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United States' Federal Indebtedness and Fiscal Policy Trade-Offs

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ABSTRACT

We estimate federal spending and taxes by birth-year, gender, race, and education, by interacting official budget totals with microsimulation demographics to project federal budget imbalances. Future federal spending exceeds tax receipts under current policy. The federal Fiscal Imbalance totals $162.6 trillion in present value, six-fold larger than outstanding debt held by the public. Restoring fiscal balance would require immediately and permanently either raising all federal taxes by 26.1 percent or reducing all federal spending by 33.4 percent, or some combination of the two. Holding harmless some population groups from changes, including people over age 59, increases the required adjustment rate.

1. Introduction

Federal budget deficits and debt have increased consistently after the Budget Enforcement Act of 1990 was abandoned in 2002 and Congress enacted several spending increases and tax cuts. Fiscal measures to counter effects of the Great Recession of 2008-09, tax cuts enacted via the Tax Cuts and Jobs Act of 2017, and several economic bailouts during Covid-19's aftermath have boosted federal debt as a share of GDP, lending new urgency to concerns about rising tax burdens on future generations and for sustaining economic security and growth.[1]

Federal debt held by the public stood at 26.2 trillion at the end of 2023, almost as large as U.S. Gross Domestic Product (GDP).[2] Measurement of the federal government's *indebtedness* under current fiscal policies, however, requires consideration of more than just "contractual" (or "explicit") debt on the federal government's books. Many current federal policies and programs commit the federal government to continuing expenditures into the future. If, however, federal receipts projected under current tax policies are insufficient, policy changes to "come up with the money" will be necessary. This is just like the necessity of allocating future resources to service debt accrued from the past.[3]

Some future expenditure commitments (such as Social Security and Medicare Part A) are funded out of revenues earmarked for those programs. Others (such as on Medicare Parts B, C, and D, Medicaid, Supplemental Security Income, Supplemental Nutritional Assistance, and many others) are funded out of the general revenues, user fees and premiums and other non-tax

[1] Great Recession relief programs include the Emergency Economic Stabilization Act of 2008 (EESA) with the key component of Troubled Asset Relief Program (TARP). Covid-19 assistance packages include the Coronavirus Preparedness and Response Supplemental Appropriations Act (CPRSA), 2020 (Total $7.8B); The Families First Coronavirus Response Act (FFCRA, Total $15.4B); The Coronavirus Aid, Relief, and Economic Security Act, (CARES Act) (Total $2.1T); Paycheck Protection Program and Health Care Enhancement Act (PPHCE, Total $483B); The Coronavirus Response and Relief Supplemental Appropriations Act, 2021 Consolidated Appropriations Act, 2021 (Total $900B); The American Rescue Plan of 2021 (Total $1.9T).
[2] Congressional Budget Office, 10-Year Budget Projections, February 2024, Table 1.1: https://www.cbo.gov/system/files/2024-02/51118-2024-02-Budget-Projections.xlsx.
[3] The term "current fiscal policies" encompasses tax and expenditure policies applicable today and scheduled changes already enacted to apply in future years.

receipts. Moreover, the federal government is committed to purchasing public goods and services, which are also paid for out of federal general revenues.

If future federal purchases per capita are assumed to continue at historical rates, the present discounted value of annual projected funding shortfalls under current policies – that is, all projected non-interest federal expenditures minus projected federal receipts – constitutes the federal government's unfunded ("non-contractual" or "implicit") obligation under current policies. This obligation indicates the extent to which fiscal policies are structurally out of balance. Adding together "explicit" debt and "implicit" obligations provides a full measure of federal *indebtedness* under current policies, which we call the "fiscal imbalance" (FI). [4, 5]

Although the Congressional Budget Office and Social Security and Medicare actuaries regularly publish budget projection spanning many decades into the future, the federal budget process, whereby Congress adjusts fiscal policies in the national interest, statutorily considers projected expenditures and receipts only over the next 10 years. The relatively short policymaking horizon implies a low likelihood of Congress adopting fiscal adjustments to address the entirety of implicit federal obligations. Indeed, the "short-term bias" in the budget process appears to have encouraged increases in federal unfunded obligations beyond the 10-year policymaking horizon via "sunset provisions" for new spending programs and tax cuts that are politically difficult to reverse.

1. Historical growth of federal debt held by the public.

[4] Inclusion of contractual federal debt in the fiscal imbalance measure implies that interest expenditures (to service contractual debt) must be excluded from the measure of non-contractual debt to avoid double counting. The non-contractual obligation component of FI equals the sum of discounted federal receipt shortfalls sufficiently far into the future so that the discounted value of shortfalls farther into the future no longer increases the corpus already accumulated because of discount factor compounding.
[5] Both contractual and non-contractual debt involve risks. The real value of contractual debt may be altered via inflation and non-contractual debt may be changed via tax and spending policy changes. Both federal indebtedness elements are determined by federal policy decisions and are, therefore, subject to political risks.

Figure 1 shows Congressional Budget Office's 10-year projections of (contractual) federal debt as a share of GDP since 1996. Federal debt's share in GDP has increased consistently since the late-2000s. As noted earlier, the CBO's 10-year debt projections shifted downward between 1996 and 2001 and each year's update indicated a declining debt-GDP ratio over the next 10 years. With the abandonment of BEA-1990 in 2002, however, federal debt held by the public has consistently trended upward.

A full decomposition of the reasons for past increases in federal debt's GDP share is not attempted here but some features are noteworthy. Major past increases in the debt-to-GDP ratio were clearly driven by policy responses to economic emergencies: The 2008-09 Great Recession and the 2020-22 Covid-19 pandemic. Others were triggered by tax reductions such as the Tax Cuts and Jobs Act of 2017. The CBO's debt-to-GDP ratio projections shown in Figure 1 indicate that large upward shifts (indicated as lines with block markers) occurred often while downward shifts in the 10-year projection series during normal economic times were much smaller, leading to a secular upward trend. This pattern of debt increases does not support a consistent up-and-down relationship suggestive of counter-cyclical fiscal policy.

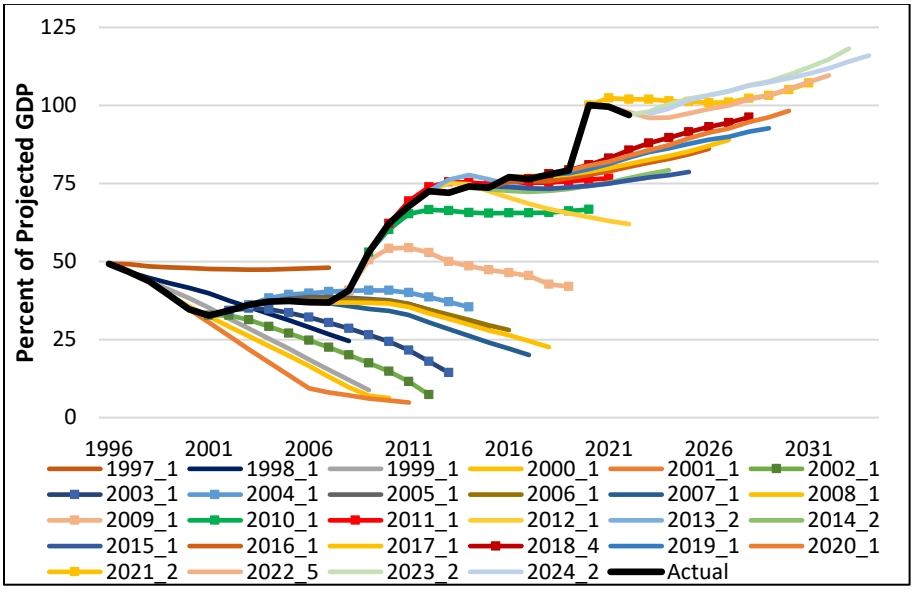


Figure 1: *Congressional Budget Office's historical 10-year projections of publicly held debt-to-GDP ratio.*
Source: Authors' calculations from CBO's Budget and Economic Outlook (various years and months).

Past federal debt increases may also have arisen from prior underestimates of entitlement program spending arising from faster-than-expected growth in the population of retirees and their Social Security and Medicare benefits. Our long-term budget projections constructed by extending CBO's 10-year projections (as reported below) show that current federal budget policies embody a large structural imbalance between federal receipts and (non-interest) expenditure commitments. It means that, lacking corrective fiscal policy changes, a significant reason for future year-over-year increases in (explicit) debt held by the public will be annual realizations of built-in (implicit) budget shortfalls.

2. The fiscal imbalance (FI) measure

Table 1 shows FI calculated as the sum of four asset components: [6] (1) Contractual U.S. federal debt held by the public (a negative value); (2) the present discounted value of projected (dedicated) taxes minus expenditures for Social Security Old Age, Survivors and Disability Insurance and Medicare Hospital Insurance (OASDHI);[7] (3) the present discounted value of taxes and other receipts (revenues not dedicated to OASDHI) minus federal non-OASDHI

[6] Our construction of FI is based on U.S. demographic and economic projections of the PWBM's microsimulation, which projects the evolution of the U.S. population along many dimensions. See the PWBM Brief on the microsimulation's demographic projections. In addition, the calculations are based on data on federal debt from the U.S. Treasury, budget projections from the U.S. Congressional Budget Office (CBO), and age-profiles of tax and transfer distributions by gender, race, and lifetime educational attainment. The latter are developed from various U.S. micro-data surveys. The construction of these elements is described a PWBM working paper. Federal budget projections and FI measures are compared to GDP projections, which are benchmarked to the Congressional Budget Office's projections through the year 2030, are also based on PWBM's microsimulation as described in Appendix A6. CBO Budget aggregates through 2034 are distributed across the population to calculate per-capita taxes and transfers, PWBM microsimulation demographic projections are used to project budget aggregates into the future. See Appendices 1-4 for a detailed description of the calculation methods.
[7] Medicare expenditures are assumed to grow faster than GDP through year 2060 consistent with historical experience as explained in our working paper.

expenditures on (mandatory) transfer programs;[8] and (4) the present value of (discretionary) program-specific receipts minus purchases of defense and non-defense public goods and services. [9, 10] The construction of these components is described in several Appendices provided below.

Table 1 shows estimates of FI and its components as present discounted values in constant 2024 dollars. Column 1 of the Table shows the government's outstanding "asset/debt" position. Columns 2-4 show receipts, expenditures, and FI when projections are extended through the next 75 years (2024-98). Columns 5-7 show projections implemented without a time limit. The bottom part of the Table shows FI and its components as a share of the present discounted value of projected U.S. Gross Domestic Product (PDVGDP).[11]

	Outstanding Debt	**75-Year Present Values (2024-98) ***			**Infinite Horizon Present Values***		
	Assets (+)/ Debt (-) (A)	**Receipts (R)**	**Expenditures (E)**	**FI (A+R−E)**	**Receipts (R)**	**Expenditures (E)**	**FI (A+R−E)**
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Present values in trillions of constant 2024 dollars*						
(Asset (+)/ Debt (−)	**-33.0*****			**-33.0**			**-33.0**
OASDHI	**3.0****	**105.1**	**144.7**	**-36.6**	**165.2**	**237.9**	**-69.7**
Social Security	2.8**	79.2	100.0	-18.1	124.7	160.9	-33.4
Medicare Part A	0.2**	25.9	44.7	-18.6	40.6	77.0	-36.2
Non-OASDHI	**3.8****	**199.4**	**155.5**	**47.7**	**321.1**	**259.0**	**65.8**
Discretionary		**0.7**	**82.8**	**-82.0**	**1.1**	**126.9**	**-125.8**
Net Value	**-26.2**	**305.2**	**382.9**	**-103.9**	**487.5**	**623.9**	**162.6**
	As a percent of the present discounted value of GDP*						

[8] These transfers are determined by policies about program eligibility and benefit levels. Funding includes general revenues, program-specific premiums ("offsetting receipts"), user fees, and other non-tax receipts. For programs that expire periodically (for example, the Supplemental Nutritional Assistance Program), the CBO includes expenditures not yet appropriated by Congress under the "current policy" expectation that they will be continued without interruption.

[9] These include expenditures on national defense, infrastructure, research and development, administration, foreign affairs, and other government functions and operations. See our working paper for additional details.

[10] Nominal values of taxes, transfers, and purchases per capita are assumed to grow at a 3 percent rate per year. This rate is obtained from the projection of labor productivity growth from the PWBM microsimulation. Present values of future taxes and transfers are calculated at a long-term discount rate of 4.4 percent per year – consistent with the Social Security Administrations long term nominal interest rate (intermediate) assumption. Results on the sensitivity of key fiscal metrics – FI and the present discounted value of GDP (PDVGDP) – are provided in Appendix 11.

[11] See Appendix 5 for the method used to project U.S. GDP.

(Asset (+)/ Debt (–)	**-2.0**			**-2.0**			**-1.3**
OASDHI	**0.2**	**6.5**	**9.0**	**-2.3**	**6.7**	**9.7**	**-2.8**
Social Security	0.2	4.9	6.2	-1.1	5.1	6.6	-1.4
Medicare Part A	0.0	1.6	2.8	-1.1	1.7	3.1	-1.5
Non-OASDHI	**0.2**	**12.3**	**9.6**	**3.0**	**13.1**	**10.6**	**2.7**
Discretionary		**0.0**	**5.1**	**-5.1**	**0.0**	**5.2**	**-5.1**
Net Value	**-1.6**	**18.9**	**23.7**	**-6.4**	**19.9**	**25.4**	**-6.6**
Memo: Present Discounted Value of GDP (PDVGDP)		**1,615.1**			**2,454.8**		

Table 1: *Federal fiscal imbalance (FI) under current fiscal laws and purchases policies.*
Source: Authors' calculations.
* Present values calculated at a nominal discount rate of 4.4 percent.
** Intragovernmental debt for Social Security, Medicare, and other programs.
*** Gross federal debt.

The FI measure calculated in perpetuity – a comprehensive measure of the federal budget's structural resource shortfall – stands at $162.6 trillion or 6.6 percent of PVGDP. Viewed by rows, the Table shows the programmatic breakdown of the fiscal imbalance: Row entries in the last column show that the non-OASDHI surplus of 65.8 trillion is smaller than the sum of shortfalls in OASDI and HI ($33.4+$36.2=$69.7 trillion), net public purchases at current rates ($125.3 trillion) and outstanding federal debt held by the public ($26.2 trillion). Viewed by column, the Table shows receipts, expenditures, and net receipts. The last column's "net value" row shows a unified budget view: Total present valued receipts of $487.9 trillion, total present valued expenditures of $624.3 trillion, and the structural, present valued FI of $162.6 trillion.[12]

Underlying the FI measure reported in Table 1 are projected primary annual deficits as shown in Figure 1.[13] Panel-A of Figure 1 shows time profiles of projected annual federal receipts, non-interest expenditures, and primary deficits (non-interest expenditures minus

[12] A sizable part of the federal FI – the "best estimate" under current fiscal policies – accrues in the distant future. Shortfalls further out in time involve greater uncertainty. But uncertainty implies that the "best estimate" may be too high or too low. So, our preferred aggregation method is not to truncate shortfalls accruing after an arbitrary time limit, but to include all future shortfalls with progressively smaller weights attached to more distant ones. That's precisely what present value discounting with a positive discount rate accomplishes. The discount rate selected is the Social Security Trustees' long term (intermediate assumption) interest rate, which is consistent with today's longest-term interest rate on Treasury securities, and incorporates risks associated with long-term federal government funding costs. Yet another reason to prefer the infinite horizon fiscal imbalance measure is that the government's intertemporal budget constraint is not closed over any finite budget window.
[13] While FI is calculated in perpetuity, Table 1 shows annual primary deficits only through the year 2100.

receipts) through year 2100 as percentages of projected annual GDP. Panel-B of the Figure shows projected annual primary deficits as a share of projected annual receipts and non-interest expenditures.

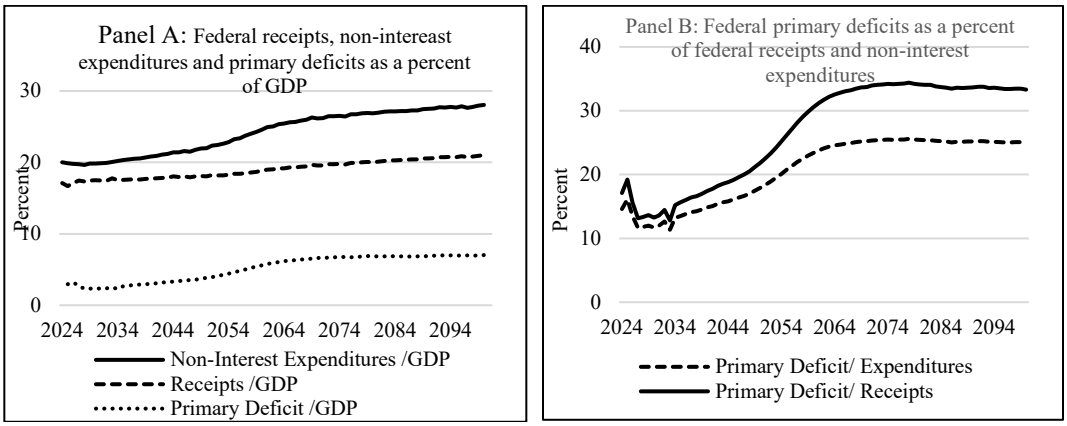


Figure 2: *Panel A: Projections of federal receipts, expenditures, and deficits as a share of projected GDP; Panel B: Federal deficits as a share of projected receipts and expenditures.*
Source: Authors' calculations.

The imbalance in projected non-interest expenditures and receipts is evident from Panel A of Figure 1. Continuing population aging, rapid increases in health care expenditures, combined with current policies on taxes, transfers, and purchases lead to projections of increasing primary deficit-GDP ratios during the next few decades. Panel-B of the Figure shows that deficit-to-expenditure and deficit-to-receipts ratios continue to increase after the mid-2020s. The deficit-expenditure share increases from a (projected) just above 13.5 percent during the 2020s to 23.4 percent by 2060, after which the rate of increase slows down. And the deficit-receipts share increases from about 15.6 percent during the 2020s to 30.5 percent by 2060, after which the rate of increase is slower. Panel B shows that the gap between the two ratios increases over time.

Each year's deficit-expenditure and deficit-revenue ratios indicate the annual percentage changes in each (expenditure cuts or revenue increases) that would be needed to maintain budget balance. The increase in the gap between the two ratios implies that annual accruals into U.S.

explicit debt are projected to grow larger over time. PWBM's projections under current federal tax and spending policies have debt held by the public as a share of GDP increasing from 97 percent in 2023 to 191 percent by 2050, and to 831 percent by the end of this century.[14]

Panel-A of Figure 1 shows rapid growth of expenditures, receipts, and primary deficits during the first few decades followed by a relative flattening of those time profiles. The rapid short-term increases in primary deficit-GDP ratios occur because of rapid increases in the retiree population, causing rapid growth in Social Security, Medicare, Medicaid, and other retiree benefits. The predominantly tax-paying working-age population is projected to grow at a much slower rate. Accentuating this effect is the assumption that federal health care (Medicare and Medicaid benefits) expenditures per capita will grow faster than GDP per capital through 2060. Although the primary deficit-GDP ratio eventually stabilizes, it is projected to remain large and positive for many years after 2100. The present value of projected primary deficits plus outstanding explicit debt yields the FI-to-PVGDP ratio of 6.6 percent.

