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DEMOGRAPHICS AND THE FISCAL CHALLENGE

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Abstract

This paper evaluates the role of demographic change in the U.S. fiscal outlook. We first ask how much of the projected rise in federal debt reflects population aging by holding the elderly share of the population at its 2006 level in the Congressional Budget Office's (CBO's) long-term budget projections. We then combine age-specific fiscal flows from the National Transfer Accounts with CBO-based budget projections and alternative demographic scenarios to examine how future fertility and immigration would affect primary balances and debt-to-gross domestic product (GDP) ratios. We find that population aging is a major source of projected fiscal pressure, and plausible changes in fertility or immigration would not quickly or fully reverse it. Higher fertility improves the fiscal outlook only after a long delay and initially worsens consolidated federal, state, and local balances because children require public resources before they pay taxes. Higher immigration improves the fiscal outlook more quickly, especially when additional immigrants are highly skilled. But even large demographic changes substantially reduce, rather than eliminate, the need for future tax or spending adjustments.

I. Introduction

The U.S. federal government faces significant fiscal challenges. According to the Congressional Budget Office (CBO) (2026a) outlook, the deficit will be 5.8% of gross domestic product (GDP) in fiscal 2026, compared with an average of 3.8% of GDP over the past 50 years. Under current law, the deficit is projected to rise to 6.7% of GDP by 2036. Over this same period, debt held by the public is projected to rise from its current level of 101% of GDP to 120%. Longer term analyses of the budget situation are no more encouraging. The CBO's (2026b) 30-year projections, also released in February 2026, showed debt held by the public rising to 144% of GDP in 2046 and 175% of GDP in 2056. Notably, elements of this projection may be overly optimistic. Primary deficits are projected to remain constant at roughly 2% of GDP, but this is accomplished by the assumption that discretionary spending as a fraction of GDP will fall from its current level of 5.9% of GDP to 4.8% by 2036, following which it will remain roughly constant.[1]

Discussions of the current U.S. fiscal situation often prominently feature demographic issues, especially in the case of Social Security and Medicare. With the Social Security trust fund only a few years away from depletion, fertility at a record low, and net migration down sharply, this emphasis is likely to intensify in the next few years. But demographic change is only one of several drivers, alongside tax and spending policy, the trend rate of economic growth, business cycle fluctuations, and interest rates. Sorting out the role of demographics—past and future—is not trivial, and the long horizons involved breed confusion. Discussions of low fertility, for instance, frequently fail to distinguish between the effects of the currently low birth rate and the effects of birth-rate declines that took place decades ago.

[1] The primary deficit is the total budget deficit excluding net interest outlays. It measures the gap between current revenues and spending, excluding the costs of past borrowing.

This paper evaluates the extent to which our long-term fiscal challenges result from demographic change and then considers how changes in demographics might alter the fiscal trajectory.

We first look directly at how the age structure of the population affects budget balance in CBO's 30-year outlook, focusing on the effect of the rise in the share of elderly on Social Security and Medicare spending as a share of GDP. We re-run the CBO projections holding the 65-plus population shares at their 2006 values. The conclusion is that, in a literal sense, population aging is indeed the main driver of fiscal problems going forward. Absent the rise in the 65-plus share, the debt-to-GDP ratio would have peaked around 2020 and would be projected to decline to between 15% and 30% by 2056. This benchmark is useful but unrealistic, in that it alters the country's demographics in a way that does not correspond to a coherent counterfactual. Further, it limits the analysis of population aging to its effect on Social Security and Medicare, whereas population aging also has other important effects.

Our second approach focuses on how demographic change can affect the fiscal trajectory. We begin with information on age-specific flows of cash and in-kind services between the government and households—distinguishing between the federal government and state and local governments—and combine these profiles with CBO's program-specific federal budget projections. For the consolidated government, we combine the federal baseline with a state and local projection based on the 2024 age profile of spending per person, which we assume grows with productivity

We interact these flows with projections of population by single year of age from scenarios in which we vary future fertility and net migration. The resulting primary balance paths and debt-to-GDP ratios are not meant to be serious forecasts of the future, since we know that the policy and economic environment will necessarily change depending on how demographics evolve. Rather, they are indicators of the extent to which demographic change along a particular path would lead to an imbalance that would force a policy change.

Two important themes emerge from the exercises just described. The first is what we call the *crossing effect*: the result that the long- and short-run fiscal effects of variations in fertility differ from each other not only in magnitude but also in sign. This pattern results from the shape of the economic life cycle in a modern economy. Children and the elderly are on average net recipients of government resource transfers, with the elderly receiving more, while working-age people are net contributors. A rise in fertility lowers the total dependency burden in the long run by reducing the ratio of elderly to working-age people, but in the short run it raises youth dependency with no offsetting effect on old-age dependency. (See Weil 1997 and 2026 for more extensive treatments of this issue.)

One might think that because people become net contributors to the government budget around age 25, this is the number of years that it would take before an increase in fertility rates began to yield fiscal benefits. This is incorrect. If fertility rises in a sustained fashion—for example, if the birthrate in the United States were to return to the replacement level—then even after 30 or 40 years the vast majority of the extra people who were born as a result of the fertility increase would still be net burdens on the government. For this reason, the crossing times in our scenarios—the time until an increase in fertility yields a net fiscal benefit—are roughly 35 years for the federal budget and 60 years for the consolidated

government. Beyond a certain level, moreover, further increases in fertility eventually worsen the budget even in the long run. Neither feature is present for immigration: because most immigrants arrive as working-age adults, they are net contributors from the start, and higher immigration continues to improve the federal balance across the full range we consider.

A second theme that will run through the results below is that the fiscal effects of demographic change—and the impact of which demographic scenario unfolds—look very different from the perspective of the federal government and that of state and local governments. The federal government bears large expenses associated with old people and reaps low revenue from this group in the form of income taxes and social contributions. State and local governments continue to receive property tax revenue from old people while not incurring especially high expenses from them; but they face high costs from children through education. Thus, higher fertility is particularly good for the federal government in the long run and not particularly costly in the short run, while for state and local governments it represents a high up-front cost with no long-run benefit. Because the two levels diverge so sharply, how—and whether—to combine them into a consolidated picture is itself a substantive question, which we take up in Section III.F.

Together, our findings have several clear implications. While higher fertility can pay fiscal dividends, it takes an extremely long time and the fiscal benefits, even in the very long run, are not large enough to undo the debt accumulated before those benefits arrive. Within the conventional 30-year planning horizon, higher fertility increases the primary federal deficit. For the consolidated federal, state, and local government, the crossover time to net fiscal benefits on a flow basis is roughly 60 years. By 2099, the effects of fertility can be quite large: the consolidated primary deficit is 7 percentage points of GDP lower under a long-run total fertility rate (TFR) of 3.0 than under a rate of 0.75. But even with a TFR of 3.0, the fiscal situation would be worse than it is today.[2]

Higher immigration can improve the fiscal outlook substantially, with the largest gains from high-skill immigrants. Further, unlike higher fertility, higher immigration delivers fiscal benefits without a time lag. But except for the 4-million high-skill case in 2056, even improbably high levels of net migration (with or without a simultaneous rise in fertility) are not enough to preclude the need for tax and spending adjustments. It is worth noting some of the channels by which demographics might affect the fiscal situation that we do not explore. These include the effects of variations in fertility and migration on the path of per-worker income growth via the effect of population size on the speed of technological progress (Jones, 2022); the impact of different paths of debt accumulation on the interest rate on government debt; and how changes in the demographic makeup of the voting population might influence the particular set of fiscal adjustments that end up getting made in the face of a demographics-induced rise in deficits.

The rest of this paper is organized as follows. Section II lays out the CBO budget outlook and asks how the federal deficit and debt paths would differ if the elderly share of the population had remained at its 2006 level. Section III describes the demographic scenarios,

[2] The total fertility rate is the number of children a woman would have over her lifetime if current age-specific fertility rates remained unchanged.

age-specific fiscal flows, CBO-based budget baseline, and the distinction between federal and consolidated measures. Section IV traces the effects of alternative fertility and immigration assumptions on primary balances and debt-to-GDP ratios under the CBO-based baseline. This section also considers the effect of changing the skill composition of prospective immigrants. Section V presents robustness and interpretation exercises, including alternative interest-rate assumptions, alternative fiscal-policy baselines, and equivalent tax and spending changes. Section VI concludes.

II. How important is population aging to the fiscal trajectory over the next 30 years?

CBO projects roughly constant primary deficits of about 2% of GDP over the next 30 years. Many factors contribute to this situation. If tax rates were higher, GDP growth faster, or spending on any of myriad programs lower, there would not be a deficit. Demographic change (which will affect elements of both spending and tax collection) could not properly be described as the root cause of the deficit any more than any other element of fiscal policy or the economic environment. That being said, it is still worthwhile to assess the magnitude of the fiscal effects resulting from the particular demographic changes that are occurring, holding constant the other factors that affect the deficit. That is, we do not ask: "Did population aging cause these deficits?" Instead, we ask: "How would deficits be different if there had been a different demographic path?"

In particular, we ask: How much of the change in the debt-to-GDP ratio since 2006 is attributable to population aging, holding all else constant? We choose 2006 as a starting point because the primary deficit in that year was close to zero, the baby boom generation had just begun to retire, and the ratio of retirees to workers was relatively flat from 1996 to 2006.

Because our focus is on projections of the federal debt, and not just on Social Security and Medicare, we rely, where we can, on CBO projections and demographic assumptions, rather than those from the Social Security Administration (SSA) and the Centers for Medicare and Medicaid Services (CMS). However, as we note below, we sometimes use information from SSA that is not available elsewhere.

We define the population aging effect as the increase in the share of GDP going to Social Security and Medicare attributable to rising dependency ratios and the changing age mix of retirees. For Social Security, we operationalize it as follows. Let $SocGDP_t$ be the ratio of Social Security (OASI—excluding DI) outlays to GDP in year t. Let B_t be the number of beneficiaries and W_t be the number of workers in year t. Let $AvgSocBen_t$ be the average Social Security benefit received in year t. Let the aged dependency ratio, the ratio of beneficiaries to workers, be dep_t . Then:

$$SocGDP_t = \frac{B_t\ AvgSocBen_t}{GDP_t} = \frac{B_t\ AvgSocBen_t}{W_t * \frac{GDP_t}{W_t}} = dep_t \frac{AvgSocBen_t}{GDP\ per\ worker_t}$$

We also adjust the average Social Security benefit for the changing age mix of retirees. Because younger workers have larger benefits than older workers, the age mix will affect

the time patterns of benefits. In particular, we assume that real benefits rise 1.4% each year, and so calculate that 75-to-84-year-olds have benefits that are 87% as large as 65-to-74-year-olds, and the 85-plus have benefits that are 76% those of 65-to-74-year-olds.

Define $AgeIndex_t = sh65_t + 0.87\, sh75_t + 0.76\, sh85_t$, where $sh65_t$is the share of the elderly population that is aged 65-74, and similarly for the other share variables.

Our counterfactual average Social Security benefit is the benefit that would have arisen with the age distribution of beneficiaries of 2006.

$$\widehat{AvgSocBen_t} = AvgSocBen_t \frac{AgeIndex_{2006}}{AgeIndex_t}$$

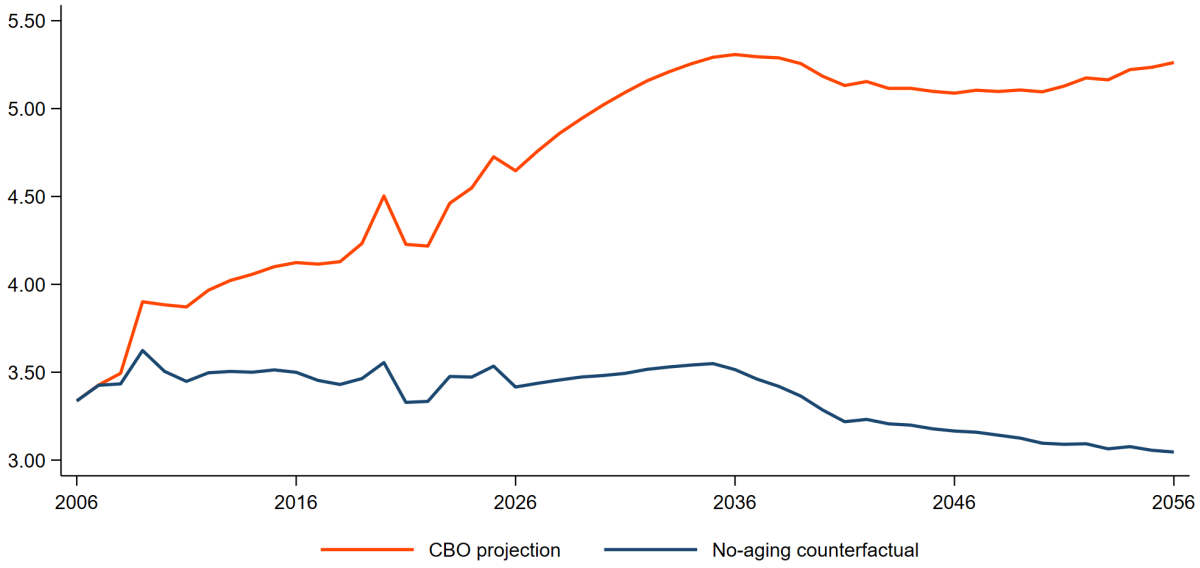
Our counterfactual Social Security share of GDP is then defined as:

$$\widehat{SocGDP_t} = SocGDP_t \frac{dep_{2006}}{dep_t} \frac{AgeIndex_socsec_{2006}}{Ageindex_socsec_t}$$

Figure 1 shows the results using CBO projections of the ratio of beneficiaries to covered workers as the relevant dependency ratio and CBO projections of the age distribution of the 65-plus population for the age indexes. Using this simple methodology, the counterfactual no-aging Social Security share of GDP shows a small decline over time. This no-aging counterfactual preserves the other determinants of Social Security benefits relative to GDP, including changes in benefit rules, earnings histories, labor-force participation, and the relationship between covered earnings and GDP. In particular, rising inequality and employer healthcare costs reduce taxable payroll relative to GDP, while the phased increase in the normal retirement age exerts downward pressure on benefits.

FIGURE 1

Social Security outlays with and without aging (% of GDP)



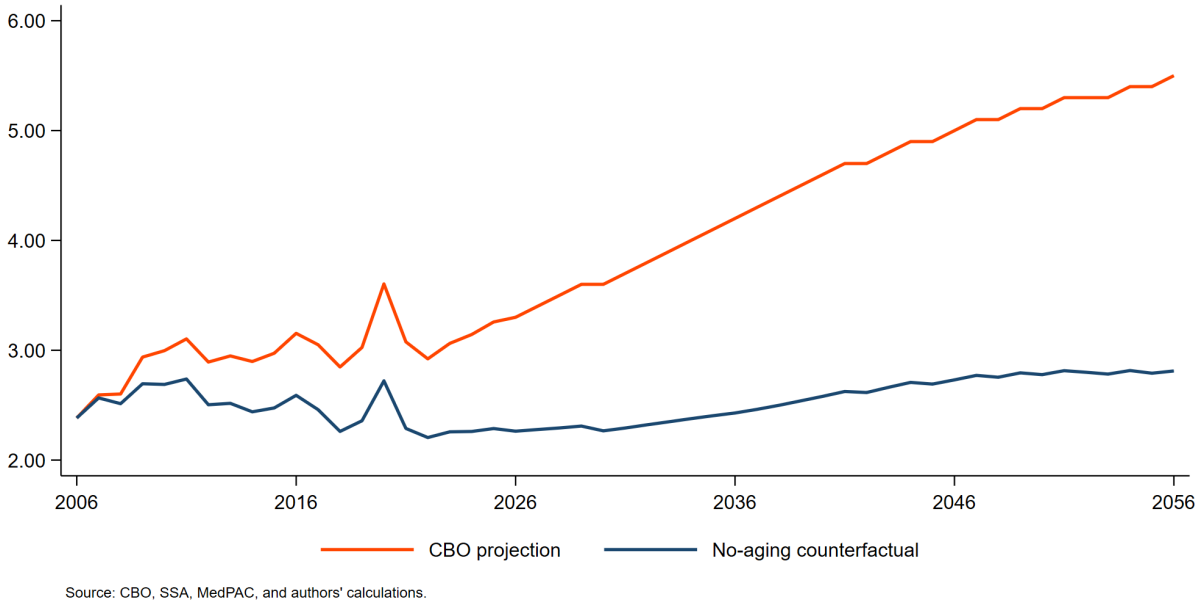
Source: CBO, SSA (2025 historical counts), and authors' calculations.

