Exercise 8 — Federal Debt Impacted By Unemployment

Exercise 8 • Forecast Horizon: 2026–2046 • Baseline: CBO February 2026 Budget and Economic Outlook

Builds on Exercise 2 (employment forecasts), Exercise 4 (payroll tax decline), Exercise 6 (federal spending), and Exercise 7 (GDP trajectory).

Method & Assumptions

This exercise models how AI and robotics-driven unemployment — as forecast in Exercise 2 — compounds the existing federal debt trajectory established in the CBO's February 2026 baseline. Four governing mechanisms are modeled simultaneously:

1. Revenue erosion: Approximately 85% of federal tax revenue (individual income tax + payroll taxes + corporate income tax) is employment-sensitive. As employment falls per Exercise 2, revenue falls proportionally from a $5.6T baseline. A 15% stable floor (excise taxes, tariffs, other receipts) is maintained.

2. Structural spending inertia: Mandatory spending (Social Security, Medicare, Medicaid) continues growing at approximately 3.5% per year driven by demographic aging — independent of revenue. This creates a structural widening of the gap even before interest compounds.

3. Interest rate premium: As debt/GDP rises above sustainable levels (~80%), the market demands higher yields to compensate for increasing default risk. The model applies a risk premium of 5 basis points per percentage point of debt/GDP above 80%, increasing the cost of new debt issuance as the ratio deteriorates.

4. Debt compounding: Each year's deficit is added to the outstanding debt. The growing debt stock multiplied by rising interest rates produces interest payments that themselves require new borrowing, creating a self-reinforcing spiral. Approximately 15% of debt matures and is refinanced at current rates each year (consistent with the U.S. Treasury's average maturity of roughly 6–7 years).

Federal Debt Forecast — Selected Years

CBO 2026 baseline serves as the Year 1 anchor. Color shading: pale blue = baseline, yellow = moderate deterioration, orange/red = severe, deep red = crisis territory.

Category	2026	2030	2035	2040	2046
Federal Tax Revenue	**$5.6T**	**$5.4T**	**$4.4T**	**$3.5T**	**$3.4T**
Federal Debt (Held by Public) * See fiscal crisis note below	**$29.5T**	**$41T**	**$69T**	**$118T**	**$222T**
GDP (Nominal)	**$32.0T**	**$31.2T**	**$27.3T**	**$23.5T**	**$23.0T**
Federal Debt as % of GDP † Enters de facto insolvency territory well before 2046	**92%**	**132%**	**252%**	**504%**	**967%**
Interest Rate on New Debt (10-yr Treasury) ‡ Risk premium rises with debt/GDP; may be higher	**4.5%**	**4.2%**	**4.7%**	**5.9%**	**8.0%**
Interest Payments as % of Federal Budget (Outlays) † Mathematically unsustainable without drastic policy response	**14%**	**21%**	**28%**	**37%**	**55%**

Interpreting the Trajectory

2026–2030 — The window closes: Even before AI displacement materially reduces revenue, the CBO baseline already projects debt rising from 92% to 132% of GDP by 2030 — driven by structural deficits. The marginal impact of early AI displacement is modest ($5.4T vs. CBO's $5.6T projected revenue), but the direction is now reinforced in both dimensions: debt rises faster and GDP grows more slowly.

2030–2035 — Acceleration begins: This is the period when Exercise 2's employment displacement begins to materially reduce revenue. Revenue falls from $5.4T to $4.4T while mandatory spending continues rising. The deficit

widens sharply. Debt/GDP passes 250% — a level that has historically triggered sovereign debt restructuring in advanced economies (excepting Japan, whose debt is almost entirely domestically held).

2035–2040 — Debt service crowding: Interest payments grow from approximately $2.8T to $5.3T annually. By 2040, interest consumes approximately 37% of all federal outlays — up from 14% in 2026. Every dollar of federal spending that goes to interest is a dollar unavailable for defense, healthcare, education, or Social Security. This is the fiscal mechanism that forces the budget cuts identified below.

2040–2046 — Terminal trajectory: The model shows debt/GDP approaching 500–1,000% — numbers that have no historical precedent and represent theoretical rather than operational projections. In practice, the United States would experience a sovereign debt crisis well before reaching these levels, most likely in the mid-to-late 2030s. That crisis could manifest as: (a) forced renegotiation of debt terms, (b) Fed monetization of debt through money creation (causing severe inflation), (c) an emergency restructuring of mandatory programs, or (d) some combination. The model is not predicting these outcomes; it is showing that under the parameters of this exercise, they become unavoidable.

⚠ **FISCAL CRISIS THRESHOLD NOTE:** Historical evidence suggests that debt/GDP ratios above approximately 150–200% are incompatible with continued market access to new borrowing at sustainable rates for any economy — including reserve currency issuers. The U.S. would likely be forced into a policy crisis response (spending restructuring, debt restructuring, or monetary inflation) between 2033 and 2040 under this scenario. The 2040 and 2046 figures are therefore upper-bound projections of the debt burden at terminal displacement, not predictions of a functioning ongoing fiscal state.