3. The generational imbalance (GI) measure for OASDHI

To the extent that federal public purchases and benefits were (and continue to be) funded through borrowing, past and current generations escape the associated tax burdens. Those burdens are transferred to future generations, whose taxes must service the resulting debt. However, estimating excess benefits of past and current generations is only possible for programs with dedicated funding, such as OASDHI, whose taxes and expenditures can be distributed across participating individuals.

[14] The CBO's projection of the ratio of debt held by the public to GDP is 169 percent (See CBO's Long Term Budget Projections, February 2023).

OASDHI expenditures are funded solely out of dedicated payroll taxes and income taxes levied on the Social Security benefits of high-income retirees. We use micro-data information to distribute OASDHI revenues and expenditures per capita by birth year, gender, race, and education. The per-capita amounts are projected to grow at the rate of projected labor productivity growth for future OASDHI participants.[15]

Table 2 shows the decomposition of OASDHI's FI into GI and the residual (FI-GI) attributable (under current OASDHI policies) to future generations. For those alive in 2024, subtracting the present discounted value of OASDHI benefits from the sum of the present discounted value of projected revenues and beginning-of-2024 OASDHI trust fund assets, yields the generational imbalance (GI). The GI value of –$62.7 trillion shown in Table 2 is negative, indicating that OASDHI benefits are larger than assets plus taxes in present value for the "closed group" of past and current generations under today's OASDHI policies. This is a smaller negative amount than OASDHI's FI of –$69.7 trillion, which covers the benefits net of OASDHI Trust Fund and the present value of taxes for all generations including future ones. By implication, future generations are projected to receive net OASDHI benefits of $7.0 trillion (FI–GI).

The GI measure shows the "give-away" implied under today's OASDHI policies to current and past generations of benefits exceeding their contributions in present value. Under the standard assumption that OASDHI's expenditures must be ultimately paid for out of its dedicated resources, maintaining current-OASDHI-policy for those alive today throughout their lifetimes would mean they would bequeath GI as a debt to future generations and the entire FI would have to be funded out of taxes levied on future generations. Their net contribution would

[15] Future projections of taxes and benefits incorporate growth in per capita amounts at the rate of labor productivity growth. The latter is estimated as growth in the ratio of projected GDP to hours worked each year estimated by PWBM's microsimulation.

have to be increased from –$7.0 trillion to $62.7 trillion (an increase of $69.7 trillion) to cover their own current-policy shortfall ($7.0 trillion) and the shortfall bequeathed by past and current generations ($62.7 trillion). The longer that current OASDHI policies are maintained, the larger the share of GI bequeathed to future generations.

Program	Birth Cohorts Included	Present Values in Trillions of Constant 2023 Dollars				As a Percent of PVGDP			
		Trust Fund Asset (+)/ Debt (-) (A)	Taxes (T)	Benefits (B)	GI (A+T-B)	Trust Fund Asset (+)/ Debt (-) (A)	Taxes	Benefits	GI (A+T-B)
Social Security and Medicare Part A (OASDHI)	All (FI)	3.0	165.2	237.9	-69.7	0.1	6.7	9.7	-2.8
	Past and Current: GI	3.0	76.0	141.7	-62.7	0.1	3.1	5.8	-2.6
	Future (FI-GI)		89.2	96.2	-7.0	0.0	3.6	3.9	-0.3
Social Security (OASDI)	All (FI)	2.8	124.7	160.9	-33.4	0.1	5.1	6.6	-1.4
	Past and Current: GI	2.8	57.7	97.2	-36.7	0.1	2.4	4.0	-1.5
	Future (FI-GI)		67.0	63.7	3.3	0.0	2.7	2.6	0.1
Medicare Part A (HI)	All (FI)	0.2	40.6	77.0	-36.2	0.0	1.7	3.1	-1.5
	Past and Current: GI	0.2	18.3	44.5	-25.9	0.0	0.7	1.8	-1.1
	Future (FI-GI)		22.3	32.6	-10.3	0.0	0.9	1.3	-0.4

Table 2: *OASDHI's FI attributable to past and current generations (GI) and future generations (FI-GI).*
Source: Authors' calculations. Balance values may not add up because of rounding errors.

It is instructive to compare OASDHI's –$62.7 trillion GI with the accumulated OASDHI trust fund of just $3.0 trillion, which represents the amount that current and past generations have contributed more than their past benefits. This surplus contribution is recorded by way of nonmarketable securities held in OASDHI trust funds. Table 2 shows that Social Security (OASDI)'s FI and GI are –$33.4 trillion and –$36.7 trillion, respectively, while Medicare Part A's (HI) values are –$36.2 trillion and –$25.9 trillion, respectively. By implication, future generations are slated, under current policies to make net contributions of $3.3 trillion for Social Security and receive net benefits of $10.3 trillion from HI (Medicare Part A), adding up to net benefits of $7.0 trillion from of OASDHI.

4. Future net taxes by population subgroups

The PWBM's microsimulation database also allows a disaggregated view of future federal payments and receipts, including taxes and transfers of U.S. population subgroups. A significant component of FI is the aggregate discounted value of projected net taxes – taxes minus transfers – of current and future generations.[16] We aggregate them separately for population subgroups distinguished by birth year, gender, race, and lifetime education. And we divide each total by the base year population of the corresponding population subgroup to obtain *actuarial* present values of net taxes per capita.

Figure 2 shows a disaggregated view of FI's future net-taxes component. The amount shown for each birth cohort (with age in 2024 shown on the x-axis) of a given type (by gender, race, and lifetime education) equals the actuarial present value of projected net taxes per capita over the future expected lifetime of each person in the subgroup's initial population, assuming today's fiscal policies remain unchanged throughout their remaining lifetimes.[17] In Figure 2, thicker lines refer to females, thinner to males. Unbroken lines refer to those with attainment of a college degree, dashed lines to those without; and grey lines refer to whites, black lines to non-whites (see also Figure 2's legend key).

[16] This component of FI equals implicit debt minus the present value of federal purchases.
[17] Negative ages indicate future-born birth cohorts. For race, the distinction is between white and non-white. For education, it is those with and without a college degree.

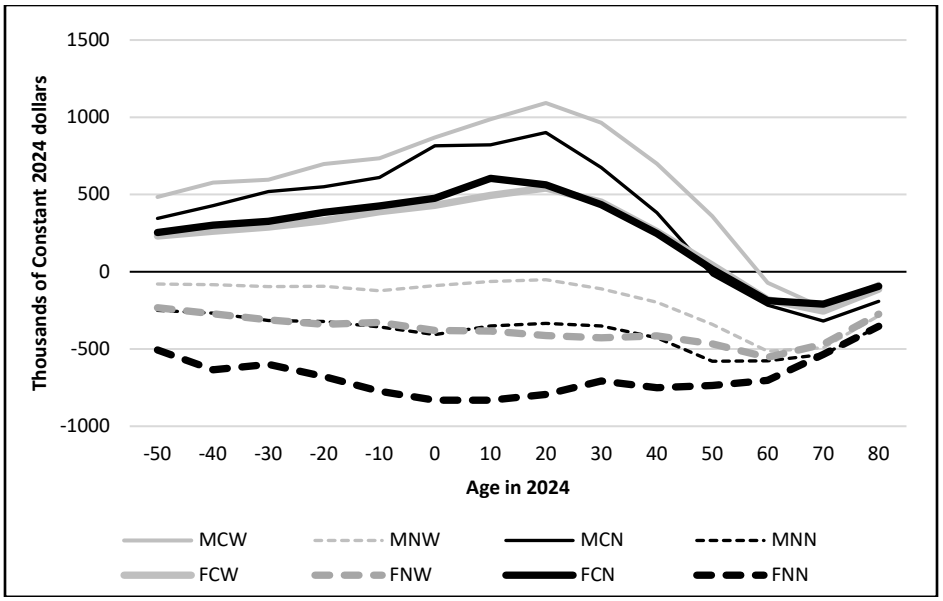


Figure 2: *Lifetime net taxes by birth-cohort, gender, race, and lifetime educational attainment.*
Legend Key: 1st letter: M=male, F=female; 2nd letter: C=college, N=non-college; 3rd letter: W=white, N=non-white.
Source: Authors' calculations.

Figure 2 suggests that there is a substantial "college divide" in the U.S population in overall treatment under current fiscal policies: Among the three dimensions of gender, lifetime education, and race, the widest gaps in actuarial lifetime net tax payments under current fiscal policies occur between individuals who do versus do not attain college education during their lifetimes. Figure 2 shows that people of working age who attain college degrees (unbroken lines) will pay substantial taxes (net of their transfer receipts) and those who do not will receive transfers, on net, during their remaining lifetimes.[18] For example, a 20 year old white male in 2024 who attains a college degree during his lifetime (the gray, thin, unbroken line in Figure 2), will pay about $1 million more in taxes than transfers – both calculated as present values as of 2024 – during the rest of his expected lifetime. In contrast a 20-year-old white male who does

[18] Negative net taxes indicate that the actuarial present value of future transfers dominates the actuarial present value of taxes. A decomposition of remaining lifetime net taxes by birth cohort, gender, race, and education by type of federal taxes and transfers is provided in the Appendix.

not attain a college degree (gray, thin, dashed line) will receive, in present value, about $100,000 by way of transfers on net over and above the taxes he pays during his remaining lifetime. Those with no college degrees experience lower lifetime employment and earnings, and more frequent eligibility to federal transfer programs. Among the college-educated, older individuals have low lifetime net taxes from receipts of sizable Social Security and Medicare benefits. Finally, if we look at the attributes of sex and race, males and whites are projected pay more in net taxes compared to females and non-whites over their remaining lifetimes.

Among the college-educated, both white and non-white males (thin gray and black unbroken lines, respectively) pay higher lifetime net taxes, presumably because their labor earnings are higher, compared to white and non-white college educated females (thick gray and black unbroken lines, respectively). Among those with positive lifetime net taxes, the largest present discounted values occur for those in their twenties. This is because their highest future working, earning, and tax-paying years are closer to the present while years of significant benefit receipts (Social Security and Medicare) are farther off in the future.For younger and future birth cohorts, as-yet far in time from their working years, the effect of discounting reduces lifetime net tax values. A more detailed decomposition of net tax distributions by federal tax and transfer programs and person types are provided in Appendix 9.

Figure 3 shows the PWBM microsimulation's initial birth-cohort shares of males and females by lifetime education (those projected to attain college degrees during their lifetimes). First, it shows that the population of non-college group constitutes about one-half of the population among the working-age males and females. The female non-college group is large among older generations but have declined rapidly for subsequent birth cohorts. Second, the Figure shows that the shares of both genders with college degrees or more are projected to increase among

younger and future generations (with low and negative ages in 2024). The increase in the projected shares of women who attain college degrees (and, correspondingly, the decline in the shares of women who don't) is especially rapid. Because those with a college education are projected to be net-tax payers during their lifetimes, it's worth noting that the fiscal imbalance measure reported above would be even larger if the trend toward an increasingly educated population were absent.

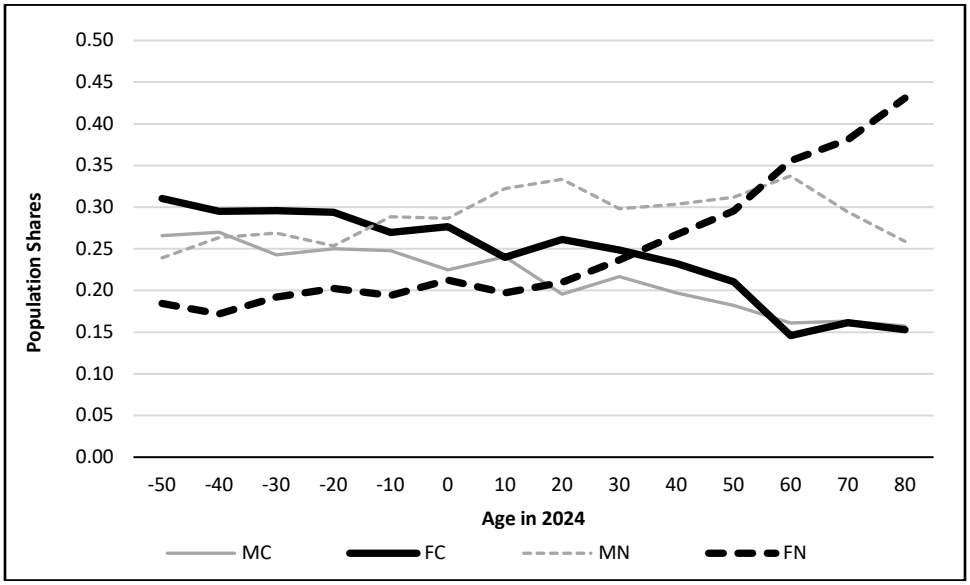


Figure 3: *Initial Birth Cohorts (by Age in 2024): Shares by Lifetime Educational Attainment and Sex.*
Legend Key: 1st letter: M=male, F=female; 2nd letter: C=college, N=non-college.
Source: Authors' calculations based on data from the PWBM Microsimulation.

5. Policy changes to eliminate FI

U.S. national indebtedness ($162.6 trillion) is far larger than suggested by outstanding contractual debt held by the public ($26.2 trillion). Restoring fiscal balance (FI=0) would require increasing taxes, reducing transfers, reducing federal purchases, or some combination of these policies.

Table 3 examines a menu of policy alternatives for restoring reducing FI.

Policy #	Policy Specification	Required Adjustment Percentage(s)
1	Increase taxes and expenditures in equal percentage change	14.6
2	Increase all federal taxes	33.4
3	Reduce all federal expenditures	26.1
4	Reduce all federal transfer payments	32.7
5	Adjust OASDHI's and non-OASDHI programs in proportion to their own FIs. Adjust OASDHI's taxes and transfer in equal percentage and Adjust non-OASDHI's taxes and expenditures in equal percentage	 17.3 13.1
6	Adjust non-OASDHI's taxes and expenditures in equal percentage	23.0
7	Adjust all taxes and transfers; maintain federal purchases	16.5
8	Hold the elderly (age 60+) harmless under Policy #1	15.7

Table 3: *Alternative tax increases and benefit reductions required to eliminate the U.S. fiscal imbalance.*
*Includes OASDI and Non-OASDI benefits

Table 3 shows the fiscal policy changes that would have to be introduced, immediately and permanently, to reduce FI to zero, that is, to service past debt and eliminate all future federal financial shortfalls implied by today's fiscal policies. Policy 1 levies the adjustment on the broadest possible base: Total federal tax and transfer base (all current tax bases and all transfers). All government receipts are increased, and all government expenditures are reduced by the same percentage. The required adjustment is 14.6 percent. As Figure 4 shows, introducing Policy 1 would shift all lines in Figure 3 upward.

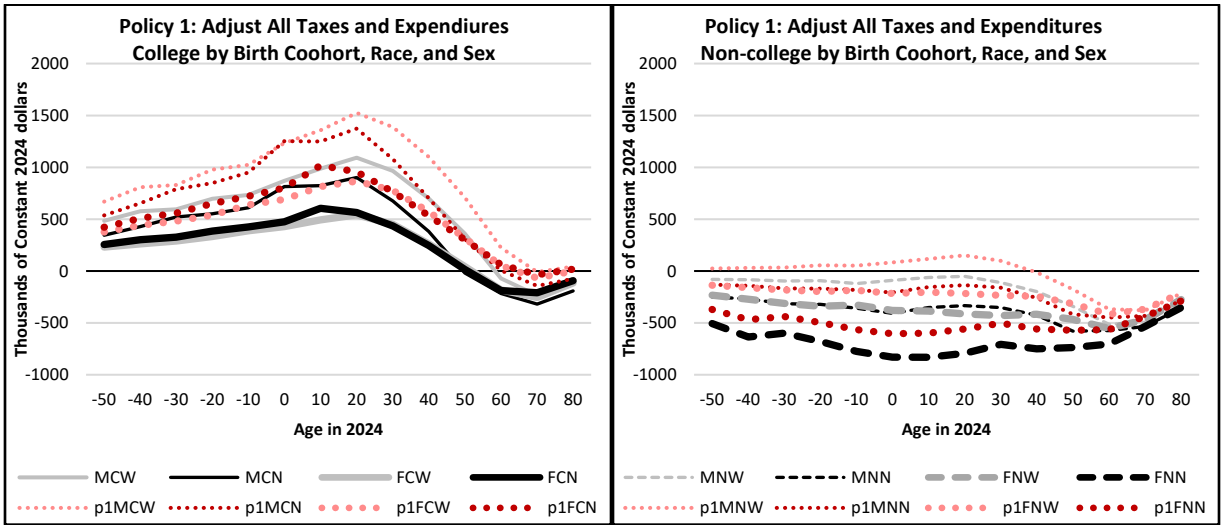
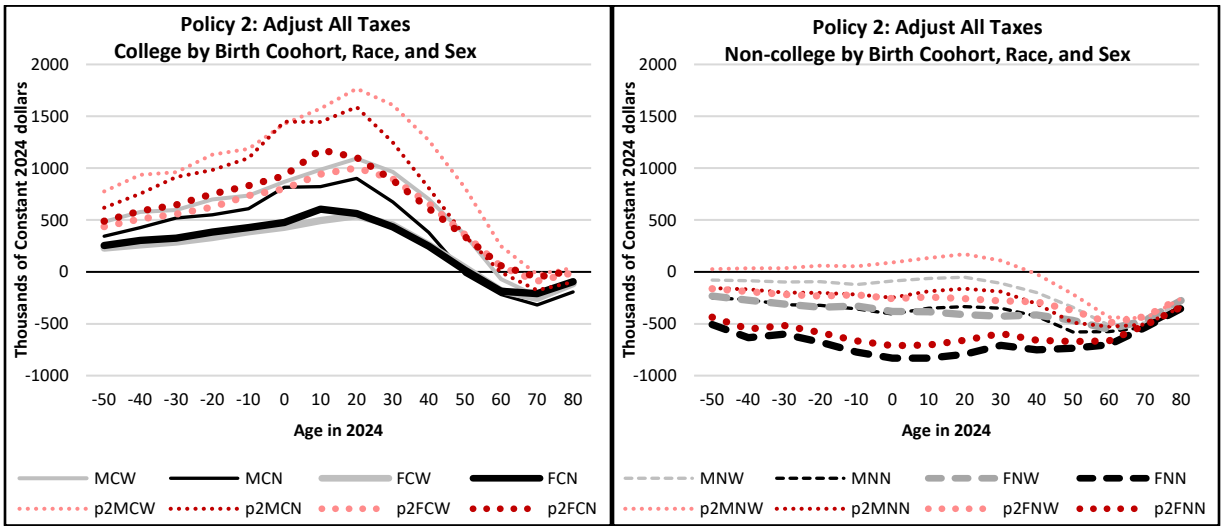


Figure 4: *The effect of increasing all taxes and reducing all transfers and purchases by 14.6 percent (Policy 1) on prospective lifetime net tax payments by birth-cohort, gender, race, and lifetime education.* Source: Authors' calculations.

