

DISCUSSION DRAFT

A Reconsideration of Fiscal Policy in the Era of Low Interest Rates

Jason Furman and Lawrence Summers¹

November 30, 2020

The last generation has witnessed an epochal decline in real interest rates in the United States and around the world despite large buildups of government debt. As Table 1 illustrates U.S. ten-year indexed bond yields declined by more than 4 percentage points between 2000 and early 2020 even as projected debt levels went from levels extremely low by historical standards to extremely high by historical standards. Similar movements have been observed at all maturities and throughout the industrial world. Available market data suggests that the COVID crisis has depressed real interest rates despite raising government debts, likely by increasing inequality, uncertainty and the use of information technology.

Table 1
U.S. Debt is Much Higher
But Interest Rates Are Much Lower

	2000	2020
Debt-to-GDP (10-year ahead forecast)	6%	109%
Real Interest Rates	4.3%	-0.1%

Note: Debt-to-GDP forecast is the CBO 10-year ahead forecast (2030 from June 2019 Alternative Fiscal Scenario for 2020). Real interest rates are based on 10-year Treasury Inflation Protected Securities (TIPS) from January 2000 and February 2020.

Source: Congressional Budget Office (2000, 2019b); U.S. Department of the Treasury; authors' calculations.

This paper argues that while the future is unknowable and the precise reasons for the decline in real interest rates are not entirely clear, declining real rates reflect structural changes in the economy that require changes in thinking about fiscal policy and macroeconomic policy more generally that are as profound as those that occurred in the wake of the inflation of the

¹ Jason Furman is a Professor of the Practice of Economic Policy jointly at the Harvard Kennedy School and the Economic Department at Harvard University as well as a non-resident Senior Fellow at the Peterson Institute for International Economics. Lawrence Summers is the Charles W. Eliot Professor and President Emeritus at Harvard. The authors are indebted to extraordinary research assistance by Wilson Powell III and additional research assistance by Joseph Kupferberg. The authors have benefited from innumerable conversations on these topics with many people over the years and specific inputs to this paper from Wendy Edelberg, Richard Kogan and Brian Sack.

1970s. In terms of the dichotomy posed by Blanchard and Summers (2019) we believe the evidence points increasingly towards revolution rather than evolution.

Our analysis begins by considering the downward trend in real rates. We note that with massive increases in budget deficits and government debt, expansions in social insurance, and sharp reductions in capital tax rates, one would have expected to see increasing real rates if private sector behavior had remained constant. We suggest that changes in the supply of saving associated with lengthening life expectancy, rising uncertainty and increased inequality along with reductions in the demand for capital associated with demographic changes, demassification of the economy, and perhaps changes in corporate behavior have driven real interest rates down. It may well be that, as suggested by Stansbury and Summers (2020), declines in the sensitivity of spending to real rates due to declines in interest-sensitive spending as a share of GDP and other factors have exacerbated the decline in real rates. We argue that neutral real rates are as likely to fall below their levels immediately prior to COVID as they are to rise above them. Finally, we consider the role of monetary policies, changing asset supplies and risk premiums in affecting long-term real rates concluding that they are likely minor and, in any event, that the precise reasons for declining real rates do not much affect their implications for fiscal policy.

We discuss three implications for fiscal policy that follow from low interest rates:

First, fiscal policy must play a crucial role in stabilization policy in a world where monetary policy can counteract financial instability but otherwise is largely “pushing on a string” when it comes to accelerating economic growth. The roughly 600 basis point reductions in rates that have been found necessary to counteract recessions will be infeasible for the foreseeable future. Limitations on how far interest rates can be reduced given the zero lower bound and the possible inefficacy of lower rates in stimulating demand raise the possibility that full employment may be infeasible with overly restrictive fiscal policies. Even if full employment is feasible with a given fiscal policy there is the possibility that the necessary very low interest rate level will be associated with excessive leverage and put financial stability at risk. These views represent a departure from the orthodoxy of the last generation. They open up the prospect that countries may be less constrained by fiscal space because fiscal expansions themselves can improve fiscal sustainability by raising GDP more than they raise debt and interest payments. They also imply that policymakers need to do more to both improve automatic recession insurance and also find more ways to use fiscal policy to expand demand without increasing

deficits, for example through balanced budget multipliers, more progressive fiscal policy and also expanded social insurance.

Second, we reconsider traditional views about the dangers of debt and deficits. We note that in a world of unused capacity and very low interest rates and costs of capital, concerns about crowding out of desirable private investment that were warranted a generation ago have much less force today. We argue that debt-to-GDP ratios are a misleading metric of fiscal sustainability that do not reflect the fact that both the present value of GDP has risen and debt service costs have fallen as interest rates have fallen. Instead we propose that it is more appropriate to compare debt stocks to the present value of GDP or interest rate flows with GDP flows. We note that at current and prospective interest rate levels nominal and real Federal debt service is likely to be low not high by historical standards over the next decade, a point that is strengthened when account is taken of interest recycled to the Treasury by the Federal Reserve and interest receipts on Federal financial assets. Moreover, current debt levels are at low rather than high levels relative to calculations of the present value of GDP or prospective tax receipts. The kind of reasoning employed in formulating the Maastricht criteria a generation ago does not suggest alarm about current debt levels or those over the next decade in the United States or most European countries. While current projections do raise concerns over the fiscal situation beyond 2030 we note that that there is enormous uncertainty and that much of the issue would be addressed if necessary reforms internal to Social Security and Medicare were undertaken.

Third, we consider the issue of borrowing in the context of how the borrowed funds are used. We highlight that traditional notions of financial responsibility for households and businesses hold that borrowing in order to invest in assets that have a return well in excess of the cost of borrowing increases creditworthiness and benefits future stakeholders. Think for example of a household that accumulates equity by owning rather than renting the home in which it lives or a business that owns rather than leases its headquarters. Drawing on recent work considering dynamic scoring effects of various Federal expenditure programs we argue that borrowing to finance appropriate categories of Federal expenditure pays for itself in Federal budgetary terms on reasonable assumptions.

We conclude with thoughts on appropriate guidelines for U.S. fiscal policy. We reject traditional ideas of a cyclically balanced budget on the grounds that it would likely lead to inadequate growth and excessive financial instability. We set the goal that fiscal policy should

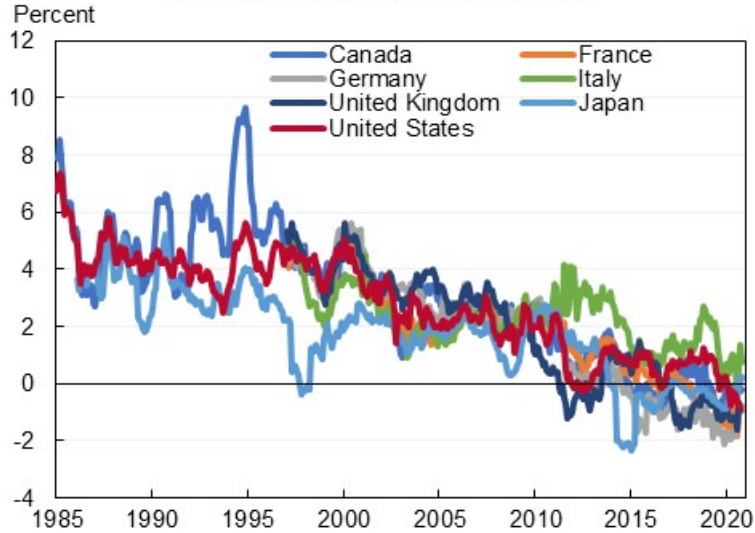
advance economic growth and financial stability. Achieving this goal depends on both improving responses to downturns and expanding and improving public investment. As a new guidepost, we propose that fiscal policy focus on supporting economic growth while preventing real debt service from being projected to rise quickly or to rise above 2 percent of GDP over the forthcoming decade. We also propose three guidelines that would be consistent with achieving this broader objective within the guidelines we recommend: (i) undertaking substantial emergency spending that is not paid for in response to economic downturns; (ii) paying for all long-term commitments with broad exceptions for ones that plausibly pay for themselves in present value; and (iii) improving the composition of government to make it more supportive of demand and also more efficient.

The surprising and likely long-lasting decline in interest rates

As striking as any development in the global economy over the last generation is the large and sustained fall in real global interest rates. As Figure 1 illustrates it has been a feature of all the G7 economies and more broadly has been universal in the industrial world. A clear downward trend in longer term real rates antedates the 2008 financial crisis and has continued since it was substantially resolved. The observations that the trend has been equally pronounced in long- and short-term real rates, has lasted over 30 years and has coincided with constant or slightly declining rather than increasing inflation and inflation expectations suggest that it is a real rather than a monetary phenomenon.² Figure 2 shows that while long-term forecasts largely expected the slowdown in economic growth due to an aging population, they entirely missed the large decline in real interest rates.

² Real interest rates were also negative or low in the 1940s and 1950s (Council of Economic Advisers 2015). This appears to have been primarily to do with a combination of financial repression, falling debt, high tax rates on capital, and lack of robust social insurance contributing to high levels of saving.

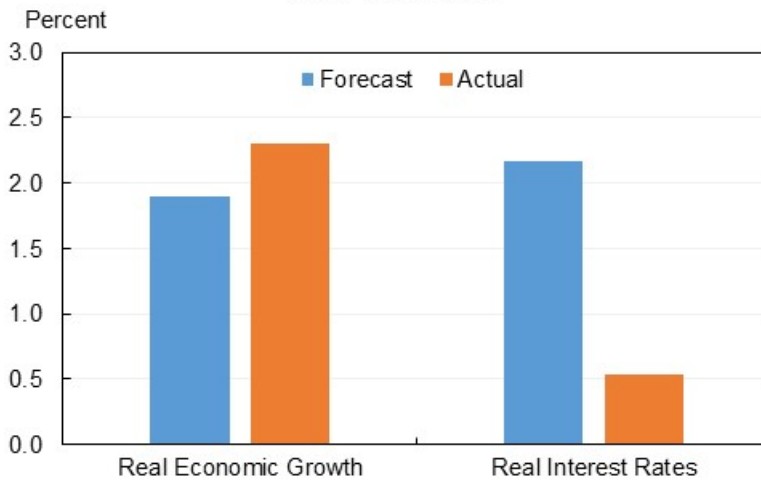
Figure 1
Real Ten-Year Benchmark Rate



Note: Inflation measured by one-year changes in the core consumer price index (core personal consumption expenditures for United States).

Source: Bank of Canada; Statistics Canada; Eurostat; Japanese Statistics Bureau; U.S. Bureau of Economic Analysis; Macrobond; authors' calculations.

Figure 2
Social Security Trustees' 1989 Economic Forecasts for 2019 vs. Actual



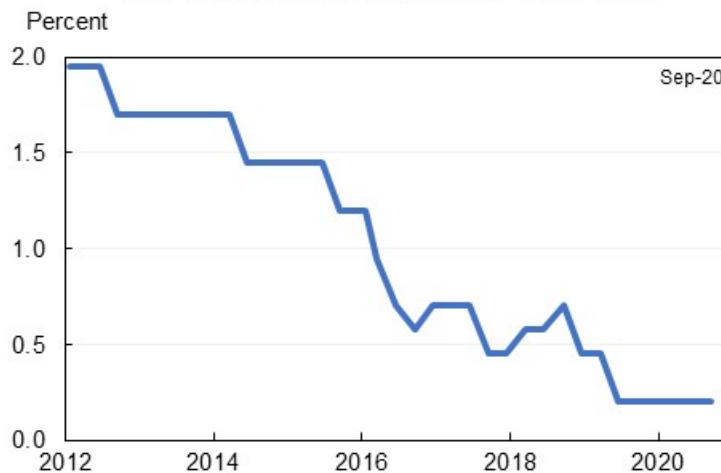
Note: Real interest rates are calculated from forecasted/actual nominal interest rates and forecasted/actual Consumer Price Index inflation.

Source: The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (1989, 2020); authors' calculations.

Estimates of the “neutral real interest rate” provided by the Federal Open Market Committee (FOMC) and economists have also fallen to low levels. The FOMC projection of the

neutral real rate derived as the difference between its long-run federal funds rate and inflation projection is now at an all-time low of 0.2 percent down from 1.95 percent eight years ago as shown in Figure 3. Aronovich and Meldrum (2020) provide new estimates and a summary of the findings of existing macro models suggesting a downward trend and a real rate very close to zero. *These estimates all significantly exceed what is priced into markets. As this is written 10 year forward federal funds are priced at 1.4 percent and ten year forward inflation is priced at 2.2 implying a real federal funds rate of -0.9 a decade from now.*

Figure 3
Federal Open Market Committee Median Expectation
for Long-Run Real Federal Funds Rate



Note: Expected long-run real federal funds rate calculated by subtracting long-run expected PCE inflation, adjusted for the historical divergence from CPI inflation, from the long-run expected federal funds rate.

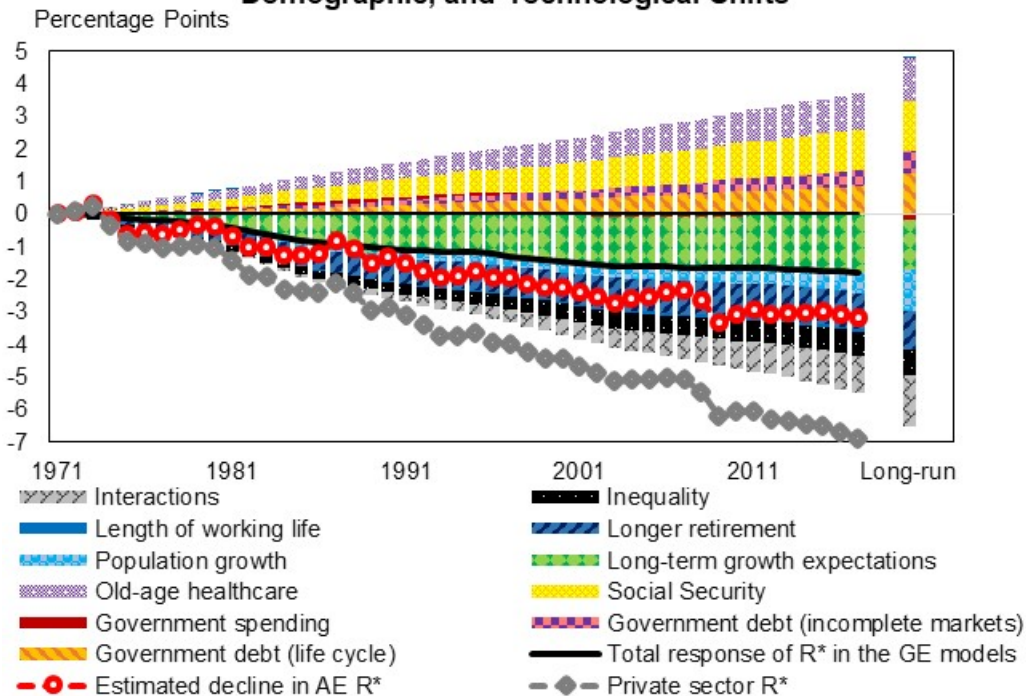
Source: Federal Reserve Bank of St. Louis; Bureau of Labor Statistics; Bureau of Economic Analysis; Macrobond; authors' calculations.

