Fiscal Deficits

Prof. Lutz Hendricks

Econ520

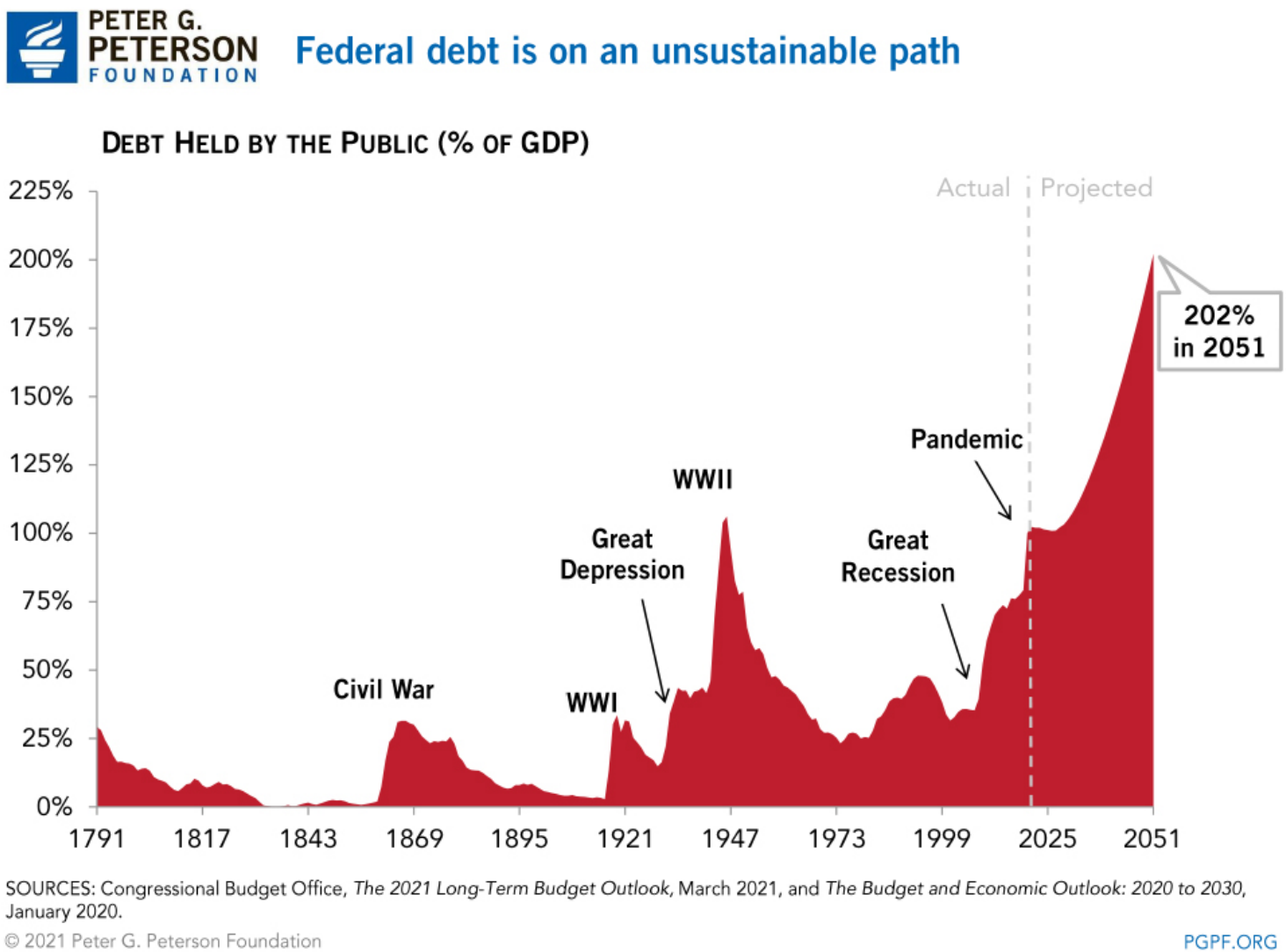
February 16, 2023

Topics

In this section you will learn:

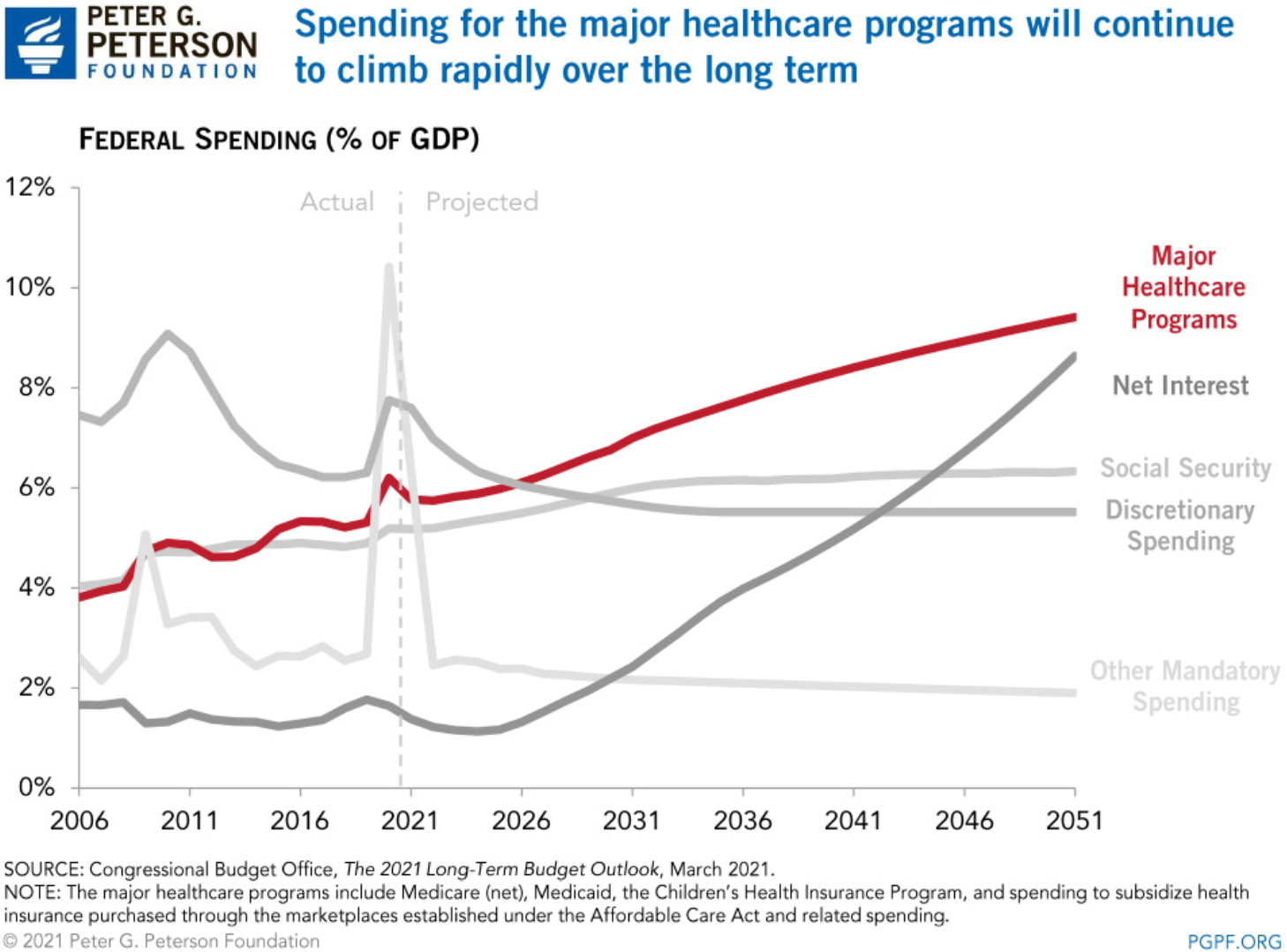
1. what the outlook for the U.S. government budget looks like
2. what deficits do

Public Debt is Rising



Source: PGPF, 2021

Main Driver: Health Spending



Source: PGPF, 2021

Rising fraction of older people + rising health care prices.

Summary: Facts

Summary

1. At given levels of spending and revenues, the deficit will continue to climb.
2. The main problem is rising health care spending.
   But there is also a big Social Security imbalance (which does not appear in the budget).
3. Rising interest payments may be a big part of the problem.

Questions:

1. What do big deficits do?
   Crowding out?
2. How much debt is "sustainable?"

Two views

THE NATIONAL DEBT IS ON AN UNSUSTAINABLE PATH

CBO estimates that federal debt, which is already at high levels, will climb significantly over the next 30 years. In CBO's latest projections, debt is expected to climb from 77 percent of GDP in 2017 to 150 percent of GDP in 2047, based on current law.