Figure 4 splits Figure 3 into two panes. The left pane shows net taxes of those with lifetime college education and the right pane shows net taxes of those without (negative values representing net transfers).[19] Policy 1 results in lifetime net tax profiles shifting upward (in both panes) because taxes are increased, and transfers are reduced. Public purchases are also reduced under Policy 1, but reduced provision of public goods and services is not seen in Figure 4, which is limited to showing prospective federal taxes net of transfers per capita for each group. The effect of this policy change is to increase net tax burdens and reduce protections under social safety net programs for those alive today and for future generations.



[19] Y-axes on the two panes of Figure 4 are scaled identically to maintain comparability of policy-induced line shifts.

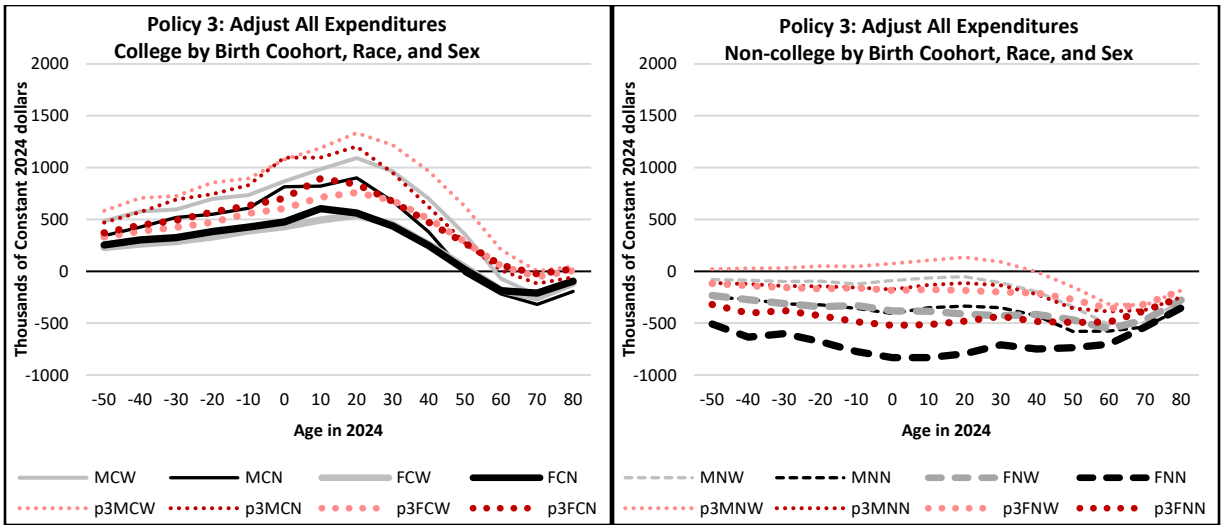


Figure 5: *The effect of increasing all taxes (Policy 2, top two panes), alternatively, reducing all expenditures (Policy 3, bottom two panes), on prospective lifetime net tax payments by birth-cohort, gender, race, and lifetime education.*
Source: Authors' calculations.

As shown in Table 3, compared to adjusting the broadest federal tax and benefit base (Policy 1), targeting a subset of federal programs would require larger adjustment percentages. For example, limiting the adjustment to all federal taxes (Policy 2) would require an adjustment of 33.3 percent, while limiting it to all federal expenditures (transfers plus purchases, Policy 3) would require an adjustment of 26.1 percent. The top two panes of Figure 5 show the effects of Policy 2, and the bottom two panes show the effects of Policy (3).

As one might expect, the effect of concentrating the adjustment on taxes (Policy 2) will impose a larger financial burden on those who pay more taxes. Since the required adjustment percentage is also larger under Policy 2 compared to Policy 1, the remaining-lifetime net tax profile by birth cohort increases by more under the former for those who attain college education and have larger taxable incomes (top left panel in Figure 5). In contrast, the effect of policy 2 is smallest on those paying low taxes: For example, non-college, non-white females (top right panel of Figure 5).

Alternatively, concentrating the adjustment on all expenditures (Policy 3) would impose large financial burdens on those who receive the most transfers.[20] The bottom-right panel of Figure 5 shows that those who do not attain college education experience larger increases in their net tax burdens under Policy 3 compared to Policies 1 and 2. Interestingly, the changes are of comparable magnitude for current older generations among the college educated under all three policies because these generations pay sizable taxes to and simultaneously receive sizable benefits from the federal government.

Myriad other alternatives are available for crafting the collection of policies to reduce the nation's fiscal imbalance. Each would concentrate tax and expenditure adjustments on specific programs and population groups. For each policy type, one could calculate the corresponding set of prospective lifetime net-tax profiles by birth-cohort and selected other attributes. The birth-cohort net tax profiles for Policies 4-9 in Table 3 are not shown here, but each increases net tax profiles by different amounts depending on the population group's exposure to programs subject to fiscal adjustments.

The policy alternatives of Table 3 assume no change in private economic decisions on labor supply and household saving in reaction to policy changes. Under tax large increases, for example, primary and secondary workers in many households may reduce work hours and decide to retire earlier. The implied reduction in the wage tax base would imply that the tax increase required to eliminate FI would be even larger than the percentages suggested in Table 3. Then, a potential spiral of rising tax rates and declining economic activity may mean that achieving fiscal sustainability (FI=0) is not feasible.

[20] Everyone would receive reduced benefits from cuts to public purchases, which are not reflected in Figures 4 and 5)

On the federal expenditures side, eliminating FI through reductions to OASDHI and/or non-OASDHI transfers alone would weaken the U.S. social safety net. By implication, minimizing adverse effects of reducing national indebtedness on the economy and on the social safety net would require a distributed approach. As Table 3 suggests, the lowest percentage adjustment is associated with the broadest adjustment base, whereby all taxes and all benefits are adjusted in equal percentage.

It is worth noting that federal tax, transfer, and purchase programs provide benefits and social protections to the entire population over several phases of their lifecycles. Almost all individuals pay taxes and receive benefits during childhood, as working-aged adults, and during retirement. Many receive transfers and pay taxes during narrow time windows of their lifecycles, often even concurrently. For example, households may receive child and other tax credits, unemployment insurance, and other transfers in one year and become employed and begin to pay taxes in the next. Retirees receive large OASDHI and other transfers and simultaneously pay sizable income and other taxes based on pension incomes and withdrawals from tax-qualified saving plans. A preference for minimizing adjustments on taxes, (alternatively, on transfers), may be motivated by the desire to prevent weakening economic incentives to work and save (alternatively, preserve safety-net protections for economically vulnerable groups). Under a prospective lifetime net-tax-burden perspective, however, both tax increases and transfer cuts appear likely to have both effects, to weaken net economic incentives and safety net protections afforded by the federal fiscal system.

6. Conclusion

Federal debt has increased consistently since the early 2000s after abandonment of the BEA's (1990) constraints on deficit increasing measures. Because federal budget policies included strong expenditure commitments on providing public goods and services and maintaining social insurance and safety net programs, a more complete measure of federal indebtedness must add a measure of those unfunded obligations under current federal policies to outstanding federal debt held by the public. Our measure of federal indebtedness, FI, adds together outstanding "explicit" debt and "implicit" net obligations. We estimate FI at $162.6 trillion (6.6 percent of the present discounted value of GDP), which is six-fold larger than outstanding federal debt held by the public. The associated GI measure, calculated only for OASDHI programs, reveals that past and current generations are slated to receive $62.7 trillion more than they will pay to fund OASDHI programs.

Current fiscal policy redistributes tax revenue from educated high earning males and females to help finance social insurance and safety net protections for the less educated and economically less well-off individuals and families. Restoring balance to federal finances (reducing FI to zero) would require a 26.1 percent across-the-board cut in federal expenditures, or a 33.4 percent increase in federal receipts, or some combination of the two. If all taxes and all expenditures are to be adjusted, the required adjustment percentage equals 14.6 percent across the board. Holding people older than age 59 harmless increases the required across-the-board adjustment to 15.7 percent.

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Appendix 1

Fiscal and Generational Imbalance Measures and Prospective Lifetime Net Taxes

Fiscal imbalance and prospective lifetime net taxes metrics take as their starting point the government's present-valued (intertemporal) budget constraint. This constraint may be written as

(A1.0) $\mathrm{PVG_t} = \mathrm{NWG_t} + \mathrm{PVTL_t} + \mathrm{PVTF_t}$.

Equation (A1.0) is a financing constraint. It says that at time t (the initial year), the present value of all prospective government purchases of goods and services, PVG_t, must be paid for out of its total resources: the net wealth of the government, NWG_t plus the present value of prospective net tax payments by current generations, PVTL_t, and plus the present value of aggregate net tax payments by future-born generations, PVTF_t. Net taxes are calculated as tax payments net of transfer receipts in each period.

Equation (A1.0) may be satisfied under many different configurations of government tax and spending laws. For example, low (high) $\mathrm{PVG_t}$ implies that prospective net tax payments of living and future generations must be correspondingly lower (higher) for the two sides of (A1.0) to balance; and given $\mathrm{PVG_t}$, low net taxes levied on living generations must be offset by higher net tax levies on future ones, and so on.

In general, prospective government spending and net taxes of living and future generations under *current policy* (denoted as PVG_t^c, PVTL_t^c, and PVTF_t^c), which includes scheduled future changes such as expirations of particular spending, tax, and transfer laws, the two sides of (A1.0) usually would, in general, not be equal. The present valued difference between the government's current-policy spending and resources equals the current-policy fiscal imbalance, $\mathrm{FI_t^c}$.

(A1.1) $\mathrm{FI_t^c} = \mathrm{PVG_t^c} - [\mathrm{NWG_t} + \mathrm{PVTL_t^c} + \mathrm{PVTF_t^c}]$.

Since resources on hand today, NWG_t, are already accounted for and fixed from past accruals, the present valued dollar amount, FI_t^c, shows the *additional* resources needed for the government to fully fund current-policy purchases, PVG_t^c. A positive value of FI_t^c indicates a funding shortfall that must be resolved either by levying additional net taxes (increasing taxes or cutting transfers from current-policy levels) or by reducing government purchases themselves below current-policy levels. That is eliminating the imbalance shown in (A1.1) involves changing fiscal laws to establish equality of the two sides of equation (A1.0).

Appendix 2

Computation Method

Estimation of the two present-valued terms within square brackets in equation (A1.1) can be accomplished by calculating prospective lifetime net tax measure for a population group. This measure is the dollar amount, defined as the actuarially discounted present value of per capita net tax payments (under a given fiscal policy) of a population cohort over the rest of its expected lifetime.[21] Adding up the population-weighted GAs of all birth cohorts alive today yields the term PVTL_t^c. Similarly, calculating the GAs of yet-to-be-born population cohorts over their expected lifetimes (by using future population projections) and adding their population-weighted present-discounted values yields the term PVTF_t^c.[22] Prospective lifetime net taxes and fiscal imbalance measures can be calculated under any given set of fiscal laws or policies, *p*, to reveal the extent of tax- and spending-law adjustments needed to restore intertemporal budget balance ($\mathrm{FI}_t^p = 0$). It also reveals the extent of trade-offs in distributing the adjustments on spending and net taxes on living and future generations.

[21] In this study population cohorts are distinguished by birth year, gender, race, and lifetime educational attainment.
[22] The latter calculation is extended sufficiently far into the future so that the present discounting procedure results in a stable value of PVTF_t^c.

The term NWG_t is simply total contractual asset/debt position of the government vis-à-vis the rest of the world.[23] As noted above, the sum of remaining lifetime net taxes over all members of living generations yields the term PVTL_t^c. This sum is

(A2.2) $\text{PVTL}_t^c = \sum_{j_t=0}^{D} \sum_x \left(GA_{j_t,t}^{c,x} p_{j_t,t}^x \right)$,

where, x represents a combination of gender, education, and race attributes [gender (male, female), education (college degree, no-college degree) and race (white, nonwhite)], D is the maximum age of life (assumed to be 120 years), $p_{j_t,t}^x$ represent the populations of type x aged j in year t, and $GA_{j_t,t}^{c,x}$ represents current-policy remaining lifetime net taxes in year t of person-types x aged j in year t (indexed by j_t), that is, present values as of year t of per capita net taxes that each generation would pay under current policies during its expected lifetime.

The generational account, $GA_{j_t,t}^{c,x}$ is calculated as

(A2.3) $GA_{j_t,t}^{c,x} = \frac{1}{p_{j_t,t}^x} \sum_{s=t}^{t+D-j_t} \sum_x p_{j_t,s}^x \left(\sum_{i=1}^{k} q_{i,j_t,s}^{c,x} \right) R^{s-t}$,

where $R = 1/(1 + r)$, and r is the discount rate. Equation (A2.3) expresses the actuarially discounted value of prospective per capita net payments of a generation aged j at year t. The account for each generation is calculated by (1) finding the algebraic sum of the per capita taxes and transfers paid in each year, s, by the members surviving in that year (including people of that age and person-type who have immigrated since year t), (2) multiplying that sum by the population in year s, (3) discounting the result back to year t, (4) aggregating such discounted values over the generation's remaining lifetime, and (5) dividing the result by the generation's population in the initial year, t. In equation (A2.3), $q_{i,j_t,s}^{c,x}$ stands for the current-policy per capita

[23] The U.S. Treasury department reports this as "debt held by the public." It includes outstanding Treasury Bills, Notes, Bonds, Inflation protected, and other securities issued by the federal government and held by individuals, corporations, state and local governments, Federal Reserve banks, and foreign entities. As of year-end 2020 it stood at $21.6 trillion.

payment (or receipt, when q is negative) of type i in year s $(> t)$ by a generation of person-type x aged j in year t. The per capita net payment—after accounting for all (k) types of taxes and transfers in year s—is given by the sum in parentheses in (A2.3). This term, multiplied by the population of such persons in year s, $p^x_{j_t,s}$ yields the aggregate net payment that individuals of type x aged j in year t make in year s. U.S. population projections are taken from PWBM's microsimulation, which is calibrated to many features of the United States demography and demographic projections. Summing such discounted values for each year s over the remaining life of individuals aged j in year t (from t to $+D-j_t$) yields the discounted value of their aggregate net tax payments. Division by $p^x_{j_t,t}$, the population of such persons in year t, converts this actuarially discounted sum to a per capita amount and represents the generational account of the generation of person-type x, aged j in year t, under current fiscal laws (denoted by superscript c).

Prospective per capita payments of each type of tax (or transfer) are estimated by distributing projected aggregate payments of that type by age and person-type categories. The calculation uses U.S. population projections and aggregate federal taxes and transfers from an official source. The source used here is the Congressional Budget Offices' annual Budget Outlook report (CBO, 2024). To each type of aggregate tax or transfer projection, it applies a relative profile by age and person-type normalized to a 40-year-old male. The exception is child-SCHIP benefits that are allocated only to children aged 0-17 with relative profiles normalized to male children aged 12.[24] The relative profile value for a 38-year-old woman is the ratio of her per capita payment to that of a 40-year-old man.

[24] No education attributes are assigned to children aged 0-17.

Relative profiles for various taxes and transfers are estimated from survey data and the latest available profiles are used to distribute projected aggregate payments by age and person-type in future years. It is worth noting that each tax and transfer profile shows dollars per capita paid and received net of any tax-expenditures provisions associated with the corresponding federal programs. For example, the profile used for labor and capital income taxes shows those tax payments per capita net of any exemptions, deductions, credits, depreciation, and other allowances, that determine tax liabilities. Hence, the profiles capture "current fiscal policy" in the broadest sense of the term. For the United States, estimates of per-capita payments and receipts are calculated form micro-survey datasets of the Census Bureau, the Current Population Survey (Annual Social and Economic Survey), the Social Security Administration's Annual Statistical Supplement to the Social Security Bulletin, the Federal Reserve's Survey of Consumer Finances and the Census Bureau's Survey of Consumer Expenditures, and others.

The Congressional Budget Office's projections of aggregate payments are available only through the year 2030. For the years 2024-2034, the relative tax/transfer profiles are used to distribute by age and person-type, projected aggregate federal revenues and transfer expenditures. This yields per capita payments by age and person-type for those years. For the year 2034, PWBM microsimulation population totals are used to calculate each budget aggregate and 2034 and future per capita values are benchmarked using the ratio of CBO's aggregate for 2034 and the aggregate obtained using the PWBM microsimulation's population. The benchmarking factors are generally quite close to 1.0. Indicating that error from using the simulated population through 2034 are acceptably small. Per capita values for 2035 and later are obtained by growing per capita values for 2034 at the rate of labor productivity (g). Hence, if the last available tax and expenditure aggregate if for year l,

(A2.4) $q^{c,x}_{i,j_t,l+u} = q^{c,x}_{i,j_t,l} * (1+g)^u, \quad i = 1,..k; \quad u = 1,...T.$

Relative tax and transfer profiles and associated aggregate payments and receipts specify the pattern of prospective per capita taxes levied on and receipts provided to various generations living at year t and, therefore, collectively embody the generational pattern of fiscal policy at year t. Because all relative profiles are normalized to average payments by z-year-old males (40-year-old males in general and 12-year-old male children in the case of SCHIP benefits), the per capita payment of the z-aged normalizing individuals can be expressed as

(A2.5) $q^{c,m}_{i,z,t} = \frac{Q^c_{i,t}}{\Sigma^D_{j_t=0}\left(r^m_{i,j_t,t} \cdot p^m_{j_t,t} + r^f_{i,j_t,t} \cdot p^f_{j_t,t}\right)}.$

In (A2.5), $r^m_{i,j_t,t}$ represents the per capita payment (or receipt, if negative) of type i that a person aged j in year t makes relative to the payment of a 40-year-old male in year t, and $Q^c_{i,t}$, t represents the aggregate current-policy payment or receipt of type i made in year t. Of course,

(A2.6) $q^{c,x}_{i,j_t,t} = q^{c,m}_{i,z,t} \cdot r^x_{i,j_t,t}.$

PVG_t is estimated by discounting prospective aggregate government purchases back to year t. If projections of aggregate purchases are unavailable or need to be extended, they are estimated by distributing, according to age, the per capita purchases in the last year (actual or projected) for which an aggregate figure is available, by making the per capita purchases by age grow at the same rate as labor productivity, and finally, by using a population projection to aggregate the per capita figures. Many yearly government purchases, such as for defense and general administration, cannot be assigned to specific age groups and are prorated to all individuals alive in that year. Note that this methodology uses estimates of government purchases distributed equally across the population only to mechanically extend the projections of those purchases. It does not try to assign the benefits of such purchases by age and person

type. As with the per capita distribution of taxes and transfers, the estimates for purchases assume a constant relative profile by age, reflecting an equal benefit to all current individuals.