Longer-term real interest rates are expected to remain negative. The five-year forward five-year real indexed bond rate is currently -0.5 percent and the ten-year forward expectation of the ten-year real interest rate is -0.1 percent. These estimates are more likely to be over- than underestimates of prospective real short-term rates since they make no allowance for term or liquidity premiums normally present in these markets. In a mechanical sense, increases in inflation expectations towards currently targeted levels would reduce real rates unless the Federal Reserve took offsetting actions. Convergence with other industrial countries would also reduce U.S. real rates.

The decline in interest rates has happened even as public debt levels have risen. In the United States the real interest rate on ten-year debt was 4.3 percent as measured by the yield on 10-year Treasury Inflation-Protected Securities (TIPS) in January 2000, a time when it was widely expected that the entire federal debt would be largely paid off over the following decade as shown in Table 1 above. In February 2020 the economy was in a similar cyclical position but the debt was on course to rise to more than 100 percent of GDP over the following decade (the pre-pandemic projection) and at the same time the 10-year TIPS rate had fallen to -0.1 percent.

Any discussion of the causes of the decline in real interest rates has to begin with the observation that the most obvious factors bearing on real rates—government fiscal positions, social insurance expansions and changes in the after-tax profitability of capital—have all operated to increase rates. They imply that *ceteris paribus* neutral real rates in the industrial world would have declined by about 700 basis points (Rachel and Summers 2019). This suggests substantial changes in the structure of the private economy. Rachel and Summers (2019) suggest a tentative decomposition of some of these factors as shown in Figure 4.

Figure 4
Changes in the Equilibrium Real Interest Rate as a Result of Policy, Demographic, and Technological Shifts



Source: Rachel and Summers (2019).

At this point we find explanations based on the financial crisis, monetary policy choices or global factors to be implausible accounts of more than a small part of the decline in real rates. Declines in real rates predate the financial crisis, continued after financial conditions had normalized, and are equally pronounced in countries like Canada where the financial crisis was much less severe and financial institutions remained healthy.

In general, economists doubt the ability of monetary policy to affect real rates over long horizons. Abnormally easy monetary policies would be expected to manifest themselves in unusually rapid growth in nominal GDP whereas actual growth has consistently fallen short of expectations. There is no tendency for declines in real rates to be greater at the short end than at the long end of the yield curve as one might expect if monetary policy was a primary driver.

Rachel and Summers (2019) consider global factors. There have only been very small fluctuations in the current account of the industrial countries taken as a group. While the United States was running a substantial current account deficit in 2005 when Ben Bernanke (2005) famously invoked a “savings glut” to explain declining U.S. real rates, that deficit roughly halved over the subsequent decade even as real rates continued to decline.

The evidence is most consistent with structural changes in propensities to save and invest as the dominant reason for declining real rates. As Summers (2014) argued, factors operating to raise private saving include longer retirement periods, increased inequality, and rising uncertainty. Factors operating to reduce private investment include slowing labor force growth, greater efficiency in the use of capital, for example through companies like Uber and Airbnb, the impact of information technology in reducing the need for large capital investments, as for example law firms need much less office space per lawyer, and dramatic reductions in the relative price of capital goods. Increases in corporate market power and increased pressure on corporations to pay out cash to shareholders may also contributed to reduced investment.

An alternative line of explanation for low and declining real rates focuses on changes in risk premiums as relative asset supplies change as argued, for example, by Caballero, Farhi and Gourinchas (2017). Rachel and Summers (2019) question the importance of this line of thought noting that required returns on assets aside from government debt like risky debt, real estate and stocks have moved largely in tandem with debt yields. They note other difficulties with the safe asset theory including the emergence of negative swap spreads and growing supplies of government debt in recent years. Another view is that low rates reflect a shift in the risk profile

of government debt from providing a source of risk to acting as a hedge (Campbell, Sunderam, and Viceira 2017), although rates have fallen as much at the short end (which has a beta of zero) as at the long end so this explanation is unlikely to be an important part of the story.

Ultimately, however, the exact reason for low interest rates makes little difference for the analysis of fiscal policy except to the degree the explanations bear on the persistence of the trend. Whatever the cause of low interest rates, their relevant consequence is to limit the ability of monetary policy to stimulate demand and reduce the cost of borrowing.

The decline in interest rates has three important implications: (i) as monetary policy is limited in its ability to stabilize the economy and financial system, fiscal policy must play a critical role; (ii) fiscal sustainability cannot be assessed by traditional debt-to-GDP ratios but should instead be understood with measures like nominal or real interest as a share of GDP; and (iii) many public investments pay for themselves, or come close to paying for themselves, and the risk of not undertaking these investments is larger than the risk of doing too little deficit reduction. The remainder of this paper discusses these three implications in turn.

Implication 1: Active Use of Fiscal Policy is Essential in Order to Maximize Employment and Maintain Financial Stability in the Current Low Interest Rate World

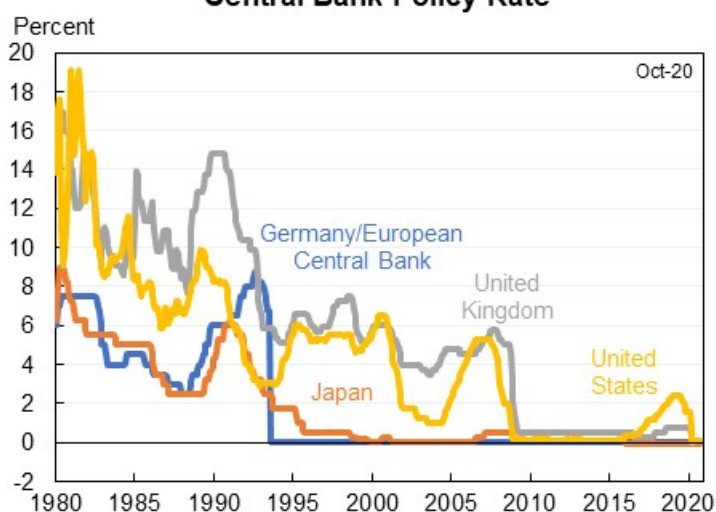
Traditional thinking for the last half century has held that monetary policy should take primary responsibility for stabilizing aggregate demand and ensuring low inflation. This is the essential economic theory behind the widely implemented idea of independent central banks with targets. Fiscal policy is seen as operating through automatic stabilizers and through discretionary stimulus packages at moments of major distress. Fiscal policy is seen largely through the prism of microeconomic efficiency, fairness and equality, and the desire to promote investment by avoiding crowding out.

This thinking is no longer appropriate if monetary policy cannot be relied on to stabilize the economy or to ensure that inflation targets are achieved. We believe that this will be the case for as long as interest rates remain anywhere near current and prospective levels. Moreover, there is a real risk that contractionary fiscal policies will jeopardize financial stability by forcing decreases in interest rates that may encourage excessive leverage and asset price bubbles.

The challenges associated with low interest rates

The clearest challenge associated with lower equilibrium interest rates is constraints on monetary policy. In 2000 David Reifschneider and John Williams published a paper predicting that the federal funds rate would be at the zero lower bound 5 percent of the time. Since the publication of the paper it has been at the zero lower bound 38 percent of the time. And it has been at the bound 59 percent of the time since the onset of the financial crisis. As we write, option markets suggest that five years out there is a 72 percent chance that nominal rates will be at their current level of effectively zero or even negative. As shown in Figure 5, interest rates in other major economies, most notably Japan, have also been at an effective lower bound (often negative) for much of the time in recent decades.

Figure 5
Central Bank Policy Rate



Source: European Central Bank; Bank of Japan; Bank of England; Federal Reserve; Macrobond; authors' calculations.

In the United States, the average policy interest rate reduction in the nine recessions before the pandemic was 630 basis points. Even if the long-run nominal federal funds rate reaches the FOMC's expectation of 2.5 percent, something the market doubts, that would leave less than half as much room to respond to future recessions as past recessions with only a little additional room if rates are allowed to go negative. The European Central Bank and Bank of Japan may have even less room to respond to future recessions, and in fact neither of them was able to cut rates in response to the current recession because they were already at the effective lower bound. While rate reductions can be augmented by measures like quantitative easing and

forward guidance or even yield curve control, the only effect of such measures is to reduce term premiums. Given their current low level this is unlikely to add much to the efficacy of monetary policy. How much investment would be done at a zero percent ten-year Treasury rate that would not be done at a one percent ten-year Treasury rate?

The consequence, if not compensated for by more active fiscal policy, would be longer and more severe recessions. Moreover, it is at least plausible that recessions have hysteresis effects and reduce subsequent potential output through effects on both labor force scarring and subsequent productivity (e.g., Adler et al. 2017; Oreopoulos, von Wachter, and Heisz 2012; Yagan 2019; DeLong and Summers 1988).

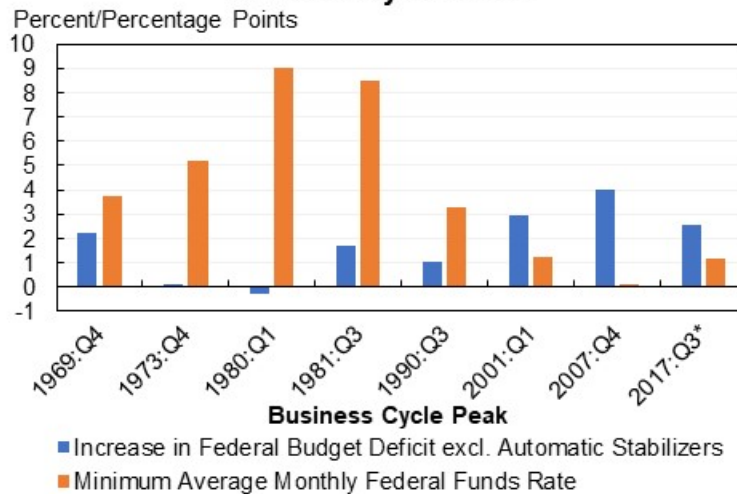
The importance of setting fiscal policy on the basis of the need to maintain aggregate demand is highlighted by a counterfactual calculation. While there was much controversy over the content of the 2010 National Commission on Fiscal Responsibility and Reform's (commonly known as the Bowles-Simpson commission) recommendations for moving towards budget balance, there was, at the time, little debate over the merits of their objective. The Bowles-Simpson plan would overtime have represented about a 4 percent of GDP annual shift towards austerity by the end of the decade. Given that for much of the period unemployment was above its sustainable non-accelerating inflation rate of unemployment (NAIRU) level, this would have adversely impacted aggregate demand. For 5 years during this decade the federal funds rate was at its lower bound and at no point did it exceed 2.5 percent. It is therefore not remotely plausible that a lower rate path could have offset more than a small fraction of the reduction in aggregate demand the fiscal contraction would have produced. The result likely would have been even more economic slack and inflation further below target.

This is of course a hypothetical calculation. Had a major recession ensued, fiscal policy responses would surely have been implemented. The point is that with our current economic environment, fiscal policies need to be set with a view to maintaining full employment.

A second, related, challenge is financial stability. Lower interest rates lead to a shift to riskier assets, higher leverage, and the possibility of bubbles as investors reach for yield, and reduce the capital of banks, which have been unable to reduce deposit rates as much as lending rates (e.g. Borio, Gambacorta, and Hoffman 2015; Dell'Ariccia, Laeven and Suarez 2017). This may be exacerbated by central bank asset purchases which have increasingly become a tool to provide additional support for the economy at the effective lower bound (Bernanke 2020).

Finally, in addition to complicating countercyclical policy in recessions it is possible that there is also a chronic lack of demand that makes it impossible for the economy to grow normally even outside of recessions. The experience of the United States in 2018-19 is instructive in this regard. These were the ninth and tenth years of an economic expansion with a record number of months of consecutive job growth and a relatively low unemployment rate. Nevertheless, the stance of macroeconomic policy in these two years was what one would associate with a moderate to severe recession as shown in Figure 6. The fiscal stimulus was larger than that of most recessions since the 1960s and interest rates were cut to levels that were also more accommodative than in most previous recessions. This public support, not private demand, helped the economy to grow at a 2.6 percent annual rate. Moreover, even with this extraordinary monetary and fiscal stimulus the inflation rate still remained below the Federal Reserve’s 2 percent target over this period.

Figure 6
Monetary and Fiscal Easing After
Business Cycle Peaks



Note: Increase in budget deficit is measured 8 quarters from peak; federal funds rate is minimum from peak through 24 months after peak.

Source: Congressional Budget Office (2020c); Federal Reserve; Macrobond; authors’ calculations.

Lower equilibrium interest rates make it clear that economies will be in liquidity traps, where the interest rate needed to equilibrate saving and investment is an unattainable negative rate, much more often in future recessions. The experience of 2018-19 raises the prospect that the liquidity trap may not just be confined to downturns but that secular stagnation may be a

chronic problem of the demand for loanable funds falling short of the supply of funds at any nominal interest rate above zero even in normal times.

Central bank policy interest rates are at or near zero in all of the major advanced economies leaving little if any additional scope for monetary policy to support additional demand and speed the closing of output gaps.

