



Budget Model

Long-Term Financial Implications of Current Federal Budget Policies

Summary: Under current law, we project that national debt will rise to 225% of GDP by 2050 and continue to rise thereafter. Changing demographics will reduce future economic growth.

Key Points

- Current U.S. fiscal policy is in permanent imbalance as current debt plus projected future spending outstrips future tax revenue. Achieving fiscal balance would require the federal government to permanently increase tax revenues by over 40% or reduce expenditures by 30% or some combination of both.
- These estimates are supported by a new “bottom up” accounting, demographics, and economics framework. This framework captures how projected changes in demographics and labor-force dynamics impact the economy, tax revenues and means-tested spending.
- We project that growth of a key productivity measure central to government finances---the “total skill-adjusted adjusted labor input”---will fall by more than half over the next three decades, from 1.1 percent per year during the past decade to 0.7 percent per year going forward.

Introduction

Just like all individuals and businesses, the federal government is subject to a budget constraint: It must fund all expenditures, current and future, from its tax and non-tax receipts over time.

Government debt is one measure of the federal government’s financial condition but is inherently backward looking. A more complete measure of the federal government’s financial condition---the “fiscal imbalance”---equals the sum of existing debt and future overspending relative to tax receipts. By construction, the fiscal imbalance must be zero for a fiscal policy to be sustainable without future changes (“fiscal balance”).

This brief reports PWBM’s micro-founded measure of the U.S. federal fiscal imbalance based on a “bottom up” construction of future taxes and expenditures based on projections of the future population, labor force, productivity, federal purchases, transfers, and taxes and total output. The overall federal fiscal imbalance is

decomposed into prospective net tax contributions by population subgroups distinguished by gender, education, race, and birth year.

U.S. Budget Projections

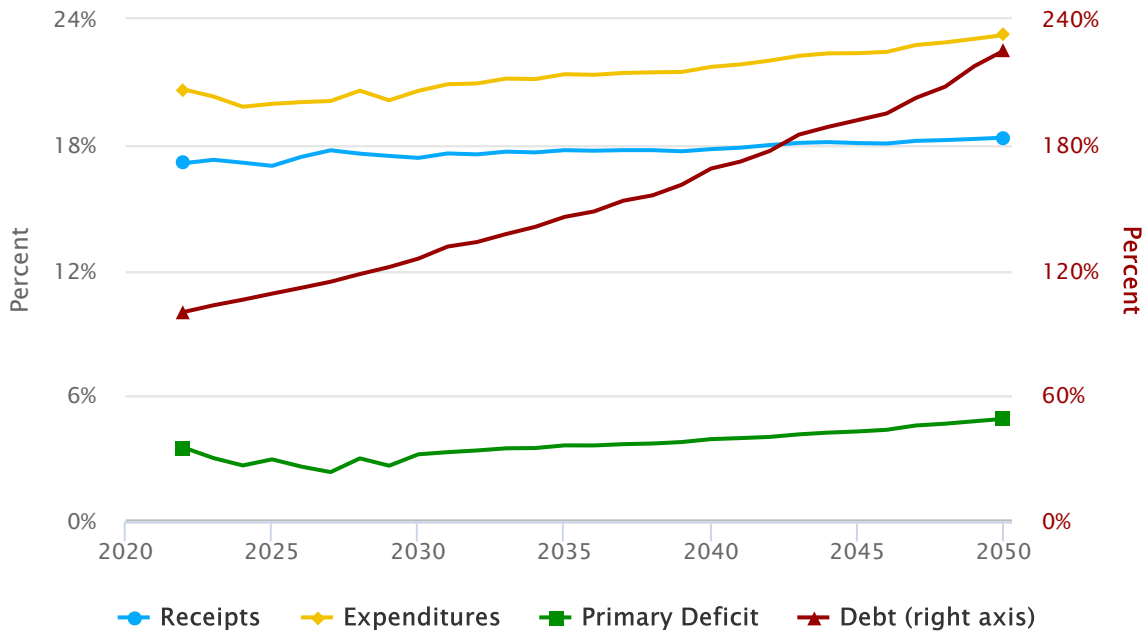
Continuation of current fiscal policies reveals a structural budget shortfall: A persistent excess of future annual federal non-interest expenditures compared to future federal receipts. This financial shortfall – the annual “primary deficit” – is displayed in Figure 1. The primary deficit equals the amount of federal expenditures excluding debt service payments in excess of federal revenues.