Government net wealth, NWG_t, can be estimated by cumulating the sum of past government surpluses (or deficits, if negative). The government's existing tangible assets, such as parks and infrastructure, are excluded from NWG_t, and their prospective service flows, which represent the consumption of public goods, are excluded from PVG_t^c. If these assets were included in NWG_t, their service flows would have to be included in PVG_t^c. Because the value of the assets must, by definition, equal the present value of their service flows, they would cancel each other if they were included in equation (A1.1). Thus, the exclusion of these items does not affect the trade-off between PVTL_t^c and PVTF_t^c .

Appendix 3

Generational Imbalance (GI)

Programs such as Social Security and Medicare Part 1 (Hospital Insurance) are purely redistributive in that all dedicated payroll and other taxes are eventually paid out as benefits.[25] The social insurance these programs provide occasions an on-going redistribution from workers to retirees and other beneficiaries. The prospective lifetime net taxes measure aggregates dollars paid to and received from the federal government by all individuals classified by birth year.[26]

The fiscal imbalance for such programs can be written as the negative of existing assets in the program's trust fund ($NWTF_t$) and the sum of the actuarially discounted present values of net payroll and other taxes projected for living and future generations: negative net tax payments

[25] Government purchases of program-administrative services are not included in these accounts.
[26] Evaluating social insurance provision as a separate benefit is not implemented under lifetime net tax calculations reported in this study.

(taxes−benefits<0 in present value over remaining lifetime) increase the program's fiscal imbalance.

(A3.1) $\mathrm{FI}_t^c = -(\mathrm{NWTF}_{\,t} + \mathrm{PVTL}_t^c + \mathrm{PVTF}_t^c)$.

Calculations of the terms PVTL_t^c and PVTL_t^c are restricted to program revenues and expenditures and follow the same steps as described above. In the case of programs with dedicated revenue sources, the term $-(\mathrm{NWTF}_{\,t} + \mathrm{PVTL}_t^c)$ on the right hand-side of (A3.1) shows the Generational Imbalance (GI_t^c) on account of past and living generations.[27]

A positive FI_t^c indicates a shortfall of resources that must eventually be made up through a change in current tax and benefit laws. Given $\mathrm{NWTF}_{\,t}$, which is fixed from the past, the change in GI_t^c following a change in the laws indicates how much of the policy adjustment is levied on living generations. For example, a change in laws that results in a large reduction in FI_t^c but little change in GI_t^c would show that most of the adjustment cost is levied on future generations of program participants under the new laws.

Appendix 4

PWBM's Estimation of FI, GI, and Prospective Lifetime Net Taxes.

Generations are distinguished by single year of birth, age, gender, race (white and nonwhite) and educational attainment (college degree and no college degree). Relative tax and transfer profiles are calculated from micro-data surveys, one for each combination of these attributes. That is, for each age, we distinguish 12 person-types as shown in Table A4.1. Earlier calculations of these metrics distinguished generations by age and gender only. That's because demographic projections of the Social Security Administration that are used in those studies do

[27] The term NWTF_t, which shows the accumulated assets or debt of the program through year t, records the overall effect of past net payments of past and current generations.

not decompose population projections by race and education. The PWBM microsimulation, which is calibrated to demographic and economic features of the United States, projects race and education (among other) attributes of the projected population.

Label	Gender (M, F)	Education (N, C)	Race (W, N)
MCW	Male	College degree or more	White
MNW	Male	No college degree	White
MCN	Male	College degree or more	Nonwhite
MNN	Male	No college degree	Nonwhite
FCW	Female	College degree or more	White
FNW	Female	No college degree	White
FCN	Female	College degree or more	Nonwhite
FNN	Female	No college degree	Nonwhite

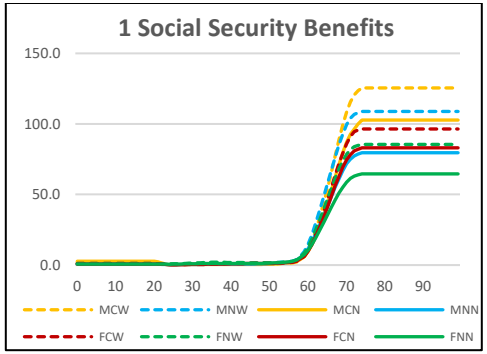
Table A4.1. *Person-Type Characteristics Distinguished for Calculating Labor Efficiency*

Because mortality, fertility, and immigration rates (and their evolution through many interactive socio-economic processes such as ages and frequencies of marriage, childbearing, and divorce, patterns of assortative mating, and processes of family formation and dissolution etc.) differ significantly across individuals by race and education, the demographic composition of the future population is projected to change according to momenta and trends in those variables observed in the past. The PWBM microsimulation builds in those trends to deliver an evolving future demographic profile.

Differential base-period tax and transfer distributions by race and education in addition to age and gender, interact with differential growth and mortality rates for those population groups. Table A4.1 shows how each year's population is classified by gender, race, and education (attainment of college degree over the lifetime versus no college degree). Figure A4.2 shows relative tax and benefit profiles by age estimated from micro-data surveys and used to allocate federal tax and benefit aggregates (see Tables in Appendix 8) by the population groups shown in

Table A4.1.[28] Several age-benefits profile charts in the figure, especially those related to means tested benefits such as Medicaid (3), Supplementary Nutritional Assistance (5), Supplemental Security Income (6), Unemployment Compensation (7) Earned Income Credit (8) and other welfare transfers (10), rental subsidies (25), child nutrition (26), disability insurance (27), pandemic relief (28), indicate higher benefit awards per capita to nonwhites (unbroken lines) and those with lowest education (green and blue lines). On the other hand, the age-profiles for taxes such as labor income taxes (21), Social Security payroll taxes (22), Medicare payroll taxes (23), capital income taxes (32), real-estate taxes (34), corporate income taxes (35), deposit insurance premiums (36), indirect taxes (39), etc. show higher relative values for whites (dashed lines) and those with high-education (red and yellow lines). Moreover, the profile for labor force attachment (24) shows lower levels for nonwhite and less educated individuals.

[28] The tax and benefit aggregates and 10-year projections that are allocated by the relative age-profiles are taken from the Congressional Budget Office's Budget and Economic Outlook, February 2024.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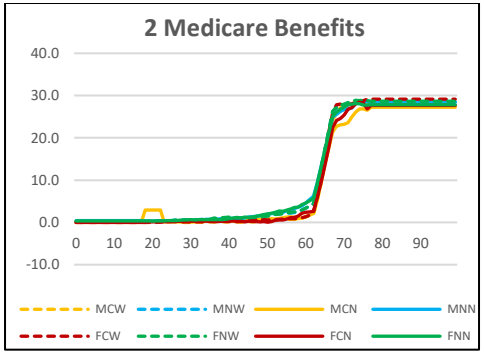
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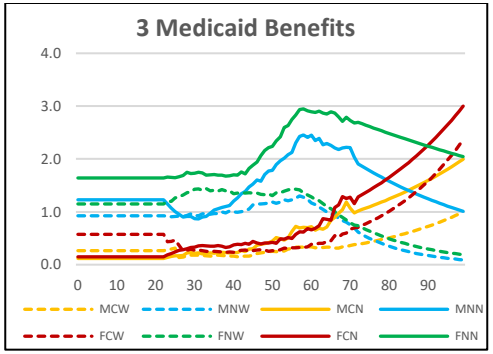
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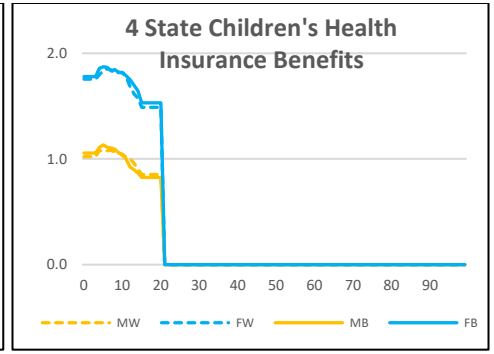
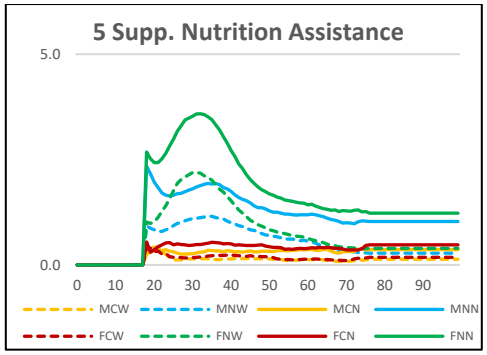
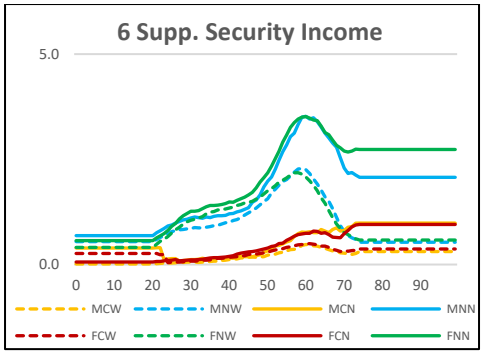
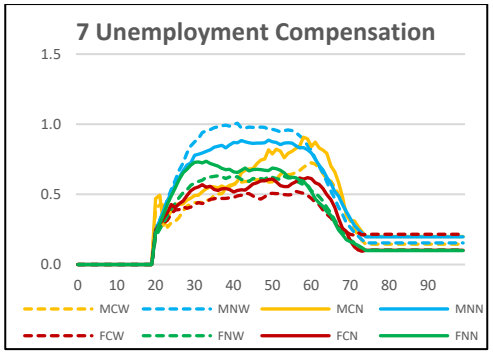
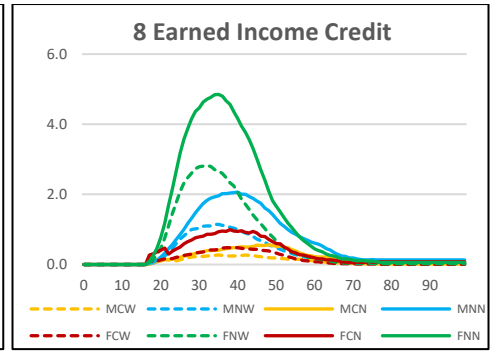
MCW MNW MCN MNN
FCW FNW FCN FNN

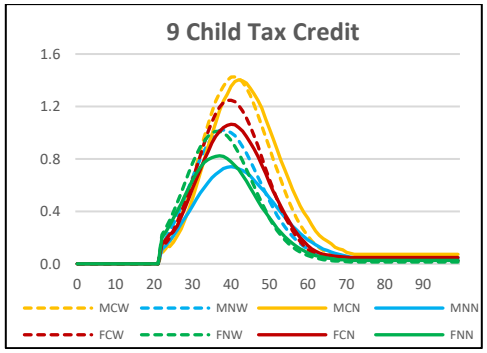

4 State Children's Health Insurance Benefits
2.0
1.0
0.0
0 10 20 30 40 50 60 70 80 90
MW FW MB FB

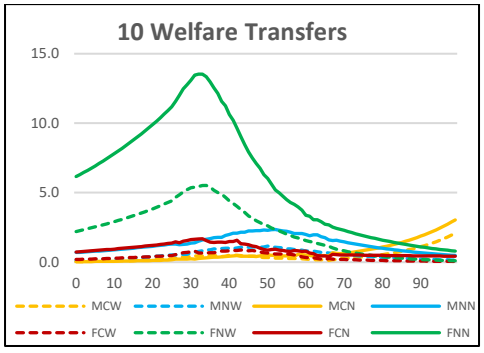

5 Supp. Nutrition Assistance
5.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

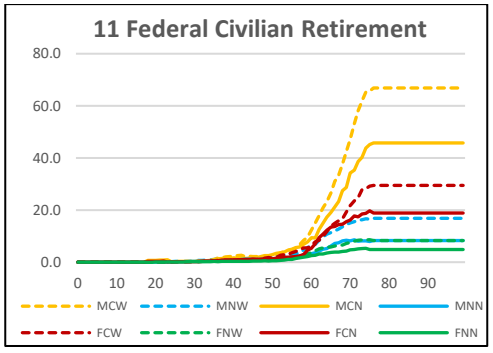

6 Supp. Security Income
5.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

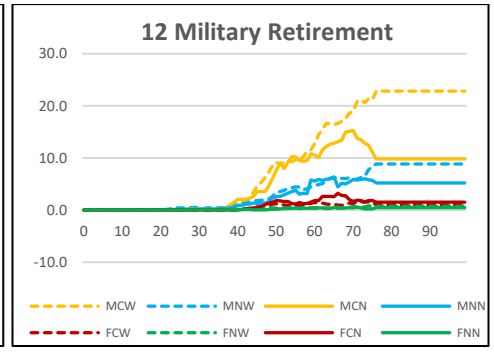

7 Unemployment Compensation
1.5
1.0
0.5
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

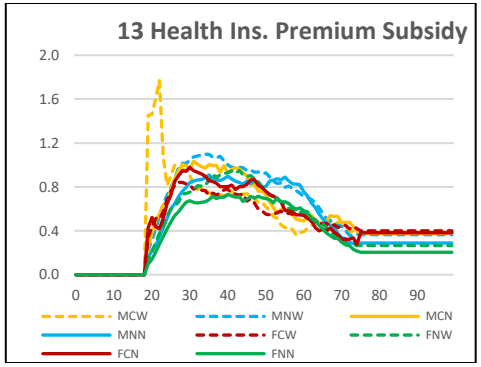

8 Earned Income Credit
6.0
4.0
2.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN


9 Child Tax Credit
1.6
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN


10 Welfare Transfers
15.0
10.0
5.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN


11 Federal Civilian Retirement
80.0
60.0
40.0
20.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN


12 Military Retirement
30.0
20.0
10.0
0.0
-10.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN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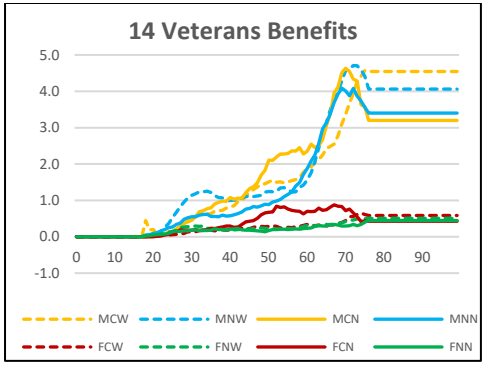
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN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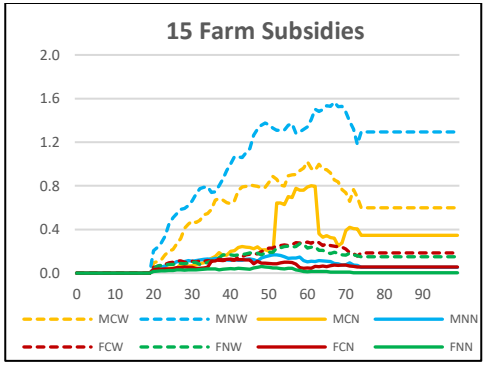
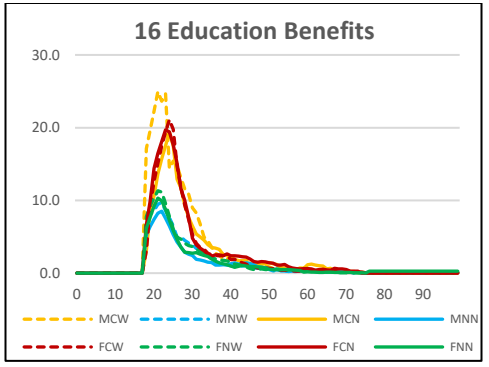
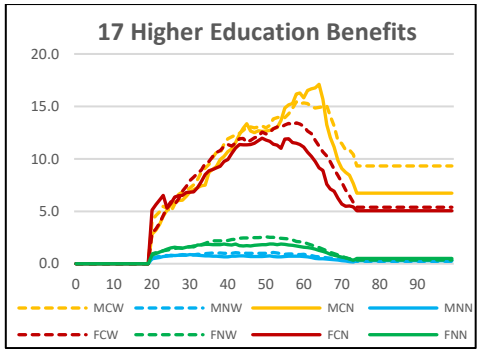
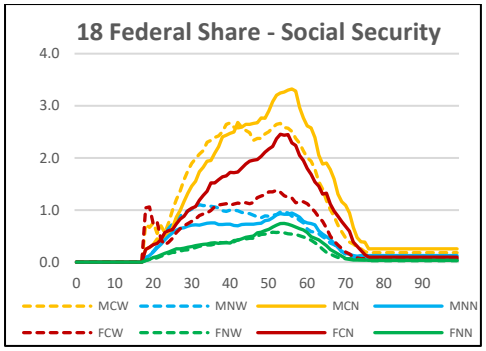
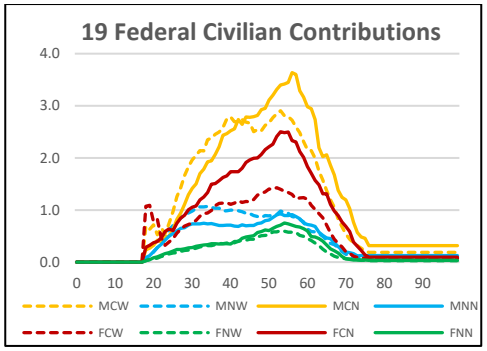
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