Low interest rates mean that countries cannot afford not to undertake fiscal expansions

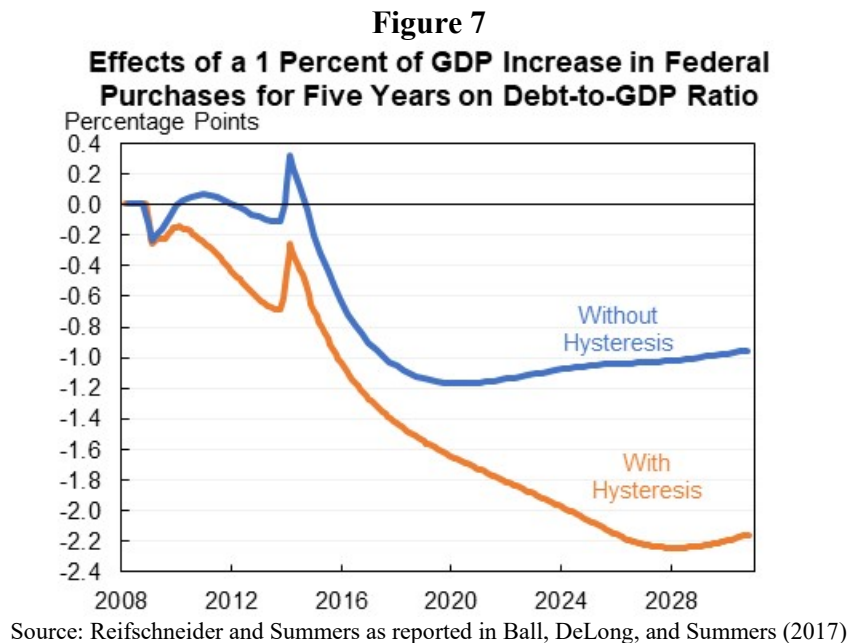
The main concerns about fiscal expansion in economic downturns is that they will lead to unsustainable debt and may not be affordable in countries that currently have high debt levels. This concern is misplaced. At a minimum, countries can always come back later to raise revenues or reduce spending in order to get debt trajectories back on a desired course. More importantly, this may not even be needed as fiscal support may *help* fiscal sustainability by increasing output more than it raises debt, thus reducing the debt-to-GDP ratio.³

A range of academic research and modelling by organizations such as the IMF and Organisation for Economic Co-operation and Development (OECD) in recent years has found that fiscal expansions in depressed economies can reduce the debt-to-GDP ratio. DeLong and Summers (2012) found that even a small amount of hysteresis would result in a fiscal expansion increasing GDP by more than it increases debt, resulting in a reduction in the debt-to-GDP ratio. This view is supported by the empirical evidence in Auerbach and Gorodnichenko (2017), who use a variety of specifications of fiscal shocks in a panel data set of advanced economies and find that “a fiscal stimulus in a weak economy may help improve fiscal sustainability along the metrics we study,” namely debt-to-GDP ratios and credit default swap spreads.

Most of the major macroeconomic models also have the property that fiscal expansions in depressed economies at the zero lower bound can improve fiscal sustainability. The OECD (2016) showed that public investment reduced the debt-to-GDP ratio in most of the advanced economies in both its National Institute’s Global Econometric Model (NiGEM) and Fiscal Maquette (FM) models. The IMF found similar results in modelling of demand-side policies (Gaspar, Obstfeld and Sahay 2016). Ball, DeLong and Summers (2017) report a run of the Federal Reserve staff’s FRB-US model which shows that a 1 percentage point increase in fiscal

³ In the next section we will talk about the limitations of debt-to-GDP as a metric. We use that metric here because it was the basis of the research we are citing.

stimulus reduces the debt-to-GDP ratio by 2.2 percentage points after 20 years, as shown in Figure 7.



Auerbach and Gorodnichenko find their result still holds at high debt levels, a finding that is echoed in the OECD modelling which does not evidence any relationship between the level of debt and whether fiscal policy pays for itself. In general, the higher a country’s debt the more the growth rate-interest rate differential matters for its fiscal trajectory and the less that the cost of stimulus itself matters for debt dynamics, as shown in the standard debt dynamics equation:

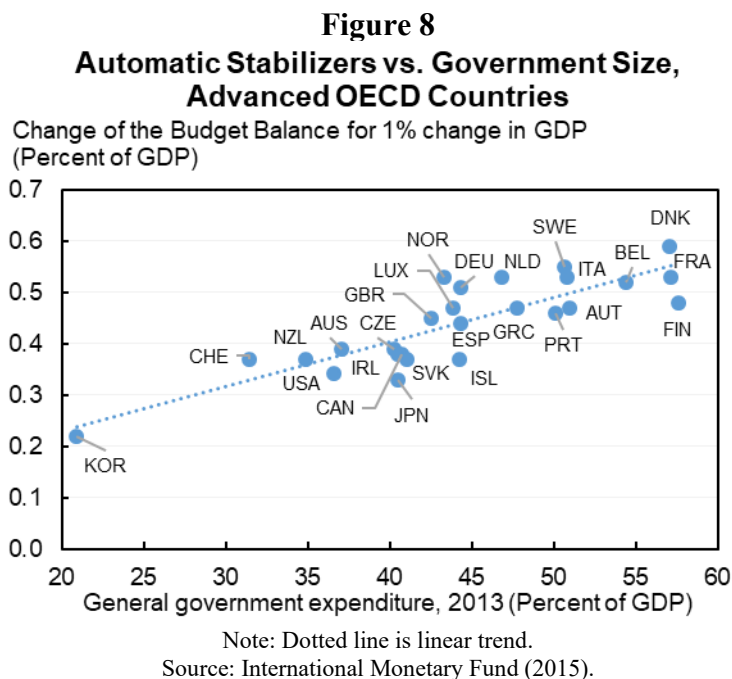
$$\left(\frac{\text{Debt}}{\text{GDP}}\right)_t - \left(\frac{\text{Debt}}{\text{GDP}}\right)_{t-1} \approx (r_t - g_t) \left(\frac{\text{Debt}}{\text{GDP}}\right)_{t-1} + \left(\frac{\text{Primary Deficit}}{\text{GDP}}\right)_t$$

where r is the real interest rate, g is the real growth rate of GDP, and the primary deficit is the difference between non-interest spending and revenues. To the degree that it can raise growth rates relative to interest rates, then fiscal stimulus will have even larger favorable effects on debt dynamics in a high debt economy than a low debt economy.

The case for a fiscal expansion in a depressed economy at the effective lower bound does not rest on nor require that fiscal expansions reduce the debt-to-GDP ratio. Fiscal expansions could easily pass a cost-benefit test even without these effects, but to the degree to which the dynamic cost is smaller than the static cost, or even negative, the net benefit will be even larger.

The importance of automatic recession insurance

The increasingly limited effects of monetary policy call not just for discretionary responses in situations like the current moment but also for improvements in the automatic stabilizers, especially in countries like the United States that have weak automatic stabilizers. Automatic stabilizers are spending increases or tax cuts that happen automatically when the economy weakens. For example, when more people lose jobs labor tax payments go down and unemployment insurance benefits go up. The magnitude of automatic stabilizers is generally related to the size of government, as shown in Figure 8. Some European countries with larger stabilizers have, however, undone them with discretionary fiscal contractions in past periods of economic weakness.



One way to make automatic stabilizers larger would be to increase both revenues and expand benefits. An alternative approach is to build in specific macroeconomic contingencies that trigger additional assistance when, for example, the unemployment rate rises above a certain level (Boushey, Nunn, and Shambaugh 2019). This automatic recession insurance could include national transfers to subnational units that have a harder time borrowing in downturns, increased unemployment insurance benefits, or other transfers like nutritional assistance or even across-the-board cash transfers.

There are four arguments for establishing more automatic contingent policies. First, they can lessen downturns and speed economic recoveries by overcoming the political limitations of discretionary fiscal policy which often gets slowed down by recognition lags, political debates, and may end prematurely as the political system tires of change. Second, automatic contingent policies can be more regionally differentiated, for example they can be based on state-level or other subnational economic measures so as to provide the greatest assistance where it is most needed, including in response to regional recessions. Third, they often make microeconomic sense. For example, the optimal level of unemployment insurance depends on the unemployment rate because when the unemployment rate rises moral hazard concerns about discouraging job seeking diminish and the importance of consumption smoothing rises (Baily 1978 and Chetty 2008). Finally, they may advance additional priorities; for example, providing assistance to states and localities can help prevent damaging cuts to education (Fiedler, Furman, and Powell 2019).

Aggregate demand can be further increased in a budget neutral manner

Given that interest rates are at essentially lower-bound levels around the world even in the presence of substantial deficits, the case that maintaining full employment requires more than monetary policy is compelling. The obvious concern is that expansionary fiscal policy may not be sustainable if it leads to excessive debt accumulation. We have already noted that expansionary fiscal policy may actually reduce levels of debt relative to GDP by stimulating growth and increasing revenue collections. There is a further crucial point as well—it is possible for fiscal policy to stimulate demand without increasing the deficit or the level of government indebtedness.

First, fiscal policy can take advantage of the balanced budget multiplier whereby spending has (over time) a higher multiplier than taxes (Haavelmo 1945) because increases in spending increase demand dollar for dollar whereas, particularly in the case of very progressive tax increases, taxes are paid out of funds that otherwise would have been saved. A reasonable estimate is that the spending financed by taxes on high-income households is at least half as potent in stimulating the economy as spending financed by borrowing

Second, fiscal policy can shift in a more progressive direction. One of the causes of lower interest rates has been the increase in inequality which has resulted in larger incomes for higher-income households who are the most likely to save it. Offsetting the increase in inequality would

reduce net national saving for any given interest rate, something that has often been viewed as a minus for economic growth but in the current circumstances would be welcome (e.g., Koo and Song 2016). Note that in general a larger government generally is a more progressive one so the first and second recommendations are related.

Finally, public support for retirement, health care, college and other large, lumpy and sometimes uncertain needs reduce the need for lifecycle and precautionary saving, thus boosting consumption demand. When Keynes visited the United States during World War II, he highlighted maintaining demand as an important virtue of the then recently adopted Social Security system. In all cases the expanded public support could be paid for on a pay-as-you-go basis so that they need not change the short- or long-run deficit.

Implication 2: Lower Interest Rates Necessitate New Measures of a Country’s Fiscal Situation

The debt-to-GDP ratio is the most common measure of a country’s fiscal situation used by policy makers and is enshrined in rules that govern fiscal policy. Recently some have been alarmed as the debt-to-GDP ratio has risen across the world and now stands at more than 100 percent in the majority of G7 economies, as shown in Table 2.

Table 2
General Government Net Debt as a Percentage of GDP, 2020

Canada	46
France	110
Germany	54
Italy	149
Japan	177
United Kingdom	98
United States	107
<i>Memo: G7 Countries</i>	<i>110</i>

Note: In international comparisons, U.S. values are for general government, not federal government.
Source: International Monetary Fund; Macrobond.

Debt levels have been a leading metric for public policy but the decline in interest rates shows how problematic this measure is. For example, in 1992 the Maastricht Treaty set a limit of 60 percent debt-to-GDP ratio for countries in the euro zone. At the time, ten-year German bonds had a nominal interest rate of 7.8 percent or a real interest rate of about 5 percent. In 2019 the nominal interest rate on ten-year German bonds had fallen to -0.2 percent or a real interest rate of about -2 percent. At interest rates prevailing in 1992, a country with a 60 percent debt-to-GDP ratio paid about 5 percent of GDP in interest. Today, Japan with a 177 percent debt-to-GDP ratio is expected to pay 0.2 percent in interest and the United States with a 107 percent debt-to-GDP ratio for general government is expected to pay 2.0 percent of GDP in interest, with the real interest after accounting for inflation being negative or close to zero in both countries. *If a 60 percent debt-to-GDP ratio made sense as a ceiling in 1992 it definitely no longer does. Instead a much higher ceiling would be appropriate today.* This is a vivid illustration of how the debt-to-GDP metric is flawed and why it should be replaced with other measures of a country's fiscal position. Importantly, these other measures generally show that fiscal positions are *better* today than they were a few decades ago as the favorable debt sustainability dynamic associated with lower interest rates outweighs the increase in the debt itself.

Shifting from the debt-to-GDP metric is part of a broader reappraisal of the ways in which the current debt and deficit situation is less of a concern in an economy in which growth rates have often exceeded interest rates in the past and are likely to continue to exceed them for sometime in the future (see, e.g., Elmendorf and Sheiner 2017, Blanchard 2019, Furman 2016, DeLong and Summers 2012).

The debt-to-GDP metric has three shortcomings that make it a misleading metric of a country's fiscal position:

1. *It ignores the fact that debt can be repaid over time.* Debt is a stock (an amount estimated at a point in time that does not need to be repaid immediately) while GDP is a flow (measured over a discrete period of time). A stock-stock perspective on the debt compares the debt to the present value of GDP over the indefinite future. With lower interest rates, the present value of future GDP is higher and debt is correspondingly more manageable over time.

2. *It ignores interest rates.* Relatedly, at lower real interest rates a given amount of debt is less costly. The stock-stock perspective is based on a very speculative measure of the present value of GDP over an infinite horizon, a metric that requires knowing growth and interest rates for the indefinite future. In contrast a flow-flow perspective looks at how much that debt costs today, in interest payments, as compared to income today, providing a sense of how affordable that debt is.

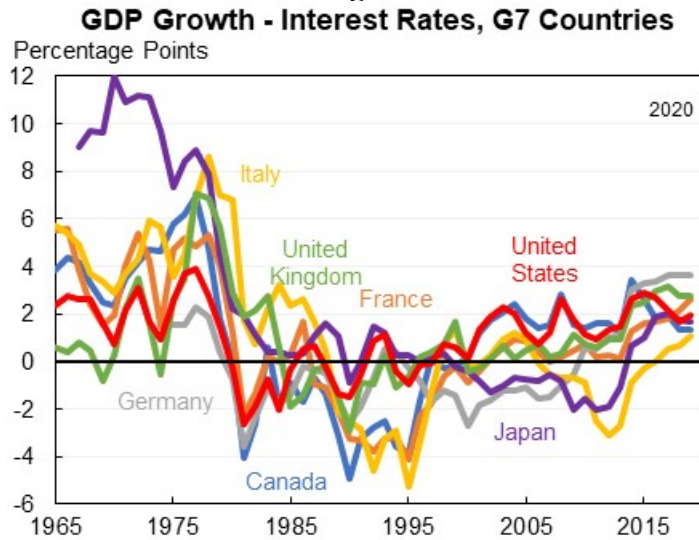
3. *It is a backward-looking concept.* The public debt is effectively the sum of the unified deficits that a country has run from its inception (with some adjustments for financial transactions). It does not reflect scheduled future policies, like pensions, or likely future policies, like the cost of responding to future emergencies. It also does not incorporate the ability to respond to evolving debt concerns with future tax increases or spending cuts.