Panel 1 of Figure 1 shows annual federal receipts, expenditures, primary deficits, and federal debt as a percent of projected annual Gross Domestic Product (GDP). Panel 2 shows annual federal primary deficits as a percentage of total annual federal expenditures and receipts.

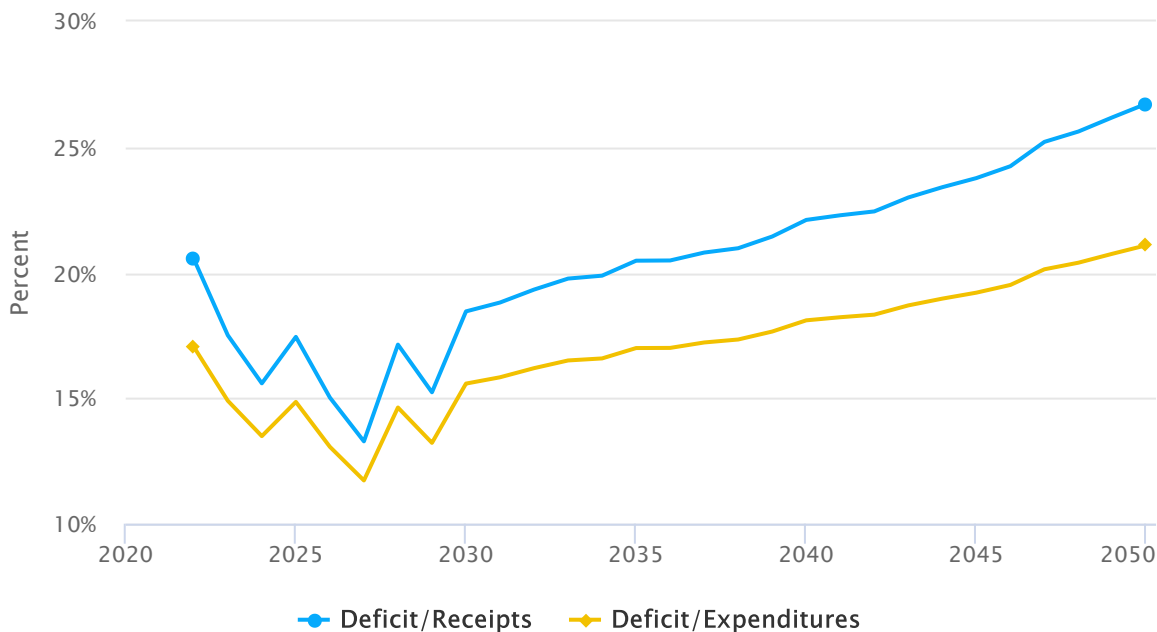
Figure 1: Federal Budget Projections: Receipts, Expenditures, Primary Deficits and Total Federal Debt Held by the Public.

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Panel 1: Federal Budget Projections: Expenditures, Receipts, and Primary Deficits as a Percentage of GDP



Panel 2: Federal Primary Deficits as a Percentage of Federal Receipts and Expenditures



Source: Author's calculations based on PWBM's microsimulation and CBO budget aggregates as of February 2021.

Key takeaways from Figure 1 are:

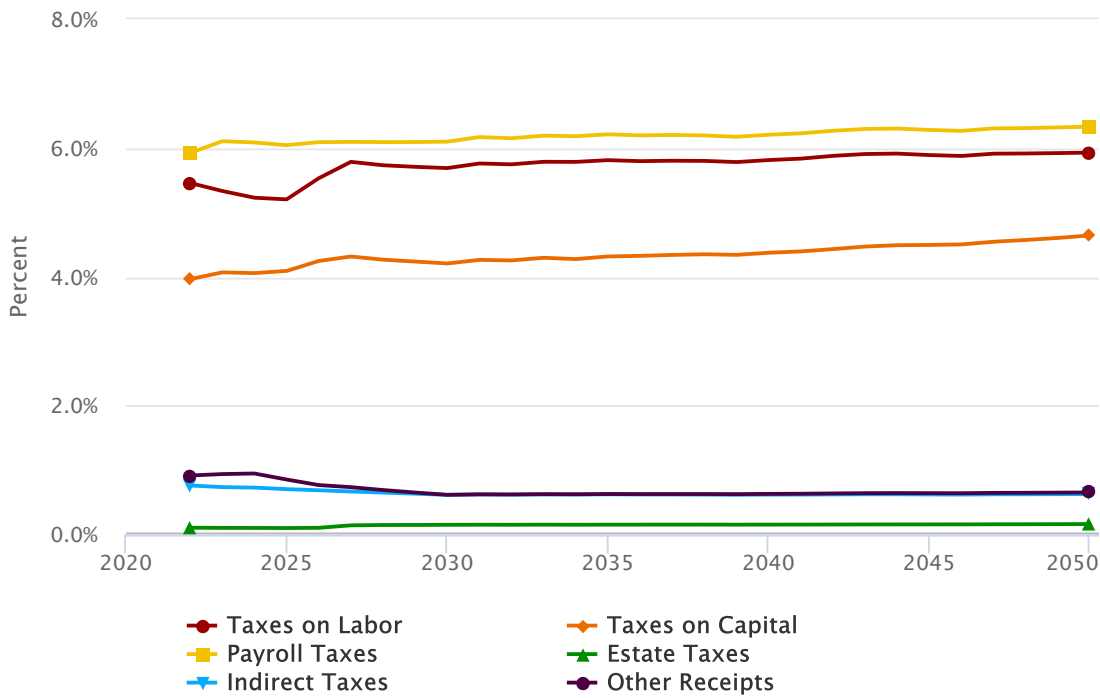
- Primary deficits increase from about 12-13 percent of total expenditures during the 2020s to more than 20 percent by 2050.
- Primary deficits increase from about 17 - 18 percent of total receipts during the 2020s to more than 25 percent by 2050. The primary deficit shares indicate the amount of expenditure reductions, revenue increases, or some combination of the two, that would be required to achieve primary budget balance in future years.
- Continuation of current federal budget policies would escalate total federal debt held by the public from about 100 percent of GDP today to almost 225 percent by 2050.

Figure 2 shows projected federal receipts (Panel 1) and expenditures (Panel 2) as a share of projected GDP. Panel 1 of Figure 2 shows that payroll taxes and taxes on labor and capital contribute the most to total federal receipts. Panel 2 shows that federal purchases of goods and services, Social Security, and Medicare constitute the largest expenditures today. However, spending on federal health care programs – Medicare and Medicaid-plus-SCHIP – are projected to increase most rapidly through 2050.¹