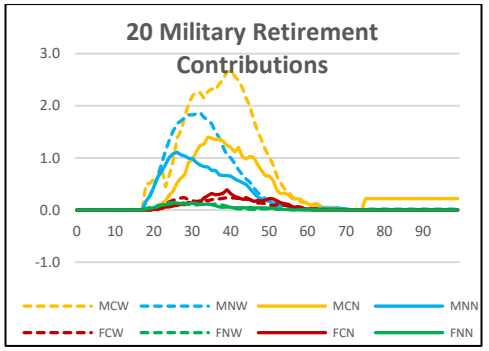

15 Farm Subsidies
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

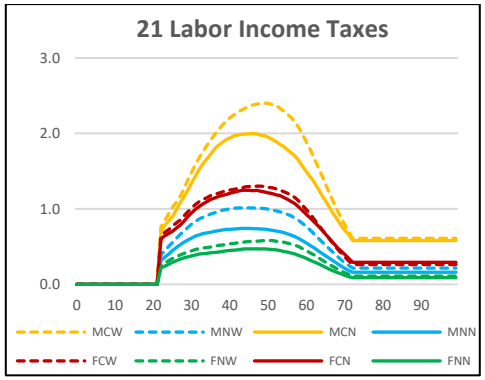

16 Education Benefits
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

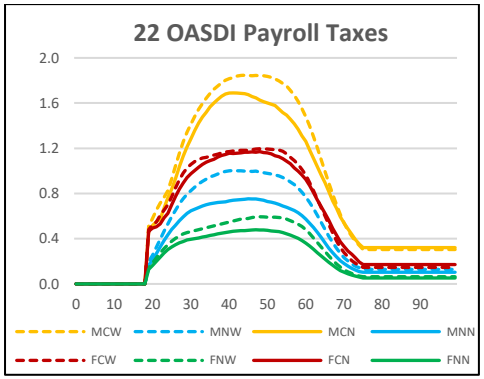

17 Higher Education Benefits
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

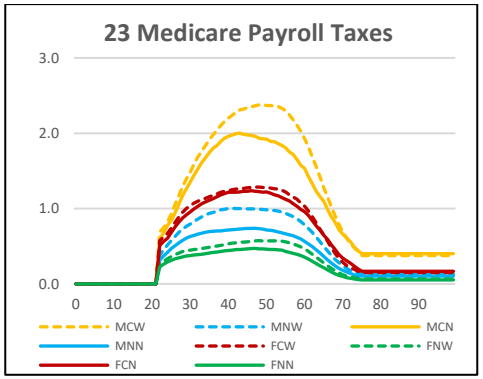

18 Federal Share - Social Security
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

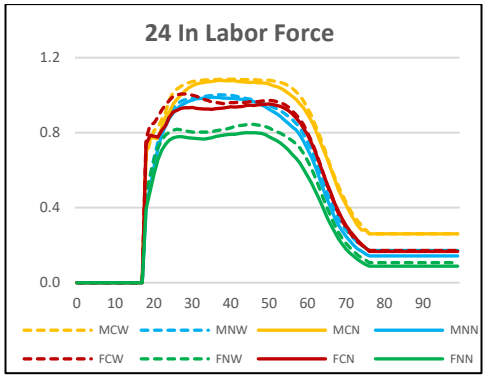

19 Federal Civilian Contributions
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

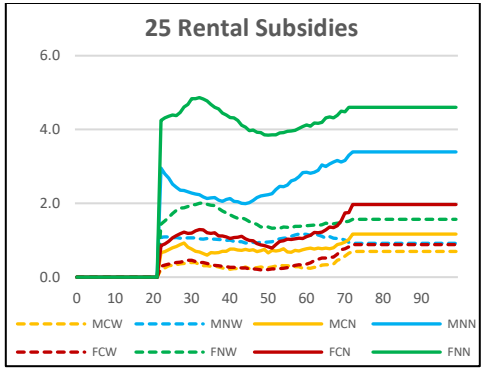

20 Military Retirement Contributions
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

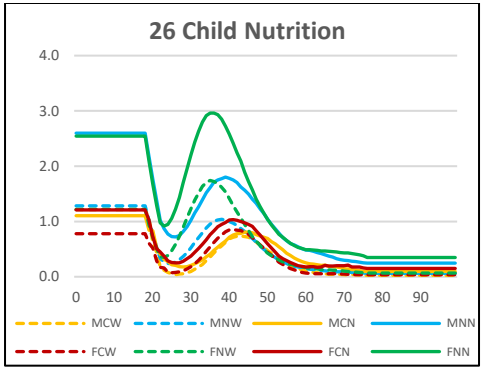

21 Labor Income Taxes
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

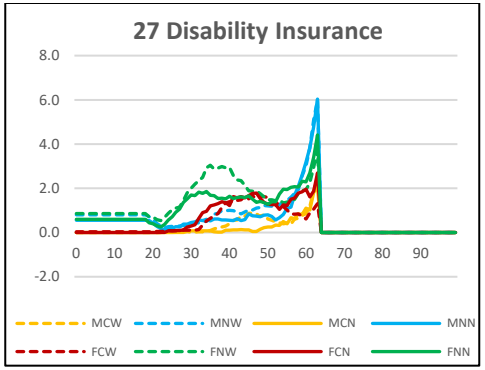

22 OASDI Payroll Taxes
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

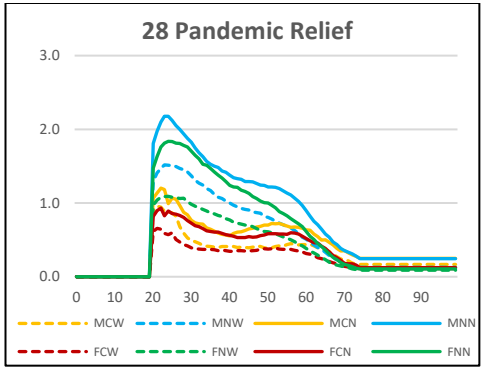

23 Medicare Payroll Taxes
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

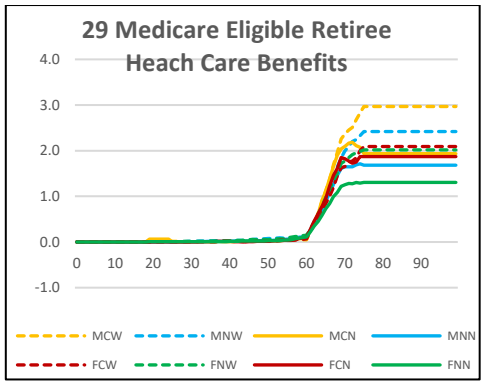

24 In Labor Force
MCW
MNW
MCN
MNN
FCW
FNW
FCN
FNN

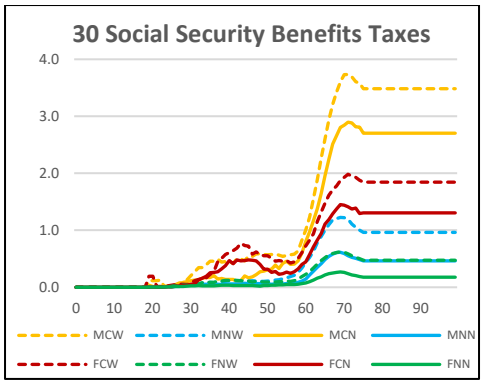

25 Rental Subsidies
6.0
4.0
2.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

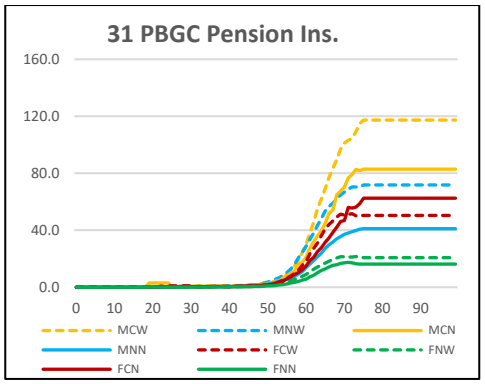

26 Child Nutrition
4.0
3.0
2.0
1.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

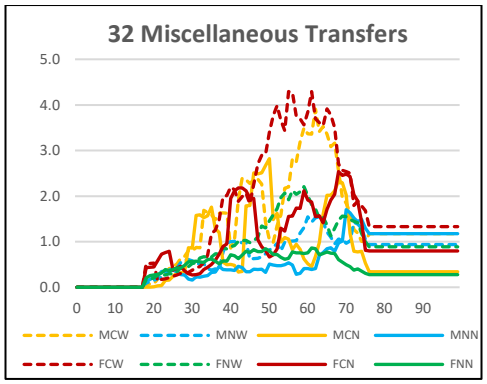

27 Disability Insurance
8.0
6.0
4.0
2.0
0.0
-2.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

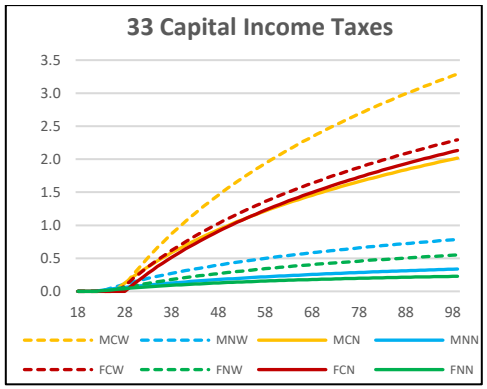

28 Pandemic Relief
3.0
2.0
1.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

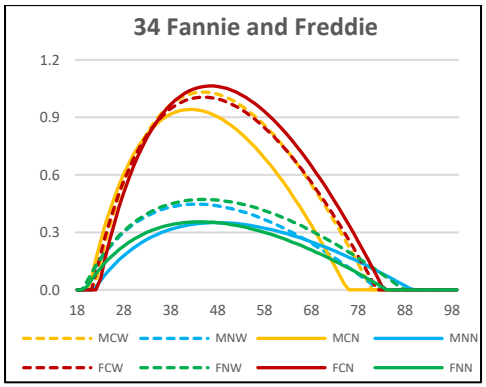

29 Medicare Eligible Retiree Heach Care Benefits
4.0
3.0
2.0
1.0
0.0
-1.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

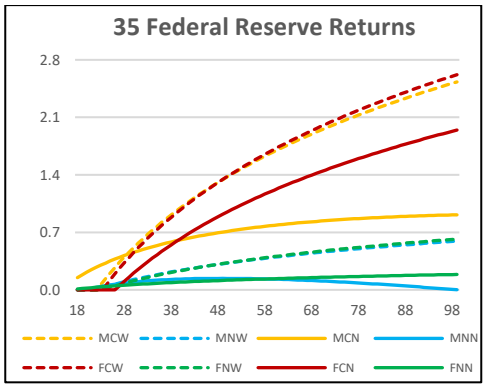

30 Social Security Benefits Taxes
4.0
3.0
2.0
1.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN

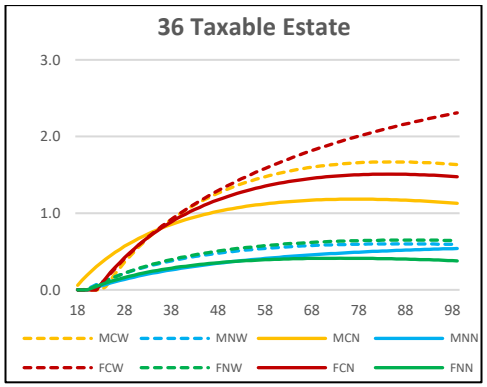

31 PBGC Pension Ins.
160.0
120.0
80.0
40.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN
MNN FCW FNW
FCN FNN


32 Miscellaneous Transfers
5.0
4.0
3.0
2.0
1.0
0.0
0 10 20 30 40 50 60 70 80 90
MCW MNW MCN MNN
FCW FNW FCN FNN


33 Capital Income Taxes
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
18 28 38 48 58 68 78 88 98
MCW MNW MCN MNN
FCW FNW FCN FNN


34 Fannie and Freddie
1.2
0.9
0.6
0.3
0.0
18 28 38 48 58 68 78 88 98
MCW MNW MCN MNN
FCW FNW FCN FNN


35 Federal Reserve Returns
2.8
2.1
1.4
0.7
0.0
18 28 38 48 58 68 78 88 98
MCW MNW MCN MNN
FCW FNW FCN FNN


36 Taxable Estate
3.0
2.0
1.0
0.0
18 28 38 48 58 68 78 88 98
MCW MNW MCN MNN
FCW FNW FCN FNN

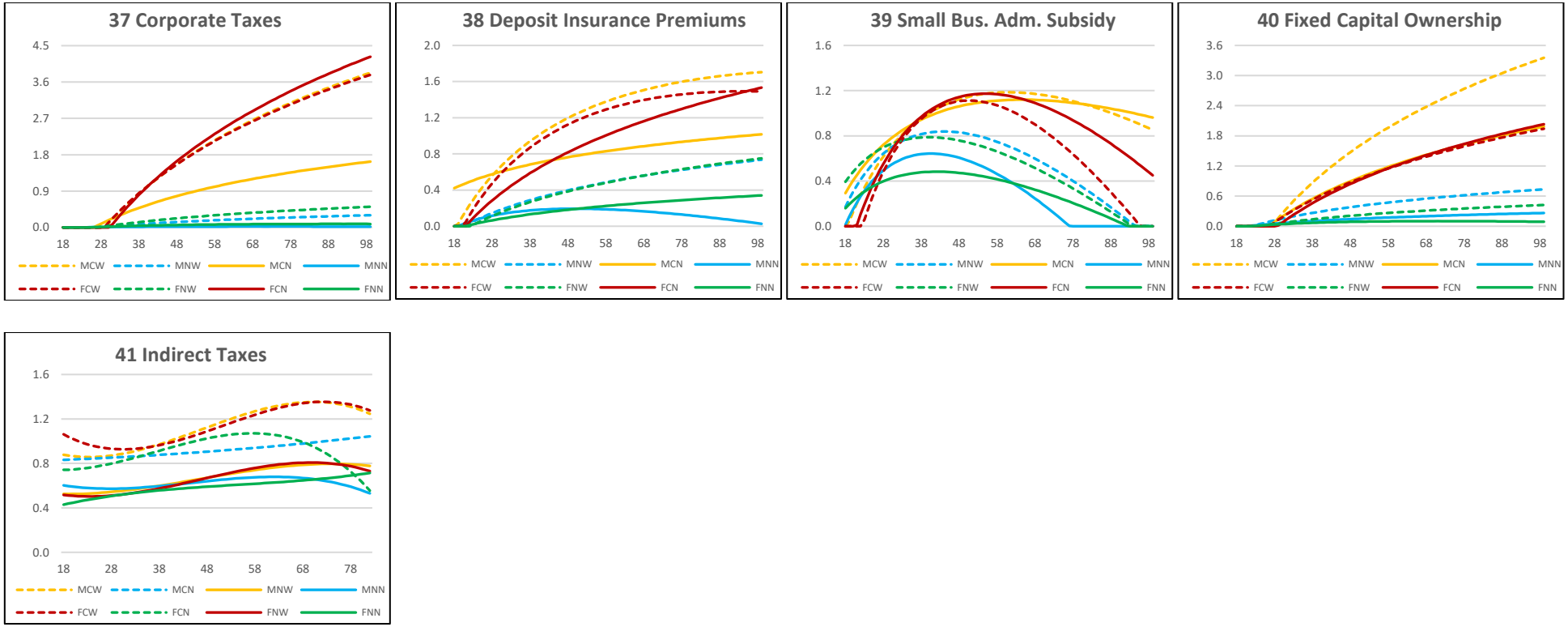


Figure A4.2: *Relative tax and transfer profiles by single year of age.*

Sources: Annual Social and Economic Supplement to the Current Population Survey, 2022; Survey or Consumer Finances from the Federal Reserve Board of Governors, 2022; Consumer Expenditure Survey from the U.S. Bureau of Labor Statistics, 2022

Legend labels: M=Male, F=Female, C=College Degree, N=No College Degree, W=White, N=Nonwhite.

Appendix 5

Projecting U.S. Wages, Employee Compensation, and Gross Domestic Product (GDP)

A. Production Function Framework

PWBM's projection of U.S. GDP utilizes a production function framework that specified how inputs of labor and capital are converted to output each year. The production function for each year t, is given by equation (A5.1)

(A5.1) $Y_t = P_t A_t K_t^{\alpha} {L_t}^{1-\alpha}$

Y_t = Nominal national output

P_t = Price level

A_t = Multifactor productivity

K_t = Capital services input

L_t = Efficiency adjusted labor services input

α = Output elasticity of capital

Decompose $L_t = h_t \times H_t$

H_t = total hours (FTEH) and h_t is average worker efficiency per FTEH to get

(A5.2) $Y_t = P_t A_t K_t^{\alpha} (h_t H_t)^{1-\alpha}$

Total labor productivity, η_t, which is output per hour, is given by

(A5.3) $\eta_t = \frac{Y_t}{H_t} = A_t K_t^{\alpha} {h_t}^{1-\alpha} {H_t}^{-\alpha} = A_t k_t^{\alpha} {h_t}^{1-\alpha}$, where $k_t = K_t / H_t$.

Expressed in terms of growth rates:

(A5.4) $\frac{d\eta_t}{\eta_t} = g^{\eta} = \frac{dA_t}{A_t} + \alpha \frac{dk_t}{k_t} + (1-\alpha)\frac{dh_t}{h_t} = g^A + \alpha g^k + (1-\alpha) g^h$,

Equation (A5.4) shows the components of labor productivity growth. Of these, multifactor productivity growth dA_t/A_t , is measured as the excess growth in GDP from technological improvements after accounting for growth of labor and capital inputs. This growth

component is assumed to continue at its historical rate of 0.63 percent per year.[29] The output elasticity of capital is also estimated from BLS productivity data and set at 0.367.

B. Production Factor Inputs:

Labor productivity growth from higher capital intensity, k_t, is measured by the growth of the productive capital stock relative to labor hours. Productive capital equals non-residential fixed assets (equipment, structures, and intellectual property products) plus non-owner-occupied and other residential structures owned by households, corporates, sole-proprietorships and partnerships, and non-profit institutions. The total for 2022 is $41.6 trillion.

Capital Stock projections are made by distributing the initial year's (2022) capital stock ($41.6 trillion) among holders of claims on the nation's capital. The distributions of holdings by the 12 person-types are calculated by using the Federal Reserve's 2019 Survey of Consumer Finances. This survey identifies the distribution of asset holdings. Liquid assets, which represent transactions balances (cash and money market accounts and other liquid assets) are excluded and remaining assets are distributed across the 12 person types noted earlier. Figure A5.1 shows these distributions.

[29] Calculated from Bureau of Labor Statistics' report on multifactor productivity growth index 1987-2020. The BLS series used is Multifactor Productivity for Private Business Sector (NAICS 11-81), Index 2012 = 100.000

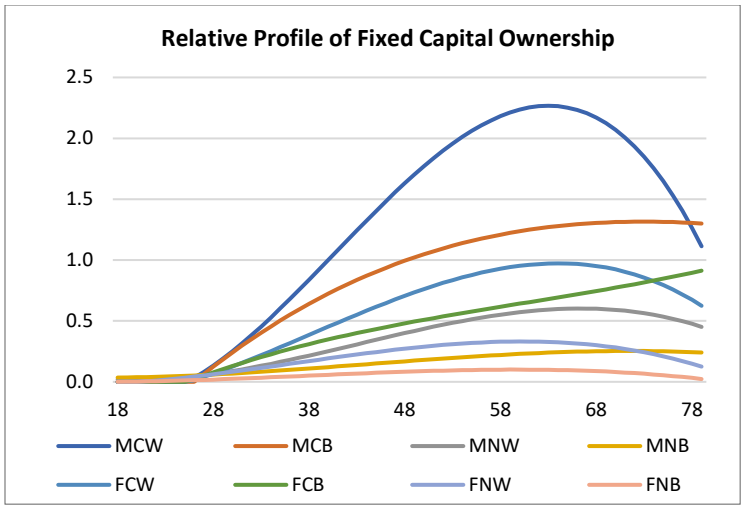


Figure A5.1: *Relative Age Profiles of Fixed Capital Ownership by Person Type.*
Source: Authors' calculations from the Federal Reserve's Survey of Consumer Finances.

Projection of the productive capital stock for future years assumes that relative holding patterns of claims on that stock will remain constant and changes in population's size and in the relative proportions of person-types in the population will drive the evolution of the stock. Projecting aggregate productive capital in this manner yields an average annual growth rate of 1.3 percent per year through the year 2100. In the very long term, that growth rate averages just over 1 percent per year. Efficient labor, L, growth is calculated by first finding relative average hourly wages in each year by person-type from the PWBM microsimulation's annual wage and work hours variables.