We assess the impact of population aging on Medicare in a similar fashion. The only difference is the age pattern of Medicare expenditures. According to MedPAC (2022–2025), on average from 2019-2022, Medicare spending for the average 75-to-84-year-old was 1.4 that of the spending for the average 65-to-74-year-old, while spending for those 85 and older was 1.68 times the spending of the 65-to-74-year-old. We assume that relative spending by age is constant and construct our age index for Medicare expenditures accordingly.

Figure 2 shows our estimate of how much population aging affects Medicare expenditures. Without population aging, Medicare spending would be rising over time—reflecting the assumption that average healthcare costs will continue to rise faster than per capita GDP, but the rise is much smaller. This relatively small role for healthcare costs reflects two phenomena. First, in this decomposition we are attributing all interactions between healthcare costs and population aging to population aging. That is, if we asked instead how much lower would Medicare outlays be if healthcare costs didn't rise faster than per-capita GDP, we would get a larger effect (because a given change in average Medicare costs has a larger effect when the dependency ratio is higher). Second, healthcare costs have been rising more slowly over the past decade, and CBO assumes that they will continue to abate over time, making rising healthcare costs a smaller contributor to long-term fiscal challenges than they were perceived to be in the past.

FIGURE 2

Medicare outlays with and without aging (% of GDP)

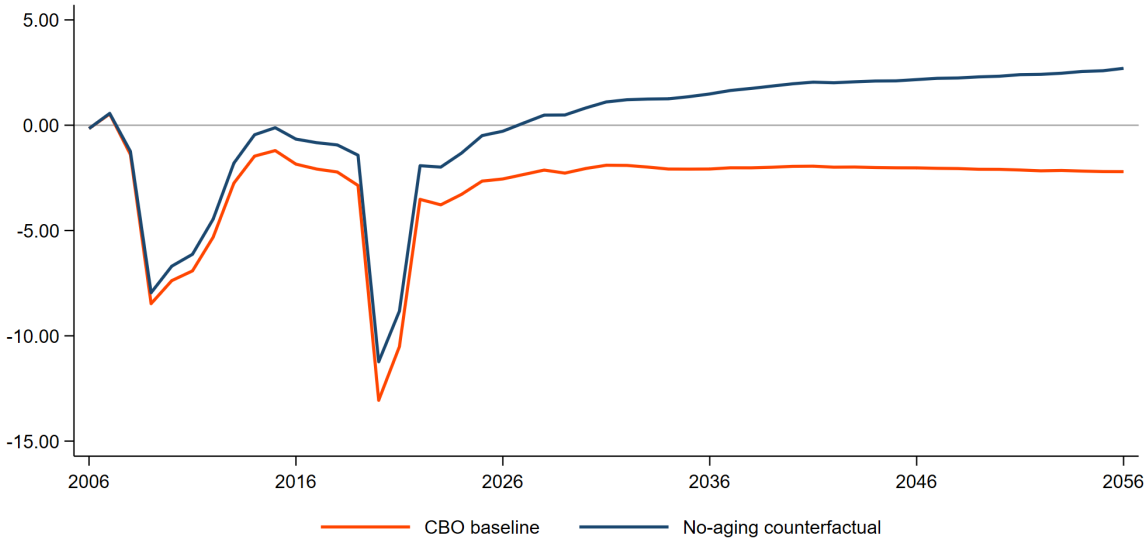


Source: CBO, SSA, MedPAC, and authors' calculations.

Figure 3 shows a counterfactual primary balance if we replace CBO Social Security and Medicare projections with the no-aging projections and hold all other elements of the budget constant. Without population aging, the federal government would run primary surpluses. This reflects CBO's assumption that discretionary spending rises only with inflation over the 10-year budget window and then remains roughly constant as a share of GDP, while revenues rise over time as real income growth pushes taxpayers into higher brackets.

FIGURE 3

Primary balance with and without aging (% of GDP)

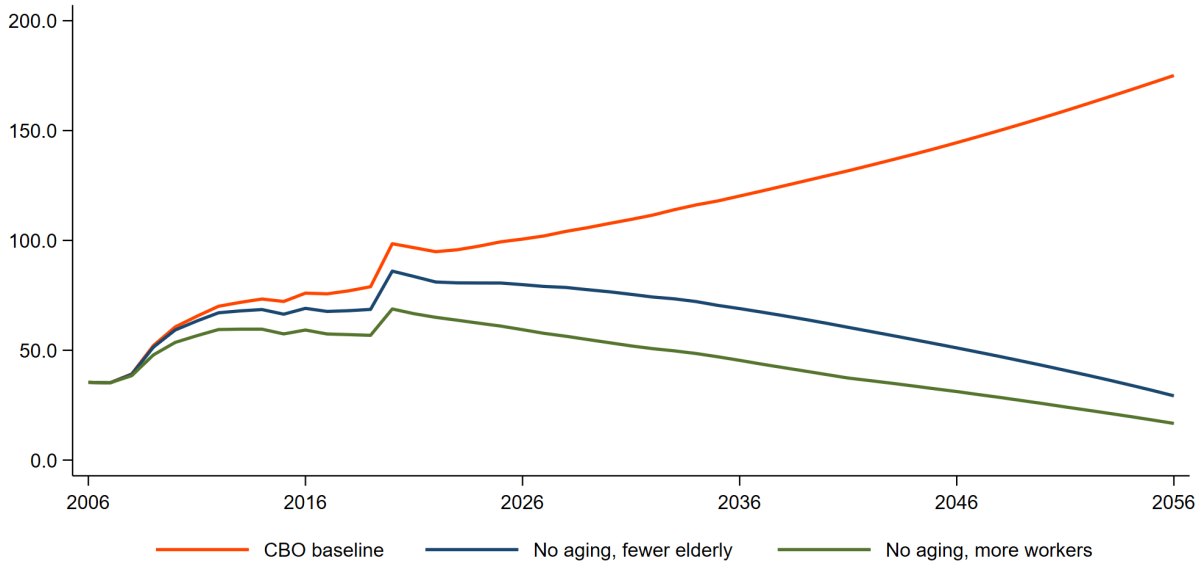


Source: CBO, SSA, MedPAC, and authors' calculations.

As a result, the debt-to-GDP ratio would fall, rather than rise as it does under the CBO baseline, as shown in Figure 4. How far it falls, however, depends on how the lower dependency ratio is achieved—through fewer elderly or more workers. The blue line shows the no-aging debt-to-GDP path when the elderly population is smaller. If the dependency ratio is instead held down by a larger working-age population, GDP is higher as well, which further reduces the debt-to-GDP ratio by spreading existing debt over a larger economy, as shown by the green line.

FIGURE 4

Debt held by the public with and without aging (% of GDP)



Source: CBO, SSA, MedPAC, and authors' calculations.

III. Demographic scenarios and fiscal projection methods

The preceding section shows that population aging is a major reason the federal fiscal outlook has deteriorated. But it does not follow that plausible changes in fertility or immigration would quickly or fully reverse that deterioration. Fertility and immigration affect the budget through different channels, over different time horizons, and with different implications for GDP. We therefore turn next to coherent demographic scenarios that vary fertility and net immigration and ask how those scenarios would affect fiscal outcomes.

A central issue is how to measure the fiscal effect of demographic change. Much of the existing work on immigration, including the National Academy of Sciences, Engineering, and Medicine report and Cato Institute analyses (Bier et al, 2026), focuses on the effects of immigration on the level of government debt. That measure is not well suited to assessing fiscal sustainability. Higher fertility or immigration could raise the level of federal debt but still improve fiscal sustainability if it raises GDP by more. In addition, conclusions about the dollar level of debt depend heavily on the assumed fiscal regime. For example, if taxes are assumed to rise in the future to stabilize the debt, then higher immigration is more likely to reduce future debt levels; if taxes are held fixed, the same demographic change may have a different effect.

We focus instead on the primary balance as a share of GDP and the debt-to-GDP ratio. [3] Both measures scale fiscal outcomes by the size of the economy, which is essential when

[3] We define the primary balance as revenues minus noninterest spending. A positive balance is a primary surplus, while a negative balance is a primary deficit.

the demographic change being studied also changes GDP. As we show below, the estimated effects of demographic change measured relative to GDP are much less sensitive to the choice of budget baseline than are conclusions based on the dollar level of debt.

The debt-to-GDP ratio also captures a channel that annual primary-balance measures do not: the dilution of previously accumulated debt. When higher fertility or immigration raises future GDP, the burden of debt incurred in earlier years falls relative to the economy.

A. Cross-sectional fiscal flows

Our analysis begins with the National Transfer Accounts (NTAs), an internationally standardized set of accounts developed to measure how people at different ages produce, consume, save, pay taxes, and receive transfers (Lee and Mason, 2011; United Nations Population Division, 2013). The NTAs allocate public and private consumption, labor income, asset income, taxes, and transfers across the age distribution, providing a comprehensive cross-sectional picture of fiscal flows by age. These accounts are calibrated so that they match the values in the National Income and Product Accounts (NIPAs). Spending on programs with age-specific patterns such as education, healthcare, and other social insurance programs is distributed by age. Other government spending such as police and fire protection, defense, and general government administration is distributed equally across the population. Taxes are also distributed by age, based on the age profiles of the relevant tax bases.

The NTA public-sector accounts consolidate federal, state, and local governments. We decompose them into federal and state-and-local by splitting each spending and tax component separately into a federal component and a state-and-local component. The Technical Appendix to this paper describes our methodology for making these adjustments.

Figures 5, 6, and 7 show fiscal flows by age in the NTAs by level of government. For the federal government, we show both total spending (Figure 5) and spending by CBO category (Figure 6). Federal spending is relatively flat by age until 65, when it rises sharply. For state and local governments (Figure 7), the primary age-related component of spending is education, so spending is much higher for younger people but rises much less for older Americans. The increase in spending at very old ages for both the federal government and state and local governments is largely accounted for by Medicaid spending on nursing home care.

Tax revenue patterns also differ by level of government. Federal taxes are concentrated among working-age adults, reflecting the significant role of payroll taxes as well as the lifecycle pattern of taxable income. State-and-local revenues show less variation by age once people reach working age, reflecting their greater reliance on sales and property taxes.

FIGURE 5

Federal government: Total spending and revenues by age (2025, per capita)

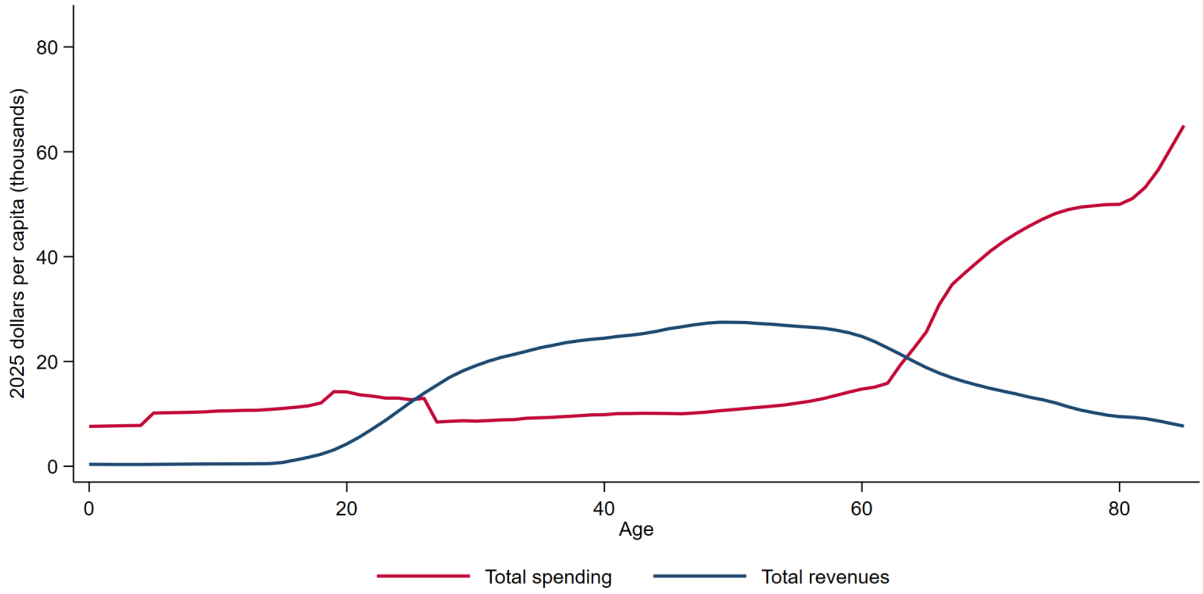


FIGURE 6

Federal government: Spending and revenues by age (2025, per capita)

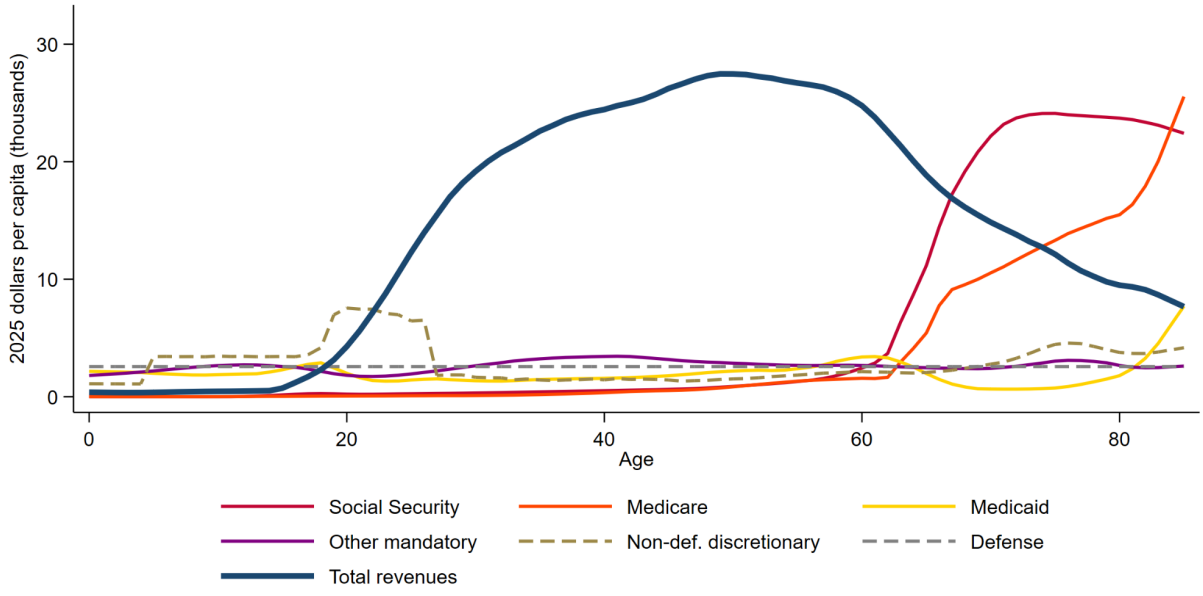
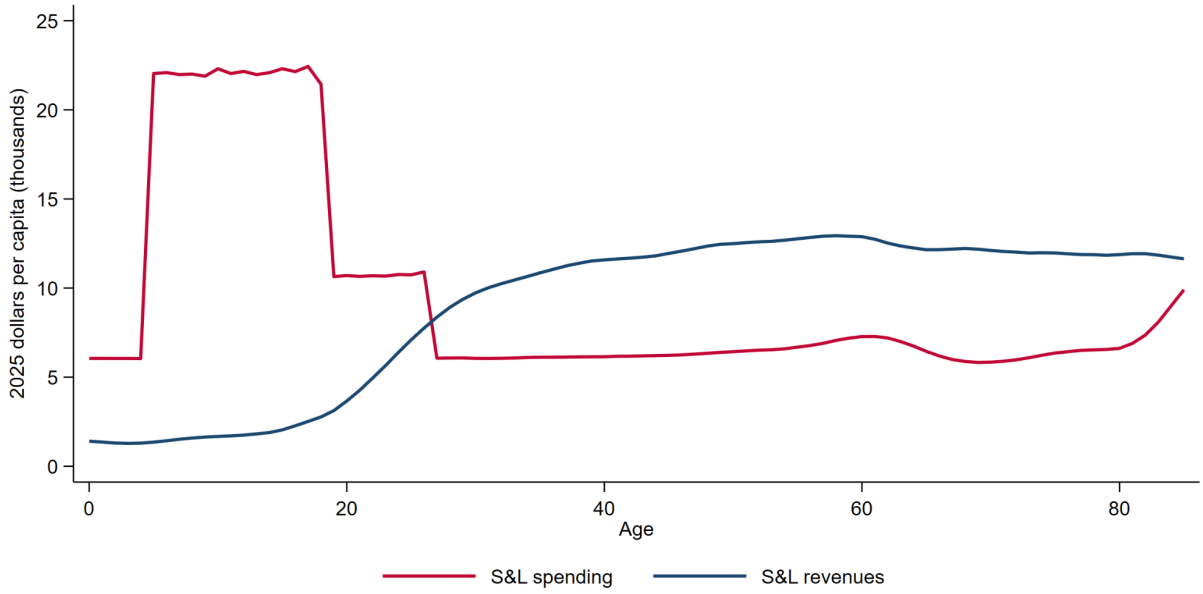