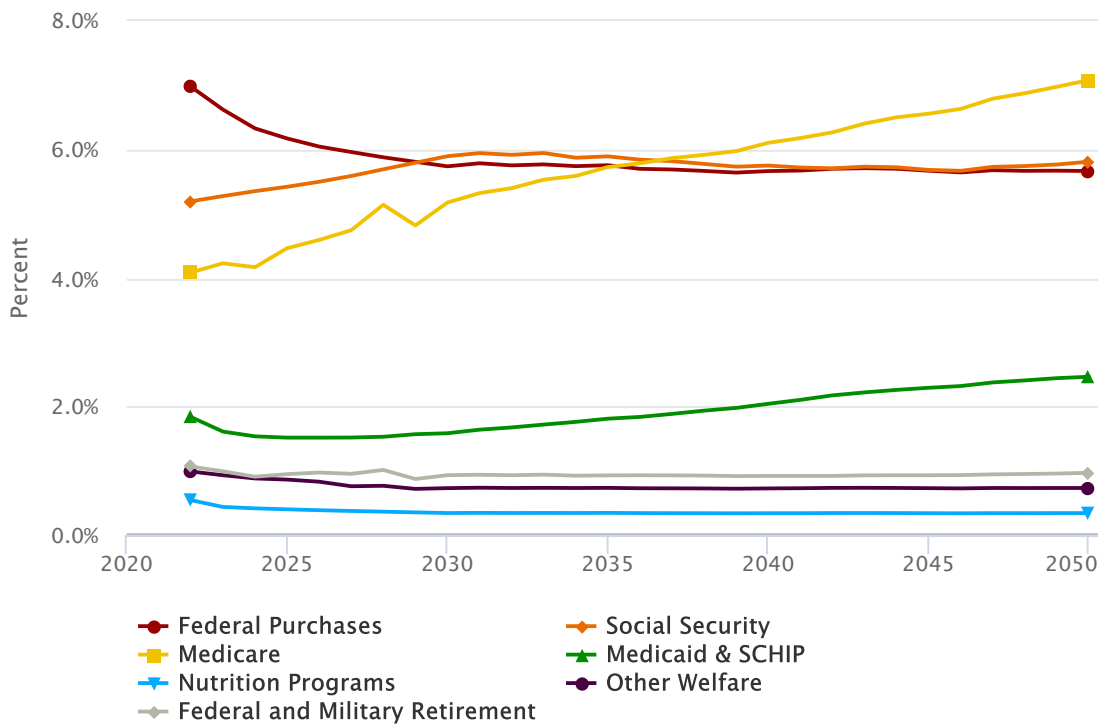
Figure 2: Components of Federal Receipts and Expenditures.

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Panel 1: Projected Federal Receipts by Type as a Percent of GDP



Panel 2: Projected Federal Expenditures by Type as a Percent of GDP



Source: Authors' calculations based on PWBM's microsimulation of U.S. demographics and economy.

Forward-Looking Measures of Federal Indebtedness

At the end of 2022, debt held by the public is estimated by the CBO and PWBM to be about \$24 trillion, or 100 percent of GDP. However, this measure is inherently “backward looking” and does not account for future expenditures relative to tax revenue. Even projections of future debt paths, like that shown in Figure 2 (Panel 1) are limited by time truncation.

Under FASB rules, companies are required to report the present value of shortfalls in their long-term obligations. This type of reporting was intended to reduce financial report gaming and remove bias in decision-making. The same approach could also apply to the federal government with two minor differences:

- A company enjoys the legal construction (the “put option”) of bankruptcy protection. As a result, company’s forward-looking liabilities are calculated under a “shutdown” basis. In contrast, the federal government is assumed to be an infinite-lived entity with creditors, taxpayers and/or beneficiaries ultimately facing the burden for any shortfalls. So, the government’s financial position is calculated as a permanent “ongoing concern” under current law.
- A company’s long-term liabilities are required by law to focus mainly on accrued retirement and health care liabilities consistent with a shutdown liability. Similarly, for the federal government, only accrued government debt and related instruments are backed by the full faith and credit of the U.S. government. However, future federal tax and expenditures that are also included in the federal government’s “ongoing concern” calculation are not legal obligations but are subject to policy changes. Still, the very point of a federal accounting exercise is to measure the imbalance associated with current policy so that policymakers can be alerted in case changes are required to achieve balance. An accounting exercise that simply defines there to be no future shortfalls because policymakers can always change policies to address those future shortfalls is inherently circular.

Table 1 reports the forward-looking “fiscal imbalance” of the U.S. federal government over the next 75 years and over the infinite horizon. The fiscal imbalance is equal to the level of debt held by the public today (as of end of 2021) plus the present value of future shortfalls of federal non-interest expenditures relative to federal receipts.

Table 1: Fiscal Imbalance Estimates.

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75-year horizon		
	Trillions of Dollars	Percent of the Present Value of GDP
Current Debt	21.4	1.6
PV of future shorfalls	72.4	5.4
<i>PV of future federal expenditures</i>	<i>315.1</i>	<i>23.5</i>
<i>(less) PV of future receipts</i>	<i>242.7</i>	<i>18.1</i>
Fiscal Imbalance	93.8	7.0
Permanent time horizon		
	Trillions of Dollars	Percent of the Present Value of GDP
Current Debt	21.4	0.9
PV of future shorfalls	181.5	7.3
<i>PV of future federal expenditures</i>	<i>621.5</i>	<i>25.0</i>
<i>(less) PV of future receipts</i>	<i>440.0</i>	<i>17.7</i>
Fiscal Imbalance	202.9	8.2

Source: Authors' calculations.

