust fund data*. Available at: https://www.ssa.gov/oact/STATS/admin.html.

Appendix A: Contributions required in fully funded system

Table A1. Income, contributions, and total assets for median worker contributing 10.6% of assets to a funded system

Age	Income ($)	Contributions ($)	Interest on assets ($)	Total assets ($)
22	26,400	2,798	--	2,798
23	26,400	2,798	76	5,672
24	26,400	2,798	153	8,624
25	26,400	2,798	233	11,655
26	29,096	3,084	315	15,054
27	31,689	3,359	406	18,820
28	33,923	3,596	508	22,924
29	35,955	3,811	619	27,354
30	37,690	3,995	739	32,087
31	39,289	4,165	866	37,118
32	40,790	4,324	1,002	42,444
33	42,145	4,467	1,146	48,057
34	43,437	4,604	1,298	53,959
35	44,799	4,749	1,457	60,165
36	45,960	4,872	1,624	66,661
37	47,280	5,012	1,800	73,473
38	48,484	5,139	1,984	80,596
39	49,616	5,259	2,176	88,031
40	50,673	5,371	2,377	95,779
41	51,796	5,490	2,586	103,856
42	52,938	5,611	2,804	112,271
43	54,051	5,729	3,031	121,032
44	55,182	5,849	3,268	130,149
45	56,131	5,950	3,514	139,613
46	56,941	6,036	3,770	149,419
47	57,813	6,128	4,034	159,581
48	58,542	6,205	4,309	170,095
49	59,068	6,261	4,593	180,949
50	59,278	6,283	4,886	192,118
51	59,430	6,300	5,187	203,605
52	59,414	6,298	5,497	215,400
53	59,056	6,260	5,816	227,476
54	58,514	6,203	6,142	239,820
55	57,668	6,113	6,475	252,408
56	56,277	5,965	6,815	265,189
57	55,020	5,832	7,160	278,181
58	53,433	5,664	7,511	291,356
59	51,801	5,491	7,867	304,713
60	49,642	5,262	8,227	318,202
61	47,061	4,988	8,591	331,782
62	45,828	4,858	8,958	345,598
63	44,622	4,730	9,331	359,659
64	43,444	4,605	9,711	373,975
65	43,444	4,605	10,097	388,677

Average income: $48,625
Income from assets at 4.5% annuity: $17,490
Replacement rate at age 65: 36.0%

Note: Assumes interest rate of 2.5%. Earnings profile based on Social Security's Scaled Earnings Profile.
Source: 2019 Social Security Trustees Report and Authors' calculations.

Appendix B: Comparing results from approximation to Leimer (2007)

One of the primary goals of the calibration method described in the body of this paper is to update estimates of the Missing Trust Fund to reflect the situation today. But the estimates obtained from that method are just that, estimates. Showing that the estimation method presented above results in numbers that closely fit those in Leimer (2007) – which are based on actual data and then projections – would build confidence in the method. To make this comparison, we use the actual numbers reported in Leimer (2007) and put the numbers presented in Figures 1 and 2 into 2001 dollars and 2001 present value to be consistent with the time period used in Leimer (2007). Figures B1 and B2 show the results of this comparison and reveal

stark differences. The difference is small for earlier years but becomes larger for birth cohorts that either had not begun making payments into the program when Leimer's data ended (roughly the 1980 birth cohort) or had not begun receiving payments (roughly the 1940 birth cohort).
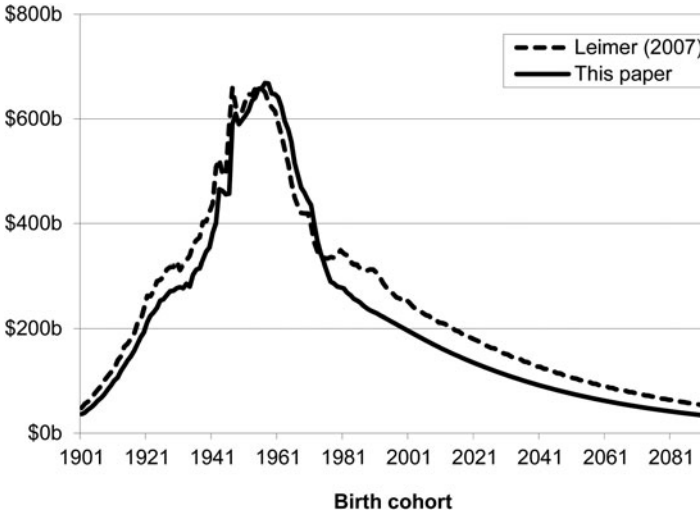

Figure B1. Present value of payroll tax contributions by birth cohort, 2001 dollars.
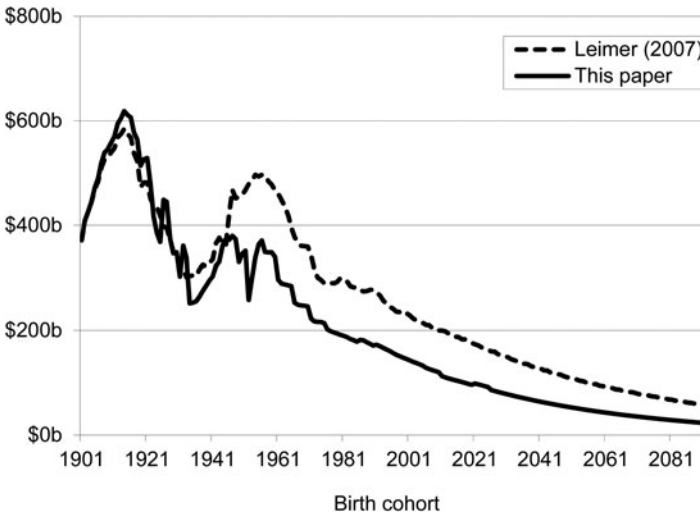*Sources*: 2019 Social Security Trustees Report; Leimer (2007); and authors' calculations.