FIGURE 7

State and local government: Spending and revenues by age (2025, per capita)



B. Demographic scenarios

We construct our own projections of the U.S. population by single year of age, sex, and nativity, built directly on the assumptions underlying the CBO's most recent demographic outlook (CBO 2026c). We use the standard cohort-component method: Each year, the population at each age is survived forward using CBO's age- and sex-specific mortality rates, net immigration is added according to CBO's assumed level and age-and-sex distribution, and births are generated by applying age-specific fertility rates to the female population.[4]

We track the foreign-born population separately within the projection. The foreign-born stock is initialized in 2022 using foreign-born shares by age and sex estimated from the monthly Current Population Survey (CPS).[5] For the purpose of situating our scenarios in historical context, we also track the second generation—U.S.-born children with at least one foreign-born parent. Children of foreign-born mothers are identified directly within the projection. Children of native mothers and foreign-born fathers are added using a constant-odds intermarriage model, in which the probability that a native mother's partner is foreign born rises with the foreign-born share of prime-age men, with the odds ratio calibrated to

[4] Small closure terms, computed from the baseline and held fixed across scenarios, reconcile our mechanical cohort-component arithmetic with CBO's published series The closure terms absorb components of CBO's population accounting that we do not model explicitly—emigration of the U.S.-born, the overseas armed forces population, and small definitional and rounding differences. They are computed once, from the requirement that the baseline reproduce CBO's published population by age and sex in every year, and are then held fixed across all demographic scenarios. They are small relative to the flows we vary.

[5] We average the foreign-born share by single year of age and sex over all monthly Current Population Survey files from 2021 through 2023 to smooth sampling noise in single-year-of-age cells. The CPS measures the civilian noninstitutionalized population. We apply the resulting shares to CBO's population totals.

match the second-generation birth share observed in the CPS. The generational decomposition affects only our descriptive figures on the first- and second-generation shares of the population. It plays no role in the fiscal calculations, where the second generation is treated like other natives.

Our scenarios vary fertility and net immigration.[6] Each scenario is defined by an ultimate level of the total fertility rate or of annual net immigration. The ultimate level is approached along a linear path that begins in 2026 and is reached in 2035, after which it is constant; the age pattern of fertility and the age-and-sex pattern of net migration are held fixed at CBO's assumptions throughout. In CBO's baseline, the total fertility rate is approximately 1.55 and long-run net immigration is approximately 1.2 million per year. We consider alternatives with ultimate total fertility rates of 1.2, 2.1, and 2.5, and ultimate net immigration levels of 500,000, 2 million, and 3 million per year. These alternatives are phased in over 10 years, reflecting the fact that neither fertility nor migration flows change discontinuously in practice.[7]

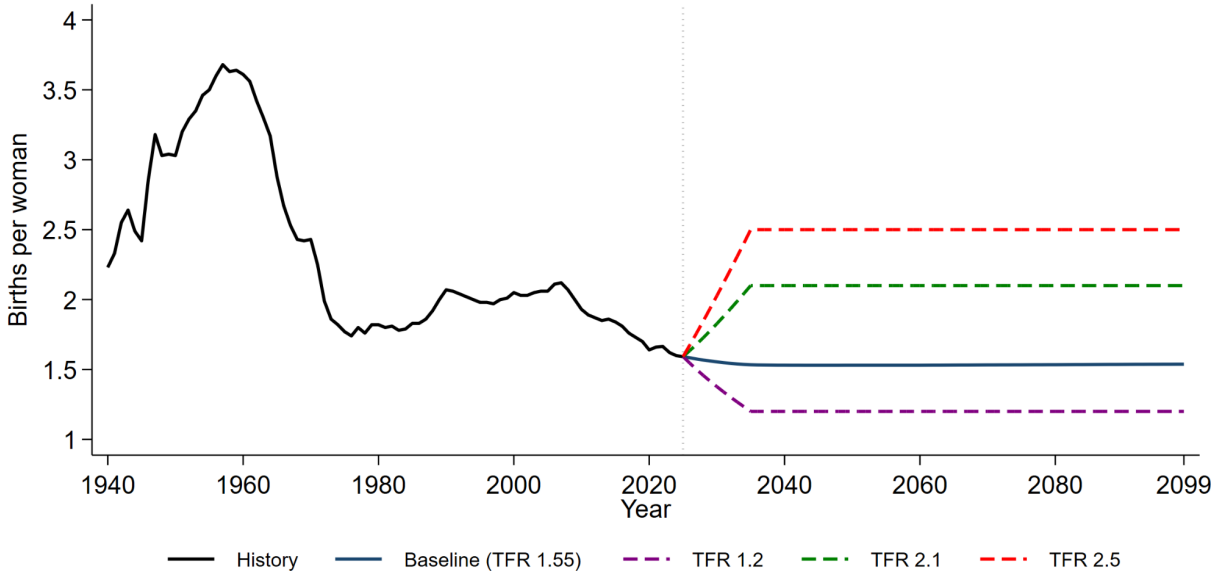
As shown in Figure 8, the fertility scenarios span outcomes from very low fertility already observed in some advanced economies to fertility well above replacement. Figure 9 shows our net immigration assumptions in historical context. A net immigration level of 500,000 per year would be extremely low in historical perspective. As a share of the population, it would be lower except for temporary episodes: the Depression, World War II, the Great Recession, the COVID period, and the unusually low immigration levels of the past year and a half. And unlike those episodes, it would persist indefinitely. Net immigration of 2 million or even 3 million people per year is high relative to recent experience, but it is not unprecedented when measured as a share of the population. Immigration rates were comparable or higher in parts of the late 19th and early 20th centuries. The difference is that, compared with that period, fertility is currently much lower and native-born population growth is slower. As a result, a given number of immigrants has a larger effect on the composition of the population than it did when the native-born population was growing more rapidly.

As shown in Figure 10, under the baseline assumption of below-replacement fertility and net immigration of about 1.2 million per year, the combined first- and second-generation share of the population rises above its historical peak later this century. With higher immigration, the increase is much larger. But the figure also shows that this result depends importantly on fertility: When TFR is assumed to recover to 2.5, the same immigration flows produce a smaller increase in the first- and second-generation share because the native-born population is growing more quickly. Thus, even immigration levels that are not historically unprecedented in population-share terms could imply a historically high first- and second-generation population share in a low-fertility environment, with potentially important political and social implications.

[6] Relative age-specific fertility rates are held constant as the total fertility rate is varied among projections. Similarly, relative age- and sex specific rates of net migration are held constant as total net migration is varied among projections. We apply the same fertility and mortality rates to the foreign-born and native populations.
[7] A few of the figures below trace fiscal outcomes across a wider range of ultimate fertility rates.

FIGURE 8

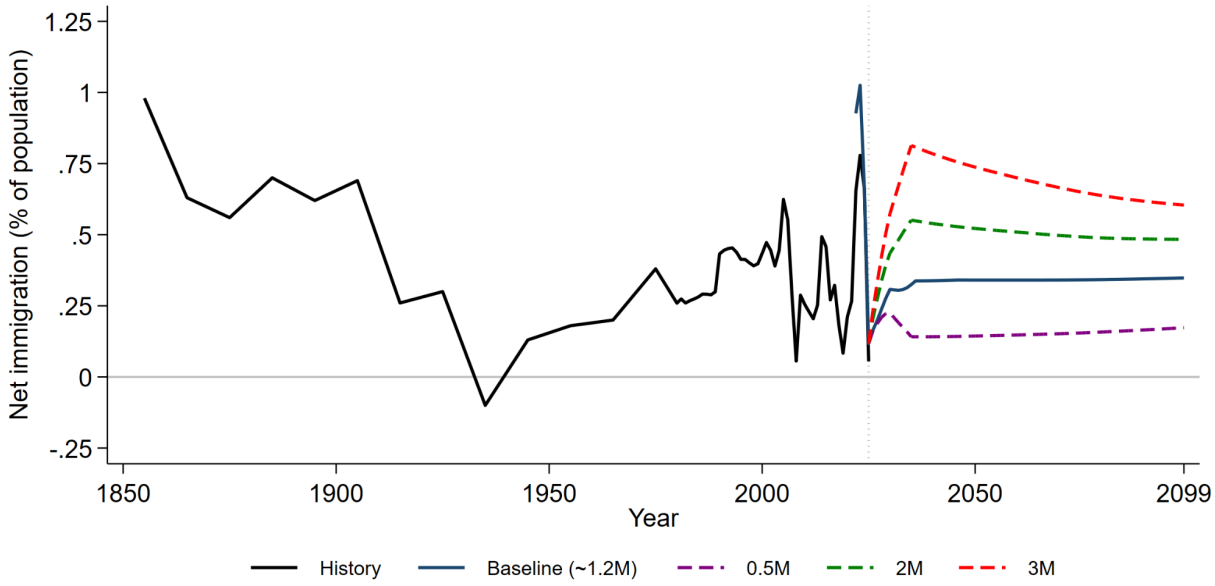
Total fertility rate: History and scenario assumptions



SSA history; CBO 2022–2025; scenarios reach ultimate level by 2035.

FIGURE 9

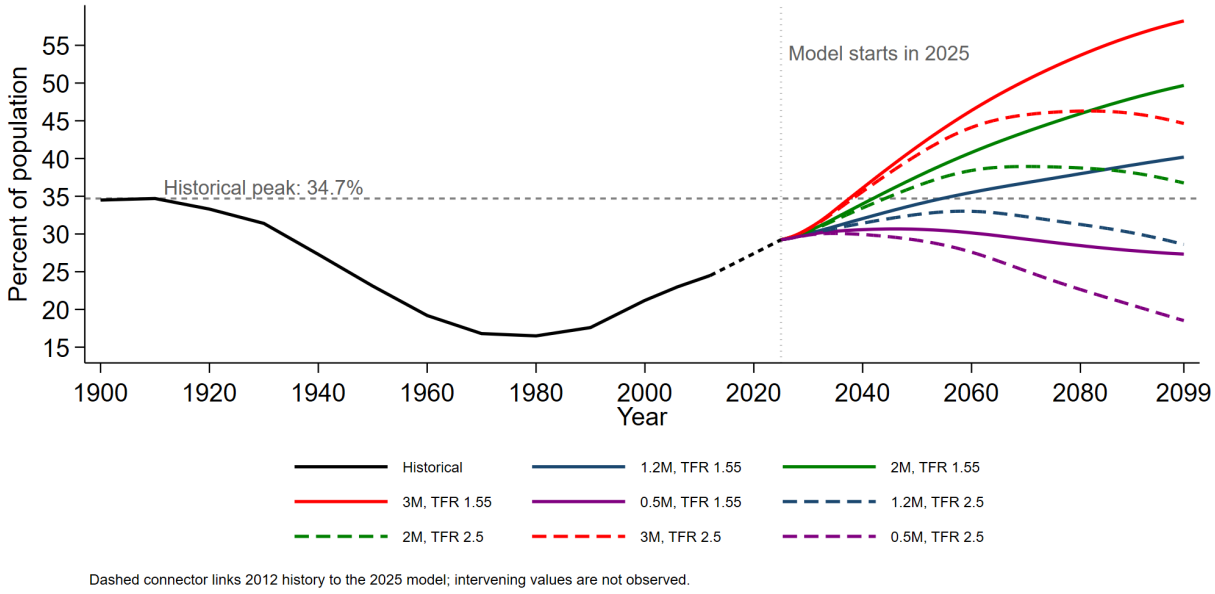
Net immigration as a share of population



Source: NAS (2017), SSA (2025), CBO (2026c).

FIGURE 10

First- and second-generation share of U.S. population



Dashed connector links 2012 history to the 2025 model; intervening values are not observed.

Historical Pew data and alternative immigration/fertility scenarios.

The combined demographic effects of our 16 different fertility and migration assumptions are shown in Table 1a (for the year 2056) and Table 1b (for the year 2099). In each table, panel A shows the projected total population of the country, panel B the old age dependency ratio (population age 65 and older divided by population ages 20-to-64), and panel C the youth dependency ratio. The size of the total population in 2056 ranges from 324 million to 484 million depending on fertility and migration assumptions. In 2099, the range is from 231 million to 796 million. The old age dependency ratio in 2056 ranges from 33% to 46% and in 2099 from 35% to 78%. One can also use these tables to assess, in a crude fashion, the tradeoff between fertility and net migration in affecting demographic outcomes such as population size or dependency ratios. For example, the old-age dependency ratio in 2056 that results from using the CBO baseline assumptions of ultimate TFR of 1.55 and ultimate net migration of 1.2 million would also result if the ultimate TFR was 2.5 and net migration was roughly 570,000 or alternatively if ultimate TFR was 1.2 and ultimate net migration was roughly 1.5 million. The tables also drive home that the importance of migration in shaping demographic outcomes is a function of the level of fertility, especially over long horizons. Comparing annual net migration of 500,000 and 3 million, the old-age dependency ratio in 2099 differs by 10.1 percentage points using the CBO baseline fertility, but by only 1.6 percentage points if the ultimate TFR is 2.5.

TABLE 1A

Combined fertility and migration effects, 2056

Panel A. Total population (millions)

		Ultimate net migration			
		0.5M	Baseline (~1.2M)	2M	3M
Ultimate TFR	1.2	323.6	344.4	368.5	398.4
	Baseline (1.55)	342.6	364.1	389.2	420.2
	2.1	375.0	397.9	424.6	457.6
	2.5	398.3	422.1	449.9	484.3

Panel B. Old-age dependency ratio

		Ultimate net migration			
		0.5M	Baseline (~1.2M)	2M	3M
Ultimate TFR	1.2	46.3%	42.8%	39.5%	36.1%
	Baseline (1.55)	45.1%	41.8%	38.6%	35.3%
	2.1	43.3%	40.2%	37.3%	34.2%
	2.5	42.1%	39.2%	36.4%	33.4%

Panel C. Youth dependency ratio

		Ultimate net migration			
		0.5M	Baseline (~1.2M)	2M	3M
Ultimate TFR	1.2	26.6%	26.5%	26.3%	26.2%
	Baseline (1.55)	33.2%	32.9%	32.6%	32.3%
	2.1	44.0%	43.5%	42.9%	42.4%
	2.5	51.2%	50.6%	49.9%	49.2%

Old-age dependency = pop 65+ / pop 20–64; youth dependency = pop 0–19 / pop 20–64.