Over the next 75 years, the fiscal imbalance is equal to about 7 percent of the present value of all future GDP. To achieve fiscal balance, the federal government could permanently decrease all sources of federal spending—including Social Security, Medicare, Medicaid, and all other spending---by 30 percent. Or the federal government could permanently increase all sources of federal tax revenue---including payroll taxes, individual taxes, excise taxes, and all business taxes---by 39 percent. Or the federal government could do a combination of both.

The imbalance only worsens over the permanent time horizon. In this case, the imbalance grows to 8.2 percent of the present value of all future GDP. That is equivalent to about 33 percent of all future expenditures or 46 percent of all future tax receipts.

Micro-Foundations for Federal Budget Projections

The federal budget projections reported above are constructed from detailed projections of U.S. demographics and individual amounts of taxes and expenditures. The calculations distinguish by gender,

education, and race (“population subgroups”).² We consider a total combination of eight population subgroups using the following letter code ordering:

- First letter: Sex (male, female) indicated by M and F
- Second letter: Education (no college, college) indicated by N and C
- Third letter: Race (white, non-white) indicated by W and N

So, for example, the combination FNN indicates the female, non-college, non-white population subgroup. While more granular population group distinctions are possible in theory, they produce larger “standard errors” along with less reliable empirical estimates.

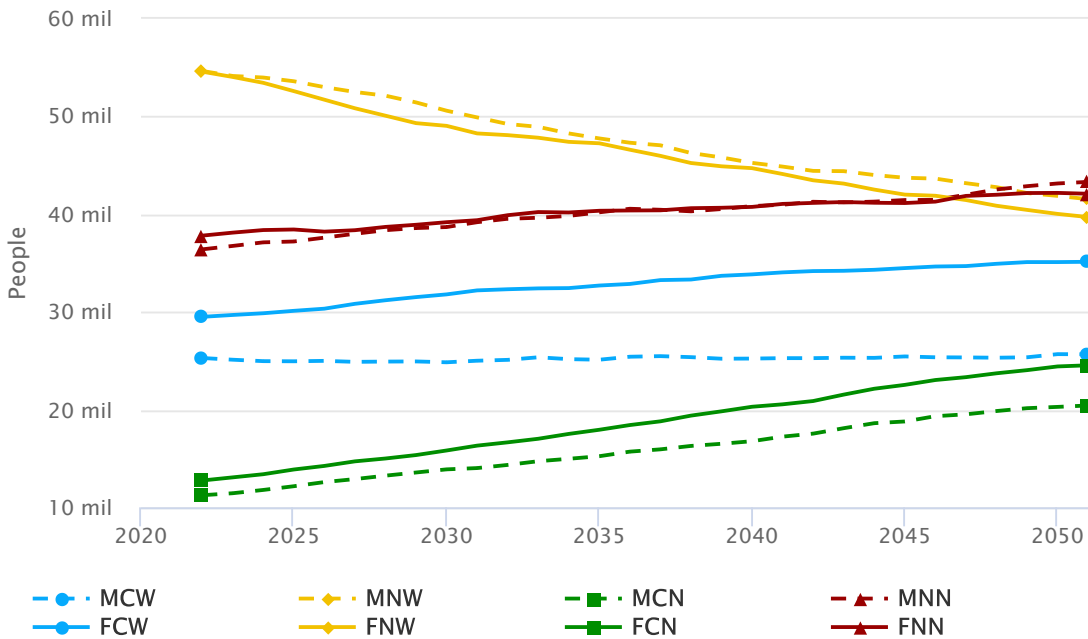
Our detailed projections, therefore, allow us to capture three key factors by population subgroup over time: (i) changes in the total population shares, (ii) changes in the labor force participation rate, and (iii) changes in individual productivities conditional on labor force participation.

Panel 1 of Figure 3 reports projected changes in the total population represented by population subgroup through 2050. Panel 2 reports their corresponding labor force participation rates.