Top Three Federal Budget Areas Most Likely to Be Reduced

As debt service rises to 37–55% of federal outlays, the remaining budget must compress around mandatory interest payments. The three categories below represent the most probable sites of forced reduction — ordered by the combination of political feasibility and sheer dollar magnitude.

Rank	Budget Category	2026 Baseline	Rationale for Prioritized Reduction
1	**National Defense**	**$892B**	The largest single discretionary budget item is the only major category without constitutionally protected beneficiary rights. As debt service consumes an ever-larger share of outlays, defense becomes the primary pressure valve — a conclusion consistent with the Exercise 6 modeling, which already projected defense falling to $474B by 2046. Sequestration of this magnitude would represent the most severe peace-time military reduction in U.S. history, with generational consequences for force readiness, procurement, and alliances.
2	**Non-Defense Discretionary (Education, Transportation, Justice, Housing, Research)**	**~$758B**	Non-defense discretionary spending is subject to annual appropriations — making it the most mechanically accessible category for Congress to reduce each year. Absent mandatory program reform, this category absorbs cuts first. Exercise 6 modeled proportional declines across all of these functions. In a debt-crisis environment, cuts would likely be deeper and faster than modeled, as discretionary programs have no legal payment floor unlike Social Security or Medicare.
3	**Federal Health Programs (Medicare, Medicaid, ACA)**	**$1,720B**	At $1.72T in 2026, federal health programs are the largest single program category — larger than defense and growing with an aging population. While politically the last resort, the arithmetic is unavoidable: when interest consumes 37–55% of outlays, no category of this magnitude can remain fully exempt. Medicare benefit cuts, Medicaid eligibility restrictions, and ACA subsidy reductions become mathematically necessary by the late 2030s. Reducing health programs while Social Security payouts are also declining (Exercise 5) creates a compounding crisis for older and lower-income Americans.

The Feedback Loop — Why This Is Self-Reinforcing

The compounding mechanism that makes this scenario qualitatively different from a standard recession is the interaction between all three prior exercises:

Exercise 5 → Exercise 8: Declining Social Security payouts reduce the income floor for retired workers. With less income, they spend less. Reduced consumer spending contracts corporate revenue → lower corporate tax collections → deeper revenue shortfall → more deficit borrowing → higher debt.

Exercise 6 → Exercise 8: Shrinking public sector employment (modeled in Exercise 6) itself reduces payroll tax revenue from government workers, whose income was previously outside the AI displacement model. Fewer teachers, soldiers, and federal employees means less taxable income, compounding the private-sector displacement already modeled.

Exercise 7 → Exercise 8: Falling household equity values reduce capital gains tax receipts (part of individual income tax). As the equity market contracts by $19T through 2046, annual capital gains realizations fall substantially — a revenue category not fully captured in the employment-linked revenue model above, meaning the revenue projections may be optimistic.

Important Caveats

[1] **No policy response modeled:** This is a mechanical extrapolation of current law plus the Exercise 2 employment trajectory. Real policy responses — tax reform, benefit restructuring, debt ceiling changes, monetary policy — would alter the trajectory materially.

[2] **Reserve currency buffer:** The U.S. dollar's status as the global reserve currency provides meaningful but not unlimited ability to carry higher debt/GDP ratios than other countries. This is reflected in the relatively modest risk premium applied here; the actual premium would depend on how long dollar reserve status is maintained under fiscal stress.

[3] **Debt monetization:** If the Federal Reserve were to purchase Treasury debt at scale (as in 2020–2021), interest rates could be artificially suppressed. However, this would likely produce significant inflation, which is an implicit tax on holders of dollar-denominated assets and effectively a form of default.

[4] **GDP productivity offset:** AI-driven productivity gains for remaining workers could partially sustain corporate profits and therefore corporate tax receipts, even as headcount falls. This is not credited in the revenue model above.

[5] **New-job AI revenue:** If AI agents and robotics firms generate substantial corporate profits — and if those profits are taxed — corporate income tax could partially offset payroll and income tax losses. Current corporate tax rates and enforcement would need to be applied to AI-generated income streams, which existing tax law does not yet clearly address.

Sources

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4. AAF — Highlights of CBO's February 2026 Budget and Economic Outlook — https://www.americanactionforum.org/insight/highlights-of-cbos-february-2026-budget-and-economic-outlook/

5. Bipartisan Policy Center — Deficit Tracker 2026 — https://bipartisanpolicy.org/report/deficit-tracker/

6. Exercises 2, 4, 5, 6, 7 — AI & Robotics Impact on Work research series — [project artifacts]