TABLE 1B

Combined fertility and migration effects, 2099

Panel A. Total population (millions)

		Ultimate net migration			
		0.5M	**Baseline (~1.2M)**	**2M**	**3M**
Ultimate TFR	**1.2**	231.2	285.8	344.6	420.2
	Baseline (1.55)	289.2	349.1	413.6	496.6
	2.1	413.4	483.4	559.4	656.8
	2.5	523.1	601.3	686.6	795.6

Panel B. Old-age dependency ratio

		Ultimate net migration			
		0.5M	**Baseline (~1.2M)**	**2M**	**3M**
Ultimate TFR	**1.2**	78.4%	70.3%	65.0%	60.6%
	Baseline (1.55)	62.0%	57.6%	54.6%	51.9%
	2.1	44.4%	42.9%	41.8%	40.7%
	2.5	36.6%	36.0%	35.5%	35.0%

Panel C. Youth dependency ratio

		Ultimate net migration			
		0.5M	**Baseline (~1.2M)**	**2M**	**3M**
Ultimate TFR	**1.2**	24.4%	24.3%	24.2%	24.1%
	Baseline (1.55)	31.7%	31.3%	31.0%	30.7%
	2.1	43.9%	43.2%	42.7%	42.2%
	2.5	52.6%	51.8%	51.2%	50.6%

Old-age dependency = pop 65+ / pop 20–64; youth dependency = pop 0–19 / pop 20–64.

C. Budget baseline and evolution of age-specific flows

The age profiles described above measure fiscal flows and income in a cross-section. To use them in projections, we must specify how the per-capita flows in each budget category and the age-specific income profiles evolve over time. For the federal government, our main baseline is based on CBO's long-term budget outlook, the basis for most policy discussions of the federal fiscal challenge. Specifically, we take the projected paths of each revenue and spending category from CBO's most recent long-term budget outlook (CBO 2026b) It embeds program-specific assumptions—per-beneficiary health spending rising faster than productivity, means-tested programs rising more slowly than GDP, and discretionary spending flat in real terms for 10 years and then constant as a share of GDP.

We distribute each category across ages using the NTA age profile that most closely corresponds to it. Spending that does not vary by age—such as defense, is distributed equally across the population. We provide a detailed crosswalk between the NTA and CBO spending and revenue categories in the Technical Appendix.

We also anchor baseline GDP to CBO. In each year, we scale the age-specific profiles of labor income and asset income so that, when applied to the baseline population, they sum to CBO's projected GDP. The long-term budget outlook extends only to 2056, but we are interested in longer-run projections. After 2056 we assume all age-specific fiscal flows and income increase with productivity.

For the state-and-local sector, there is no comparable long-term CBO baseline. We therefore project state-and-local flows by growing the 2024 state-and-local age profile with productivity, using the same baseline GDP path described above. For the consolidated government, we combine this state-and-local projection with the CBO-based federal baseline.

D. From age profiles to fiscal projections

Our analysis then combines two ingredients: the age-specific fiscal flows and income profiles evolved under the budget baseline described in Section III.C, and projections of the population by age from Section III.B. To trace the fiscal effects of demographic change, we apply those flows to each alternative population structure so that aggregate spending, revenue, and GDP change as the number of people at each age changes.

Because our intention is to provide a rough estimate of what the CBO extended baseline would be if CBO had made different demographic assumptions, we treat discretionary spending differently. CBO assumes that discretionary spending is constant in real terms for the first 10 years of the projection. We therefore hold total discretionary spending fixed at its baseline level over that period, adjusting per-capita amounts as population changes so that aggregate discretionary spending remains unchanged. After the first 10 years of the projection, per capita discretionary spending is assumed to rise with productivity.

This question of how aggregates should change when population changes is an important one. Apart from the first 10 years of discretionary spending, our approach assumes proportionality—that aggregate flows scale with the number of people in each age group. For most of the budget this is reasonable. Twice as many 50-year-olds should mean twice as much income tax and social insurance collected from them, and for most large transfer programs, like Social Security, fixed costs are modest, and so marginal cost is close to average cost. Whether this assumption is reasonable is less clear for spending with low marginal cost. Defense is the clearest example: It does not necessarily cost more to defend the country when the population increases. In practice, however, holding defense fixed rather than allowing it to scale with population has only modest effects on our results, because defense is a relatively small share of GDP and the CBO baseline already constrains discretionary spending in aggregate over the first 10 years.

A separate concern is that some categories of spending may involve economies of scale or short-run capacity constraints. Public capital is the clearest example: Transportation infrastructure, schools, hospitals, and other public facilities may not scale smoothly with

population year by year. More consequential departures from proportionality are therefore possible, especially for state-and-local capital spending, including school facilities, but we do not model these and note them as a limitation.

E. Adjusting fiscal profiles by nativity

Our baseline fiscal profiles differ by nativity, which is important for evaluating the effects of alternative immigration assumptions. First-generation immigrants earn less and pay less in tax during their working lives but receive lower old-age benefits. Following National Academies of Sciences, Engineering, and Medicine (2017), we set the wages and taxes of first-generation immigrants to 80% of those of natives, and their old-age (65-plus) benefits also to 80 percent. We back out the native flows in each age group so that the population-weighted average of natives and immigrants matches the NTA value; public goods such as defense are distributed equally. The second generation is treated like other natives in the fiscal calculations.

In addition to the baseline assumptions about nativity just described, we also consider an alternative set of assumptions in which additional net migrants, beyond the CBO baseline of 1.2 million per year, are more educated and skilled than our baseline. Specifically, in this high-skill assumption, migrants are assumed to earn 120% of the native-born profile at the same age (paying correspondingly higher taxes) and to receive old-age benefits equal to 100% of the native-born profile at the same age.

F. Federal and consolidated government perspectives

We show the effects of demographic change for the government sector as a whole, and separately for the federal and state and local governments. Which measure is most appropriate depends on the question being asked. The consolidated balance captures the full resource cost to the public sector, abstracting from which level of government records the transaction. A child educated by a school district and a retiree supported by Medicare are both claims on the same economy. Netting the federal and state-and-local effects therefore gives the clearest measure of what a demographic change costs or saves the public sector as a whole.

But there are also reasons to keep the levels of government separate. The federal government and state and local governments operate under very different budget institutions. State and local governments generally face balanced-budget requirements and adjust taxes or spending in response to fiscal pressure, so their imbalances do not cumulate into debt in the same way federal imbalances do. To the extent the question is debt accumulation, the federal balance is therefore the relevant margin.

There is also a question of timing and incidence. The consolidated measure sets a cost borne by one level of government against a benefit accruing to another, often in a different decade, as though the two were fungible. For that reason, the consolidated balance is best read as a measure of the overall public-sector effect of demographic change, while the separate federal and state-and-local balances show where those costs and benefits arise, when they arise, and which governments would face pressure to adjust.

IV. Impact of demographic change under the CBO-based baseline

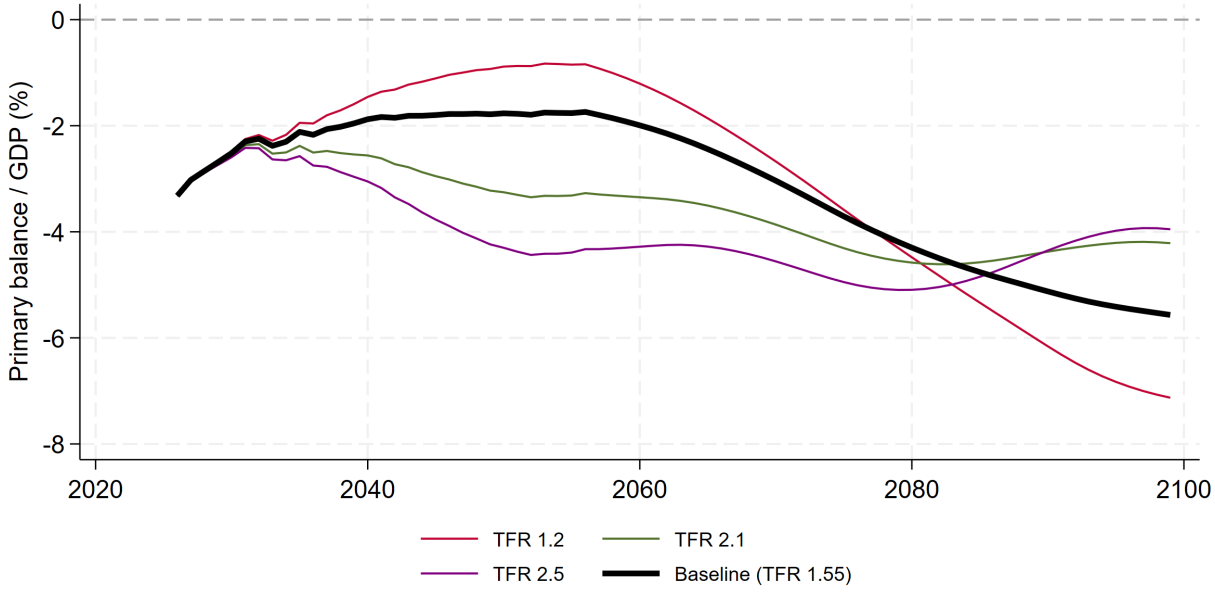
A. Fertility

Figure 11 shows the effects of alternative fertility assumptions. We begin with the consolidated federal, state, and local government sector because it captures the full public-sector cost and benefit of demographic change. Higher fertility worsens the consolidated primary balance for several decades because higher fertility increases the number of children immediately, and children receive substantially more in public spending—especially education and health spending—than they pay in taxes. The primary deficit with very high fertility is larger than the baseline until 2086. The fiscal benefits of a larger working-age population arrive only after those children grow up.

This time pattern is the crossing effect: Higher fertility worsens fiscal outcomes at first, but can improve them later once larger cohorts reach working age and broaden the tax base. The same logic can appear in both primary-balance and debt-to-GDP figures, although the crossing occurs later in debt because debt reflects the cumulative effect of many years of deficits.

FIGURE 11

Primary balance/GDP (consolidated): Fertility scenarios



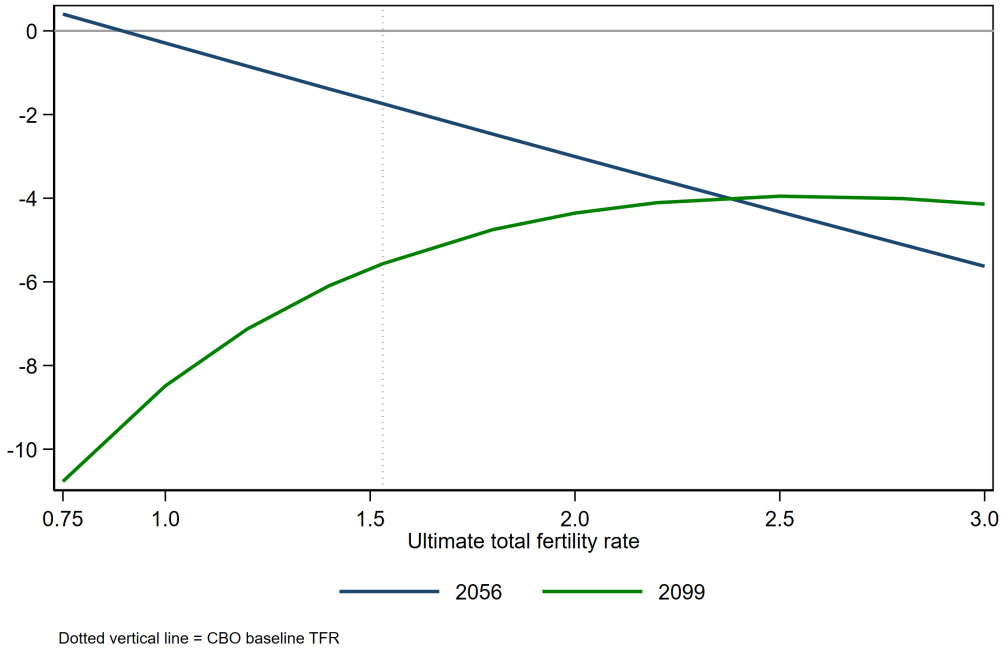
Dashed line = balanced primary budget

Figure 12 plots the primary balance in various years against the ultimate fertility rate. Early in the projection period, lower fertility produces the strongest consolidated primary balance because it reduces the number of children. But over longer horizons, very low fertility becomes less favorable because it produces a smaller tax base and a larger elderly

population relative to the workforce. At the other extreme, very high fertility also worsens the consolidated budget because it creates large cohorts of children whose public costs arrive well before their tax payments. In our simulations, the long-run consolidated budget outcome is therefore best when fertility is about 2.5.

FIGURE 12

Consolidated primary balance by ultimate TFR (percent of GDP, federal + S&L)



Dotted vertical line = CBO baseline TFR

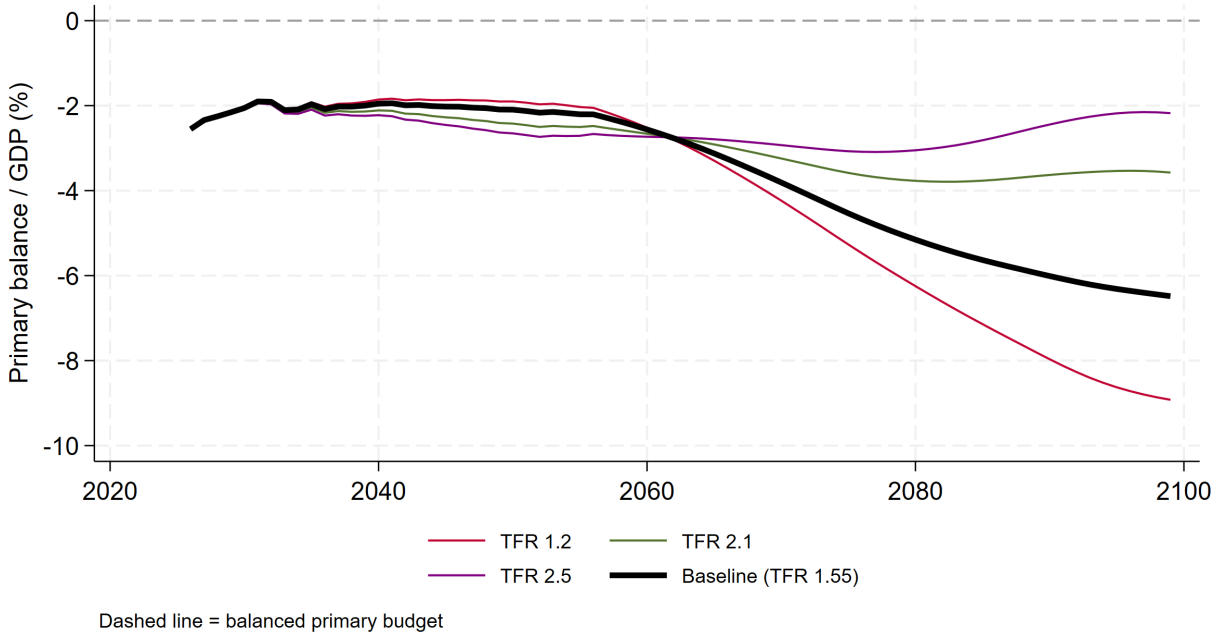
This result is closely related to the support-ratio logic in Weil (2026), but with the weights tailored to the government budget rather than to total consumption and labor income. Weil shows that the adjusted support ratio is maximized near replacement because very low fertility raises old-age dependency while very high fertility raises child dependency. Our consolidated-budget results point to a similar tradeoff, but using age-specific public spending and tax profiles rather than economy-wide consumption and earnings profiles.