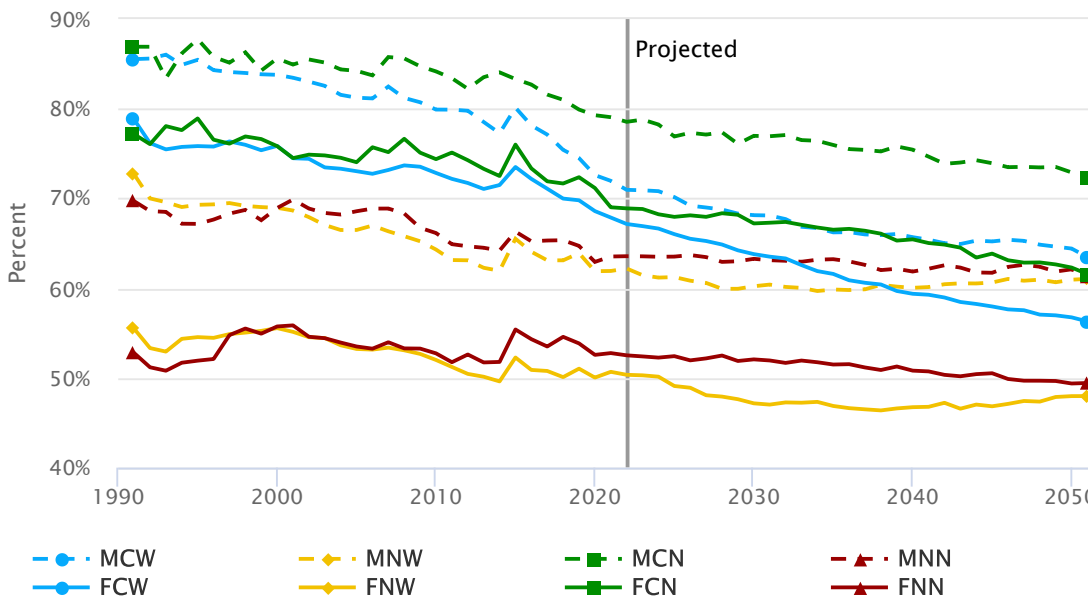
Figure 3: U.S. Projected Population and Labor Force Participation Rates by Person Type.

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Panel 1: U.S. Projected Populations by Person Type



Panel 2: Labor Force Participation Rates by Person Type History and Projections



The three-letter group labels show:

- First letter: Sex (male, female) indicated by M and F
- Second letter: Education (no college, college) indicated by N and C
- Third letter: Race (white, non-white) indicated by W and N

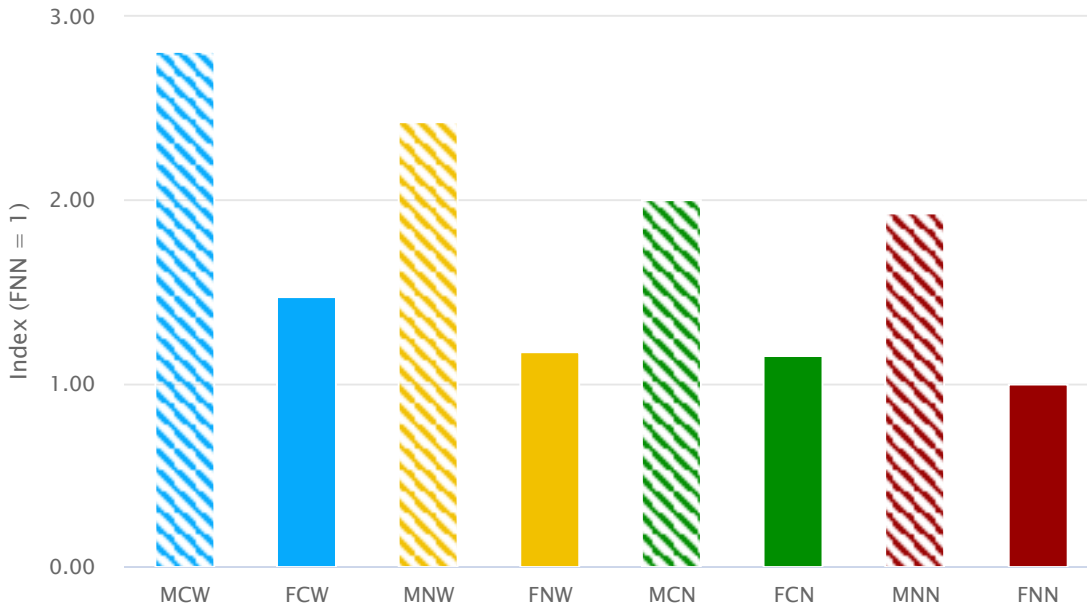
Source: Authors' calculations from the Census Bureaus' Annual Social and Economic Survey and PWBM's microsimulation.