The next three subsections address these considerations in more detail including showing how more coherent measures of the fiscal situation dramatically changes our understanding of fiscal sustainability, making it clear that most major advanced economies are in better fiscal shape today than they were twenty or thirty years ago when their debt levels were much lower.

The debt is less of a concern: a stock-stock perspective

While interest rates have come down dramatically, growth rates have fallen much less. As a result, the difference between growth rates and interest rates has risen in all of the G7 economies over the last three decades and is a substantial positive number in all of them ranging from 1.1 in Italy to 3.7 in Germany as shown in Figure 9. Growth rates exceeding interest rates is the norm not the exception, occurring about two thirds of the time since 1871 in the United States and for much of the time in other major economies as well (Blanchard 2019).

Figure 9



Note: GDP growth is average annual growth rate over prior 5 years. Interest rates are average of 10-year and 3-month government bond yields.

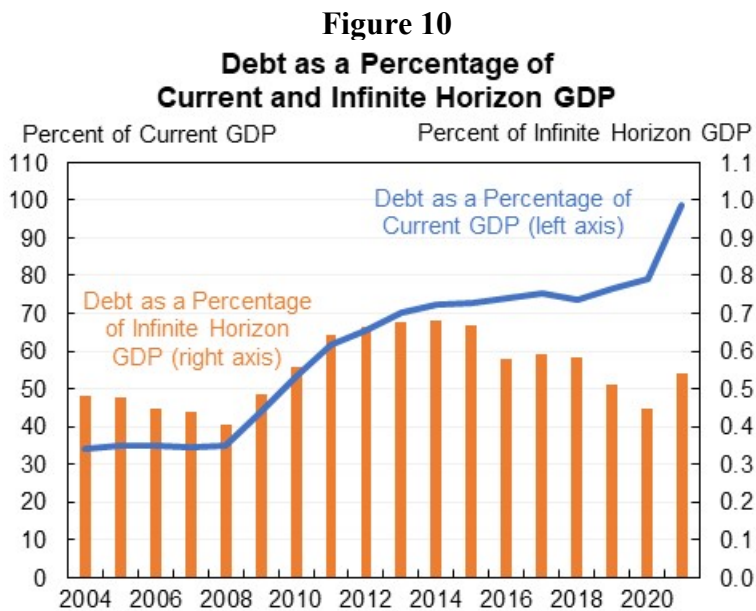
Source: World Bank; Macrobond; Global Financial Database; authors' calculations.

When growth rates exceed interest rates the present value of GDP is infinite. This means that over time the economy will outgrow its debt and associated interest so that the debt will disappear relative to the economy. From a stock-stock perspective, the debt stock is 0 percent of the present value of GDP stock. This is a more favorable fiscal situation than most of the G7 economies appeared to enjoy in the early 1990s when interest rates were substantially above growth rates so that the present value of GDP was finite and debt was a positive fraction of the present value of GDP.

Interest rates could rise and growth rates could fall in which case the present value of GDP could be finite. In the United States the only regular and systematic measure of GDP over an infinite horizon we are aware of is produced by the Social Security Trustees. Any estimate of this quantity is highly speculative and subject to massive uncertainty, and we have our quibbles with some of their specific assumptions, but this measure provides a useful benchmark with which to assess how the U.S. debt appeared at various points in time.

According to the latest Social Security Trustees Report (2020) the present value of GDP over an infinite future was \$3.8 quadrillion on January 1, 2020. As of November 19, 2020, the U.S. federal debt held by the public was \$21.2 trillion. Adjusting these to have the same dates, debt is 0.5 percent of infinite horizon GDP. In other words, a 0.5 percentage point increase in revenue as a share of GDP or reduction in spending as a share of GDP would be sufficient to pay

off the entire debt. This is smaller than or similar to what policymakers would have thought at various times in the past as shown in Figure 10 even as the debt has nearly tripled as a share of current GDP.



Note: 2021 value is based on debt as of November 19, 2020.

Source: The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters; Department of the Treasury; Macrobond; authors' calculations.

This intuition applies more broadly. For example, a decline in $r - g$ from 1.0 to 0.5 doubles the present value of GDP—and so makes twice as much debt sustainable relative to the future stock of GDP. This ½ percentage point decline in $r - g$ is an order of magnitude smaller than the actual 5 percentage point reduction in $r - g$ in the median G7 economy since 1990.

The debt is less of a concern: a flow-flow perspective

The stock-stock perspective relies on a highly uncertain extrapolation of fiscal conditions into the indefinite future. An alternative coherent metric avoids that problem by comparing the flow of interest on the debt to the flow of annual GDP. The two measures are, of course, related as lower interest rates raise the present value GDP and make it more possible to pay the debt off over time.

The more analytically relevant measure is *real* interest payments as a share of GDP. Real interest rates adjust for inflation by comparing the real interest rate paid on the debt to the size of GDP. Equivalently, it can be understood as nominal interest payments as a share of GDP minus

the amount that the debt is inflated away each year as a share of GDP. Specifically, the formula is:

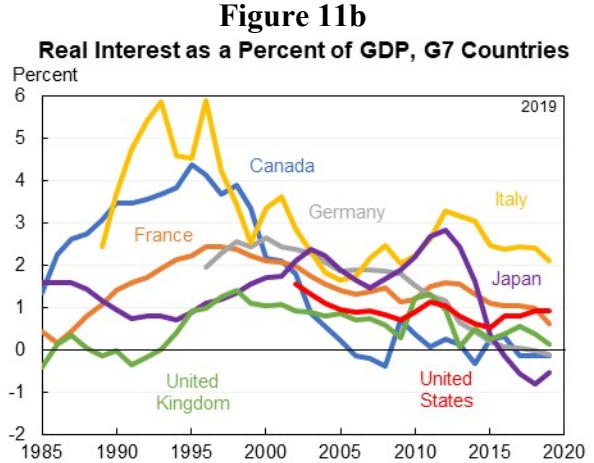
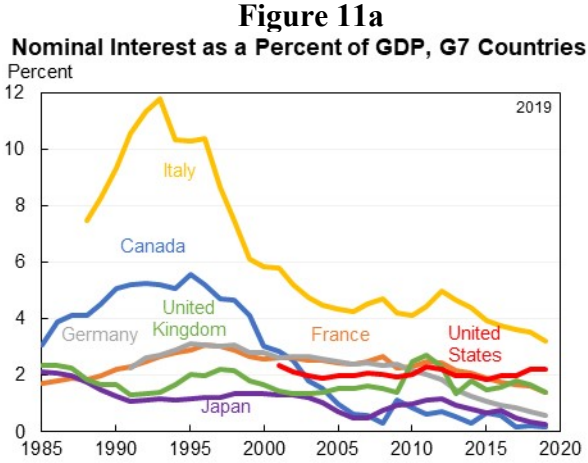
$$\left(\frac{\text{Real Interest}}{\text{GDP}}\right)_t = \frac{\text{Interest}_t - \text{Inflation}_t * \text{Debt}_{t-1}}{\text{GDP}_t}.$$

In implementing this concept we smooth inflation by averaging it over five years, which comes closer to the concept of expected inflation which is relevant for real interest rates. As one would expect, real interest as a share of GDP falls when, all else equal, nominal interest rates fall, inflation rises, nominal GDP rises, or when the debt rises. This last effect is because the larger the debt-to-GDP ratio the more an economy benefits from the inflation that partly erodes the debt.

Real interest payments as a share of GDP are more analytically relevant than the more commonly used nominal interest payments as a share of GDP. For example, consider two economies that both have debt-to-GDP ratios of 100 percent and nominal interest rates of 4 percent. Nominal interest costs as a share of GDP are thus 4 percent in each economy. Assume now that the first economy has no inflation and the second economy has 4 percent inflation. For simplicity assume there is no real growth in either economy. The no inflation economy has a real interest to GDP ratio of 4 percent, the amount it needs to raise revenues or reduce non-interest spending in order to stabilize the debt-to-GDP ratio. In contrast, the second economy has a real interest to GDP ratio of 0 percent so it need not raise taxes or cut non-interest spending to offset the cost of its debt. That is because the second economy is able to deflate away the debt by an amount equal to its nominal interest payments.

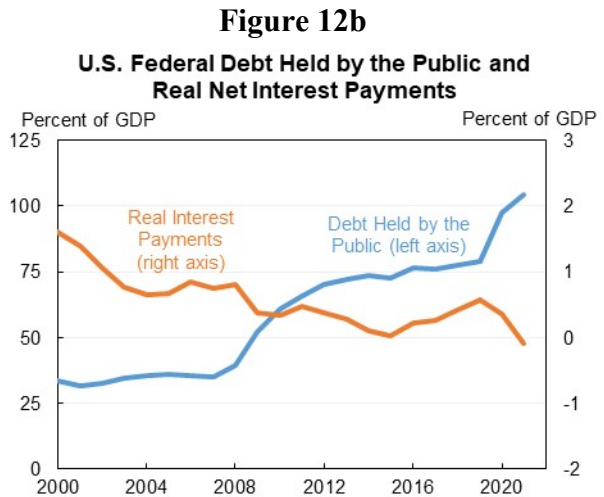
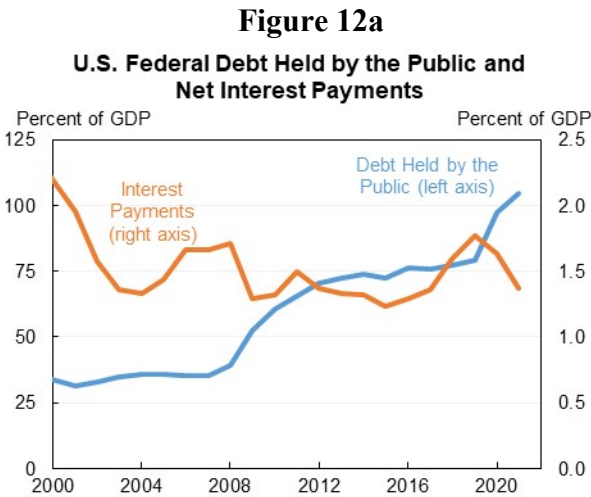
Both nominal interest payments and real interest payments have fallen as a share of GDP across the G7 economies and are generally lower today than they have been in decades as shown in Figures 11a and 11b.⁴

⁴ These figures show general government net interest payments, which in the United States includes payments by federal, state, and local governments.



Note: General government, including for United States.
 Source: International Monetary Fund, Macrobond; authors' calculations.

The U.S. experience over the last twenty years provides a vivid example of how different the analytically meaningful flow-flow perspective is from the misleading stock-flow perspective conveyed by debt-to-GDP ratios. In 2000 U.S. Federal debt was 34 percent of GDP, not far from its post-war low. Since then the debt-to-GDP ratio rose almost monotonically, nearly tripling to over 100 percent of GDP. At the same time both nominal and real interest rates have fallen so that both nominal and real interest as a share of GDP have fallen nearly monotonically and are now towards the low end of the range as shown in Figure 12a and 12b.



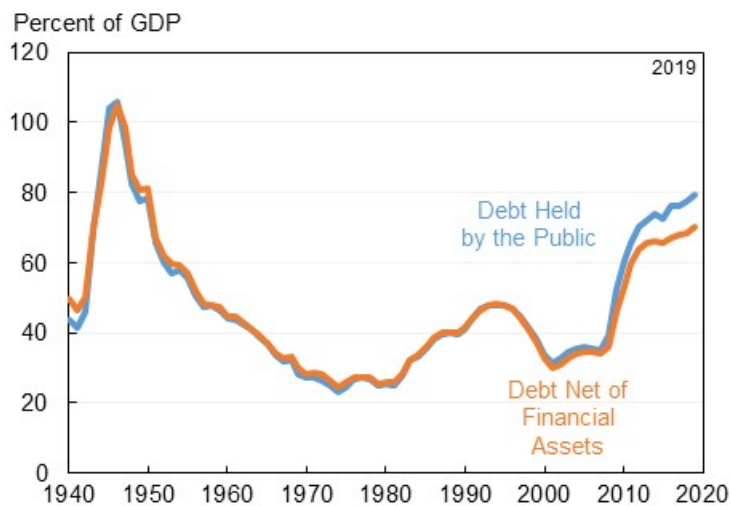
Note: 2021 values are projections.
 Source: Office of Management and Budget; Congressional Budget Office; Macrobond; authors' calculations.

BOX I – Adjusting debt and interest payments to reflect the Federal government’s complete balance sheet

The federal U.S. debt and net interest data used in this paper has followed U.S. scorekeeping conventions which are at variance with the economically relevant concepts. In addition to liabilities the Federal government also has financial assets, the largest of which is direct student loans and the second largest of which is cash at the Treasury. The relevant concept of debt for both fiscal sustainability and assessing macroeconomic effects is the debt held by the public net of financial assets. As the CBO (2020d) explains, “Debt net of financial assets also provides a more comprehensive picture of the government’s overall effect on credit markets than does debt held by the public. When the government borrows to make loans that will be repaid in the future, the overall supply of credit is essentially unchanged. Therefore, the issuance of that debt does not crowd out, or take the place of, debt issued in the private sector to the same degree that debt issued for other purposes does.” For example, when the Federal government shifted from guaranteeing private student loans to making direct loans itself its financial position and risks were essentially unchanged but the debt held by the public rose. Figure I.1 shows the divergence between debt held by the public and debt net of financial assets which has grown over time and is now about 9 percentage points.