Debt at those levels would be unprecedented. – Peterson Foundation, 2017

Low interest rates also create numerous opportunities. They expand the scope for expansionary fiscal policy, make the debt more sustainable and increase the scope of public investments that will pay for themselves over time. – Furman and Summers (2020)

The government budget constraint

The government budget constraint

$$\underbrace{G_t + Tr_t + rB_t}_{\text{spending}} = \underbrace{T_t + \Delta M_t}_{\text{income}} + \underbrace{\Delta B_t}_{\text{borrowing}} \tag{1}$$

Sources of funds:

- Tax revenues: T
- New bond issues: $\Delta B_t = B_{t+1} - B_t$
- Seignorage: $\Delta M = M_{t+1} - M_t$

Uses of funds:

- Government spending on goods and services: G
- Transfer payments: Tr
- Interest payments on bonds (real): rB_t

The government budget constraint

Government income: $Y_t = T_t + \Delta M_t$

Government spending: $X_t = G_t + Tr_t$

Saving: $S_t = Y_t - X_t$

Budget constraint: $B_{t+1} = (1 + r_t) B_t - S_t$.

This is intuitive ... and the same holds for a household or firm.

Intertemporal budget constraint

The budget constraint is accounting.

It says nothing about how much spending / debt is sustainable.

To see how much debt is sustainable, we need to look at the **intertemporal** budget constraint.

Then we will find:

Present value of income = Present value of spending + initial debt

Present value:

- sum of all future values
- discounted by cumulative interest factors $R \equiv 1 + r$
- e.g., $Y_t + Y_{t+1}/R + Y_{t+2}/R^2 + \ldots$

▸ Derivation

r versus g

How much debt is sustainable depends on the race between

- interest accumulation (governed by interest rate r)
- GDP growth (governed by growth rate g)
  Also the growth rate of tax revenues.

r/g determines the rate at which debt/GDP grows over time.

Traditional view: $r > g$

Output growth g: perhaps 3% p.a.

Real interest rate r (on stocks!): averages about 7% p.a. over that last 100 years.

If the government has debt today, it needs to save (enough).

Otherwise the interest share of the government budget keeps growing without bounds.

Not sustainable.

Intuition

Simple case: No growth; no primary deficits

- $B_{t+1} = (1+r)B_t - S_t$ with $S_t = 0$

Debt grows at rate r.

Output grows at rate g.

Debt to output ratio B/Y grows at rate $r-g$.

$r > g \implies B/Y$ grows without bounds.

How to prevent B/Y from exploding?

Need to run primary surplus $(S > 0)$.

Traditional view

If the government borrows today, it has to save in the future.

This is true even though

- government debt can grow without bounds
- the government never has to repay its debts

The constraint simply comes from the need to keep debt-to-output finite.

Implications

1. If the government borrows today, taxes will be higher in the future (or spending must be cut)
2. The longer the government waits before stabilizing the debt, the higher taxes must rise
   - 2.1 because the debt grows due to accumulated interest
   - 2.2 but the present value of the tax collection does not depend on when the debt gets repaid

Low Interest Rates: $r < g$

Now output grows faster than the interest burden on debt.