Separating federal from state and local governments helps illustrate the mechanism. For the federal government, the primary deficits in the different fertility scenarios are nearly indistinguishable through 2060. This is for two reasons. First, additional young people have relatively little direct effect on the federal budget. Second, when larger birth cohorts begin entering the workforce, the positive fiscal effect is partly offset by the continued arrival of additional cohorts of children. After 2060 the primary deficits resulting from fertility changes fan out sharply, and in the intuitive direction: Higher fertility lowers the primary federal deficit and lower fertility raises it.[8] By 2099, the primary federal deficit ranges from 2.2% of GDP under the highest-fertility scenario (TFR 2.5) to about 8.9% under the lowest (TFR 1.2), against roughly 6.5 at baseline.

[8] A high enough fertility rate will eventually be detrimental to the federal government's budget, as the small deficits associated with children become large enough to outweigh the lower share of spending on the elderly as a share of GDP. In our simulations, we find that a fertility rate of about 6 maximizes the federal primary surplus in the long run.

FIGURE 13

Primary balance/GDP (federal): Fertility scenarios

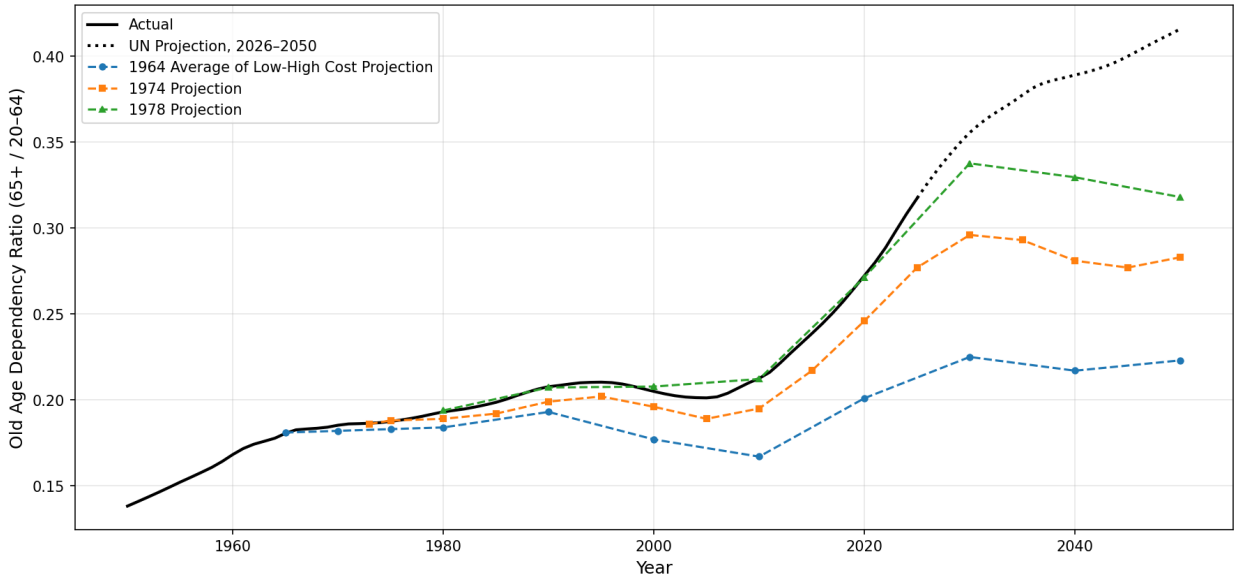


Dashed line = balanced primary budget

The fact that variations in fertility affect the federal deficit with such a long lag may seem paradoxical, given that the United States has just experienced a significant fertility decline in the past two decades (TFR fell from 2.08 in 2008 to 1.59 in 2025) and that declining fertility is central to so many diagnoses of the fiscal pressure now facing the United States in the next few decades. What about the long delay? The explanation for this apparent paradox is that the current fiscal pressure is the result of a different decline in fertility: the one that took place in the 1960s. Figure 14 makes this point by showing the old-age dependency ratio as projected by Social Security actuaries in 1964, the last year of the Baby Boom, and then again 10 and 14 years later. The current episode of rising old-age dependency after several decades of stability, which we showed above, was largely responsible for the current federal deficit and was predicted more than four decades in advance.

FIGURE 14

U.S. old-age dependency ratio: Projections vs. actual



Sources: Projections from Table 10, United States Population Projections for OASDHI Cost Estimates (1964, 1974 reports); Table 2C, Long-Range Cost Estimates for OASDHI System (1978 report). Actual data and UN projection from United Nations, Department of Economic and Social Affairs, Population Division (2024). World Population Prospects: The 2024 Revision. Population by 5-year age group, USA, 1950–2050.

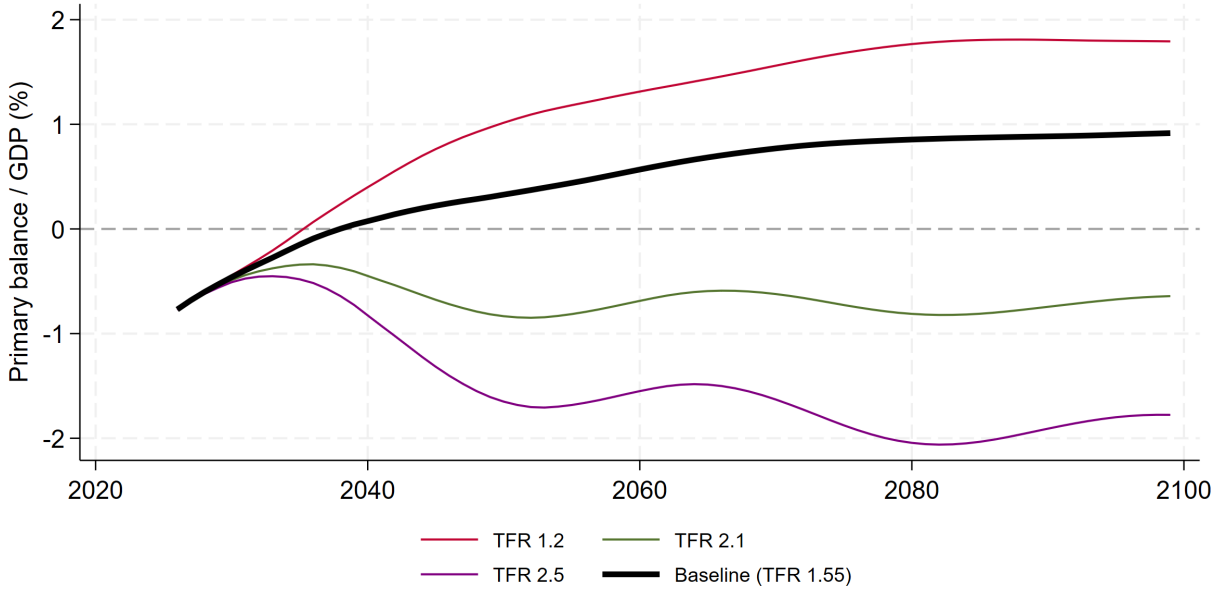
The black UN series comprises estimates through 2023 and projections from 2024, including the solid segment for 2024–2025. Historical projection curves are author-supplied.

For state and local governments, the pattern is quite different: Higher fertility raises spending much sooner, especially through education and other services for children, and those costs dominate over the horizons we examine.[9] Thus, while the end of the Baby Boom yielded very modest fiscal benefits for the federal government in the short run and much larger difficulties in the long run, it produced benefits to state and local governments almost right away.

[9] In our simulations, lower fertility is always beneficial for state and local governments.

FIGURE 15

Primary balance/GDP (S&L): Fertility scenarios



Dashed line = balanced primary budget

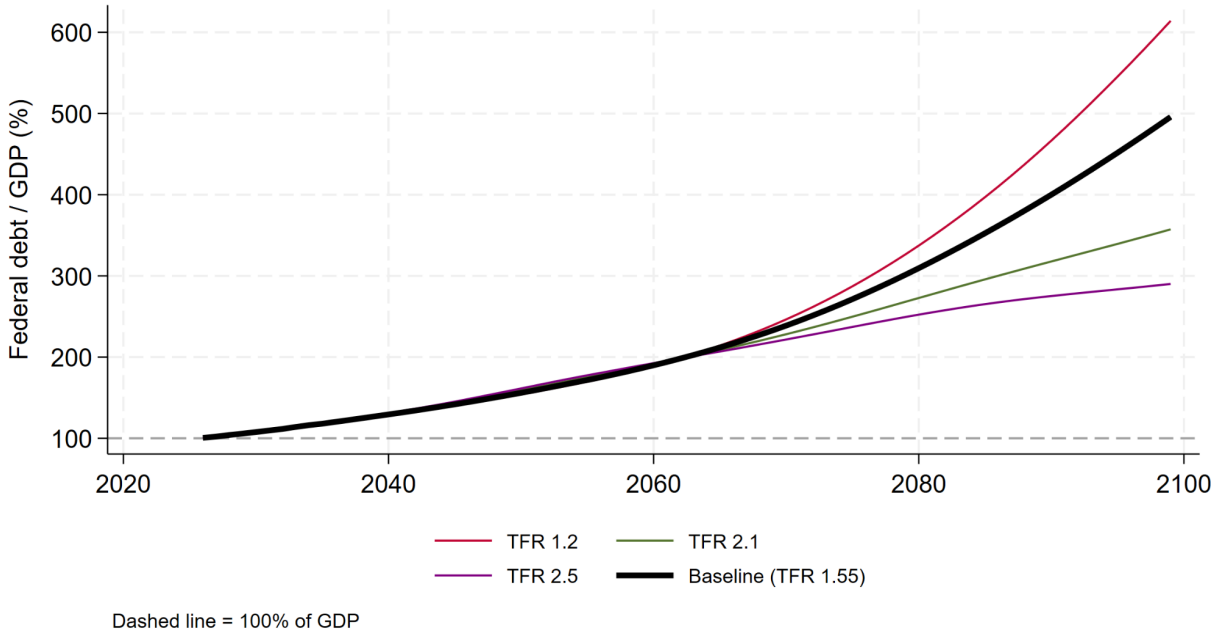
The primary-balance figures just presented show the annual fiscal pressure created by alternative fertility paths on a year-by-year basis. For a shock that produces short- and long-run impacts that have different signs, as is the case with the effect of fertility changes on the federal budget, it is natural to look at a net effect. Examining the effect on the cumulative debt is one way to approach this issue. But there is a second, equally important reason to look at debt. Alternative fertility scenarios vary not only how much the government has to borrow, but the country's ability to bear that debt burden. For example, we showed above that an increase in fertility will raise the federal government's need to borrow over many decades. But it is important to note that the resulting larger working-age population (and thus large economy) will be more able to support that debt. This effect can be very large. Using the data from Table 1 above, the working-age population in the year 2099 is more than double (320 million versus 147 million) when comparing our lowest- and highest-fertility scenarios and using the CBO baseline for immigration.

Figure 16 shows the debt-to-GDP ratio for the federal government for our four fertility scenarios. Varying the fertility scenario has very little impact on debt-to-GDP for more than 40 years, both because there is not a large impact on the primary deficit (as we showed above) and because the impact on total debt is offset by the change in GDP brought about by growth of the working-age population. To flesh out this point: The lowest-fertility scenario entails the smallest primary deficits, and thus the least growth of debt in the first 40 years, but it also features the smallest growth of the working-age population that has to support this debt. Beyond 2070, however, the effect of fertility on the primary deficit, on the one hand, and on the working-age population, on the other, work to influence the debt-to-GDP ratio in the same direction. High fertility leads to a smaller primary deficit and a

larger working-age population (and thus higher GDP). The debt-to-GDP ratio in 2099 differs by a factor two comparing our highest- and lowest-fertility scenarios.[10]

FIGURE 16

Federal debt/GDP: Fertility scenarios



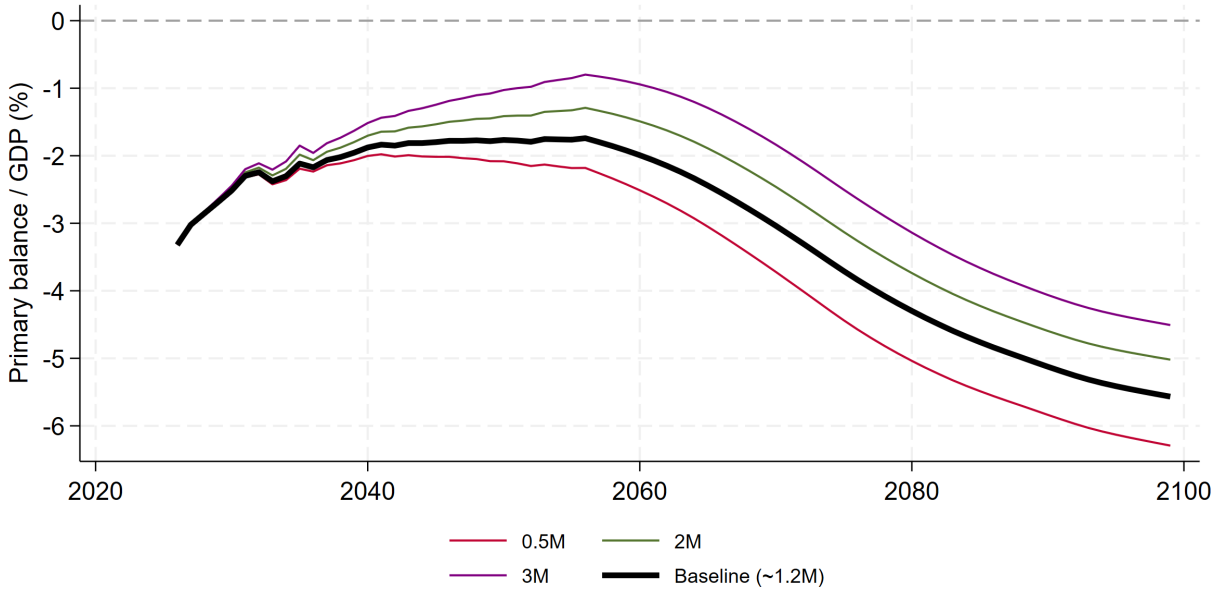
B. Immigration

Figure 17 shows the effects of alternative net immigration assumptions on the primary balance of the consolidated government. The contrast with fertility is immediate: Immigration has no crossing. Higher immigration improves the primary balance, and the gains grow over time as additional immigrants and their children expand the working-age population. In our simulations, increasing long-run net immigration from CBO's baseline of about 1.2 million per year to 3 million per year lowers the consolidated primary deficit by about 0.9% of GDP by 2056. This is roughly 54% of the projected primary deficit in that year. Unlike fertility, there is no comparable interior optimum in the range of immigration assumptions we consider: Higher immigration improves the consolidated primary balance throughout.

[10] In principle, we can make similar figures for state and local government debt or for a consolidated government. However, since most state and local governments operate under balanced budget provisions, we do not follow this path.