Figure B2. Present value of benefits by birth cohort, 2001 dollars.
Sources: 2019 Social Security Trustees Report; Leimer (2007); and authors' calculations.

This result suggests the issue may simply be in the projections used in the two approaches – Leimer (2007) used projections from the *2000 Social Security Trustees Report*, and we use projections from the *2019 Social Security Trustees Report*. Indeed, Figure B3 suggests this is likely the case, as, after 2000, both the long-run forecasted payroll contributions Social Security was anticipating as well as the benefits it assumed it would have to pay out dropped significantly. If the *2000 Social Security Trustees Report* numbers are used and our methodology applied, the Leimer (2007) estimates and our estimates come into line, as is shown in Figures B4 and B5.

In short, the approximation method used seems to reflect fairly well what one would get using actual data.
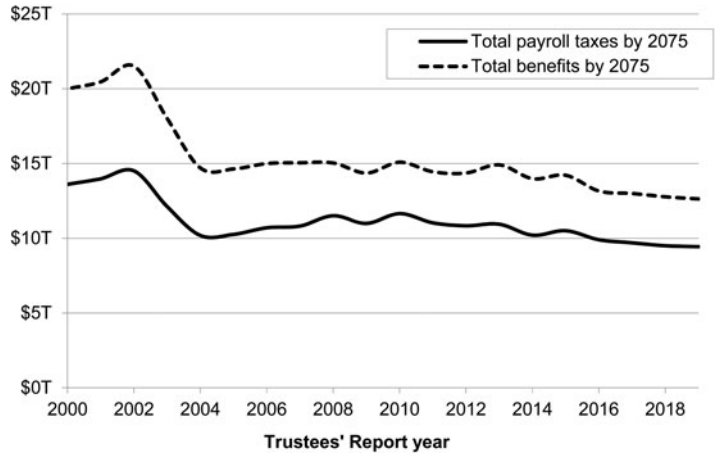

Cite this article: Munnell AH, Hou W, Sanzenbacher GT (2022). How to pay for Social Security's Missing Trust Fund? *Journal of Pension Economics and Finance* **21**, 344–358. https://doi.org/10.1017/S1474747220000384

Figure B3. Evolution of projected payroll-tax receipts and benefit payouts by 2075, by trustees report.
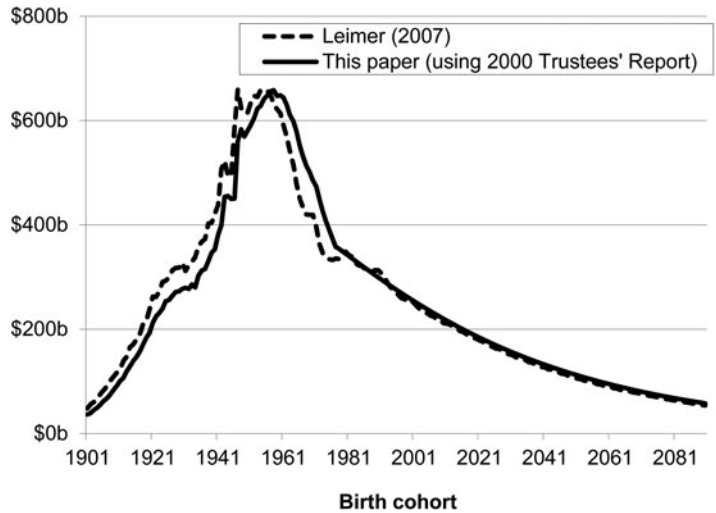*Source*: 2000–2019 Social Security Trustees Reports.

Figure B4. Present value of payroll tax contributions by birth cohort, 2001 dollars.
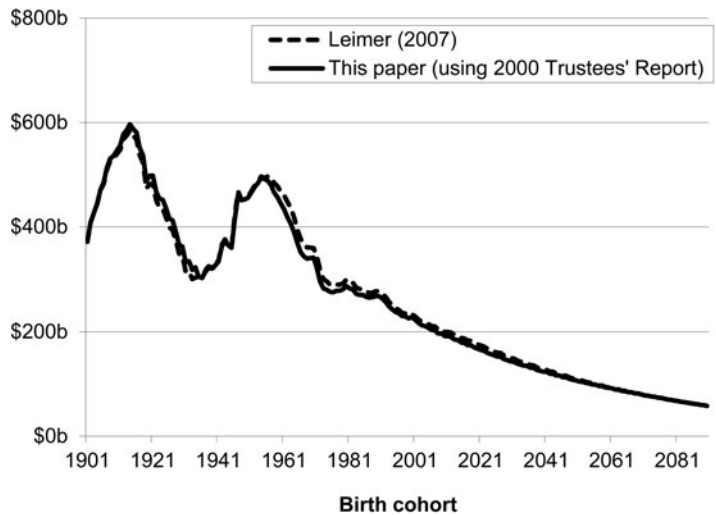*Sources*: 2000 Social Security Trustees Report; Leimer (2007); and authors' calculations.

Figure B5. Present value of benefits by birth cohort, 2001 dollars.
Sources: 2000 Social Security Trustees Report; Leimer (2007); and authors' calculations.