- Even if the government rolls over all interest

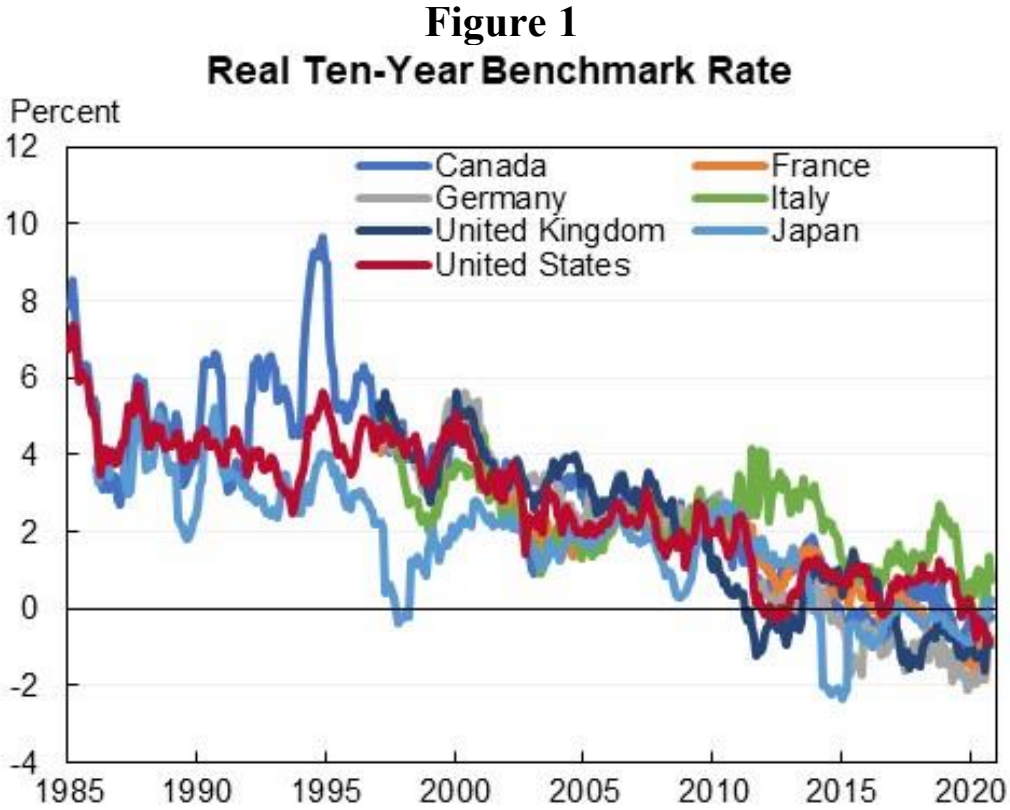
The government can keep borrowing forever.

The debt-to-output ratio does not blow up.

The government can invest in future growth without having to worry too much about debt repayment.

- The opportunities that Furman & Summers have in mind.

Low Interest Rates



Source: Furman and Summers (2020)

Real interest rates have been falling for a long time (why?).

Interest Payments

Figure 14a

U.S. Federal Debt Held by The Public

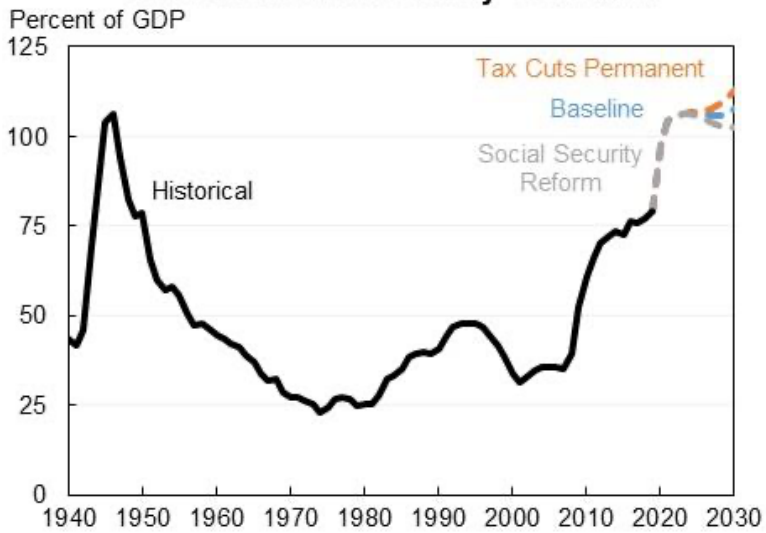
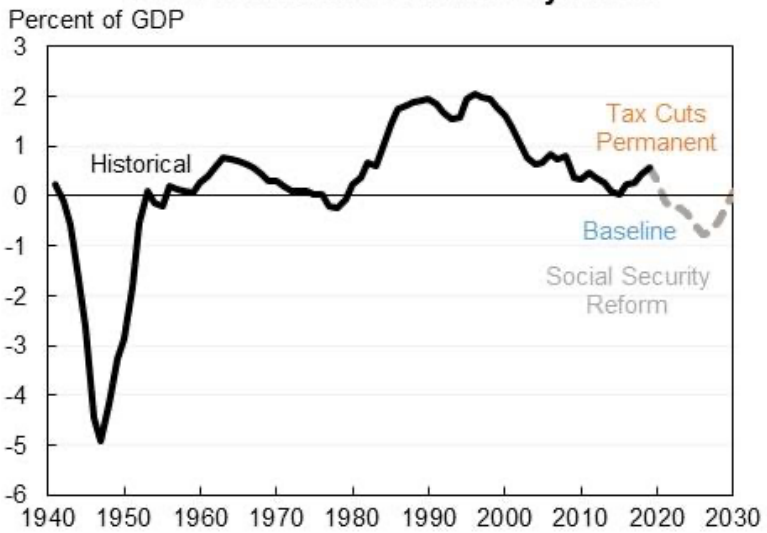


Figure 14b

U.S. Federal Real Interest Payments



Source: Furman and Summers (2020)

Key point

It's not the size of the debt that matters, its the size of interest payments relative to output.