FIGURE 17

Primary balance/GDP (consolidated): Immigration scenarios

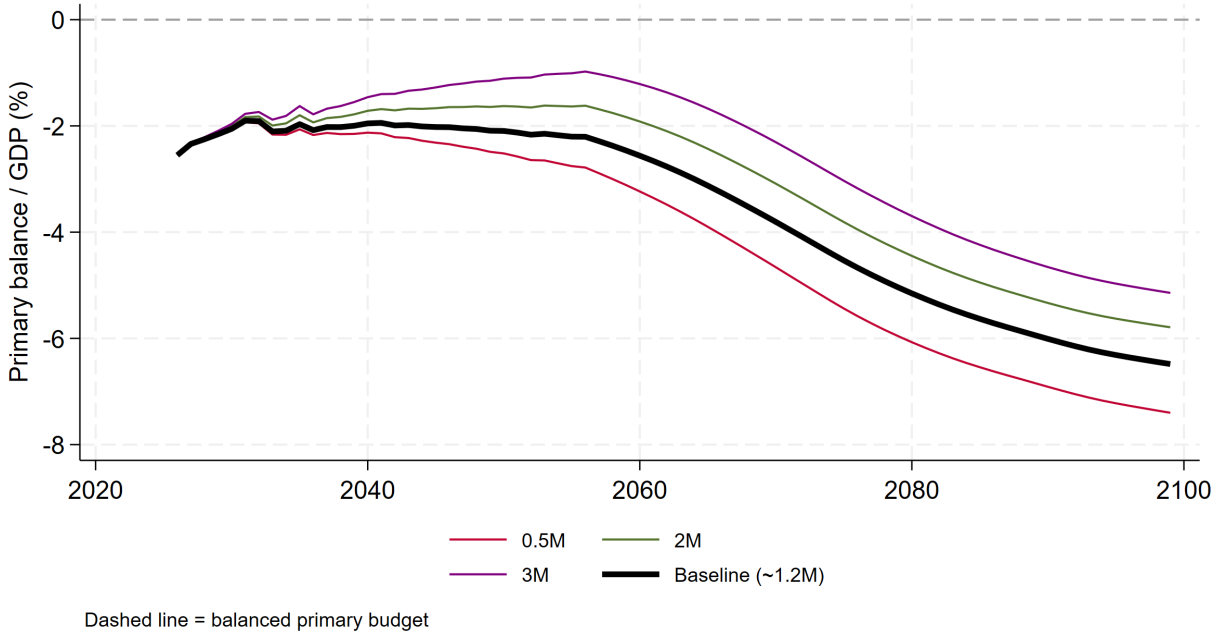


Dashed line = balanced primary budget

Looking solely at the federal budget (Figure 18), the effects of immigration are even more favorable. Higher immigration raises the federal tax base relatively quickly because immigrants arrive closer to working age than newborns do. In the long run, increasing net immigration from 1.2 million to 3 million per year improves the federal primary balance by about 1.3% of GDP.

FIGURE 18

Primary balance/GDP (federal): Immigration scenarios

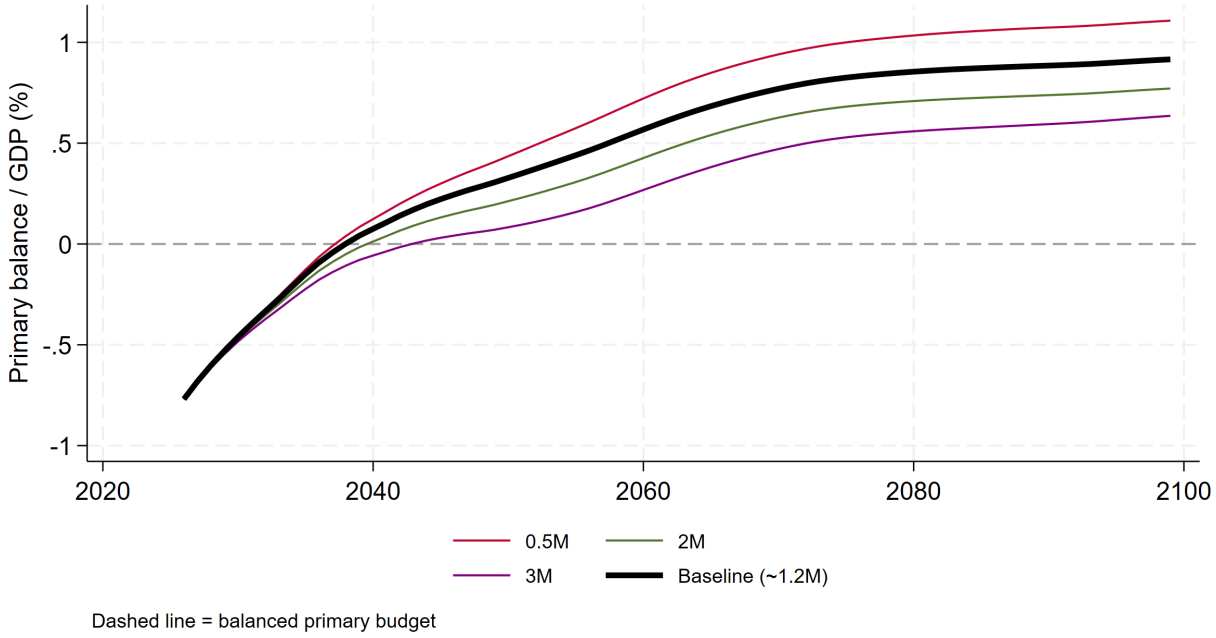


Dashed line = balanced primary budget

For state and local governments (Figure 19), the effect goes in the opposite direction under our standard assumptions. Higher immigration reduces the long-run state-and-local primary balance by about 0.3% of GDP when long-run net immigration rises from 1.2 million to 3 million per year. This result also holds across the range of immigration levels we consider. Thus, the consolidated gains from higher immigration are positive but smaller than the federal gains alone, because part of the federal improvement is offset by a worsening of state-and-local balances.

FIGURE 19

Primary balance/GDP (S&L): Immigration scenarios



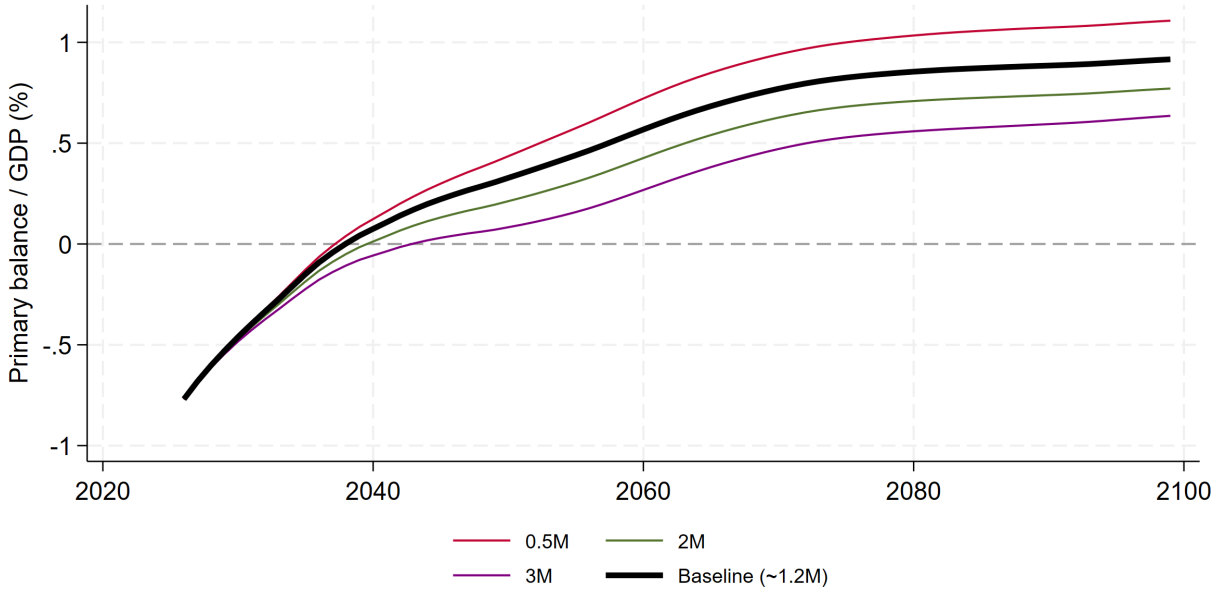
Dashed line = balanced primary budget

These differences across levels of government reflect both the age profile of immigrants and the way we incorporate evidence from the National Academies of Sciences, Engineering and Medicine report. Following this evidence, we assume that first-generation immigrants have lower earnings and pay lower taxes during their working years, and that they receive lower benefits in old age. Children, however, receive similar public services regardless of nativity, including education. The lower old-age-benefit profile matters most for the federal government, where Social Security and Medicare are large, while the costs of education and other broadly provided public services matter more for state and local governments. As a result, higher immigration is much more favorable for the federal budget than for state-and-local budgets, and the consolidated effects are driven primarily by the federal gains.

Figures 20 and 21 repeat the analysis of varying net migration on the federal (Figure 20) and state-and-local (Figure 21) primary balances. For the federal government, high-skill migration just magnifies the budget benefits of higher immigration. Annual migration of 2 million, with the additional migrants beyond the CBO baseline being high skill has the same beneficial effect on the budget as annual migration of 3 million under our baseline assumptions about immigrant skills. Annual migration of 3 million with the additional migrants being high skill brings the primary budget approximately into balance by 2056. For states and localities, the highly skilled migrants are so beneficial that they reverse the negative effect of migration on the primary balance. Higher earnings generate more sales, property, and income tax revenue while the cost of educating immigrants' children is unchanged, so high-skill immigration raises the state-and-local balance above baseline in every year of the projection.

FIGURE 20

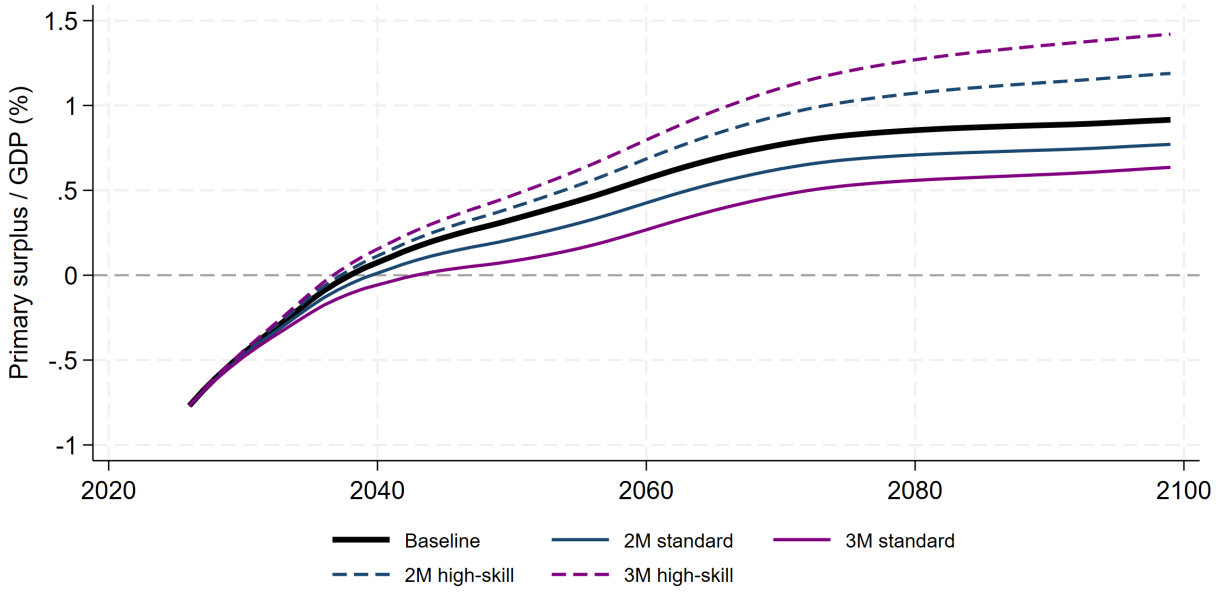
Primary balance/GDP (S&L): Immigration scenarios



Dashed line = balanced primary budget

FIGURE 21

Primary surplus/GDP (S&L): Standard vs. high-skill immigration



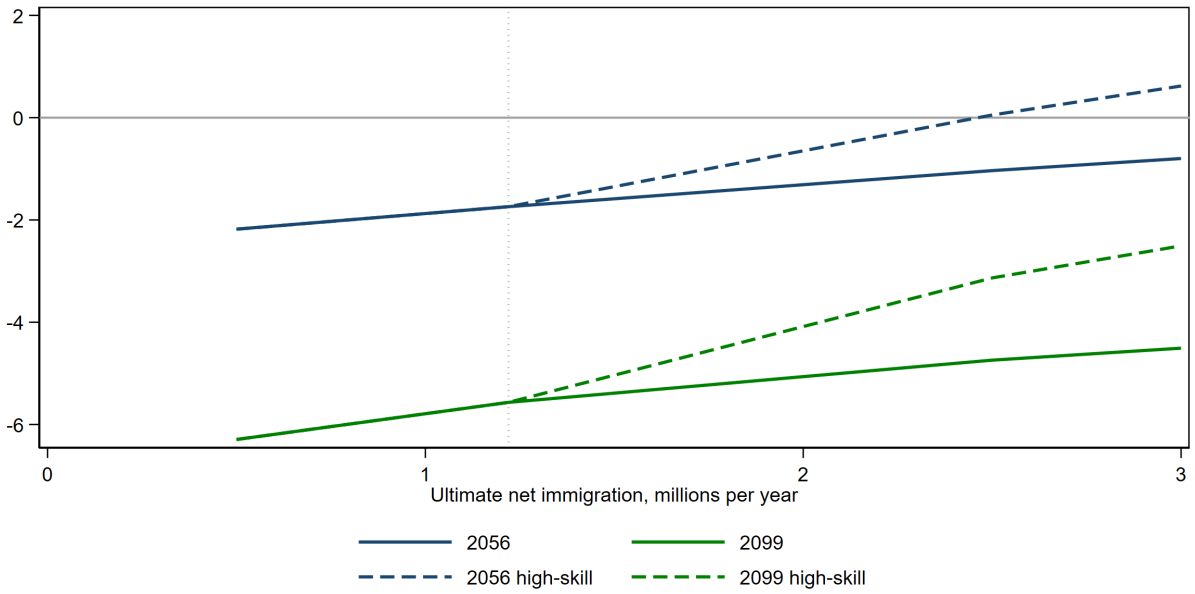
High-skill = above-baseline immigrants earn 120% of same-age native-born earnings and receive full old-age benefits

Finally, Figure 22 looks at the effect on the consolidated government balance of continuously varying the annual flow of net migrants over the entire range of 500,000 to 3

million (maintaining CBO baseline fertility). We show this for two years: 2056 and 2099. For each year, the solid line plots the primary balance under our baseline assumption about immigrant earnings and benefits. For levels of immigration above the CBO baseline of 1.2 million per year, we also consider the alternative set of assumptions in which all of the additional immigration beyond the CBO baseline is composed of high-skill immigrants who earn 120% of the native average and get benefits equal to 100% of the native average. The slope of the dashed lines is more than twice that of the solid lines. In other words, admitting an additional high-skill net migrant does more than admitting two net migrants with the baseline skill composition. For 2056, annual net migration of roughly 2.5 million, with the extra 1.3 million above the CBO baseline all being high skill, is enough to fully close the projected deficit (which is 1.7% of GDP at baseline). By contrast, that same level of immigration without a change in the skill composition would leave a projected deficit of 1% of GDP. Looking at 2099, even annual net migration of 3 million, with all the immigrants beyond the CBO baseline being high skill, only closes 55% of the projected primary deficit.