Figure I.1

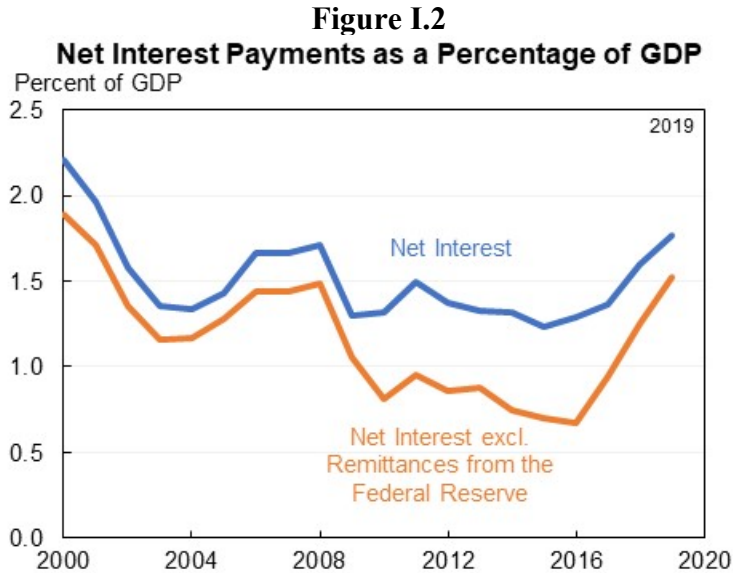
Debt Held by the Public and Debt Net of Financial Assets



Source: Office of Management and Budget; Richard Kogan’s calculations.

The Federal budget defines “net interest” largely as the interest paid on Treasury bonds with adjustments for other interest paid and received by other Federal agencies (for example, the equity earnings of the National Railroad Retirement Investment trust partly offset net interest). The data do not count the Federal Reserve as part of the Federal government even though it is clearly a Federal agency and the Treasury’s and Federal Reserve’s balance sheets should be thought of on a consolidated basis for thinking about fiscal sustainability and the macroeconomy. Put another way, fiscal analysis should essentially not count the Treasury debt held by the Federal Reserve but should add the Federal Reserve’s reserves because these are effectively interest-bearing short-term debt. In 2019 the Federal Reserve earned interest of \$103 billion largely on its Treasury and mortgage securities while paying \$41 billion in interest mostly on

reserves. This \$62 billion interest spread reflected the higher interest rates it received on its longer-term assets than it paid on its shorter-term debt and \$55 billion of this spread was remitted to the Treasury. Thus, the Federal government’s consolidated net interest should subtract out remittances to the Federal Reserve which are currently inaccurately classified as a receipt (or revenue item) not as net interest. Figure I.2 shows the gap between net interest and net interest minus Federal Reserve remittances over the recent past. The gap between these two is likely to grow substantially over the next several years as the Federal Reserve has expanded its balance sheet but the latest CBO projections expect it to come back down to 0.2 percent of GDP in 2030 (CBO 2020a).



Source: Office of Management and Budget; authors’ calculations.

END BOX-----

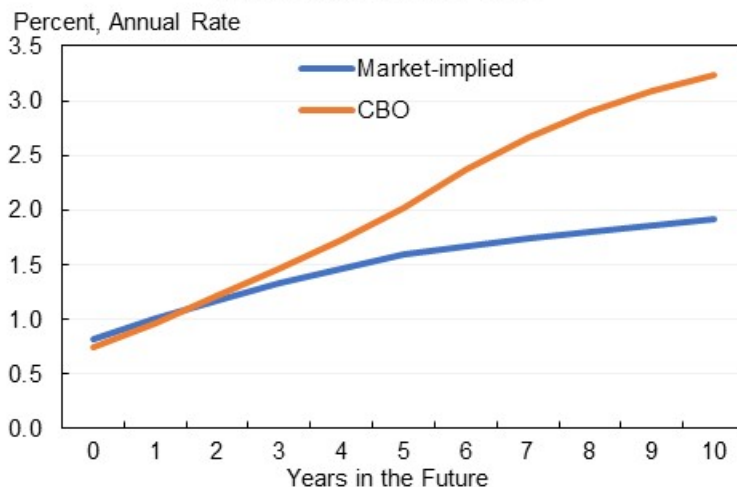
Looking forward: the debt is not “spiraling” over the next decade and interest payments are modest

Debt relative to the present value of GDP and real interest payments relative to GDP are both coherent and meaningful measures and both of them are superior to the largely incoherent concept of debt relative to GDP. All three of these measures, however, suffer from the same shortcoming: they do not reflect the future fiscal trajectory which may dwarf the cumulative historical trajectory.

Looking forward it is plausible that interest rates will rise from their current extraordinarily low levels, with the CBO forecasting a steeper increase in interest rates than

financial markets are expecting (Figure 13). CBO also projects spending on Social Security and health programs to rise, with revenues as a share of GDP expected to rise as well.

Figure 13
Forward Rates on 10-Year Government Bond,
Market-implied vs. CBO

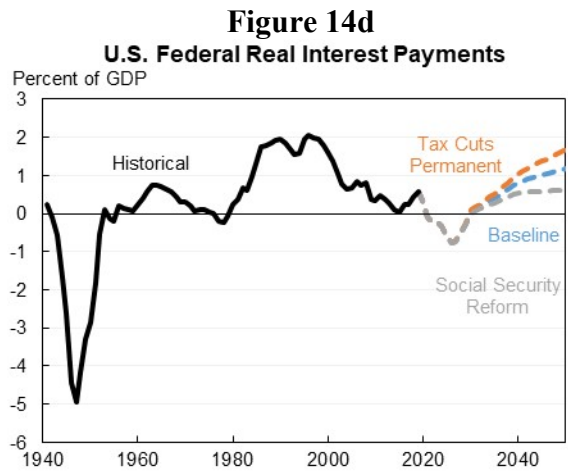
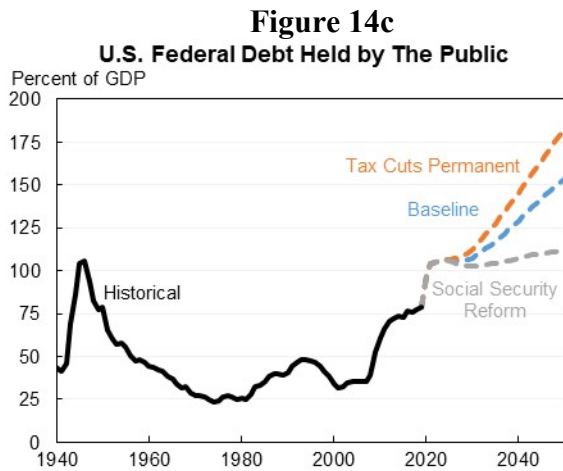
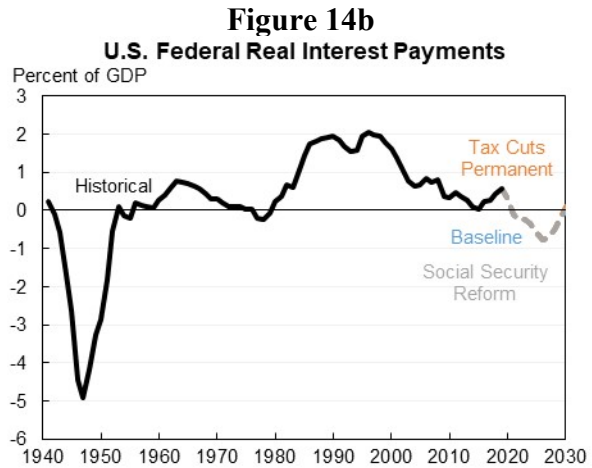
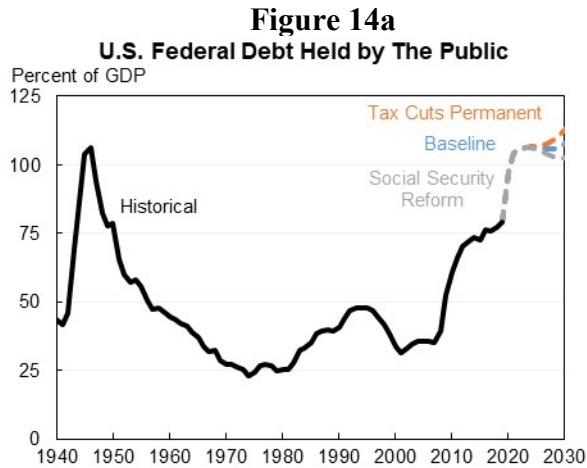


Note: Market-implied rates as of November 27, 2020. CBO based on Q4 forecasts.
 Source: Congressional Budget Office (2020b); Bloomberg.

For the United States, the latest estimates show that the debt will rise but then level off at a higher level (Figure 14a). Real interest payments will be low as a share of GDP but then increase towards the end of the ten-year budget window (Figure 14b), but will still end up well below their historical average. The estimates shown are for three scenarios: one based on the latest CBO baseline which largely assumes current law continues, one that adds in the cost of making the expiring provisions of the 2017 tax cuts permanent, and one that follows current law in assuming Social Security is reformed (in the spirit of Blahous 2017 on the proper baseline).⁵

⁵ Under current law Social Security and Medicare cannot pay full benefits after their trust funds are exhausted, which are projected to be 2034 and 2026 respectively according to the Trustees (The Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Fund 2020; The Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds 2020) and 2031 and 2024 respectively according to CBO (2020f). Current law essentially requires Social Security reform to happen, as has happened in the past when Social Security ran up against trust fund exhaustion, most recently in 1983. Instead of abruptly cutting benefits when the trust fund is exhausted our current law baseline smooths the adjustment out over time starting at 0.5 percent of GDP in 2025 and growing to 1.7 percent of GDP on and after 2035. This is equal to the present value of the Social Security shortfall as estimated by the Social Security trustees. It is a conservative reflection of current law because it does not include Medicare and because it is smaller than the adjustment CBO projects under current law. Doing everything consistently on a CBO baseline would thus show that current law would result in an even lower debt and interest rate path than we are showing here and throughout this paper.

Figures 14c and 14d show the same three scenarios over the next thirty years although, as discussed in the next section, the uncertainty around forecasts that go out this far is so large they should not have inordinate weight in policymaking today. See the Appendix for details on these projections.



Social Security reform phased in linearly from 0.5% of GDP to 1.7% of GDP over 10 years beginning in 2025
 Source: Office of Management and Budget; Congressional Budget Office; Macrobond; authors' calculations.

These baseline predictions can serve a useful purpose in assessing the fiscal trajectory but they also are limited in their ability to answer the question of whether the debt is sustainable by their assumption of no change in law or policy. This is because they do not answer the question of whether the fiscal situation *could* be made sustainable in the future. The United States collects 31 percent of GDP in general revenue, well below the OECD average of 37 percent of GDP or the OECD maximum of 57 percent of GDP collected in Norway. The United States has often

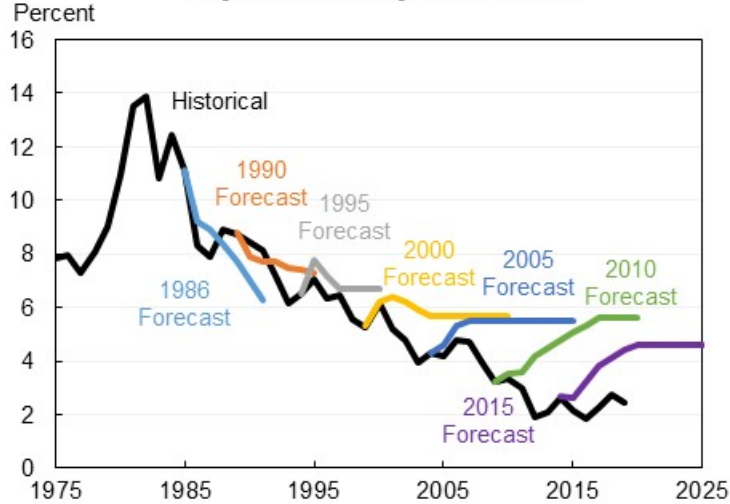
collected revenue that was higher than what it collects today and similar revenue levels have been proposed by, for example, the National Commission on Fiscal Responsibility (2010). In that sense the U.S. fiscal situation is by definition sustainable—effectively it has an asset equal to at least several percent of GDP that it could choose to collect if it needs to. Higher tax countries have less room in this regard. France, for example, is closer to the top of its Laffer curve so would have less space to close a fiscal hole with more revenue. Considerations of debt sustainability need to take into account not just the amount of taxation under the law but the capacity for taxation.

A bigger issue with forward-looking projections is the tremendous uncertainty they are subject to, the topic of the next subsection.

The uncertainty in budget forecasts is enormous especially looking forward several decades

Forecasting deficits and debt is extremely difficult and forecasts have very large standard errors that derive both from unexpected changes in economic variables like growth and interest rates and also in “technical” factors like the cost of health care and the efficiency of tax collections. The CBO does a very good job given all of the uncertainties. Its forecasts of deficits and debt produced since 1984 have been mostly unbiased in the sense that their forecast errors tend to even out without about half of their forecasts being too optimistic and about half of them being too pessimistic after adjusting for legislative changes that they were not trying to forecast (CBO 2019a). In contrast, CBO’s forecasts of net interest as a share of GDP have been systematically biased toward being too high, in large part because CBO’s forecasts of interest rates (like those of other forecasters) have consistently been too high, as shown in Figure 15.

Figure 15
10-year Treasury Note Rates



Source: Congressional Budget Office.

CBO’s forecast errors have, however, been large in both directions and grow over time. Table 3 shows their own estimates of a two-thirds error band around their forecasts for deficits and debt along with our estimates, derived from their statistics, of a 90 percent error band.

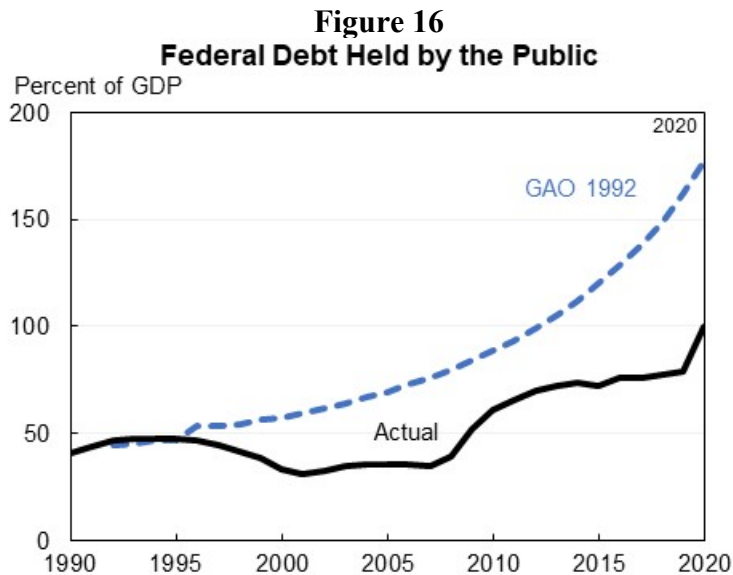
Table 3
Measures of Historical Forecast Accuracy as a Percent of GDP

	Deficit		Debt	
	Two-thirds Spread of Errors	90 Percent Confidence Interval	Two-thirds Spread of Errors	90 Percent Confidence Interval
Year 1 (Current Year)	1.0	1.8	1.5	2.8
Year 2 (Budget Year)	2.1	4.3	3.3	7.8
Year 3	3.0	5.7	6.5	13.4
Year 4	4.0	6.6	8.5	18.2
Year 5	4.1	7.5	12.3	23.4
Year 6	3.8	8.3	17.2	29.2

Source: Congressional Budget Office (2019a); authors’ calculations.