One risk: what if interest rates rise in the future?

The Effects of Deficits

What Do Deficits Do?

- Does a higher deficit imply that interest rates rise?
- Does government borrowing crowd out private investment?

Crowding out

- Start from the NIPA identity

$$Y = C + G + I + EX - IM$$

- Rewrite as

$$\underbrace{Y - T - C}_{private\ saving} + \underbrace{T - G}_{public\ saving} + \underbrace{IM - EX}_{foreign\ saving} = I$$

- Everything else equal, higher government deficits reduce investment.
- But everything else is not equal...

Crowding out

Key question:

Do private or foreign savings rise when public deficits rise?

Three views:

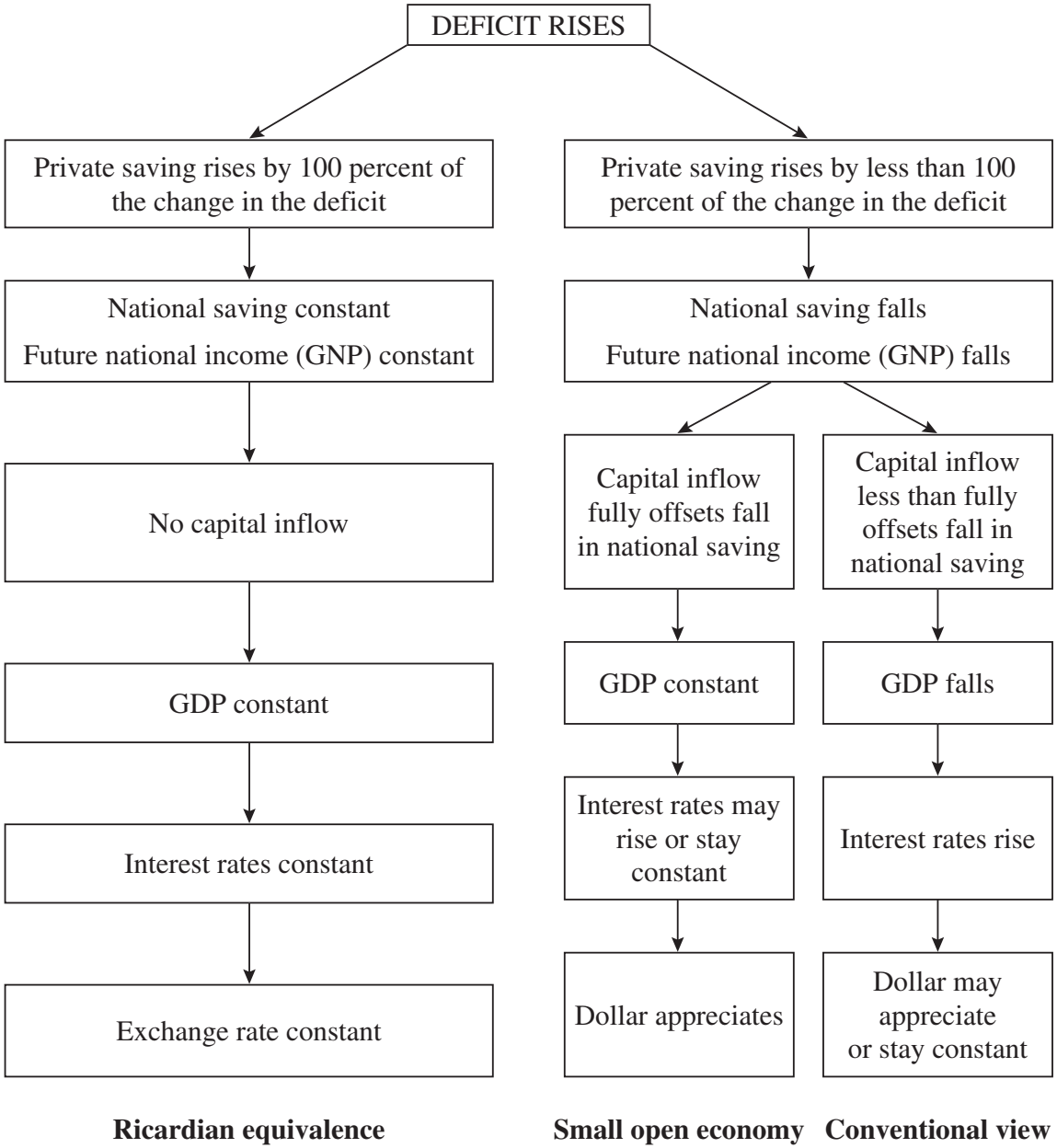
1. Private savings rise (Ricardian equivalence)
2. Foreign capital inflows fully offset deficits (open economy view)
3. Deficits raise interest rates.