FIGURE 22

Consolidated primary balance by net immigration (percent of GDP, federal + S&L)



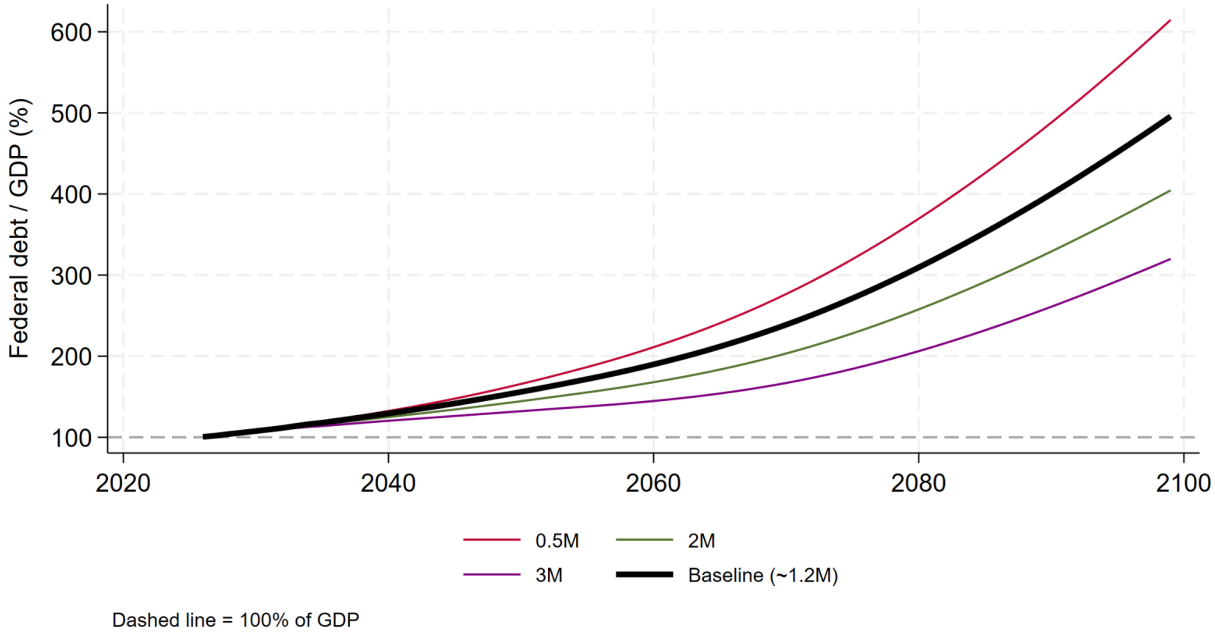
1. Debt

As in the case of fertility, we examine the debt-to-GDP path both as a way of cumulating deficits and to account for the effect of net migration on the size of the working-age population and thus GDP. Further, as in the case of fertility, we narrow our focus to the federal government. Higher immigration raises the working-age population much more quickly than higher fertility and both improves the primary balance and increases the size of the economy that has to support the debt. As shown in Figure 23, higher immigration lowers federal debt relative to GDP from early in the projection and by progressively more over time. As of 2056, debt-to-GDP is only 139% in the scenario where migration is 3 million, compared with 175% assuming CBO baseline migration. As of 2099, the gap is

much larger: 320% of GDP when net migration is 3 million versus 496% at baseline. Considering the high-skill alternative assumption makes the effect of migration on the debt even larger. Assuming 3 million net migrants per year, of whom those beyond 1.2 million are high skill, puts the federal debt-to-GDP ratio at 119% in 2056 and 232% in 2099.

FIGURE 23

Federal debt/GDP: Immigration scenarios



C. Combining changes in fertility and immigration

Fertility and immigration are often discussed as alternative ways to slow population aging, but they affect the fiscal outlook through different channels and over different time horizons. Combining them shows how much the debt path depends on the overall demographic environment, rather than on either fertility or immigration in isolation. Further, it allows us to explore whether increases in fertility and immigration together are more or less than the sum of their parts.

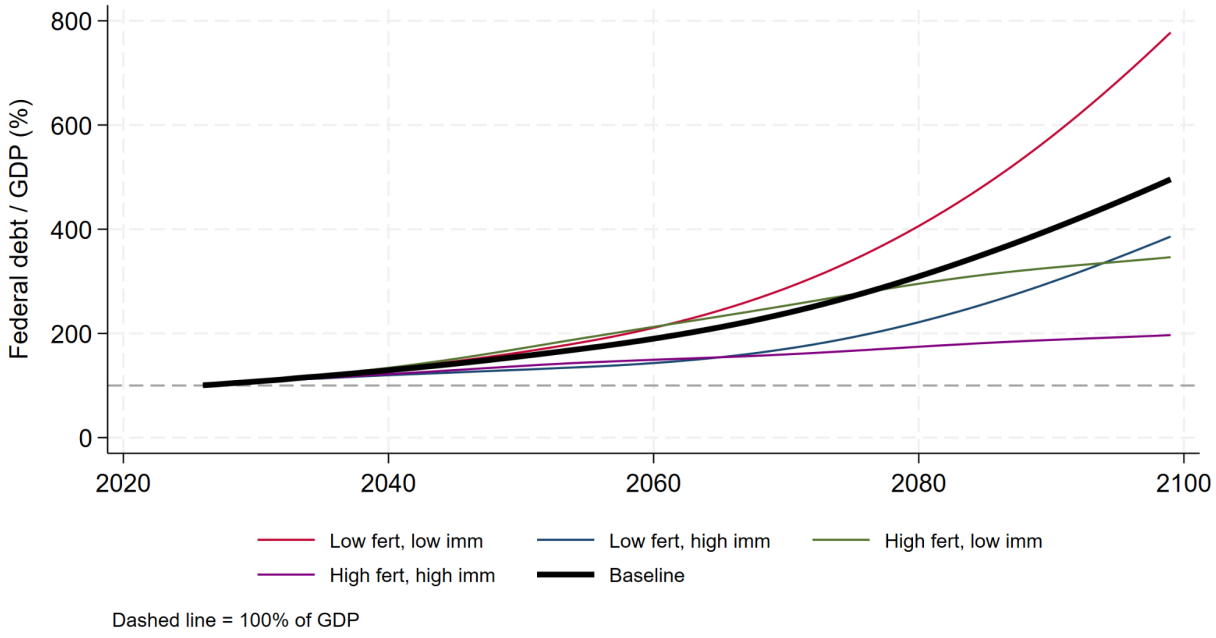
Figure 24 shows the federal debt-to-GDP ratio under four scenarios that combine low and high fertility with low and high immigration. These scenarios summarize the range of outcomes implied by the demographic assumptions, and the spread between them is wide. By 2099, federal debt ranges from roughly 197% of GDP to 778%. The demographic environment moves end-of-century debt by almost 600% of GDP—far more than any single lever produces on its own.

The ordering of the scenarios in Figure 24 reflects the two levers acting over different horizons. At a horizon of 40 years, the two paths with highest debt-to-GDP ratios are those with low immigration, while the two with the lowest debt-to-GDP ratios are those with high immigration. Further, up to this horizon, there is little difference between paths that have

the same net migration but starkly different fertility rates. In fact, paths with lower fertility feature slightly lower debt-to-GDP ratios. (Were we to include state and local governments, this effect of fertility would be even stronger.) Starting around 2065, however, the cumulative effects of fertility on both the working-age population and the elderly dependency ratio start to bite. In the long run, the scenario with high immigration and low fertility has a higher debt-to-GDP ratio than the scenario with low immigration and high fertility.

FIGURE 24

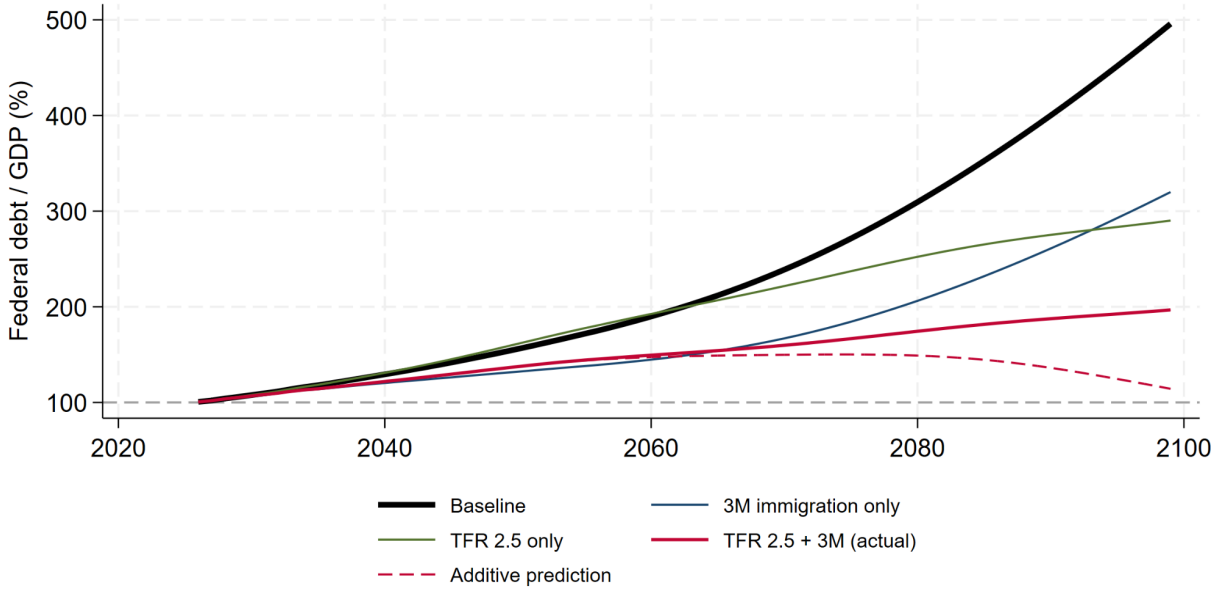
Federal debt/GDP: Four corners



Finally, these combinations let us ask whether the two levers reinforce or offset one another. Figure 25 addresses this directly: For the most favorable combination at the end of the horizon—high fertility together with high immigration—it plots the actual debt path against an additive prediction formed by adding the separate effect of each lever to the baseline. Through about 2065 the two coincide, so over the first four decades the levers are very nearly additive. After that the actual path rises above the additive prediction: The combination reduces debt by less than the sum of the two levers applied separately. The gap is substantial at the federal level—by 2099 actual federal debt is 197% of GDP against an additive prediction near 115%—and present but smaller for the consolidated government. The reason is that both levers work largely through the same channel, raising the working-age share of the population. Once immigration has done much of that work, additional fertility has less left to contribute, and it still carries the up-front child costs that immigration avoids. Fertility and immigration are thus closer to substitutes than complements as fiscal tools, especially in the second half of the century, when the shared working-age channel dominates.

FIGURE 25

Federal debt/GDP: Are fertility and immigration additive?



Additive prediction = baseline + fertility effect + immigration effect. Actual above predicted = combined gain less than the sum.

V. Robustness and interpretation

A. Adjusting for interest rates on government debt

The analysis thus far has held interest rates fixed across demographic scenarios. That assumption is defensible in this context. We use CBO's projected interest rates, which already reflect the agency's baseline assessment of the relationship among debt, growth, and borrowing costs. Moreover, the direction of any additional general-equilibrium adjustment is ambiguous. If higher immigration or fertility lowers the debt-to-GDP ratio relative to the CBO baseline, it could reduce borrowing costs by reducing concerns about the government's long-run fiscal position. At the same time, faster population and labor-force growth could raise the demand for capital and put upward pressure on real interest rates.[11]

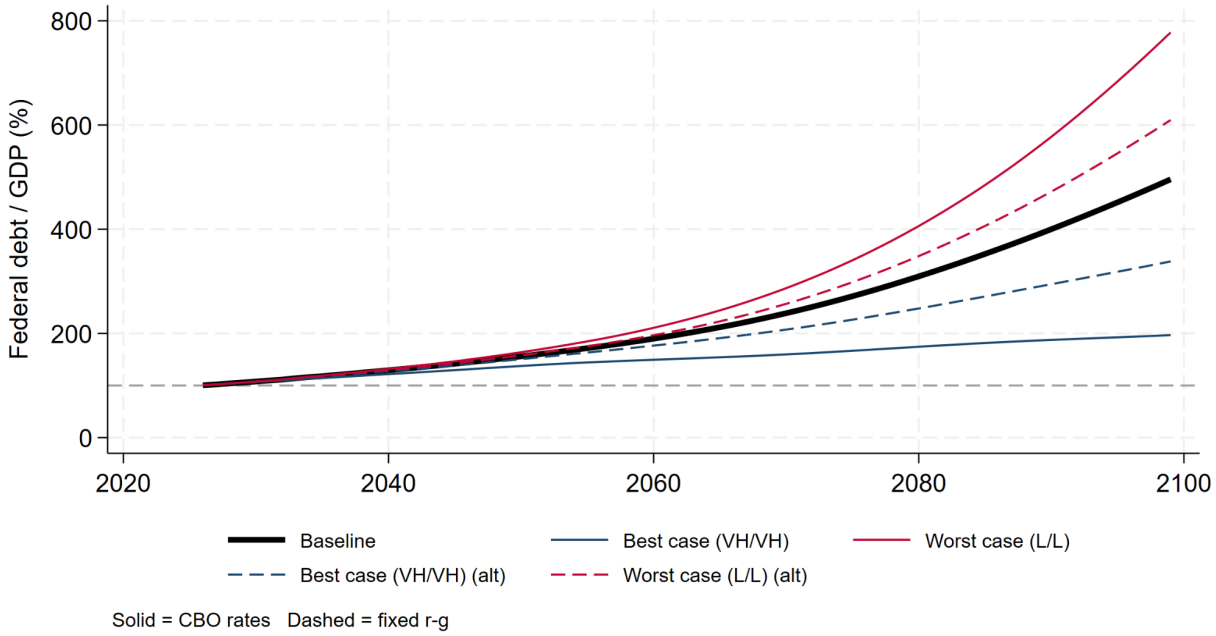
We therefore do not attempt to model the full general-equilibrium response of interest rates to demographic change.[12] Instead, Figure 26 isolates the importance of the debt-dilution channel by considering an extreme alternative assumption: Interest rates move one-for-one with the change in total output growth induced by demographics. Under that

[11] For discussions of demographic effects on equilibrium real interest rates through saving and investment channels, see Carvalho,Ferrero, and Nechio (2016) and Lisack, Sajedi, and Thwaites (2017).
[12] In principle, there are many other general equilibrium effects that could be important. For example, we assume that relative earnings by age are unaffected by changes in the relative size of age groups. If the elasticity of substitution among age groups was less than infinite, this would not be true.

assumption, faster output growth no longer improves debt dynamics through a lower interest-rate–growth differential (r-g), because the interest rate rises in parallel with growth. Conversely, slower output growth is partly offset by a lower interest rate.

FIGURE 26

Federal debt/GDP: r-g sensitivity



The comparison isolates how much of the effect of demographic change on debt-to-GDP runs through the interest-rate–growth differential on accumulated debt, rather than through the primary balance. The gap between the two interest-rate assumptions is the dilution channel. In the fixed-rate case, the best- and worst-case demographic scenarios differ by about 230% of GDP in 2080; holding the primary-balance differences fixed while letting interest rates move one-for-one with growth shrinks that difference to about 100% of GDP—a reduction of more than half. The remaining gap reflects differences in primary balances, which are present under both assumptions.

The one-for-one case is an extreme assumption, not our central one. But it points to a real qualification: To the extent that higher immigration or fertility raises equilibrium interest rates—by increasing the demand for capital as the labor force grows—the favorable effects on the debt-to-GDP ratio would be smaller than our baseline implies, possibly substantially so. The dilution channel is a large part of why faster population growth improves the fiscal outlook, and it is also the part most vulnerable to general-equilibrium offset.

B. The effect of demographic change under alternative fiscal policies

The debt paths shown so far assume the CBO-based fiscal environment apart from demographics, and in several consolidated-government scenarios they reach levels of debt-to-GDP in 2056 considerably greater than 200% of GDP. In practice, taxes would

likely rise or spending would fall well before that point. A natural question is how demographic change interacts with such adjustments. If policy is already acting to contain the debt, does higher immigration or fertility still matter, and by how much?

To examine this, we construct two alternative baselines in which policy has acted to contain the deficit. In each, we impose a permanent policy change that starts in 2026 and is sized to halve the primary deficit in 2057. We target 2057 because it is the first year beyond CBO's 30-year window, by which point the primary deficit in CBO's baseline has stabilized at about 2.3% of GDP. Halving that deficit means reducing it by about 1.1% of GDP in 2057, which we achieve in the first baseline through higher revenue—a 6% increase in all federal taxes—and in the second through lower spending—a 19% cut in Social Security benefits.[13] We then ask how the demographic scenarios considered above affect the debt trajectory in these alternative baselines.