Panel 1 of Figure 4 reports relative productivity levels during recent years by population subgroup as reported by Census average wage data.³ (The word “productivity” used herein is intended to be consistent and comparable with standard economics and government reporting terminology and does not attempt to quantify value uncompensated by labor markets.) Panel 2 of Figure 4 reports our projected productivity weighted labor supply by population subgroup.⁴

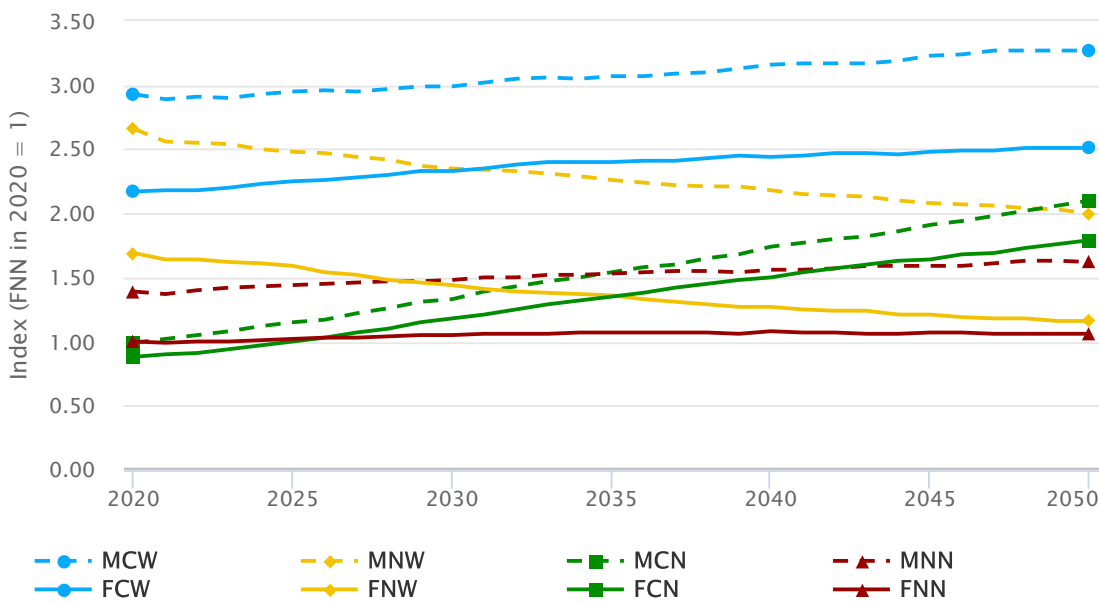
Figure 4: Productivity differentials by Person Type and Labor Force Growth Projections with FNN normalized to one.

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Panel 1: Relative Labor Skill Levels by Demographic Group (Index: FNN=1)



Panel 2: Projected Skill-Adjusted Labor Supply by Demographic Group (Index FNN in 2020=1)



The three-letter group labels show:

- First letter: Sex (male, female) indicated by M and F
- Second letter: Education (no college, college) indicated by N and C
- Third letter: Race (white, non-white) indicated by W and N

Source: Authors' calculations based on Census data.

A few notable trends emerge at the education level:

- There is a considerable shift in the population's composition by gender, education, and race (Figure 3, Panel 1), with the non-college non-educated white population declining over time.
- Labor force participation rates of college-educated individuals are projected to continue their historical declines (Figure 3, Panel 2). In contrast, while the labor force participation rates of those with less than a college education start lower, they are projected to rise slightly during the next three decades.
- Productivity-adjusted labor supply of the college-educated will continue to increase over time while that of non-college educated groups will decline (whites) or grow only modestly (non-whites).