Ricardian Equivalence

- The government budget constraint implies
  - a current tax cut + borrowing does not change the present value of taxes collected
- The household budget constraint implies
  - present value of consumption = [present value of income] - [present value of taxes]
- Households "should" not change consumption in response to deficits + tax cuts
  - what should they do?
  - what is then the effect of a deficit?

Three Views

Figure 5. Theoretical Responses to a Change in the Budget Deficit



Source: Gale and Orszag (2004)

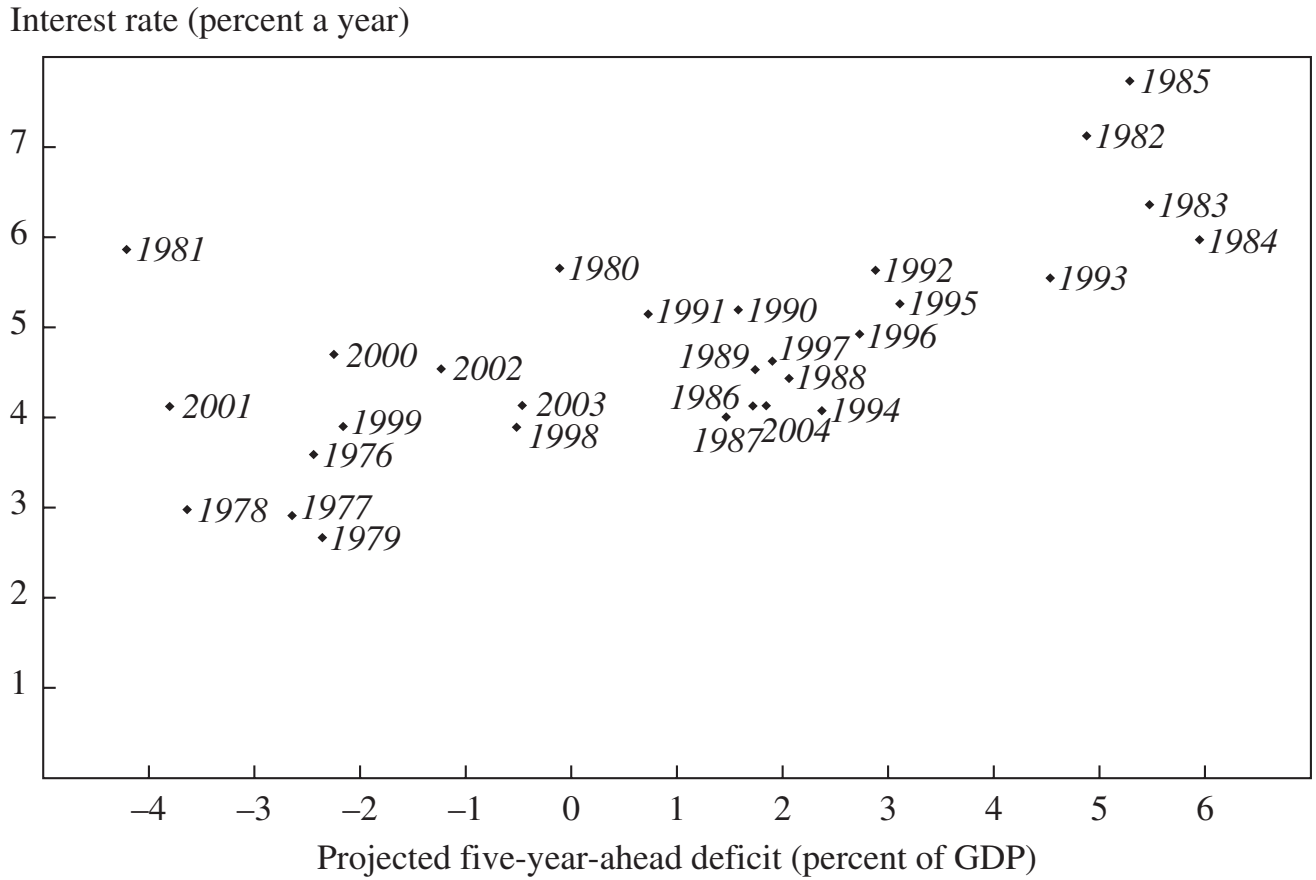
Deficits and Private Saving

- The evidence suggests: a \$100 increase in the deficit leads to
- a \$25 increase in private saving
- a \$25 capital inflow from abroad
- a \$50 reducing in U.S. investment (Sinai et al. 2004).

$$\underbrace{Y-T-C}_{+\$25}+\underbrace{T-G}_{-\$100}+\underbrace{IM-EX}_{+\$25}=\underbrace{I}_{-\$50}$$

Deficits and Interest Rates

Figure 8. Forward Ten-Year Real Treasury Rates and Projected Deficits, 1976–2004[a]



Source: Gale and Orszag (2004)

.

Best estimates suggest: increase in government deficit by 1% of GDP raises interest rates by 0.3 to 0.6%.

Is Today Different?

Does it look like crowding out is a major concern today?

One view: Furman and Summers (2019).

Real interest rates are very low, even though debt is rising.

Review Questions

1. Does the government ever need to repay any of its debt?
2. What is the main limiting factor for government debt?
3. If the government raises the deficit today, does it have to reduce the deficit in the future?
   How does the answer depend on r vs g?

Summary

1. The government budget constraint requires:
   present value of spending + initial debt = present value of tax revenues.
2. Does the government need to save to stabilize debt/GDP?
   The answer depends on r versus g.
3. Currently r is very low. More debt is sustainable.
   But future r could be higher.