Table 2 reports the change in the debt-to-GDP ratio in 2056 and 2099 relative to the corresponding baseline under three regimes: no adjustment, the higher-revenue baseline, and the lower-benefit baseline. Two patterns stand out. In the near term, the effect is essentially invariant to the fiscal regimes. Higher immigration of 3 million per year lowers the 2056 debt-to-GDP ratio by about 32–to-36 percentage points whether or not policy has acted to reduce the deficit, and the high-skill and fertility effects are similarly unaffected. The adjustment has not yet had time to alter how much debt has accumulated, so the demographic change acts on the primary balance in the same way regardless of the tax and benefit regime.

TABLE 2

Effect of a demographic change on federal debt/GDP

Percentage-point reduction relative to the corresponding baseline

	Debt/GDP in 2056			Debt/GDP in 2099		
Demographic change	**No adj.**	**Higher rev.**	**Lower ben.**	**No adj.**	**Higher rev.**	**Lower ben.**
Immigration, 3M per year	35.9	33.4	31.7	175.8	157.7	149.1
Immigration, 3M per year (high-skill)	56.5	53.0	50.5	264.3	242.7	230.0
Fertility, ultimate TFR 2.5	-5.5	-6.2	-6.3	205.7	175.3	163.4

Note: Each baseline halves the 2057 primary deficit (about 2.3% of GDP), via a permanent 6% increase in all federal revenue or a 19% cut in Social Security benefits (each about 1.1% of GDP). CBO interest rates; federal debt.

Over the longer run, the effect is somewhat smaller once policy has reduced the deficit. By 2099, higher immigration reduces debt-to-GDP by about 176 percentage points against the unadjusted baseline, but by about 158 percentage points under the higher-revenue

[13] The two adjustments have the same effect on the deficit but reach it differently, and the contrast in their required size is itself telling. Because Social Security is a far smaller base than total federal revenue, halving the structural deficit through benefits alone would require a cut of nearly a fifth.

baseline and 149 percentage points under the lower-benefit baseline. The high-skill and fertility effects shrink comparably. The reason is the dilution channel discussed earlier. Much of the long-run effect of faster population growth comes from spreading accumulated debt over a larger economy, and a budget that has already reduced that debt leaves less of it to dilute. The benefit-based adjustment reduces the effect slightly more than the revenue-based one—cutting benefits leaves immigrants' tax contributions intact while still shrinking the debt to be diluted—but the difference is small.

This runs directly counter to the conclusion drawn from the framework most often used to assess immigration's fiscal effects. Studies in the tradition of the National Academy of Sciences, Engineering, and Medicine (2017) compute the net present value of the taxes paid less benefits received by immigrants and their descendants. They find that this value rises sharply under regimes with higher taxes or lower benefits—implying that immigration is more valuable when the budget is tighter. But that calculation tells us only half the story. Higher taxes raise what immigrants pay, but they raise what everyone else pays too. What matters for sustainability is the debt-to-GDP ratio, and by that measure a demographic change is no more valuable in a tighter fiscal regime, and if anything somewhat less, because reducing the debt removes part of the channel through which population growth helps.

C. Expressing changes in demographic assumptions as equivalent tax and spending changes

Putting demographic changes and policy adjustments on the same footing allows for a more direct comparison. If the goal is to put the debt-to-GDP ratio on a lower path, higher immigration, higher fertility, tax increases, or benefit cuts can all contribute to that adjustment. Table 3 asks how large a permanent increase in federal revenues would be needed to produce the same effect on the debt-to-GDP ratio as each demographic scenario. The same logic could be applied to a benefit cut, or any other policy change, that produced the same improvement in the primary balance. Note that in considering the effect of fertility variations, we imagine these as not having resulted from some policy or other change that in itself would have fiscal effects beyond the age-specific spending and tax revenue discussed above. If higher fertility were induced by costly pro-natalist policies that would require a different calculation (Stone, 2020).

The entries therefore show how much of the fiscal adjustment is accomplished by the demographic change itself. For example, if a given debt target would otherwise require a tax increase of 2% of GDP, and higher immigration produced an improvement equivalent to 1% of GDP, the remaining tax or spending adjustment would be roughly half as large. Table 3 reports this comparison as a permanent proportional change in federal revenues. A positive number means the demographic change improves the debt path by as much as a permanent increase in federal revenues of that size, while a negative number means it worsens the debt path by as much as a permanent revenue cut.

The table has two panels, one for 2056 and one for 2099. The 2056 panel shows what change in taxes would produce the same debt-to-GDP ratio in 2056 as the demographic scenario, while the 2099 panel examines the debt-to-GDP ratio in 2099. Within each panel, the first two columns show the effect on federal debt under two interest-rate assumptions.

Column 1 keeps interest rates on CBO's baseline path. Column 2 lets interest rates rise one-for-one with the increase in output growth generated by the demographic scenario, thereby removing the benefits of debt dilution and capturing only the effects on primary balances.

Consider the eighth row, which raises net immigration to 3 million per year. In the 2056 panel, this scenario has the same effect on the debt-to-GDP ratio as a permanent 6% increase in federal revenues (column 1). If interest rates instead rise with the faster growth generated by higher immigration, the equivalent revenue increase falls to 3.1% (column 2). Thus, the same demographic change looks smaller when the interest-rate response is allowed for, and somewhat smaller when state-and-local costs are included.

Consider the same immigration scenario in 2099. By then, the effect is larger: 3 million immigrants per year is equivalent to a permanent federal revenue increase of 9.4% under baseline interest rates and 5.5% when interest rates rise with growth. This shows why the horizon matters. Immigration affects the budget relatively quickly because immigrants arrive closer to working age than newborns do, but some of the effect still builds over time as the larger population raises GDP and dilutes debt accumulated in earlier years.

The patterns that we have discussed earlier in the paper are clear:

- **Fertility has very different effects at the two horizons.** In 2056, higher fertility worsens the fiscal outlook: a TFR of 3.0 is equivalent to a 1.4% cut in federal revenues. By 2099, the federal effect has reversed. A TFR of 3.0 is equivalent to a 14.3% increase in federal revenues under baseline interest rates.

- **Higher immigration improves the budget over both horizons**. Net immigration below baseline, at 500,000 per year, worsens the fiscal outlook; net immigration above baseline improves it.

- **The characteristics of immigrants matter.** With 3 million immigrants per year, the standard immigration scenario is equivalent to a 6% federal revenue increase in 2056. If the additional immigrants are high-skill, the equivalent revenue increase rises to 9.4%.

- **Debt dilution is important.** For the faster-growth scenarios, especially high immigration and high fertility late in the horizon, much of the improvement in the debt-to-GDP ratio comes from debt dilution because a larger economy carries previously accumulated debt more easily. When interest rates are assumed to rise with growth, that channel is removed. For example, in 2056 the effect of 4 million immigrants per year falls from 8.7% to 4.6%. This does not eliminate the fiscal gains from immigration, but it does show that part of the apparent improvement comes from the interaction between faster growth and debt accumulated under the baseline.

The table can also be used to gauge how much of the fiscal challenge demographic change could solve. We calculate that a permanent tax increase of about 12.5% (roughly 2.3% of GDP) would hold federal debt to about 100% of GDP in 2056. Reaching that same target in 2099 would take a larger increase, about 21% (3.8% of GDP). A large increase in

immigration could make meaningful progress toward either goal, though not close the gaps on its own. Raising net immigration to 3 million per year is equivalent to a 6% tax increase measured against 2056 debt—about half of what reaching 100% that year would require—and to a 9.4% increase measured against 2099 debt, a little less than half of the 21% needed then. Only the most aggressive scenarios approach the full adjustment: 4 million high-skill immigrants a year is worth 13.3% against 2056 debt and 18.5% against 2099 debt, in the latter case most of the way to the target. Demographics, in other words, can substantially shrink the required tax or spending action, but only the largest and most selective immigration scenarios come close to substituting for it.

TABLE 3

Changes in demographics: Equivalent tax changes

Permanent proportional change in all federal revenue (%) that produces the same effect on the debt-to-GDP ratio as the demographic change

To get the same effect on the federal debt-to-GDP ratio in 2056, you would have to change federal revenue by this %

	Baseline interest rates	Interest rates rise with growth
	1	2
Fertility — ultimate TFR		
0.75	0.8%	1.3%
1.20	0.3%	0.6%
2.10	-0.5%	-0.9%
2.50	-0.9%	-1.6%
3.00	-1.4%	-2.4%
Immigration — net per year		
0.5M	-2.7%	-1.3%
2M	2.9%	1.5%
3M	6.0%	3.1%
4M	8.7%	4.6%
Immigration — added migrants all high-skill		
2M	4.7%	2.7%
3M	9.4%	5.6%
4M	13.3%	8.1%

To get the same effect on the debt-to-GDP ratio in 2099, you would have to change federal revenue by this %

	Baseline interest rates	Interest rates rise with growth
	1	2
Fertility — ultimate TFR		
0.75	-18.7%	-7.1%
1.20	-6.3%	-2.5%
2.10	7.4%	2.9%
2.50	11.0%	4.3%
3.00	14.3%	5.5%
Immigration — net per year		
0.5M	-6.4%	-3.0%
2M	4.9%	2.7%
3M	9.4%	5.5%
4M	12.7%	7.8%
Immigration — added migrants all high-skill		
2M	7.7%	5.1%
3M	14.1%	10.0%
4M	18.5%	13.9%

VI. Conclusion

Favorable demographic change carries a real fiscal benefit, and a large enough increase in high-skill immigration could, over a long horizon, substitute for much of the needed adjustment. But the demographic changes that would be required to close the gap entirely are larger than anything realistic. Within plausible bounds, demographics can substantially narrow the fiscal challenge but cannot resolve it.

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Technical Appendix

Calibrating National Transfer Account age profiles to the CBO baseline

The simulations require information from two sources. CBO's Long-Term Budget Outlook provides the aggregate federal budget path, but it does not allocate revenues and spending by age. The NTAs provide detailed age profiles of taxes paid and benefits received, but for a single year and on a basis that does not match CBO's projected totals. First, the NTAs are for the government as a whole, whereas CBO only covers federal spending and revenues. Second, there are conceptual differences between the NIPAs, upon which the NTAs are calibrated, and budget accounting. For example, the NTAs measure government spending other than transfers and subsidies using the NIPA concept of government consumption. This includes compensation paid to government employees, purchases of intermediate goods and services, and depreciation of government assets. In the budget, discretionary spending includes public investment (which the NTAs exclude from government consumption), but not depreciation of government assets, which the NTAs include. These two measures might be equal be similar over the long run, but will differ from year to year.

We proceed in two steps. First, we divide each NTA category into its federal and state-and-local components. For most items, the NIPAs provide a breakdown, although for higher education and some health spending, we used other sources of information. Appendix Table 1 reports the federal share we assume for each item.

Second, we calibrate the federal portion of the NTAs to the CBO aggregates. This preserves the age pattern in the NTAs while ensuring that, under baseline demographics, federal revenues, outlays, GDP, and debt reproduce CBO's projection. We first have to do a cross-walk between the NTA categories and the budget categories; our assumptions are reported in Appendix Table 1. For each federal budget category, the calibration is straightforward. We begin with the NTA per-capita profile for that category, which shows how the flow varies by age. We then apply that age profile to the CBO's baseline population by age in each year. This gives the total amount of revenue or spending that the NTA profile would imply for that year.

That implied total will generally not equal the corresponding CBO total. We therefore multiply the entire age profile by a single scaling factor: the ratio of the CBO total to the NTA-implied total. The same factor is applied at every age, so the relative age pattern from the NTAs is preserved. But after scaling, the profile sums exactly to the CBO total for that category and year.

For example, if the NTA age profile for Social Security, applied to the baseline population, implied total benefits of $1 trillion in a given year, but CBO projected Social Security benefits of $1.1 trillion, we would multiply the Social Security profile at every age by 1.1. The calibrated profile would still have the same age pattern as the NTA profile, but its aggregate would match CBO. We repeat this procedure separately for each budget category and each year.

We apply this procedure separately to the federal revenue and spending categories shown in the crosswalk below. For revenues, the categories include individual income taxes,

payroll taxes, corporate income taxes, customs duties, and other receipts. For the major age-varying spending categories, including Social Security, Medicare, Medicaid, the Supplemental Nutrition Assistance Program (SNAP), refundable tax credits, veterans' benefits, unemployment insurance, and Supplemental Security Income (SSI), the NTA profile provides the age pattern, and the CBO projection provides the annual aggregate. Supplementary Medical Insurance (Medicare Part B) premiums are netted against Medicare outlays rather than treated as a separate receipt.

Some categories require additional assumptions because they are not clearly age-specific. Defense and other public goods are distributed evenly across the population. For discretionary spending, we use the age-varying components in the NTAs where they are informative—including education, other health, student aid, and related categories—and scale them to the CBO aggregate. Residual categories for which the NTAs do not provide a meaningful age pattern—including public health services (such as disease surveillance and health inspections) and other public consumption—are distributed on a per-capita basis. This approach uses the age structure where the data provide one and avoids imposing an artificial age pattern where they do not.

GDP is calibrated in the same way. We use the NTA age profiles of labor and asset income, and scale them each year so that the aggregate matches CBO's projected GDP. This gives a GDP denominator that is consistent with both the demographic structure and CBO's macroeconomic baseline.

State-and-local flows are treated differently because CBO does not provide an analogous long-term state-and-local budget projection. We take the state-and-local age profiles from the NTAs and grow the per-capita amounts with productivity. These flows are then applied to each demographic scenario in the same way as the federal profiles, but they are not calibrated to an external state-and-local aggregate path.

APPENDIX TABLE 1

NTA-to-CBO crosswalk

NTA category	Federal share	CBO budget category
Taxes		
Taxes on Income, profits, and capital gains		
Federal income tax	100%	Income Tax
State/local income tax	0%	
Corporate taxes	74%	Corporate Taxes
Taxes on property	0%	
Consumption taxes — alcohol	51%	Customs
Consumption taxes — tobacco	23%	Customs
Consumption taxes — other	15%	Customs
Other Fees and Current Transfers	30%	Other Taxes
Social contributions, FICA taxes	100%	Payroll Taxes
Social contributions, Supplementary Medical Insurance premiums (Medicare Part B)	100%	Netted against Medicare Outlays
Social contributions, Unemployment	19%	Payroll Taxes
Cash Transfers		
Social Security	100%	Mandatory, Social Security
Family welfare, Food Stamps/SNAP/AFDC/TANF/General Assistance/WIC/Energy subsidies/Other social protection	59%	Mandatory, SNAP
Supplemental Security Income (SSI)	92%	Mandatory, SSI
Unemployment	10%	Mandatory, Unemployment
Veterans' benefits, non-healthcare	100%	Mandatory, Veterans' Benefits
Workers' comp	32%	Mandatory, Workers' Comp
EITC and other tax credits	100%	Mandatory, Premium Tax Credits, EITC, and other tax credits
Temporary disability & black lung	2%	
Student aid (Fed & S/L)	90%	Discretionary
Pension benefit guaranty, railroad retirement	100%	Other Mandatory
Age-Specific In-Kind Transfers		
Medicare	100%	Mandatory, Net Medicare
Medicaid and SCHIP	64%	Mandatory, Medicaid and SCHIP

Other Health	75%	Nondefense Discretionary (assumed to be mostly Veterans Health)
Public, Education, Primary plus Secondary	12%	Discretionary
Public, Education, Post-secondary	47%	Discretionary
Public, Education, Other	20%	Discretionary

Non-Age Specific In-Kind Spending		
Public Health	22%	Discretionary
Other Public Consumption	43%	Discretionary

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