CBO does not assess its track record over a longer period, in part because of limitations in the data that would be needed for such an assessment. Moreover, we have very few very long-range fiscal forecasts but the ones we have are consistent with the view that the errors grow over time. One of the earliest long-range forecasts was made by the Government Accountability

Office (GAO) in 1992 and it projected that the debt would reach 177 percent of GDP by the end of fiscal year 2020, which is 77 percentage points above the actual debt-to-GDP ratio at the end of that year as shown in Figure 16. Moreover, legislation adopted since 1992 likely was net debt increasing so GAO’s economic and technical forecasting error was even larger than this estimate.

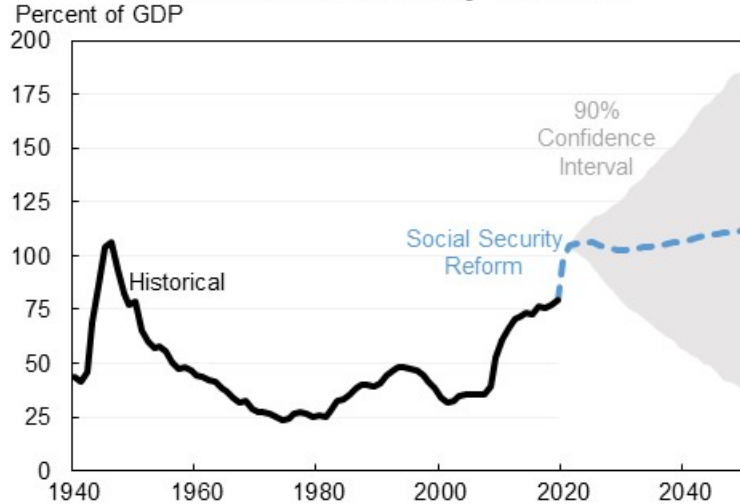


Note: GAO estimate converted from GNP to GDP and adjusted for revisions to GDP methodology since publication.
Source: Government Accountability Office (1992); Office of Management and Budget; Bureau of Economic Analysis; Macrobond; authors’ calculations.

As a back-of-the-envelope way of assessing forecast errors we assume conservatively that the standard deviation of debt forecast errors grows linearly with time, reflecting the increased uncertainty as deficit forecast errors accumulate over time. As a result, the 30-year forecast of the debt-to-GDP ratio would have error bands as shown in Figure 17.⁶ In other words, assuming the tax cuts expire and Social Security is reformed we would expect the debt-to-GDP ratio to be 112 percent of GDP in 2050 with a two-thirds chance that it falls in the 66 to 157 percent range and a 90 percent chance it falls in the 33 to 190 percent range.

⁶ The 90 percent uncertainty band is the result of a Monte Carlo simulation of 10,000 draws. The simulation draws from a distribution that assumes that there is no debt forecast error on average and that the standard deviation of the debt forecast error for each year increases over time based on the linear relationship observed in CBO’s forecast errors for years one through year six.

Figure 17
U.S. Federal Debt Held by The Public



Note: Social Security reform phased in linearly from 0.5% of GDP to 1.7% of GDP over 10 years beginning in 2025
 Source: Office of Management and Budget; Congressional Budget Office; Macrobond; authors' calculations.

The impact of uncertainty on current policymaking depends on two factors. First, how costly and irreversible are steps we take today? If it is costly to take steps today, for example irreversibly reducing the educational opportunities of children, then in the face of uncertainty it is better to delay action until more of the uncertainty has been resolved (Dixit and Pindyck 1994). Second, how costly is waiting to act? To the degree that one wants to act on the tax side there is a cost associated with waiting in that it involves a larger tax increase and thus does not efficiently smooth tax rates (Barro 1979), although in practice that cost is likely to be relatively small, especially for countries that are far from the peak of their Laffer curves. To the degree one wants to act on the spending side waiting may be more constraining as it is harder to give notice that would allow people to adjust their plans, but even here there is little adjustment that people understood or adjusted much in response to the decades of notice they got about the increase in the Normal Age of Retirement for Social Security.

Overall, the conclusion we draw from the uncertainty on forecasts is that policymakers should put relatively little weight on projections for ten years or more in the future and that large changes should not be made well in advance based on highly uncertain and possibly inaccurate forecasts, especially when it is very feasible to make adjustments later.

BOX II: The fiscal gap as an alternative measure of the fiscal situation-----

The fiscal gap is an alternative measure of the fiscal situation that aims to address the three shortcomings we have discussed: the stock-flow disconnect, falling interest rates and the need to look forward. It was originally developed by Laurence Kotlikoff and Alan Auerbach and is regularly updated by government institutions (e.g., CBO 2019b) and academics (e.g., Auerbach, Gale, and Krupkin 2019). The concept is the immediate and permanent change in the primary balance—either through an immediate increase in taxes or an immediate reduction in non-interest spending—that would be needed to stabilize the debt as a percentage of GDP at its current value for a specific period of time. As such, the fiscal gap incorporates information not just about the past debt but also about future primary deficits, GDP, and interest rates.

The fiscal gap is a more meaningful and useful concept than the debt-to-GDP ratio. It does, however, suffer from three problems. First, unlike measures like nominal or real interest as a share of GDP it does not provide an objective measure that can be used across time, across countries, or even measured at a point of time because it depends on projections about the uncertain future.

Second, and relatedly, fiscal gaps have extremely large error bands because they depend on deficit and debt forecasts that have extremely large error bands. To put this in perspective, if the debt follows the mid-course trajectory shown in Figure 17 then the fiscal gap would be 0.5 but at the upper and lower 90 percent confidence intervals the fiscal gap could be anywhere from -2.0 to +3.2 percentage points as shown in Table II.1. Projecting further in the future results in even larger errors, with the large majority of infinite horizon fiscal gaps driven by projections that are decades or more in the future.

Third, the fiscal gap measures the immediate adjustment that would be needed to stabilize the debt-to-GDP ratio at its current value. Its current value, however, is arbitrary and uninformative about what the goal of policymakers should be. The primary deficit adjustment needed to achieve different fiscal targets varies enormously as shown in Table II.1 which shows the immediate primary balance adjustment needed to achieve different debt-to-GDP goals in 2050. Does the United States need to make an immediate fiscal adjustment of 2.1 percent of GDP to get the debt down to 50 percent of GDP or would it be reasonable for the debt to rise to 112 percent of GDP through 2050, in which case no adjustment, beyond social security reform, would be needed? Note that all of the estimates in Table II.1 assume the equivalent of current law on Social Security (i.e., Social Security reform happens). If a law is passed to continue paying full benefits after the trust fund is exhausted that would add about 1.3 percent of GDP to these fiscal gap measures.

Table II.1
Immediate Primary Deficit Reduction Necessary to Achieve Selected Debt Targets in 2050
(Percent of GDP)

Debt in 2050	Immediate Primary Deficit Reduction	90% Confidence Interval for Debt with Associated Deficit Reduction	Primary Deficit Reduction Associated with 90% Confidence Interval for Debt Target
50	2.1	-29 to 129	-0.5 to 5.1
97 (Fiscal Gap)	0.5	19 to 176	-2.0 to 3.2
112 (No Change)	0.0	33 to 190	-2.4 to 2.7
150	-1.2	71 to 229	-3.4 to 1.3

Note: No change includes Social Security reform phased in linearly from 0.5% of GDP to 1.7% of GDP over 10 years beginning in 2025. Relative to the CBO baseline which assumes current policy for Social Security the fiscal gaps would be about 1.3 percentage point larger.

Source: Congressional Budget Office; Macrobond; authors' calculations.

The forward-looking nature of the fiscal gap makes it more informative about fiscal sustainability but requires forecasts and subjectivity. The tradeoff between an objective but uninformative measure and a subjective but informative one is largely unavoidable. The fiscal gap is one metric that policymakers should use but it is important to put it in a broader context and to that end we think that debt service ratios projected out over a period of about a decade are a better way to minimize uncertainty and put context on the best fiscal targets.

END BOX-----

Implication 3: The Scope and Need for Public Investment Has Greatly Expanded

One of the principal arguments made for fiscal rectitude is a desire to avoid burdening future generations with debt or to make them poorer as debt crowds out private investment. As Blanchard (2019) recognizes the low level of real interest rates undercuts the force of the crowding out argument because it implies the “certainty equivalent” productivity of capital is low. More broadly the argument itself rests on an ethically ambiguous foundation because future generations are likely to be richer than the current generation even net of any additional fiscal obligations inherited by them. The utilitarian logic for redistribution from richer to poorer should also apply across generations.

Even accepting the premise of intergenerational equity it is not obvious that deficit reduction will make future generations richer and could even leave them poorer. The narrowest example of this is deferred maintenance which is a cost that is akin to the debt even if it is not

explicitly included or measured in the Federal balance sheet. Investments in infrastructure and other areas that reduce deferred maintenance can reduce this (unaccounted for liability) and replace it with a smaller but accounted for liability. The result is measured debt goes up even if the meaningful liabilities of the Federal government go down. Put another way, it is better to fill potholes today than to wait and fill them at a cost that grows faster than the interest rate, which is currently around zero in real terms.

From a demand-side perspective in certain circumstances fiscal expansions can offset some, all or even more than all of their cost, as discussed above. This happens if they expand output more than they increase the debt by increasing the utilization of the economy's potential.

From a supply-side perspective, public investment can also offset some, all or even more than all of its cost if it has a sufficiently high rate of return in expanding the economy's potential itself. More important for a broader set of policies, public investments that have a rate of return in excess of the interest rate can repay themselves in present value terms. Dickens, Sawhill, and Tebbs (2006) provided a long-term analysis of investments in early education and found that they more than pay for themselves over a 75-year horizon. Recently in an important paper Nathaniel Hendren and Ben Sprung-Keyser (2020) synthesized high-quality research on 133 policy changes and found that numerous policy changes partly or even more than fully paid for themselves in present value by raising future wages and reducing future government transfers. As an example of their analysis consider the Perry preschool program:

“For example, “Perry Pre-School [cost] \$17,759 in 2006 USD. However, we estimate that the long-run reductions in transfer payments and increases in tax revenue offset roughly 92% of these upfront costs. Heckman et al. (2010) estimate significant earnings increases from ages 19-40, and an increase in earnings of 26% at age 40. We combine their estimated earnings effects with a forecast to age 65 this into a lifetime earnings impact of \$70,535. Using a state and Federal combined tax rate of 12.9% , this implies an increase in tax revenue of \$9,607. Heckman et al. (2010) also estimate that the policy led to a reduction of payments on welfare programs of \$3,941. In addition, there are also induced costs of college attendance and vocational training whose incidence falls on the government. Heckman et al. (2010)'s estimates actually imply a fall in such costs, saving the

government \$2,805. This suggests \$16,353 is repaid to the government, implying a net cost of \$1,406 (95% CI of [-9,235, 12,126]). Roughly 92% of the upfront spending is repaid to the government.”

Many of the programs they examined more than repaid their initial costs including “four major health insurance expansions to children over the past 50 years. We calculate an average across those policies and find that for each \$1 of initial expenditure they repaid \$1.78 back to the government in the long run.” They found similar results for numerous children’s education programs like Head Start (in one of three estimates) and more K-12 spending, some college programs like grants for tuition, and moving to opportunity housing vouchers. Even where they did not find programs paid for themselves they found a substantial offset in costs.

Hendren and Sprung-Keyser used a 3 percent real discount rate for their analysis, well in excess of the current or likely future cost of Federal borrowing. With a more realistic discount rate many more programs, especially investments in education and children, would repay themselves over time. Note even if an investment does not repay it may still be worth making.

Similarly, investments in infrastructure that have a rate of return higher than the cost of government debt are worth making and with a sufficient rate of return they will repay themselves as well. For example, research from the IMF and OECD finds that increased public investment leads to increased economic growth, which, particularly during periods of economic slack, can lower the debt-to-GDP ratio (Abiad, Furceri, and Topalova 2015 and Mourougane, et al. 2016). Research also finds that there are substantial spillovers from investment in research and development, particularly basic research, and implies current levels of investment are below their socially optimal level (Bloom, Schankerman, and Van Reenan 2013; Akcigit, Hanley, and Serrano-Velarde 2020).

The above points depend heavily on what the additional debt is used for. If it is used to fund effective public programs with high rates of return, like research, infrastructure, education and investments and support for children, it is very likely to have benefits far greater than the costs of any additional debt accumulation. Wasteful and poorly designed spending programs or tax cuts, however, are not justified by this logic.

Also, in the case of infrastructure, even if the investment pays for itself or offsets much of its cost it still may be desirable to pay for it if the payfor itself has a policy rationale, like a gas

tax or vehicle miles travelled fee that addresses other externalities and helps ensure that existing infrastructure is used better. Nevertheless, if these first best policies are not possible for political reasons it is still worth doing the second best of unpaid for infrastructure investments.

Overall, it is impossible to be sure exactly what the right balance is but given the very low interest rates currently and in the foreseeable future it is more likely to be a mistake to excessively reduce the debt at the expense of more deferred maintenance and foregone investments than it is to make the opposite mistake and overinvest.

Going Forward: New Objectives, New Guideposts, and New Guidelines

Currently the primary worry for policy in the United States and several other countries is doing too little to expand the debt, not doing too much. Low interest rates create more scope and need for expansionary fiscal policy, a reason to reassess views of debt sustainability, and more reason to undertake public investments. Overall U.S. debt service obligations are currently modest and the debt is modest relative to future GDP and the ability to generate taxes from this GDP. Even the more conventional and misleading measure of the debt-to-GDP ratio is stable over the next decade and assuming current law is complied with, which requires both the tax cuts to expire and Social Security reform, it will be essentially stable over the next three decades as well, although could plausibly be anywhere from among the lowest in postwar history to around 190 percent of GDP. Additional investments of about 1 percent of GDP that initially raised the debt above this path could potentially pay for themselves and to the degree they do not would still leave interest as a share of GDP below its historic levels.