The PWBM microsimulation implements a labor market to calculate individuals' employment and wages. The process begins by sequentially simulating the labor force participation, class of worker, full-time status, and hours worked decisions for each individual 16 years old and older. Various micro-data sources are used: The Current Population Survey Annual Social and Economic Supplement (CPS ASEC) and the American Community Survey (ACS) for the years 1996-2023 to estimate models for these outcomes using a combination of standard regression methods and machine learning algorithms. We estimate models for the historical

period and adjust them to achieve reasonable predictions into the future in a way that is consistent with the overall PWBM economic projections.

Next, we simulate annual earnings (wage and salary income plus any non-farm business income) for each worker and in each year of the microsimulation. Our general approach for achieving this is divided into three steps. First, we estimate the parameters of a simple earnings process using data from the Panel Study of Income Dynamics (PSID) between 1997 and 2021, which we allow to vary by gender and age groups. Second, we use data from the CPS-ASEC to estimate earnings regressions using workers' demographic characteristics. Finally, we put together these two components to recover a measure of earnings that reflects both the cross-sectional variation in earnings and additionally simulates the within-worker evolution of earnings over the life cycle.

Relative values of average hourly wages by person type are taken as the efficiency rates of the different person types in each future year. Average relative worker efficiencies (both absolute and relative) by person type evolve over time depending on each person-types demographic attributes including education, the realization of permanent and temporary shocks, and other attributes such as marital status and family size. In addition, increases from of annual growth of multifactor productivity and capital intensity are incorporated to derive annual growth of individual wages. Table A5.1 provides the relative worker efficiency ratios for selected years (normalized so that the efficiency level for non-white non-college females (person-type FNN) equals 1 in 2024.

	Person type by lifetime education, race, and sex*							
Year	MCW	FCW	MNW	FNW	MCN	FCN	MNN	FNN
2024	3.57	1.89	3.01	1.53	2.21	1.05	2.02	1.00

2029	4.05	2.16	3.68	1.80	2.53	1.20	2.47	1.18
2034	4.70	2.46	4.27	2.12	2.96	1.35	2.97	1.35
2039	5.48	2.84	5.02	2.44	3.47	1.57	3.44	1.59
2044	6.36	3.32	5.72	2.85	3.88	1.86	3.98	1.81
2049	7.37	3.83	6.81	3.35	4.59	2.11	4.55	2.11
2054	8.52	4.41	7.87	3.84	5.20	2.35	5.33	2.43

Table A5.1: *Index of Relative Work-Efficiency per Hour by Person type in 2024: FNN in 2024=1.0.*
*Person type Label Key: 1st Letter: M=Male F=Female; 2nd Letter: N=Less than College, C=College or More; 3rd Letter: W=White, N=Nonwhite.
Source: Authors' calculations based on the PWBM microsimulation.

Growth in total works hours is projected by the PWBM microsimulation to be close to zero. This is a consequence of growth in the relative proportion of worker-types with low labor force attachments, a shift in the age distribution of workers toward older (pre-retirement) ages, and a general trend toward reduced hours by several person types. The countervailing factor is an increase in the share of better educated workers, especially better educated women, in the work force. Figure A5.2 show projected changes in the U.S. total and worker populations (right axis) by person-type and changes in their total hours and efficiency-adjusted hours worked (left axis).

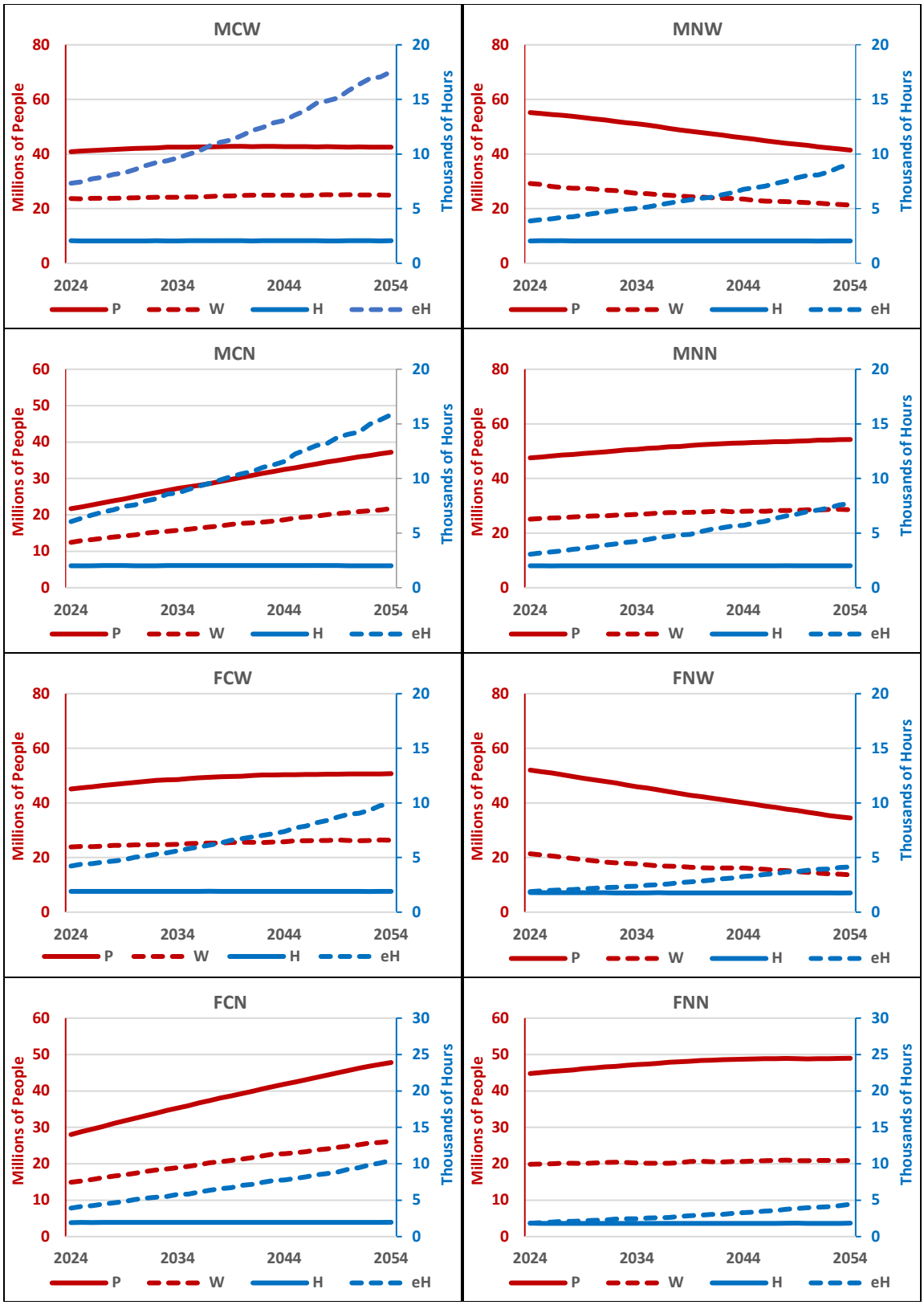


Figure A5.2: *Projected total population (P), worker population (W), average hours per worker (H), and average efficiency-adjusted hours per worker (eH) by person type through 2054.*

Title legend: Person types: 1st letter: M=Male F=Female; 2nd Letter: N=Less than College, C=College or More; 3rd Letter: N=Nonwhite, W=White.
Source: Author's calculations from the PWBM microsimulation.

As is evident from Figure A5.2, total and worker populations (red lines) of whites of both genders with less than college education levels are projected to decline and the populations of whites with college or more education are projected to remain stable. The latter have greater labor force attachment as seen in the hours/worker and efficiency-hours per worker profiles (blue lines). Projected shifts in total and worker populations result from lower projected fertility and immigration as well as higher education attainment over time for whites which causes postponement of fertility to older ages. In contrast, populations of both college and less than college educated nonwhites are projected to increase over time because of their higher fertility and immigration rates. Among nonwhites, each gender-education group has somewhat lower hours and efficiency-adjusted hours relative to their white counterparts.[30]

Appendix 6

Projecting production function parameters and U.S. GDP from PWBM's microsimulation.

The PWBM microsimulation's output includes the "class of worker" variable, which distinguishes between private sector, federal, and state and local workers. Since the PWBM microsimulation reports nominal wages for all workers and not total compensation, the latter is estimated by estimating the benefits component of employee compensation from historical data. A power regression of the ratio of total benefits to total wages using U.S. national income and product accounts data (U.S. Bureau of Economic Analysis, Table 2.1) is implemented to

[30] The microsimulation's hours projections are predicated on many variables beyond race, gender and education = such as legal status, years of residence in the United States, labor force status (full- and part year and full- and part-time), marital status, disability status, number of children, and so on. The projections shown in Figure A.3 arise from hours regressions conditioned on these additional factors as well.

extrapolate the benefits/wages ratio for future years.[31] The benefits/wages ratio stood at 20.6 percent in 2023. Extrapolating the share using estimated power regression coefficients has the ratio increasing to 24.3 percent by 2050 and to 25.1 percent by 2099. These projected benefits/wages ratios are applied to microsimulation private and government sector total wages to obtain projected future private and government sector total compensation series.

The private sector contribution to GDP is calculated via equation (3). The federal government's GDP contribution is assumed to equal the sum of government employee compensation plus government capital depreciation. The latter is projected in two steps: First, government capital depreciation is estimated using a time-trend power regression on the depreciation rate using historical data on the ratio of government capital depreciation to government capital stock.[32] Next a power regression is estimated on the historical ratio of the government capital stock to total government employee compensation.[33] Both ratios are historically quite stable and the power regressions point to stable long-term values for both. The government depreciation rate is estimated to decrease very slightly from 3.6 percent in 2022 to 4.0 percent by 2050 and to 3.9 percent by 2099. The ratio of the government employee compensation to government capital stock ratio is projected to increase slightly from 7.8 percent in 2020 to 8.0 percent by 2050 and to 8.3 percent by 2099.

The product of projected government compensation and the capital-compensation ratio yields the projected stock of government capital. And the product of the capital depreciation rate

[31] The power regression $S = at^b$, where S is the benefits-to-wages ratio and t is the time trend variable, implemented on BEA data spanning the years 1980-2023 yields coefficient estimates $\hat{a} = 0.1844$ and $\hat{b} = 0.0647$.
[32] Historical data on government capital depreciation and the government capital stock are taken from the U.S. Bureau of Economic Analysis. The power regression implemented is $D^g = at^b$, where the government-capital-depreciation rate is D^g and t is the time trend variable. The estimated coefficients are $\hat{a} = 0.0484$ and $\hat{b} = -0.0469$.
[33] The power regression in this case is $CK = at^b$, where the ratio of government employee compensation to government capital is CK and t is the time trend variable. The estimated coefficients are $\hat{a} = 6.297$ and $\hat{b} = 0.0573$.

with the government capital stock yields projected government depreciation. Finally, total U.S. GDP is projected as the sum of private sector and government contributions to GDP.

Figure A6.1 depicts projected U.S. nominal GDP through the year 2099. To calculate FI in perpetuity, The PWBM simulation was implemented through the year 2475, which is sufficiently distant to allow present discounted values of out-year deficits no longer increase the present valued FI measure. The simulation through year 2475 also enables the calculation of GDP "in perpetuity."[34]

To ensure that our GDP estimates are consistent with those of the Congressional Budget Offices' (CBO) projections (since the budget tax, transfer, and purchases aggregates through the year 2034 are those of the CBO), we benchmark our GDP projections to those of the CBO in 2034. Nominal GDP projections after 2034 are based on PWBM's calculations described above.

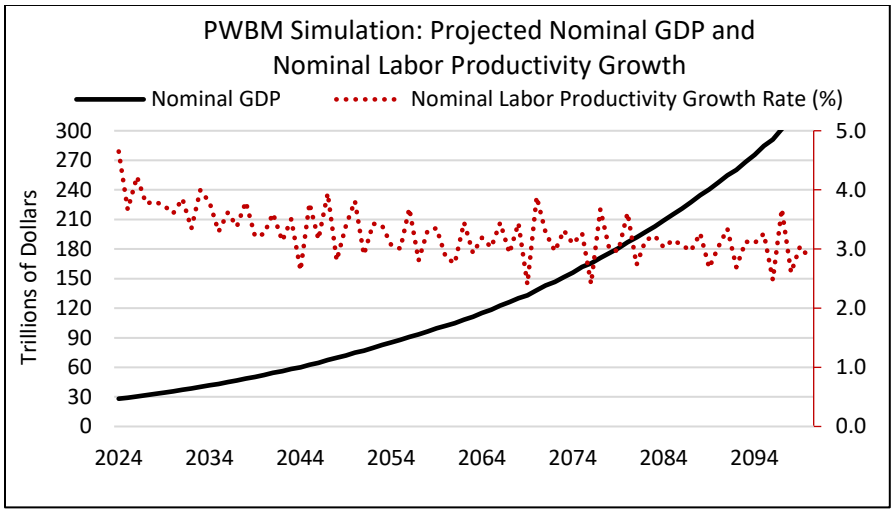


Figure A6.1: *Projected nominal GDP and nominal labor productivity growth.*
Source: Author's Calculations from the PWBM microsimulation.

[34] The sensitivity of FI and the ratio of FI to PVGDP is discussed in the Appendix, section A11.

Finally, nominal projected GDP values are discounted using the interest discount factor of 4.4 percent per year. Table A6.1 below reports PVGDP, estimated as described above (in trillions of constant 2024 dollars) over two alternative time horizons: 2024-98 and 2024-2475.

Present discounted value of projected U.S. GDP in trillions of constant 2024 dollars		
PWBM Microsimulation (50 thousand households in 2018 scaled to the U.S. household population in 2018)	Through 2099	Through the infinite horizon
	1,615.1	2,454.8

Table A6.1: *Present Value of Projected GDP under Current Fiscal Laws.*

Appendix 7

Adjusting remaining lifetime et taxes for the incidence of taxes on owners of capital

Tax policy changes introduced by the Tax Cuts and Jobs Act of 2017 imply changes to the incidence of capital income taxes across generations. That law reduced the corporate tax rate from 35 percent to 21 percent and introduced investment incentives by way of expensing of equipment and software, amortization of research expenditures, expansion of bonus depreciation, and other provisions that alter the timing of capital income accruals relative to tax payments. In addition, future taxes may be capitalized into asset values and changes in tax rates and expensing provisions for new investments may shift tax burdens away from (or toward) future capital owners, who pay the taxes, and toward (or away from) current holders of capital who bear capital losses (or enjoy capital gains). For example, prior scheduled depreciation deductions no longer apply under TCJA's accelerated depreciation schedule as implied by full expensing provisions: Under pre-TCJA law many capital investments that would have been depreciated gradually over the following decade are taken at once, producing lower effective tax rates immediately. On the other hand, expensing provisions for new investments would induce tax arbitrage to reduce the value of older capital assets, imposing losses on current capital owners. Auerbach, Gokhale, and Kotlikoff (1991) describe the adjustments needed to GAs, to correctly allocate capital taxes to generations that bear them rather than those who pay them. The adjustments needed depend upon the configurations of capital taxation provisions, applicable parameters on investment growth, depreciation rates, after-tax interest rates and other factors. The adjustments require estimates of two rates, Q and Δ, the former indicating the amount of additional tax burdens on current owners of capital from capital asset revaluations, and the latter showing the percentage reduction in

projected capital income taxes paid by future capital owners.[35] The formulae for the two adjustment factors are:

(A1) $Q = \tau z \left(1 - \frac{n+\delta}{n+\tau+\varphi}\right)$

(A2) $\Delta = (r+\delta)\tau z \left[1 - \frac{(r+\pi+\varphi)(n+\delta)}{(n+\pi+\varphi)(r+\delta)}\right]$.

Table below provides the legend and rates of the parameters used to calculate Q and Δ:

Parameter	Description	Value
r	Investors' pre-tax rate of return	4.4%
δ	Economic depreciation rate	8.0%
π	Inflation rate	2.2%
τ	Investor marginal tax rate	22.0%
n	Growth rate of investment	1.5%
z	Present value of depreciation allowances $\delta/(r+\delta)$	0.056
φ	Geometric rate of investment write-off $(r+\pi)z/(1-z)$	0.002

These parameters generate a value of Q=0.056 and $\Delta = .002$. Hence, GAs reported in the text are calculated by distributing a capital loss of 5.6 percent on current owners of capital (those alive in 2024) and a reduction in future flows of capital income taxes by 0.002 percent. [36]

[35] See the Appendix in Auerbach, Gokhale, and Kotlikoff (1991) for the derivation of the formulae for Q and Δ.
[36] The private capital stock reported by the Bureau of Economic Analysis equals $31.8 trillion making the capital loss for currently alive generations equal to $2.717 trillion. The reduction in capital tax flows for future generations equals $32.6 billion per year inflated according to the assumed rate of GDP inflation of 2.05 percent per year.

Appendix 8
Federal receipts and expenditures: Program totals calculated from the Congressional Budget Office's Budget Outlook, February 2024.