A few notable trends also emerge by race and sex:

- Females earn lower average wages than males of the same race and education.
- Nonwhites earn lower average wages than whites with the same education and sex.
- We project that differences in productivity-adjusted labor supply will fall sharply over the next three decades for workers without a college education but only fall modestly for workers with a college education.

The exact reason for differences in earnings---whether, for example, due to self-selection and/or discrimination---is outside of the scope of this analysis. Still, failure to reduce these gaps under current law also contributes to the slowdown in future productivity per worker, especially among college educated workers.

Falling Efficient Labor Growth Rates

Many traditional measures of productivity growth are calculated on a per-capita basis, which are incomplete for capturing the impact of demographic changes on government finances. The largest U.S. spending programs, including Social Security and Medicare Part A, are largely pay-as-you-go financed. The financial conditions of these programs also improve with larger population growth. A more holistic measure---the "total skill-adjusted adjusted labor input"---captures three key factors discussed above: changes in the population size, labor force participation, and relative wages.⁵

Table 2: Skill-Adjusted Labor Supply.

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Skill-Adjusted Labor Supply Growth Rates by Decade (percent per year)

Data Source	Decade	Annual Growth Rates		Major Contributor
		(percent)		
Historical (Census Bureau: Annual Social and Economic Survey)	1980-89	1.86	2.151	More women enter labor force
	1990-99	2.56		
	2000-09	1.21	1.081	Boomer retirements & declines in LFP and fertility
	2010-19	1.06		
Projection (PWBM)	2020-29	0.89	0.68	Boomer retirements & continued declines in LFP and fertility (Covid effect in 2020-29)
	2030-39	0.62		
	2040-49	0.52		

Source: Authors' calculations.

Table 2 reports historical values constructed using Census data as well as our projections for the future. Notice that the high annual growth of this measure as more women entered the workforce during the 1980’s and 1990’s. Much of that measured effect, therefore, was “one time” due to this structural change (a “level effect”). As a result, the measure fell in half with additional demographic and economic changes in the 2000’s. However, we project that it will decline further by more than a third over the next thirty years. This fall, along with our projected growth in health care costs, play major roles in explaining our projected increase in the debt-GDP ratio to 225% by 2050.

This analysis was produced by [Jagadeesh Gokhale](#) and [Kent Smetters](#). It is based on a larger analysis also conducted with [Agustin Diaz Casanueva](#). [Mariko Paulson](#) prepared the brief for the website.

Updated on December 22, 2022

1. SCHIP refers to the State Children’s Health Insurance Program that is partly funded by the federal government. ↩
2. Federal revenues and expenditures per capita grow at the same rate as national productivity growth except for health care program expenditures. Health care expenditure projections assume that excess growth of Medicare Part A and other health care outlays (Medicare Parts B, C, and D and Medicaid) will grow at the same rate through 2030 as incorporated in CBO’s 10-year budget projections (February

2021 Budget and Economic Outlook). Excess health care cost growth is assumed to be 1.87 percent through 2040 and then to decline linearly to zero by the year 2060. The rate of faster-than-GDP growth of health care expenditures (1.87 percent per year) is calculated from data reported by the U.S. Bureau of Economic Analysis for years 1982-2021. ↩

3. Relative productivity levels are measured as average hourly wages during 2015-19 by person type divided by the average hourly wage of female non-college educated, nonwhite females. Calculations are based on micro data from the Census Bureau's Annual Social and Economic Survey available at <http://www.IPUMS.org>. ↩
4. This value is calculated as the sum of the projected number of individuals in the labor market in each year multiplied by their average productivity level measured in constant 2021 dollars. ↩
5. The total skill-adjusted adjusted labor input per population subgroup is equal to its (i) population size *times* (ii) labor force productivity *times* (iii) the subgroups relative wage. The total skill-adjusted adjusted labor input is then equal to the weighted sum of the population subgroup values with weights equal to the relative size of the population subgroup, where the weights add to one. ↩