Understanding how to respond to our challenges requires setting new objectives for fiscal policy, adopting new guideposts to assess fiscal sustainability, and using new guidelines to set fiscal policy.

Any fiscal policy approach should be a combination of optimal, understandable and achievable. Some approaches, like the German balanced budget requirement, are understandable but would not be achievable for some countries and are very far from optimal for many countries, including Germany. Even if we knew the optimal approach—and we do not—it would be of little use if it was not readily understood by the public and possible for policymakers to

follow. What follows is something we think is a reasonable combination that is not too far from what policymakers could understand and implement in a manner that would foster stronger economic growth, better responses to recessions and greater financial stability.

The objective of fiscal policy

The objective of fiscal policy should be growth and financial stability including the avoidance of recessions and stronger long-term growth. This calls for more expansionary fiscal policy both in the short run to combat the current recessionary conditions and over the medium- and long-run to support demand and expand supply, including through some measures that increase short-run deficits and debt and also other measures like balanced budget multipliers, redistribution and expanded social insurance that can expand demand without increasing short-run deficits and debt.

A new guidepost for fiscal policy: keeping real interest payments below 2 percent of GDP

The room for fiscal expansion is not, however, unlimited and policymakers need a guidepost to assess fiscal sustainability, especially when the objective for fiscal policy can be consistent with many different debt levels and no single prescribed fiscal trajectory.⁷

When the growth rate is greater than the interest rate there is substantially more room to run primary deficits and any given primary deficit will not lead to an unlimited explosion of debt but instead will lead the debt to asymptote to a finite value. The finite value the debt asymptotes to could, however, be very large—and large enough that the upward pressure it exerts on interest rates makes it unlikely that growth rates will remain above interest rates in which case the resulting dynamic would be an explosion of the debt and interest payments.

We propose the following approach: policymakers need not worry about the fiscal outlook as long as the debt service-to-GDP ratio, measured in real terms, is expected to stay comfortably inside of historical experience over the next decade and does not spiral upwards

⁷ Modern Monetary Theory (MMT) has suggested that high or rising inflation is an indicator that fiscal policy should tighten (Tymoigne and Wray 2013). This raises the question of why not use monetary policy and interest rates to curb inflation? And should policymakers really have engaged in fiscal contractions in the periods like the early 1980s and even the early 2000s when inflation was above target and rising? Moreover, although debt defaults in countries that borrow in their own currency and control their monetary policy are essentially impossible, what are the limits of fiscal dominance by the monetary authority and the potential cost of not being able to roll over debt at an acceptable interest rate?

over that period. This could be roughly operationalized as limiting real interest payments to comfortably below about 2 percent of GDP ideally measured in the economically meaningful sense of net interest less remittances from the Federal Reserve and interest on Federal financial assets (see Box I for a discussion). To the degree that there is room to increase revenue a country can have more latitude and to the degree that there are major adverse signals from bond markets that are crowding out investment it has less latitude. Were it to become the case that interest payments were projected to exceed our rough ceiling then it would be appropriate to pursue policies directed at reducing the debt-to-GDP ratio. It is a feature not a bug that our approach does not provide a prescription for the appropriate level of debt to GDP itself.

The levels of debt and primary budget balances associated with different real interest rate goals depend on the real interest rate and the growth rate. When real interest rates are low there is substantially more room to have elevated debt levels without triggering excessively high real interest as a share of GDP. The higher the growth rate the larger the primary deficit could be consistent with this interest and debt path. Different required steady-state primary deficits and resulting debt levels are shown for alternative real debt service goals and assumed interest rates and growth rates in Table 4.⁸ If real interest rates stay below 1.33 percent—which is currently well above what is expected—then a debt level of 150 percent of GDP would be comfortably sustainable according to our criteria. If real interest rates, implausibly, were still 0.5 percent as the debt-to-GDP ratio rose to 400 percent that would indicate that the extremely low interest rates were such a powerful force that that degree of debt would be warranted as shown in Table 4. Conversely if real interest rates rose to 2 percent then getting the debt-to-GDP ratio should be lower as all of the problems associated with low interest rates would be diminished and thus a debt-to-GDP ratio of 100 percent would be more reasonable.

⁸ Debt dynamics can be analyzed using the identity discussed earlier: $\left(\frac{\text{Debt}}{\text{GDP}}\right)_t - \left(\frac{\text{Debt}}{\text{GDP}}\right)_{t-1} \approx (r_t - g_t) \left(\frac{\text{Debt}}{\text{GDP}}\right)_{t-1} + \left(\frac{\text{Primary Deficit}}{\text{GDP}}\right)_t$. In steady-state with a stable debt-to-DGP ratio this becomes: $\frac{\text{Primary Deficit}}{\text{GDP}} \approx (g - r) \frac{\text{Debt}}{\text{GDP}}$.

Table 4
Hypothetical Debt Sustainability Examples
(Percent of GDP)

Illustrative Scenario 1		Illustrative Scenario 2		
g = 2.0 and r = 0.5		g = 1.5 and r = 2.0		
Real Interest	Debt	Required Primary Balance	Debt	Required Primary Balance
0.5%	100%	-1.5%	25%	0.1%
1.0%	200%	-3.0%	50%	0.3%
2.0%	400%	-6.0%	100%	0.5%

Source: Authors' calculations.

New fiscal policy guidelines for the United States

Operationalizing a fiscal plan that advances the broad objectives we have set out for fiscal policy while staying within the sustainability guideposts we propose depends on the outlook for the fiscal situation. In the United States, overall U.S. debt service obligations are currently modest and the debt is modest relative to future GDP and the ability to generate taxes from this GDP. Even the more conventional and misleading measure of the debt-to-GDP ratio is stable over the next decade and assuming current law is complied with, which requires both the tax cuts to expire and Social Security reform, it will be essentially stable over the next three decades as well, although could plausibly be anywhere from among the lowest in postwar history to around 190 percent of GDP. Additional investments of about 1 percent of GDP that initially raised the debt above this path could potentially pay for themselves and to the degree they do not would still leave interest as a share of GDP below its historic levels.

Given the current outlook, a set of three broad guidelines would help move fiscal policy towards a better stance for achieving our objectives while also offering a limiting principle for pinning down this policy. Our starting point is current law, which includes the expiration of the 2017 tax cuts and Social Security reform. Debt is largely stable assuming policymakers stick to the law and concerns about debt stability are largely predicated on the worry that they will pass laws in the future that result in a higher debt trajectory.

We then propose three broad guidelines for the conduct of fiscal policy in practice which could potentially be operationalized as more specific rules:

1. *Temporary emergencies should not be paid for, with a broad definition of what constitutes a temporary emergency and what can be done in that situation.* As discussed above, more fiscal support is needed today—and will likely be needed going forward in future recessions. In many cases this fiscal support may effectively pay for itself resulting in a lower debt-to-GDP ratio and potentially lower net real interest as a share of GDP as well. Dynamic scoring using demand-side models would be appropriate for assessing the fiscal impact of short-run emergency spending. Given the potentially persistent effects of the current, and future, downturns, the possibilities of scaring reducing potential GDP, and the amount of fiscal room, it would make sense for policymakers to err on the side of a broad definition of unpaid emergency spending that lasts for several years and includes items that do not spend out immediately, like infrastructure spending.

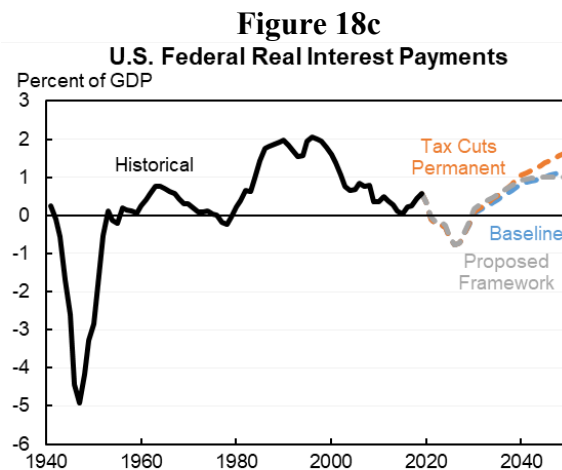
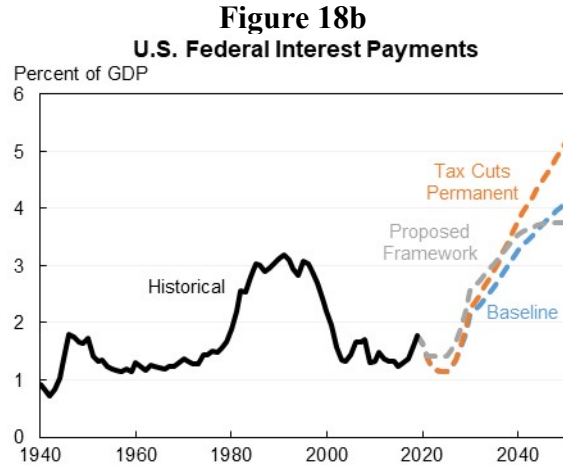
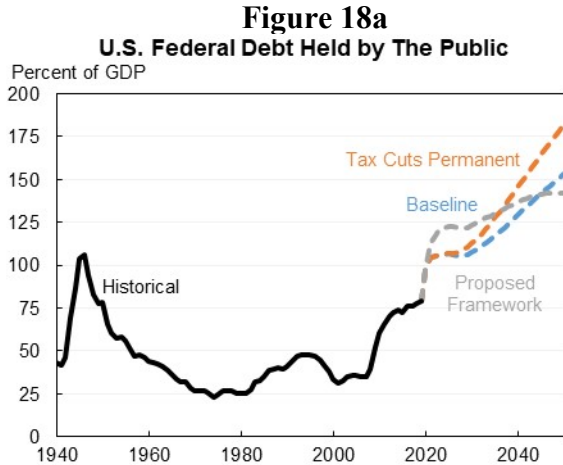
2. *Permanent programs should be paid for, with broad exceptions for programs that plausibly pay for themselves in net present value, like investments in children.* The principle of paying for permanent changes broadly makes sense and is consistent with a sustainable real debt service trajectory given the current outlook. Moreover, a limiting principle is needed for budgeting and as a way to assess whether any given program or proposal makes sense. In principle, permanent programs should be assessed using dynamic scoring. In practice such dynamic scoring may be difficult to do in real time and misses the fact that much of the payoff of investments occurs outside the budget window. As a result, we propose a crude way to take account of this by excluding a specific set of programs and investments from the constraints of pay-as-you-go when strong evidence from academic research implies they would plausibly pay for themselves in present value. This includes well-designed investments in areas like children, education, and research. *Infrastructure would ideally be paid for with Pigouvian revenue measures that improve infrastructure utilization, but it too could get an exception to the pay-as-you-go principle.*

3. *Improve the composition of government to make it more supportive of demand and more efficient.* This includes many of the steps discussed earlier in this paper: improving

automatic stabilizers to better respond to recessions and increasing demand through expanded balanced budget multipliers, more progressive fiscal transfers and expanded social insurance. The composition of what the government does matters and to make room for additional investments there are numerous changes that should be made for their own sake, like reforming health care delivery systems in a way that would save costs and potentially improve or not worsen the quality of outcomes and better enforcement of the tax system to collect what is owed under current law (Sarin and Summers 2019).

Figures 18a, 18b and 18c project the resulting debt, nominal interest and real interest paths under a program consistent with these guidelines. We believe policymakers should only focus on the next decade because of the increasingly dramatic uncertainty around budget deficits after that window but we still present thirty years of estimates to show a current best guess of the impact of this program over the longer horizon, a subject of interest to some policy analysts.

Specifically, by way of illustration, these estimates assume \$2.5 trillion in additional fiscal support over the next three years and an investment program that starts at a net cost of 1 percent of GDP but eventually starts to result in deficit decreases over a longer period of time. Overall, this would mean about \$5 trillion of deficit-financed investments over the next decade plus additional investments paid for by added revenue or other spending reductions. The result is that the debt would stabilize at less than 150 percent of GDP which would be the highest the United States has ever experienced but nominal interest payments would still be only 3.8 percent of GDP and real interest payments would be only 1.0 percent of GDP (around the 77th percentile of historical experience).



Note: Proposed framework includes Social Security reform phased in linearly from 0.5% of GDP to 1.7% of GDP over 10 years beginning in 2025. \$2.5T additional stimulus over 2021-2023. Investment in early education adds 1.0% of GDP to primary deficit through 2035 after which deficit impact linearly shrinks until it reduces primary deficit by 0.5% of GDP in 2050.
Source: Congressional Budget Office; Office of Management and Budget; The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds; Macrobond; authors' calculations.

The guidelines we propose are not universal or set in stone. They are what we believe is understandable and achievable while moving the United States closer to an optimal approach to achieving its broader economic objectives based on the current fiscal situation and outlook. To the degree the economic situation, bond markets or fiscal outlook changes then a revised set of guidelines—including a shift to even more deficit spending or potentially active deficit reduction—might be warranted.

Conclusion

Six years ago one of us reintroduced the term “secular stagnation” to describe this period of low interest rates, arguing that it was the result of an excess supply of saving meeting a declining demand for investment and thus putting downward pressure on interest rates, potentially with the zero lower bound for interest rates preventing the market from clearing. The term “secular stagnation” has a negative resonance and was intended as a warning and prod for action. But it should not be understood as an unqualified negative event that happened to the economy.

Whether low interest rates are good or bad for our economic future depends on our choices. Since interest rates cannot go well below zero as long as cash is still in existence—and even low interest rates may lead to financial stability problems—this creates a *challenge* for the economy and especially for attempts to manage recessions with countercyclical monetary policy. 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. Whether the era of low interest rates becomes a time of more prolonged and severe recessions and greater financial market bubbles or instead becomes an opportunity for public investment and stronger economic growth depends on macroeconomic policy decisions. The correct diagnosis of our situation is the starting point for better macroeconomic policy going forward.