4. Does public debt crowd out private investment?
   In normal times: yes.
   In current times: perhaps not.
5. How much debt is sustainable?
   Nobody knows.

Appendix: Derivations

Two period example

The world lasts for $t = 1, 2$.

The economy starts with debt B_1.

There is no money (or M is constant)

Budget constraint for $t = 1$:

$$B_2 = RB_1 - S_1 \tag{2}$$

Budget constraint for $t = 2$:

$$B_3 = RB_2 - S_2 \tag{3}$$

$$= R[RB_1 - S_1] - S_2 \tag{4}$$

where $R \equiv 1 + i$.

Two period example

Combine the 2 budget constraints (substitute out B_2):

$$B_3 = R^2 B_1 - RS_1 - S_2 \tag{5}$$

In words...

Rearrange

$$\frac{B_3}{R^2} = B_1 - \frac{S_1}{R} - \frac{S_2}{R^2} \tag{6}$$

The present value of debt at the end equals the present value of borrowing ("primary deficits") in all periods.

This is very general (not limited to examples with a few periods)

Many periods

We still have

$$\frac{B_{T+1}}{R^T} = B_1 - \frac{S_1}{R} - \frac{S_2}{R^2} \cdots - \frac{S_T}{R^T} \tag{7}$$

$$\frac{B_{T+1}}{R^T} = B_1 - PV(S;R) \tag{8}$$

$PV(S;R)$ is the present value of saving ("primary surpluses") discounted at R.

In words:

The increase in the present value of debt equals the present value of all dissaving ("primary deficits").

Case 1: Finite Horizon

E.g., a person who cannot die in debt: $B_{T+1} = 0$

Consider the case of $B_1 = 0$.

- Any deficit must be offset by savings of equal present value.
- If the agent borrows now, they must save later.

With initial debt, just add repayment of the debt to $t = 1$ spending.

But this does not apply to governments (or firms)!

Case 2: Infinite Horizon

Now what is the constraint on the present value of future debt B_{T+1}/R^T?

The depends on the path of output

- because tax revenues and spending rise with it.

Write output shares as lower case: $b_t \equiv B_t/Y_t$.

Assume output grows at a constant rate: $Y_t/Y_1 = g^{t-1}$.