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Individual Labor Income Taxes	1513	1542	1699	1844	1896	1970	2043	2117	2186	2278	1513
Individual Capital Income Taxes (adjusted)	744	758	835	907	932	968	1005	1041	1075	1254	744
One time Capital Levy	2329	0	0	0	0	0	0	0	0	0	2505
OASDI Payroll Taxes (see OASDHI sheet)	1177	1228	1279	1327	1379	1432	1488	1544	1602	1660	1177
Medicare Part A (see OASDHI sheet)	414	431	455	476	496	519	542	566	591	617	414
Total Income taxes on SS benefits	98	105	127	142	152	165	179	194	209	222	98
Other SocIns Taxes (UI; see NIPA sheet)	72	75	78	81	84	88	91	94	98	102	72
Corporate Income Taxes (CBO 02/2024)	569	494	491	484	491	501	511	519	519	533	569
Excise taxes	85	92	97	99	100	100	100	100	101	101	85
Estate and gift taxes	1	3	4	7	12	65	109	122	138	149	1
Federal Reserve	80	83	87	91	93	96	98	100	103	105	80
Customs duties	33	31	31	44	47	49	52	55	58	62	33
Other miscellaneous receipts	35	38	40	42	43	46	44	44	45	47	35

Table A8.1: *Federal Receipts (CBO February 2024 Budget Outlook)*

Year	2024	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Old Age and Survivors Insurance	1296	1381	1466	1550	1642	1734	1829	1927	2026	2127	2230
Disability Insurance	156	164	175	184	190	197	204	211	219	228	240
Medicare Part A	417	440	462	496	529	567	607	650	695	748	801
Medicare Part B	532	565	607	659	713	770	832	899	969	1057	1146
Medicare Part D	136	148	154	160	165	171	179	183	195	203	214
Medicaid	557	551	582	619	655	691	728	765	806	853	898
Health Insurance Premium tax credits	103	110	89	91	95	99	103	107	114	121	129
Medicare-Eligible Retiree Health Care Fund (MERHCF)	12	12	13	14	14	15	16	16	17	18	18
Childrens' Health Insurance Program (CHIP)	18	18	19	19	20	20	21	21	22	16	15
Supplemental Nutrition Assistance Program	112	110	109	112	112	113	114	115	119	121	123
Supplemental Security Income	62	64	65	67	69	71	73	75	77	79	81
Unemployment compensation	40	45	45	47	49	51	53	55	56	58	60
Earned income, child, and other tax credits	118	114	102	86	87	87	88	88	89	89	89
Family support and foster care	45	35	36	37	37	38	38	38	39	39	40
Child Nutrition	31	33	34	36	38	40	41	43	45	47	50
Civilian Retirement	128	133	138	142	145	149	153	156	163	167	171
Military Retirement	79	82	85	88	91	93	96	98	101	104	106
Veterans Income security	172	184	196	209	222	233	243	254	265	276	288
Veterans other	23	35	54	53	56	60	65	70	76	81	85
Agriculture	27	22	23	23	23	24	21	20	20	20	20
Fannie Mae and Freddie Mac	0	3	4	6	6	6	6	6	6	10	10
Higher education	67	53	36	30	31	31	32	33	33	34	35
Deposit Insurance	-26	-20	-12	-9	-61	-12	-13	-13	-14	-14	-15
PBGC (Pension Benefit Guarantee Corp.)	8	-2	0	-3	-4	-4	-4	-4	-5	-5	-5
Medicare SMI premiums (offsetting receipts)	-189	-212	-221	-241	-261	-282	-307	-333	-361	-393	-422
Other expenditures	152	159	157	151	150	144	133	127	102	97	91
Federal share Social Security	-23	-23	-24	-25	-26	-26	-27	-28	-29	-30	-31
Federal share Civil Service Retirement and other	-57	-60	-63	-65	-68	-70	-72	-75	-77	-79	-80
Federal share Military Retirement	-24	-22	-23	-23	-24	-24	-25	-26	-26	-27	-28
Receipts related to natural resources	-18	-18	-18	-17	-17	-18	-18	-18	-18	-19	-19
Receipts related to MERHCF	-11	-12	-12	-13	-13	-14	-15	-15	-16	-17	-18
Receipts related to Fannie Mae and Freddie Mac	-6	0	0	0	0	0	0	0	0	0	0
Receipts related to other programs	-28	-30	-31	-33	-34	-32	-38	-39	-26	-26	-26
Discretionary Expenditures	1739	1756	1791	1825	1860	1899	1937	1975	2016	2059	2106

Table A8.2: *Federal Expenditures (CBO February 2024 Budget Outlook)*.

Appendix 9: Tables A9.1-9.8: Detailed Decomposition of remaining lifetime net taxes shown in Figure 2.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	484,123	-140,615	-148,165	-29,305	-18,310	-77,307	-7,855	36,143	-385,413	478,721	71,729	266,850	13,515	38,721	869,536
2064	-40	576,882	-181,683	-192,368	-35,669	-22,308	-98,348	-9,654	45,635	-494,394	591,178	89,765	325,787	16,682	47,864	1,071,276
2054	-30	595,488	-183,840	-193,498	-37,519	-23,298	-99,760	-9,863	46,628	-501,149	604,148	91,131	335,181	17,147	49,030	1,096,637
2044	-20	697,192	-222,379	-235,063	-42,490	-27,215	-120,035	-11,696	55,716	-603,162	717,649	109,179	395,064	20,275	58,188	1,300,355
2034	-10	734,260	-229,169	-242,114	-42,719	-28,736	-123,775	-12,215	57,846	-620,882	746,918	112,908	413,431	21,220	60,665	1,355,142
2024	0	868,450	-300,753	-318,987	-49,704	-34,454	-160,519	-15,060	73,177	-806,301	927,263	144,210	501,613	26,165	75,500	1,674,750
2014	10	986,780	-287,106	-307,185	-42,714	-34,938	-159,232	-15,866	73,788	-773,252	970,855	146,682	537,617	27,364	77,515	1,760,033
1904	20	1,092,511	-347,959	-376,781	-40,890	-36,728	-191,134	-18,621	85,943	-926,171	1,121,154	173,540	605,196	30,677	88,115	2,018,682
1994	30	964,477	-368,539	-398,319	-35,815	-28,760	-199,901	-17,983	82,173	-967,144	1,094,173	183,994	542,716	27,282	83,457	1,931,621
1984	40	700,132	-402,638	-415,500	-33,203	-23,095	-211,761	-16,476	76,195	-1,026,479	1,002,703	193,599	430,040	24,522	75,748	1,726,611
1974	50	360,074	-427,289	-394,503	-28,129	-16,508	-211,992	-13,668	70,134	-1,021,955	824,762	182,905	289,990	20,984	63,388	1,382,029
1964	60	-70,687	-486,700	-386,977	-23,268	-11,338	-215,199	-10,330	66,817	-1,066,995	624,668	163,571	142,002	16,779	49,288	996,308
1954	70	-234,214	-442,424	-304,439	-17,534	-6,819	-191,476	-6,186	59,260	-909,618	444,137	131,242	54,126	11,860	34,039	675,404
1944	80	-78,144	-233,754	-147,459	-10,371	-3,732	-106,650	-3,454	29,094	-476,327	268,982	80,862	25,393	6,098	16,848	398,182

Table A9.1: *The Composition of remaining lifetime net taxes for male college-educated whites (MCW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	-80,343	-114,917	-133,424	-92,208	-32,040	-44,385	-3,835	25,530	-395,278	160,882	5,059	125,025	7,226	16,744	314,935
2064	-40	-84,143	-126,198	-146,816	-102,476	-35,799	-49,165	-4,276	28,245	-436,485	179,971	5,613	140,104	8,014	18,640	352,342
2054	-30	-96,348	-141,172	-163,906	-113,335	-39,788	-54,611	-4,733	31,559	-485,986	198,805	6,216	154,929	8,962	20,726	389,638
2044	-20	-92,957	-160,711	-186,066	-127,584	-46,864	-63,182	-5,560	36,384	-553,583	234,833	7,254	183,770	10,470	24,299	460,626
2034	-10	-122,201	-194,465	-226,157	-136,868	-53,006	-75,178	-6,447	43,052	-649,070	269,792	8,586	208,499	12,077	27,916	526,869
2024	0	-88,778	-187,231	-214,789	-132,622	-55,098	-73,655	-6,489	42,643	-627,242	274,155	8,418	215,062	12,272	28,557	538,464
2014	10	-63,525	-199,476	-236,063	-115,158	-57,026	-81,305	-7,104	46,646	-649,485	299,191	9,263	233,919	13,439	30,147	585,960
1904	20	-51,436	-228,349	-276,505	-100,166	-61,107	-94,891	-8,333	53,641	-715,710	342,271	10,847	263,610	14,866	32,679	664,273
1994	30	-110,095	-259,500	-310,934	-85,178	-56,462	-103,195	-8,683	55,242	-768,710	349,683	12,620	251,184	13,983	31,145	658,615
1984	40	-197,640	-267,918	-301,247	-64,994	-41,167	-98,474	-7,923	49,178	-732,544	292,690	12,709	191,609	12,076	25,822	534,904
1974	50	-341,351	-301,560	-300,625	-45,745	-27,476	-100,418	-6,704	50,438	-732,090	224,391	12,070	123,844	10,243	20,192	390,739
1964	60	-514,303	-354,672	-307,728	-25,581	-15,451	-103,474	-5,262	54,062	-758,106	154,462	10,802	55,943	8,235	14,361	243,802
1954	70	-492,631	-322,327	-251,507	-11,144	-7,394	-88,200	-3,623	46,760	-637,435	102,036	8,906	18,351	6,074	9,437	144,805
1944	80	-283,808	-197,067	-144,488	-3,744	-4,294	-53,224	-2,292	27,482	-377,627	68,665	6,249	9,761	3,690	5,454	93,818

Table A9.2: *The Composition of remaining lifetime net taxes for male non-college-educated whites (MNW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	345,112	-152,953	-194,964	-52,118	-27,274	-84,736	-7,328	44,429	-474,944	448,401	43,189	278,515	13,541	36,411	820,057
2064	-40	427,992	-176,507	-225,162	-60,545	-32,276	-99,845	-8,762	52,148	-550,949	534,667	51,024	334,056	16,006	43,188	978,942
2054	-30	519,919	-210,962	-269,567	-72,235	-38,819	-119,145	-10,514	62,623	-658,617	643,059	61,000	403,237	19,301	51,940	1,178,536
2044	-20	551,284	-237,230	-302,656	-79,939	-42,278	-133,143	-11,545	69,394	-737,397	705,330	68,009	437,453	21,056	56,832	1,288,681
2034	-10	610,450	-274,428	-349,480	-90,259	-48,037	-151,623	-13,008	79,434	-847,400	798,000	77,027	494,240	24,035	64,548	1,457,850
2024	0	814,765	-349,416	-444,228	-113,942	-60,897	-198,244	-17,051	102,407	-1,081,372	1,040,286	100,999	641,147	30,660	83,045	1,896,136
2014	10	821,969	-337,811	-433,830	-105,823	-58,413	-193,556	-16,737	100,463	-1,045,707	1,023,212	98,670	634,057	30,516	81,220	1,867,676
1904	20	901,340	-376,823	-484,473	-109,836	-61,482	-217,897	-18,807	112,065	-1,157,253	1,135,197	110,874	693,162	32,764	86,596	2,058,593
1994	30	673,821	-346,832	-439,245	-92,447	-48,207	-198,913	-16,134	96,311	-1,045,468	967,162	102,638	555,240	25,397	68,852	1,719,289
1984	40	382,040	-315,562	-378,326	-74,638	-35,060	-175,916	-13,211	81,047	-911,666	748,845	89,456	384,912	19,186	51,307	1,293,706
1974	50	-19,134	-430,654	-462,533	-81,350	-29,509	-206,739	-12,166	92,773	-1,130,179	675,714	96,211	274,082	18,308	46,730	1,111,045
1964	60	-216,755	-373,441	-338,285	-52,912	-17,482	-155,252	-7,736	70,189	-874,920	423,765	69,051	125,015	12,111	28,221	658,164
1954	70	-318,855	-357,710	-284,229	-41,696	-11,698	-130,414	-4,226	58,566	-771,408	310,470	57,511	56,141	9,303	19,129	452,553
1944	80	-192,025	-239,178	-184,138	-31,980	-7,927	-83,280	-2,721	38,823	-510,400	224,262	42,480	33,306	6,277	12,050	318,375

Table A9.3: *The Composition of remaining lifetime net taxes for male non-college-educated nonwhites (MCN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	-250,007	-111,149	-182,821	-163,595	-57,065	-44,183	-1,112	30,268	-529,658	135,486	902	117,962	8,552	16,748	279,651
2064	-40	-267,476	-117,241	-192,729	-175,431	-60,311	-46,699	-1,172	31,853	-561,731	142,524	952	124,083	9,008	17,688	294,255
2054	-30	-314,913	-139,353	-229,436	-203,897	-70,888	-55,616	-1,386	37,815	-662,760	168,680	1,131	146,556	10,635	20,846	347,847
2044	-20	-322,640	-143,904	-235,258	-210,435	-74,379	-57,263	-1,438	39,080	-683,597	174,641	1,164	152,278	11,107	21,768	360,957
2034	-10	-357,291	-165,573	-269,841	-228,844	-85,132	-65,734	-1,650	45,003	-771,772	200,595	1,337	174,843	12,753	24,952	414,481
2024	0	-406,815	-194,430	-316,019	-248,732	-97,424	-76,686	-1,893	52,634	-882,550	230,659	1,548	200,181	14,631	28,717	475,735
2014	10	-351,248	-189,843	-312,273	-218,564	-95,995	-77,955	-1,964	53,053	-843,540	238,645	1,589	208,163	15,186	28,710	492,293
1904	20	-333,812	-199,283	-331,337	-190,827	-94,114	-83,288	-2,116	55,897	-845,068	249,963	1,689	215,703	15,349	28,552	511,256
1994	30	-351,031	-204,916	-335,070	-169,838	-86,009	-85,661	-1,979	54,340	-829,133	239,637	1,802	197,520	13,460	25,682	478,102
1984	40	-427,486	-215,430	-334,399	-138,512	-63,764	-84,364	-1,491	51,629	-786,331	184,958	1,616	141,655	10,880	19,737	358,845
1974	50	-579,234	-267,825	-371,047	-121,305	-48,686	-95,942	-1,198	58,906	-847,097	144,792	1,518	96,070	9,604	15,878	267,863
1964	60	-575,720	-267,904	-315,613	-77,713	-29,870	-86,305	-687	53,850	-724,242	87,603	1,143	43,298	6,792	9,686	148,523
1954	70	-534,221	-252,843	-274,392	-47,568	-17,958	-70,566	-355	45,810	-617,872	56,244	889	15,530	4,816	6,171	83,651
1944	80	-355,953	-177,741	-181,030	-26,474	-12,448	-47,412	-212	30,843	-414,473	41,299	640	9,770	3,077	3,734	58,521

Table A9.4: *The Composition of remaining lifetime net taxes for male non-college-educated nonwhites (MNN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	230,401	-133,052	-177,577	-55,471	-18,451	-20,412	-5,721	25,233	-385,451	308,616	76,516	174,827	14,399	41,494	615,852
2064	-40	262,015	-165,891	-222,565	-65,930	-21,803	-25,318	-6,827	31,236	-477,096	371,354	93,874	206,565	17,217	50,101	739,112
2054	-30	289,345	-176,498	-236,136	-71,637	-23,733	-27,003	-7,391	33,302	-509,095	400,705	100,666	224,390	18,633	54,047	798,441
2044	-20	331,641	-188,396	-251,078	-75,194	-26,113	-28,958	-8,123	35,618	-542,245	438,064	108,792	247,761	20,381	58,888	873,886
2034	-10	388,433	-229,859	-307,590	-83,981	-30,711	-35,260	-9,652	43,227	-653,826	523,381	131,808	292,352	24,231	70,487	1,042,259
2024	0	429,439	-240,443	-321,069	-83,672	-32,928	-36,935	-10,305	45,472	-679,879	556,429	138,675	313,545	25,826	74,843	1,109,318
2014	10	494,346	-305,925	-415,904	-83,023	-36,946	-47,104	-12,347	57,297	-843,952	674,510	173,689	368,751	31,079	90,267	1,338,297
1904	20	541,808	-306,557	-418,388	-70,413	-36,475	-47,753	-13,074	57,231	-835,430	695,978	177,095	381,940	31,252	90,973	1,377,238
1994	30	451,057	-332,123	-452,775	-64,494	-31,770	-51,132	-12,814	57,963	-887,145	689,737	193,024	338,255	28,108	89,078	1,338,202
1984	40	260,713	-363,228	-480,343	-62,500	-25,108	-54,639	-11,336	58,224	-938,930	628,584	203,899	258,941	25,414	82,804	1,199,643
1974	50	42,079	-380,516	-464,724	-56,682	-17,375	-55,794	-8,975	58,406	-925,660	515,561	192,855	167,062	21,763	70,498	967,739
1964	60	-181,412	-409,598	-433,880	-49,020	-11,862	-56,426	-6,277	64,051	-903,013	397,465	171,622	78,653	17,757	56,104	721,601
1954	70	-254,648	-377,521	-351,706	-42,878	-8,071	-53,138	-3,419	59,902	-776,829	297,035	143,311	27,142	13,201	41,491	522,181
1944	80	-113,469	-229,175	-196,625	-29,595	-4,929	-33,929	-2,056	35,149	-461,159	201,381	99,562	14,661	7,894	24,192	347,690

Table A9.5: *The Composition of remaining lifetime net taxes for female college-educated whites (FCW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	-232,847	-128,129	-166,035	-117,511	-41,271	-10,782	-1,643	22,381	-442,991	101,025	9,659	74,678	7,597	17,185	210,144
2064	-40	-272,959	-149,755	-193,963	-136,529	-48,165	-12,545	-1,901	26,188	-516,670	117,155	11,215	86,555	8,822	19,964	243,711
2054	-30	-311,355	-172,415	-224,094	-152,128	-54,592	-14,454	-2,167	30,209	-589,641	134,043	12,936	98,507	10,051	22,749	278,286
2044	-20	-341,249	-193,892	-251,059	-169,967	-62,994	-16,396	-2,514	33,905	-662,917	154,695	14,735	114,483	11,583	26,173	321,668
2034	-10	-327,878	-189,985	-241,314	-166,335	-64,118	-16,004	-2,498	32,862	-647,392	153,080	14,309	114,483	11,516	26,125	319,513
2024	0	-380,773	-227,655	-296,298	-172,722	-72,144	-19,170	-2,888	40,182	-750,695	178,051	17,192	130,989	13,398	30,292	369,922
2014	10	-384,755	-251,944	-336,537	-160,622	-79,493	-22,024	-3,315	45,623	-808,312	204,330	19,675	150,434	15,394	33,723	423,557
1904	20	-413,092	-284,798	-394,679	-136,954	-83,143	-25,174	-3,711	53,023	-875,435	225,447	22,371	162,234	16,644	35,647	462,343
1994	30	-427,906	-298,578	-417,963	-112,889	-72,301	-25,769	-3,598	54,893	-876,206	224,713	24,976	149,482	15,517	33,611	448,299
1984	40	-415,767	-287,892	-403,608	-83,933	-47,001	-24,565	-3,138	54,079	-796,058	194,063	25,136	118,532	13,773	28,788	380,291
1974	50	-467,545	-302,477	-396,331	-57,178	-27,928	-24,478	-2,393	56,646	-754,138	151,254	23,802	76,923	11,737	22,877	286,592
1964	60	-553,818	-341,599	-390,768	-33,982	-16,005	-25,199	-1,508	64,500	-744,560	107,826	21,629	34,530	9,632	17,125	190,742
1954	70	-468,643	-292,108	-300,293	-16,086	-8,088	-21,116	-734	53,526	-584,899	70,636	17,247	10,455	6,741	11,176	116,256
1944	80	-274,997	-184,703	-174,843	-6,852	-4,943	-13,654	-420	32,714	-352,702	48,730	12,467	5,769	4,114	6,626	77,705