Appendix – Methodological Assumptions Underlying Long-run Budget Forecasts

The Congressional Budget Office (CBO) generally produces three ten-year projections annually and one thirty-year projection annually (e.g. CBO 2020a; 2020e). These projections are intended to be baselines, that is to reflect unchanged laws or policies going forward. The meaning of “unchanged” is clear in some cases, but in others it is ambiguous since absent additional legislation discretionary spending would go to zero and major entitlement programs would expire. In many cases, history has been repeated enough that there is a relatively clear concept of what should be assumed in the baseline (e.g., major entitlement programs are assumed to be reauthorized, as they have been historically. In other cases, it is trickier. For example, CBO assumes that a set of individual tax cuts expire in 2025 whereas in the past many but not all tax cuts have been extended instead of allowed to expire. CBO also assumes that Social Security and Medicare continue to pay full benefits after their trust funds are exhausted even though historically Congress has taken action to raise revenues or reduce spending to avoid this situation.

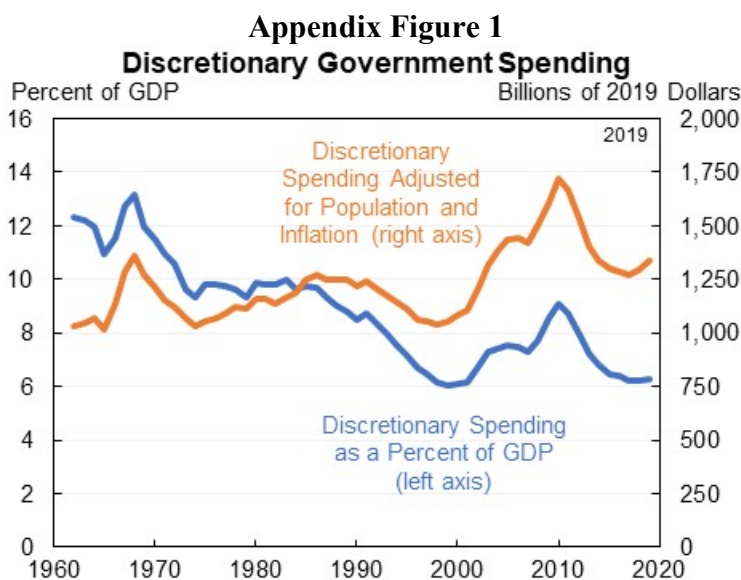
We generally show three sets of estimates which assume:

Appendix Table 1

	Expiring tax cuts	Social Security	Medicare	Rest of Budget
CBO-based Baseline	Current law	Current policy	Current policy	Generally current law except discretionary spending
Tax Cuts Permanent	Current policy	Current policy	Current policy	
Social Security Reform	Current law	Current law	Current policy	

The second issue is how to handle discretionary spending and some miscellaneous other mandatory spending not counting Social Security and health programs. CBO assumes that these grow with inflation in the ten-year budget window and with nominal GDP outside the window. Growing these series with nominal GDP is essentially assuming that Congress is annually passing what would be described as a spending increase and that the real value of what the government is buying with its discretionary spending is rising over time. Moreover, as shown in Appendix Figure 1 this is at odds with the historic pattern of discretionary spending which has fallen as a share of GDP. As such this is less a baseline than an estimate that shows what would

happen if the government passes annual spending increases. For our long-run forecasts we instead assume that discretionary spending and other mandatory spending grow with inflation plus population. This is both a more realistic description of what has happened in the past (also shown in Appendix Figure 1) and also a more realistic estimate of what it would cost the government to continue its current policies in terms of what is done by discretionary spending. If anything, it is an overly high estimate of discretionary spending—and thus an overly high estimate of the debt—because not all government costs grow with population, some are fixed, and also because adjusting for inflation implicitly assumes zero productivity growth in government.



Note: Series adjusted for population and inflation is adjusted to 2019 values using the GDP price index and the civilian population aged 16 and older.

Source: Congressional Budget Office; authors' calculations.

Finally, our long-run estimates include dynamic feedback from choices about budget policies to GDP and interest rates. These are chosen to be very conservative and come closer to standard estimates so do not reflect the fact that higher debt, for example, enables more effective monetary policy and thus smaller output gaps and a higher level of long-run output. We assume that deviations from CBO's baseline debt path lead to deviations from CBO's baseline GDP path of 0.04 percent lower GDP for each percentage point increase in the debt-to-GDP ratio relative to the CBO-based baseline in the preceding year. This approximates the effects of macroeconomic feedback due to higher debt from CBO's 2019 long-term budget outlook (CBO 2019b). In the CBO-based baseline, we also assume that interest rates increase after 2030 based on the increase

in the prior year's debt-to-GDP ratio compared with its 2030 value in order to approximate the macroeconomic feedback effects in CBO's 2019 long-term outlook. For other scenarios, interest rates increase based on the increase in the prior year's debt-to-GDP ratio compared with its value in the CBO-based baseline

References

- Abiad, Abdul, Davide Furceri, and Petia Topalova. 2015. "The Macroeconomic Effects of Public Investment: Evidence from Advanced Economies." IMF Working Paper 15/95.
- Adler, Gustavo, Romain Duval, Davide Furceri, Sinem Kiliç Çelik, Ksenia Koloskova, and Marcos Poplawski-Ribeiro. 2017. "Gone with the Headwinds: Global Productivity." IMF Staff Discussion Note 17/04.
- Akcigit, Ufuk, Douglas Hanley, Nicolas Serrano-Velarde. 2020. "Back to Basics: Basic Research Spillovers, Innovation Policy, and Growth." *The Review of Economic Studies*.
- Aronovich, Alex, and Andrew Meldrum. 2020. "New Financial Market Measures of the Neutral Real Rate and Inflation Expectations." FEDS Notes. Washington: Board of Governors of the Federal Reserve System.
- Auerbach, Alan J. William G. Gale, and Aaron Krupkin. 2019. "Revisiting the Federal Budget Outlook." *Tax Notes Federal* 813-829. August 5.
- Auerbach, Alan J. and Yuriy Gorodnichenko. 2017. "Fiscal Stimulus and Fiscal Sustainability." In *Fostering a Dynamic Global Economy*, 217-270. Kansas City, MO: Federal Reserve Bank of Kansas City.
- Baily, Martin. 1978. "Some Aspects of Optimal Unemployment Insurance." *Journal of Public Economics* 10(3): 379-402.
- Ball, Laurence, J. Bradford DeLong, and Lawrence H. Summers. 2017. "Fiscal Policy and Full Employment." In *Confronting Policy Challenges of the Great Recession: Lessons for Macroeconomic Policy*, edited by Eskander Alvi, 85-106. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Barro, Robert J. 1979. "On the Determination of the Public Debt." *Journal of Political Economy* 87(5): 940-971.
- Bernanke, Ben S. 2005. "The Global Saving Glut and the U.S. Current Account Deficit." Remarks at the Sandridge Lecture, Virginia Association of Economists. March 10.
- _____. 2020. "The New Tools of Monetary Policy." *American Economic Review* 110(4): 943-983.
- Blahous, Charles. 2017. "Fix the Federal Spending Baseline First." *Economics21*. New York: Manhattan Institute. September 10.

- Blanchard, Olivier. 2019. "Public Debt and Low Interest Rates." *American Economic Review* 109(4): 1197-1229.
- Blanchard, Olivier, and Lawrence H. Summers (eds). 2019. *Evolution or Revolution? Rethinking Macroeconomic Policy after the Great Recession*. Cambridge, MA: MIT Press.
- Bloom, Nicholas, Mark Schankerman, and John Van Reenen. 2013. "Identifying Technology Spillovers and Product Market Rivalry." *Econometrica* 81(4): 1347-1393.
- Borio, Claudio, Leonardo Gambacorta, and Boris Hofmann. 2017. "The Influence of Monetary Policy on Bank Profitability." *International Finance* 20(1): 48-63.
- Borio, Claudio, and Haibin Zhu. 2008. "Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?" BIS Working Paper 268. Bank for International Settlements.
- Boushey, Heather, Ryan Nunn, and Jay Shambaugh (eds). 2019. *Recession Ready: Fiscal Policies to Stabilize the American Economy*. Washington: Brookings.
- Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas. 2017. "The Safe Assets Shortage Conundrum." *Journal of Economic Perspectives* 31(3): 29-46.
- Campbell, John Y., Adi Sunderam, and Luis M. Viceira. 2017. "Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds." *Critical Finance Review* 6: 263–301.
- Chetty, Raj. 2008. "Moral Hazard versus Liquidity and Optimal Unemployment Insurance." *Journal of Political Economy* 116(2): 173-234.
- Congressional Budget Office (CBO). 2000. *The Budget and Economic Outlook: Fiscal Years 2001-2010*. Washington.
- _____. 2019a. *An Evaluation of CBO's Past Deficit and Debt Projections*.
- _____. 2019b. *The 2019 Long-Term Budget Outlook*. Washington.
- _____. 2020a. *An Update to the Budget Outlook: 2020 to 2030*. Washington.
- _____. 2020b. *An Update to the Economic Outlook: 2020 to 2030*. Washington.
- _____. 2020c. *Automatic Stabilizers in the Federal Budget: 2020 to 2030*. Washington.
- _____. 2020d. *Federal Debt: A Primer*. Washington.
- _____. 2020e. *The 2020 Long-Term Budget Outlook*. Washington.
- _____. 2020f. *The Outlook for Major Federal Trust Funds 2020 to 2030*. Washington.
- Council of Economic Advisers (CEA). 2015. "Long-term Interest Rates: A Survey." Report.

- Dell'Ariccia, Giovanni, Luc Laeven, and Gustavo A. Suarez. 2017. "Bank Leverage and Monetary Policy's Risk-Taking Channel: Evidence from the United States." *The Journal of Finance* 72(2): 613-654.
- DeLong, J. Bradford, and Lawrence H. Summers. 1988. "How Does Macroeconomic Policy Affect Output?" *Brookings Papers on Economic Activity* 19(2): 433-480.
- _____. 2012. "Fiscal Policy in a Depressed Economy." *Brookings Papers on Economic Activity* 43(1): 233-97.
- Dickens, William T., Isabel Sawhill, and Jeffrey Tebbs. 2006. "The Effects of Investing in Early Education on Economic Growth." Brookings Policy Brief No. 153. Washington: Brookings.
- Dixit, Avinash K. and Robert S. Pindyck. 1994. *Investment Under Uncertainty*. Princeton, NJ: Princeton University Press.
- Elmendorf, Douglas W., and Louise M. Sheiner. 2017. "Federal Budget Policy with an Aging Population and Persistently Low Interest Rates." *Journal of Economic Perspectives* 31(3): 175-94.
- Fiedler, Matt, Jason Furman, and Wilson Powell III. 2019. Increasing Federal Support for State Medicaid and CHIP Programs in Response to Economic Downturns. Unemployment Insurance and Macroeconomic Stabilization. In *Recession Ready: Fiscal Policies to Stabilize the American Economy*, eds. Heather Boushey, Ryan Nunn, and Jay Shambaugh, 93-127. Washington: Brookings.
- Furman, Jason. 2016. "The New View of Fiscal Policy and Its Application." Remarks at Global Implications of Europe's Redesign Conference. New York. October 5.
- Gaspar, Vitor, Maurice Obstfeld, and Ratna Sahay. 2016. "Macroeconomic Management When Policy Space Is Constrained: A Comprehensive, Consistent, and Coordinated Approach to Economic Policy." IMF Staff Discussion Note, September 2016.
- Government Accountability Office (GAO). 1992. *Prompt Action Necessary to Avert Long-Term Damage to the Economy*. Washington.
- Haavelmo, Trygve. 1945. "Multiplier Effects of a Balanced Budget." *Econometrica* 13(4): 311-318.
- Hendren, Nathaniel, and Ben Sprung-Keyser. 2020. "A Unified Welfare Analysis of Government Policies." *The Quarterly Journal of Economics* 135(3): 1209-1318.

- International Monetary Fund (IMF). 2015. Can Fiscal Policy Stabilize Output? In *April 2015 Fiscal Monitor: Now Is the Time*, 21-48.
- Koo, Jaewoon, and Yunxing Song. 2016. "The Relationship Between Income Inequality and Aggregate Saving: An Empirical Analysis Using Cross-Country Panel Data." *Applied Economics* 48: 892-901.
- Mourougane, Annabelle, Jarmila Botev, Jean-Marc Fournier, Nigel Pain and Elena Rusticelli. 2016. "Can an Increase in Public Investment Sustainably Lift Economic Growth?" OECD Economics Department Working Papers No. 1351.
- National Commission on Fiscal Responsibility and Reform. 2010. "The Moment of Truth." Washington.
- Oreopoulos, Phillip, Till von Wachter, and Andrew Heisz. 2012. "The Short- and Long-Term Career Effects of Graduating in a Recession." *American Economic Journal: Applied Economics* 4(1): 1-29.
- Organisation for Economic Co-operation and Development (OECD). 2016. "Chapter 2: Using the Fiscal Levers to Escape the Low-Growth Trap." In *OECD Economic Outlook 2016*, no. 2. Paris: OECD Publishing.
- Rachel, Lukasz, and Lawrence H. Summers. 2019. "Our Secular Stagnation in the Industrialized World." *Brookings Papers on Economic Activity* 50(1): 1-54.
- Reifschneider, David, and John C. Williams. 2000. "Three Lessons for Monetary Policy in a Low-Inflation Era." *Journal of Money, Credit, and Banking* 32(4): 936-966.
- Sarin, Natasha and Lawrence H. Summers. 2019. "Shrinking the Tax Gap: Approaches and Revenue Potential." *Tax Notes*. November 18.
- Stansbury, Anna, and Lawrence H. Summers. 2020. "The End of the Golden Age of Central Banking?" Secular Stagnation is About More than the Zero Lower Bound?" Unpublished manuscript.
- Summers, Lawrence H. 2014. "U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound." *Business Economics* 49(2): 65-73.
- The Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 1989. *The 1989 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance Trust Fund and The Federal Disability*

Insurance Trust Fund, Pursuant to 42 U.S.C. 401(c)(2), 1395i(b)(2), 1395t(b)(2).
Washington.

_____. 2020. *The 2020 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.* Washington.

The Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. 2020. *The 2020 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds.* Washington.

Tymoigne, Eric, and L. Randall Wray. 2013. "Modern Money Theory 101: A Reply to Critics." Levy Economics Institute, Working Papers Series.

Yagan, Danny. 2019. "Employment Hysteresis from the Great Recession." *Journal of Political Economy* 127(5): 2505-2558.