Case 2: Infinite Horizon

Then we have

$$\frac{B_{T+1}}{R^T} = \underbrace{\frac{b_{T+1}}{R^T} Y_{T+1}}_{b \equiv B/Y} = \underbrace{\frac{b_{T+1}}{R^T} g^T Y_1}_{Y_{T+1} = g^T Y_1} = \frac{b_{T+1}}{(R/g)^T} Y_1 \tag{9}$$

Apply the intertemporal budget constraint (divided by Y_1):

$$\frac{b_{T+1}}{(R/g)^T} = \frac{B_1}{Y_1} - \frac{S_1/Y_1}{R} - \frac{S_2/Y_1}{R^2} - \cdots - \frac{S_T/Y_1}{R^T} \tag{10}$$

$$= b_1 - \frac{s_1}{R} - \frac{s_2}{R^2}\frac{Y_2}{Y_1} - \cdots - \frac{s_T}{R^T}\frac{Y_T}{Y_1} \tag{11}$$

$$= b_1 - \frac{1}{R}\left[\frac{s_1}{1} + \frac{s_2}{(R/g)^1} + \cdots + \frac{s_T}{(R/g)^{T-1}}\right] \tag{12}$$

$$= b_1 - (1/R) \times PV(s; R/g) \tag{13}$$

This uses $S_t/Y_1 = (S_t/Y_t) \times (Y_t/Y_1) = s_t Y_t/Y_1$.

Note: the race between interest and output growth!

Case 2: Infinite Horizon

Assume that $s_t \equiv S_t/Y_t$ is constant at $\bar{s}$.

Then

$$\frac{b_{T+1}}{(R/g)^T} = b_1 - \frac{\bar{s}}{R}\sum_{t=0}^{T-1}(R/g)^{-t} \tag{14}$$

Recall that

$$\sum_{t=0}^{T-1}(R/g)^{-t} = \frac{(R/g)^{-T}-1}{(R/g)^{-1}-1} \tag{15}$$

Then

$$b_{T+1} = (R/g)^T\left[b_1 - \frac{\bar{s}}{R}\frac{(R/g)^{-T}-1}{(R/g)^{-1}-1}\right] \tag{16}$$

Now what happens depend on R versus g.

Traditional view: $R > g$

$R/g > 1$ and therefore $(R/g)^t$ grows over time.

For large T: $(R/g)^T \to 0$.

$$b_{T+1} = (R/g)^T \left[b_1 - \frac{\overline{s}}{R} \underbrace{\frac{0-1}{(R/g)^{-1} - 1}}_{>0} \right] \tag{17}$$

The government must save to prevent debt/GDP from exploding.

Low Interest Rates: $R < g$

Now $(R/g)^T \to 0$ over time.

$$b_{T+1} = \underbrace{(R/g)^T b_1}_{\to 0} - \frac{\bar{s}}{R} \underbrace{\frac{1-(R/g)^T}{(R/g)^{-1}-1}}_{\text{finite}} \tag{18}$$

Now output grows faster than the interest burden on debt.

The government can keep borrowing forever.

The debt-to-output ratio does not blow up.

Reading

Blanchard (2018), ch. 23

Also useful:

- Time to Worry Less about Federal Budget Deficits? (Timothy Taylor's summary of Furman & Summers)
- Jones (2013), ch 13.

Advanced Reading

- Ball and Mankiw (1995): informal. Ideas
- Gale and Orszag (2004): summarizes the evidence of the effects of deficits on interest rates
- Rubin et al. (2004) http://www.brookings.edu/papers/2004/0105budgetdeficit_orszag.as
  - nice summary of possible consequences of budget deficits.

References I

Ball, L. and N. G. Mankiw (1995): "What do budget deficits do?" Tech. rep., National Bureau of Economic Research.

Blanchard, O. (2018): *Macroeconomics*, Boston: Pearson, 8th ed.

Furman, J. and L. H. Summers (2019): "Who's Afraid of Budget Deficits: How Washington Should End Its Debt Obsession," *Foreign Aff.*, 98, 82.

——— (2020): "A Reconsideration of Fiscal Policy in the Era of Low Interest Rates," .

Gale, W. G. and P. R. Orszag (2004): "Budget deficits, national saving, and interest rates," *Brookings Papers on Economic Activity*, 2004, 101–210.

Jones, C. I. (2013): *Macroeconomics*, W W Norton, 3rd ed.

Rubin, R. E., P. R. Orszag, and A. Sinai (2004): "Sustained Budget Deficits: the Risk of Financial and Fiscal Disarray," .