Table A9.6: *The Composition of remaining lifetime net taxes for female non-college-educated whites (FNW) by Selected Years of Birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	254,044	-146,817	-207,300	-67,862	-30,827	-26,212	-6,114	38,013	-447,118	343,617	100,756	201,902	13,646	41,242	701,162
2064	-40	302,392	-180,618	-255,566	-82,673	-36,982	-32,127	-7,395	46,533	-548,828	417,638	123,730	243,295	16,458	50,099	851,221
2054	-30	326,630	-206,498	-293,477	-93,521	-41,273	-36,410	-8,248	52,895	-626,531	467,911	139,970	270,612	18,419	56,250	953,161
2044	-20	384,290	-234,929	-333,075	-105,837	-47,284	-41,665	-9,502	60,313	-711,978	538,242	160,463	311,891	21,129	64,542	1,096,267
2034	-10	426,004	-261,184	-370,238	-115,973	-52,236	-46,442	-10,536	66,974	-789,634	596,993	178,774	344,795	23,419	71,656	1,215,638
2024	0	476,105	-289,609	-410,782	-127,474	-58,573	-51,304	-11,722	74,540	-874,925	662,815	197,022	385,368	26,187	79,637	1,351,030
2014	10	604,578	-370,407	-527,006	-152,199	-70,277	-65,740	-14,781	94,586	-1,105,824	841,633	253,760	482,575	32,730	99,704	1,710,402
1904	20	562,771	-357,431	-511,288	-136,424	-64,269	-63,211	-14,467	90,049	-1,057,041	800,035	243,168	452,893	30,546	93,170	1,619,812
1994	30	434,713	-315,244	-446,897	-111,820	-49,347	-55,283	-11,781	78,095	-912,278	673,667	219,203	354,031	23,645	76,445	1,346,991
1984	40	246,976	-307,383	-427,058	-97,594	-35,466	-52,708	-9,543	69,294	-860,459	560,920	212,855	251,345	18,776	63,538	1,107,434
1974	50	16,371	-373,646	-488,033	-103,562	-27,103	-58,746	-7,814	82,693	-976,210	510,881	229,936	175,427	16,478	59,860	992,581
1964	60	-187,493	-398,037	-460,365	-92,329	-19,170	-55,338	-5,270	79,731	-950,779	404,122	209,394	90,070	12,230	47,469	763,286
1954	70	-209,470	-321,896	-329,113	-63,912	-11,994	-38,766	-2,687	58,568	-709,800	273,930	157,045	31,836	7,026	30,494	500,330
1944	80	-93,571	-204,088	-195,148	-46,075	-7,998	-24,499	-1,702	37,113	-442,397	195,410	113,619	17,544	3,460	18,793	348,827

Table A9.7: *The Composition of remaining lifetime net taxes for female college-educated nonwhites (FCN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Year of Birth	Age in 2024	Remaining lifetime Net Taxes	Present Values of Remaining Lifetime Transfers								Present Values of Remaining Lifetime Taxes					
			Social Security	Medicare	Medicaid & SCHIP	Welfare Programs	Pension & Health	Misc. Transfers	Offset. & Other Receipts	Total Transfers	Individual Income	Corporate Taxes	Payroll Taxes	Indirect	Other	Total taxes
2074	-50	-506,872	-139,663	-246,474	-258,144	-92,391	-11,178	-1,347	33,892	-715,305	96,409	3,366	81,889	9,312	17,458	208,433
2064	-40	-634,879	-178,167	-320,059	-305,968	-108,677	-14,126	-1,609	43,688	-884,917	116,340	4,200	97,252	11,308	20,937	250,038
2054	-30	-599,661	-165,769	-292,911	-304,025	-108,555	-13,275	-1,590	40,261	-845,865	113,972	4,004	96,590	11,008	20,631	246,204
2044	-20	-678,224	-190,046	-336,819	-335,381	-121,444	-15,143	-1,782	46,254	-954,361	127,945	4,542	108,027	12,418	23,204	276,137
2034	-10	-773,735	-221,791	-390,937	-378,505	-144,286	-17,756	-2,116	53,930	-1,101,462	151,800	5,336	128,512	14,670	27,409	327,727
2024	0	-831,393	-244,512	-431,728	-393,937	-156,662	-19,568	-2,307	59,752	-1,188,962	165,779	5,883	139,870	16,036	30,000	357,568
2014	10	-831,467	-259,375	-466,858	-367,117	-158,775	-21,184	-2,453	64,637	-1,211,126	176,718	6,335	148,469	17,166	30,970	379,658
1904	20	-793,995	-264,909	-480,526	-332,335	-161,178	-22,166	-2,696	66,673	-1,197,137	188,882	6,726	158,283	17,845	31,405	403,141
1994	30	-707,684	-245,515	-445,850	-265,460	-128,316	-20,117	-2,256	61,477	-1,046,037	162,618	6,525	128,921	14,758	25,530	338,352
1984	40	-749,903	-265,699	-483,169	-233,524	-88,180	-20,560	-1,782	68,203	-1,024,711	135,041	6,571	98,482	13,208	21,508	274,808
1974	50	-737,070	-274,696	-460,333	-189,986	-57,309	-20,229	-1,262	71,372	-932,443	98,927	5,911	62,970	11,117	16,448	195,373
1964	60	-702,853	-281,266	-415,476	-135,089	-37,081	-19,192	-691	71,451	-817,344	61,832	4,890	27,796	8,836	11,138	114,491
1954	70	-534,925	-229,083	-303,900	-82,076	-22,631	-15,038	-277	56,241	-596,765	36,167	3,606	9,047	6,335	6,685	61,840
1944	80	-352,833	-159,443	-197,577	-50,350	-15,368	-10,867	-171	37,922	-395,853	25,961	2,663	5,529	4,584	4,282	43,019

Table A9.8: *The Composition of remaining lifetime net taxes for female non-college-educated nonwhites (FNN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values show federal budget financial outflows and positive values show budget financial inflows.)
Source: Authors' calculations.

Appendix 10: Detailed decomposition of welfare transfers (welfare columns reported in Tables A9.1-9.8)

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-18310	-8719	-1429	-860	-3290	-1156	-417	-2438
2064	-40	-22308	-10700	-1750	-1061	-4015	-1413	-521	-2847
2054	-30	-23298	-11141	-1832	-1081	-4121	-1466	-543	-3114
2044	-20	-27215	-13037	-2137	-1287	-4862	-1718	-641	-3533
2034	-10	-28736	-13733	-2257	-1340	-5096	-1805	-663	-3842
2024	0	-34454	-16545	-2729	-1687	-6205	-2163	-828	-4297
2014	10	-34938	-17566	-2896	-1713	-6619	-2339	-837	-2969
1904	20	-36728	-18914	-3032	-1971	-7501	-2646	-924	-1739
1994	30	-28760	-13249	-2205	-2002	-6603	-2298	-846	-1559
1984	40	-23095	-10066	-1846	-2049	-5576	-1637	-718	-1203
1974	50	-16508	-7058	-1412	-1950	-4230	-894	-530	-434
1964	60	-11338	-5233	-1093	-1553	-2501	-354	-481	-123
1954	70	-6819	-3482	-816	-973	-877	-133	-481	-59
1944	80	-3732	-1810	-491	-540	-406	-69	-389	-27

Table A10.1*: The Composition of remaining lifetime welfare transfers for male college-educated whites (MCW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-32040	-8499	-6120	-5493	-4493	-3663	-801	-2970
2064	-40	-35799	-9505	-6821	-6106	-5034	-4127	-894	-3312
2054	-30	-39788	-10558	-7638	-6785	-5570	-4569	-990	-3678
2044	-20	-46864	-12476	-8990	-7930	-6603	-5441	-1163	-4261
2034	-10	-53006	-14160	-10132	-9096	-7497	-6059	-1325	-4738
2024	0	-55098	-14631	-10585	-9376	-7729	-6399	-1378	-5000
2014	10	-57026	-15924	-11537	-9112	-8408	-6935	-1427	-3684
1904	20	-61107	-17715	-12596	-9244	-9537	-8067	-1484	-2466
1994	30	-56462	-16133	-10749	-9103	-9045	-7686	-1477	-2268
1984	40	-41167	-11777	-7262	-8271	-6860	-4433	-1232	-1333
1974	50	-27476	-8045	-4650	-7075	-4558	-1766	-890	-491
1964	60	-15451	-4853	-2825	-4200	-2161	-676	-522	-214
1954	70	-7394	-2768	-1649	-1592	-759	-228	-283	-116
1944	80	-4294	-1663	-993	-908	-416	-123	-127	-65

Table A10.2: *The Composition of remaining lifetime welfare transfers for Male non-college-educated whites (MNW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-27274	-9988	-3427	-3178	-4559	-2587	-671	-2865
2064	-40	-32276	-11916	-4050	-3679	-5454	-3107	-775	-3295
2054	-30	-38819	-14453	-4883	-4362	-6554	-3750	-933	-3883
2044	-20	-42278	-15565	-5329	-4854	-7158	-4064	-1039	-4269
2034	-10	-48037	-17762	-6079	-5520	-8078	-4587	-1192	-4819
2024	0	-60897	-22671	-7757	-6883	-10519	-5952	-1519	-5597
2014	10	-58413	-22605	-7722	-6088	-10371	-5891	-1483	-4254
1904	20	-61482	-24334	-8392	-5945	-11409	-6566	-1615	-3222
1994	30	-48207	-18054	-6507	-5110	-9106	-5519	-1400	-2511
1984	40	-35060	-11762	-4916	-4491	-6921	-3995	-1166	-1810
1974	50	-29509	-8877	-4696	-5340	-5710	-2590	-1279	-1016
1964	60	-17482	-5246	-3099	-3908	-2919	-975	-926	-408
1954	70	-11698	-3503	-2395	-3154	-1141	-379	-909	-217
1944	80	-7927	-2191	-1642	-2133	-684	-219	-929	-130

Table A10.3: The Composition of remaining lifetime welfare transfers for Male college-educated non-whites (MCN) by selected years of birth. (Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-57065	-9053	-14879	-9970	-5172	-8810	-2360	-6821
2064	-40	-60311	-9518	-15615	-10617	-5445	-9225	-2513	-7378
2054	-30	-70888	-11242	-18381	-12489	-6433	-10898	-2948	-8497
2044	-20	-74379	-11685	-19305	-13103	-6683	-11299	-3103	-9201
2034	-10	-85132	-13424	-22186	-14956	-7671	-12981	-3537	-10377
2024	0	-97424	-15390	-25393	-17238	-8789	-14898	-4104	-11612
2014	10	-95995	-15972	-26496	-16404	-9129	-15492	-3903	-8599
1904	20	-94114	-16447	-26483	-15951	-9541	-16448	-3621	-5624
1994	30	-86009	-15083	-21869	-15557	-8778	-16504	-3388	-4830
1984	40	-63764	-10959	-15508	-13949	-6481	-11017	-2787	-3063
1974	50	-48686	-8195	-12264	-14243	-4761	-5384	-2255	-1584
1964	60	-29870	-4392	-8502	-10181	-2463	-2140	-1389	-802
1954	70	-17958	-2347	-6222	-6266	-1021	-816	-806	-480
1944	80	-12448	-1601	-4504	-4361	-654	-570	-440	-318

Table A10.4: *The Composition of remaining lifetime welfare transfers for Male non-college-educated non-whites (MNN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-18451	-7694	-1782	-1705	-2855	-1787	-675	-1952
2064	-40	-21803	-9117	-2113	-2022	-3391	-2102	-791	-2265
2054	-30	-23733	-9887	-2295	-2214	-3677	-2284	-866	-2509
2044	-20	-26113	-10871	-2516	-2424	-4046	-2526	-957	-2773
2034	-10	-30711	-12847	-2970	-2847	-4791	-2963	-1116	-3178
2024	0	-32928	-13756	-3181	-3064	-5123	-3195	-1219	-3390
2014	10	-36946	-16262	-3760	-3090	-6083	-3704	-1297	-2750
1904	20	-36475	-16652	-3731	-2659	-6341	-3944	-1214	-1935
1994	30	-31770	-13991	-3065	-2583	-5630	-3628	-1059	-1814
1984	40	-25108	-10897	-2504	-2607	-4591	-2470	-799	-1240
1974	50	-17375	-7944	-1838	-2387	-3363	-1003	-456	-385
1964	60	-11862	-5796	-1482	-1882	-2094	-251	-218	-139
1954	70	-8071	-3998	-1226	-1302	-1257	-85	-116	-87
1944	80	-4929	-2364	-835	-817	-766	-43	-54	-50

Table A10.5: *The Composition of remaining lifetime welfare transfers for female college-educated whites (FCW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-41271	-7036	-9553	-5766	-3038	-8123	-4340	-3415
2064	-40	-48165	-8189	-11175	-6667	-3525	-9539	-5073	-3996
2054	-30	-54592	-9332	-12679	-7568	-4014	-10839	-5684	-4476
2044	-20	-62994	-10794	-14645	-8746	-4658	-12512	-6538	-5101
2034	-10	-64118	-10796	-14858	-8815	-4658	-12754	-6828	-5408
2024	0	-72144	-12373	-16738	-10083	-5328	-14205	-7657	-5759
2014	10	-79493	-14200	-19345	-10761	-6129	-16433	-7649	-4976
1904	20	-83143	-15322	-20899	-10936	-6672	-18704	-6759	-3851
1994	30	-72301	-14061	-16737	-10767	-6091	-15942	-5360	-3344
1984	40	-47001	-10706	-9994	-9429	-4691	-7347	-3253	-1580
1974	50	-27928	-6827	-6188	-7439	-3151	-2015	-1750	-558
1964	60	-16005	-4205	-4068	-4416	-1598	-537	-903	-278
1954	70	-8088	-2317	-2562	-1932	-573	-175	-382	-147
1944	80	-4943	-1434	-1659	-1182	-332	-103	-149	-83

Table A10.6: *The Composition of remaining lifetime welfare transfers for female non-college-educated whites (FNW) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-30827	-9813	-4950	-2498	-3792	-4631	-1793	-3350
2064	-40	-36982	-11806	-5965	-3049	-4571	-5546	-2123	-3922
2054	-30	-41273	-13190	-6690	-3449	-5093	-6149	-2364	-4338
2044	-20	-47284	-15138	-7655	-3942	-5862	-7081	-2689	-4917
2034	-10	-52236	-16683	-8452	-4389	-6482	-7787	-2973	-5471
2024	0	-58573	-18771	-9503	-4860	-7248	-8779	-3405	-6007
2014	10	-70277	-23344	-11839	-6059	-9068	-10885	-3690	-5391
1904	20	-64269	-21732	-11151	-5703	-8598	-10371	-3056	-3658
1994	30	-49347	-16102	-8380	-4937	-6584	-8270	-2193	-2881
1984	40	-35466	-11143	-6353	-4656	-4768	-5224	-1440	-1882
1974	50	-27103	-8398	-5610	-5129	-3612	-2411	-1005	-938
1964	60	-19170	-5699	-4638	-4573	-2031	-957	-682	-590
1954	70	-11994	-3505	-3236	-3348	-611	-487	-443	-365
1944	80	-7998	-2330	-2270	-2190	-370	-348	-276	-214

Table A10.7: *The Composition of remaining lifetime welfare transfers for female college-educated nonwhites (FCN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

Year of Birth	Age in 2024	Welfare Programs Total	Present Values of Remaining Lifetime Benefits						
			Health Insurance Premium Subsidies	SNAP	SSI	Unemployment Compensation	EIC, Child, and Other Tax Credits	Family and Foster Care	Child Nutrition
2074	-50	-92391	-8023	-24840	-12636	-4492	-19964	-13754	-8682
2064	-40	-108677	-9604	-29403	-15417	-5335	-23361	-15713	-9843
2054	-30	-108555	-9465	-29159	-15015	-5291	-23292	-16131	-10201
2044	-20	-121444	-10612	-32666	-17001	-5921	-25882	-17997	-11365
2034	-10	-144286	-12609	-38900	-19929	-7049	-31143	-21279	-13377
2024	0	-156662	-13737	-42128	-21932	-7662	-33506	-23448	-14249
2014	10	-158775	-14619	-44873	-22407	-8138	-35444	-21637	-11658
1904	20	-161178	-15458	-46813	-22603	-8723	-39369	-19018	-9194
1994	30	-128316	-12783	-35040	-20211	-6952	-32448	-13703	-7179
1984	40	-88180	-9953	-23932	-19537	-5107	-17385	-8237	-4029
1974	50	-57309	-6885	-17000	-18002	-3332	-5567	-4545	-1978
1964	60	-37081	-3941	-12380	-13891	-1555	-1536	-2542	-1237
1954	70	-22631	-1944	-8414	-9010	-578	-528	-1390	-766
1944	80	-15368	-1250	-5881	-6321	-367	-299	-754	-496

Table A10.8: *The Composition of remaining lifetime welfare transfers for female non-college-educated non-whites (FNN) by selected years of birth.*
(Present values in constant 2024 dollars; negative values represent federal budget outlays)
Source: Authors' calculations.

A11. Sensitivity of FI and GI to Productivity Growth and Discount Rate Assumptions

The FI measures reported above are based on discounting projections of nominal future dollar flows of federal taxes and expenditures. Nominal future dollar flows are projected by (1) distributing CBO budget aggregates for various programs through the year 2034 across population subgroups distinguished by age, gender, race and education, (2) growing per-capita values annually for years after 2034 by applying a labor productivity growth rate, and applying an actuarial discount rate based on population survival rates to find present values as of 2024.[37] Labor productivity growth rates are projected based on the PWBM microsimulation. These year-specific growth rates are derived by estimating national output based on the microsimulation's annual projections of the efficiency-adjusted labor input and capital services and dividing by the unadjusted labor input (total work hours). The resulting time series of (nominal) labor productivity growth is 3.0 percent per year. Growth of per capital health care transfers (Medicare and Medicaid) are assumed to be higher by 1.9 percent through 2054 and then the excess growth is tapered down to equal economy-wide productivity growth of (3.0 percent per year).

		Present Discounted Value of GDP (PDVGDP)			Fiscal Imbalance (FI)			FI / PDVGDP		
		D Labor Productivity Growth Rate								
		-0.5%	0	0.5%	-0.5%	0	0.5%	-0.5%	0	0.5%
D Interest Rate	-0.5%	2458	3614.2	6262.9	-169.8	-242.5	-410.6	-6.9	-6.7	-6.6
	0	1837	2454.8	3608	-126.4	-162.6	-231.4	-6.9	-6.6	-6.4

[37] The nominal discount rate used (excluding mortality discount) is 4.4 percent the product of a real discount rate of 2.3 percent per year and a 2.1 percent annual GDP inflation rate.

	0.5 %	1456.5	1834.9	2451.4	-100.8	-121.5	-155.8	-6.9	-6.6	-6.4

Table 5: Sensitivity of FI to alternative discount rate and productivity growth rate assumptions.
Source: Author's calculations.

To account for future uncertainty on productivity and interest discount rates, we report FI measures under alternative values for these parameters. Table 5 shows FI measured under a +/- 0.5 percent variation in the productivity growth rates (in each future year) and a +/- 0.5 percent variation in the interest discount factor. The FI measure is shown in present value dollars and as a share of the present discounted value of GDP (PDVGDP) estimated under the same parametric variations of productivity and interest rates. The Table shows that FI estimates in present value (in constant 2024 dollars) are quite variable, as are the estimates of PDVGDP, across alternative labor productivity growth and discount rates. But the ratio FI/PDVGDP is very stable because variations in the two parameters change the numerator and denominator in the same direction and in the same approximate proportion. In general, a slower productivity growth is associated with a larger FI/PDVGDP ratio. A large proportion of FI is accounted for by OASDHI programs, which are funded out of dedicated revenues. Faster productivity growth boosts GDP growth as well as OASDHI payroll taxes and benefits. But faster growth increases payroll taxes earlier than benefits, so that the increase in the latter is smaller in present value than the increase in the former. As a result, the increase in FI under faster productivity growth is smaller than the associated increase in GDP.