MARCH 29, 2019

Answers to Questions for the Record Following a Hearing on *The Budget and Economic Outlook: 2019 to 2029* Conducted by the Senate Committee on the Budget

On January 29, 2019, the Senate Committee on the Budget convened a hearing at which Keith Hall, Director of the Congressional Budget Office, testified about The Budget and Economic Outlook: 2019 to 2029.[1] *After the hearing, Ranking Member Sanders and other members of the Committee submitted questions for the record. This document provides CBO's answers. It is available at* www.cbo.gov/publication/54991.

Senator Sanders

Question. I read with interest your recent report, "Options for Reducing the Deficit: 2019 to 2028." While I very much appreciate the work you and your team put into this volume, I was disturbed by the following statement made on page 292 during the report's discussion of a potential carbon tax:

> Many estimates suggest that the effect of climate change on the nation's economic output, and hence on federal tax revenues, will probably be small over the next 30 years and larger, but still modest, in the following few decades.

Simply put, the claim that climate change will have only "small" or "modest" effects on our nation's economy and budget is not supported by the facts.

In November, 13 federal government agencies collectively produced a new National Climate Assessment, which concluded: "With continued growth in emissions at historic rates, annual losses in some economic sectors are projected to reach hundreds of billions of dollars by the end of the century—more than the current gross domestic product (GDP) of many U.S. states."

Please provide me a list of the studies that have led you to conclude that the projected economic and budgetary harms from climate change are merely "small" or "modest."

Answer. It is important to note the time frames addressed by CBO's statement because climate change is expected to impose costs that will accumulate over time. Initially, the economic effects of climate change will probably be small relative to the size of the

1. See testimony of Keith Hall, Director, Congressional Budget Office, before the Senate Committee on the Budget, *The Budget and Economic Outlook: 2019 to 2029* (January 29, 2019), www.cbo.gov/publication/54945.

U.S. economy, but the relative cost is expected to increase throughout the 21st century. As CBO noted in its latest volume of *Options for Reducing the Deficit,* "Uncertainty about the effects of climate change—and the potential for unlimited emissions to cause significant damage—grows substantially in the more distant future."[2] That is because the potential magnitude of damage—and the range of possible outcomes—becomes increasingly large as the average global temperature rises. Hence, even if the economic costs are modest 50 or 60 years from now, they may no longer be modest 80 or 90 years from now. CBO has not assessed the magnitude of those costs at the end of the century, as some studies have done.[3]

One important consideration for understanding the future economic impact of climate change is the expected increase in the size of the economy. Dollar losses that occur in a given year are most appropriately compared with GDP in that same year. The summary finding reported in the *Fourth National Climate Assessment* compared the magnitude of annual losses at the end of the century (estimated to be hundreds of billions of dollars) with the current GDP of several states.[4] That comparison does not account for the substantial growth in GDP that is likely to occur between now and then. Although forecasting GDP decades in advance is very speculative, if the economy continues to grow as it has in recent decades for the rest of this century, as CBO expects it will, the nation's output (measured on an inflation-adjusted basis) would be several times the size it is today.

However, the effects of climate change will not be evenly distributed throughout the United States. Although losses may be small relative to GDP over the next few decades, damage is likely to be concentrated in certain areas and to have a larger impact on some sectors of the economy than others. For example, damage from rising sea levels and increases in the intensity of hurricanes would be borne by coastal communities. In 2016, CBO examined how climate change and development in coastal areas might affect the costs of damage from hurricanes. The agency concluded that, at present, less than 0.4 percent of the U.S. population, or about 1.2 million people, live in counties where per capita, hurricane damage is expected to be greater than 5 percent of the average income.[5] By 2075, however, that share would, in CBO's estimation, rise to 2.1 percent of the population, or about 10 million people.

Finally, experts believe that there is a small possibility that even relatively modest warming could, with little warning, trigger unprecedented changes during the 21st century that could have significant negative effects on the U.S. economy. For example, shifts in ocean currents could change weather patterns and affect agriculture over large areas, or the rapid

2. Congressional Budget Office, *Options for Reducing the Deficit: 2019 to 2028* (December 2018), p. 292, www.cbo.gov/publication/54667.

3. For a range of estimates of the effects associated with different levels of emissions over the 21st century, see Riccardo Colacito, Bridget Hoffmann, and Toan Phan, *Temperature and Growth: A Panel Analysis of the United States*, Working Paper 18-09 (Federal Reserve Bank of Richmond, March 2018), https://tinyurl.com/yxvnssq9; Solomon Hsiang and others, "Estimating Economic Damage From Climate Change in the United States," *Science*, vol. 356, no. 6345 (June 2017), pp. 1362–1369, https://doi.org/10.1126/science.aal4369; Tatyana Deryugina and Solomon M. Hsiang, *Does the Environment Still Matter? Daily Temperature and Income in the United States*, Working Paper 20750 (National Bureau of Economic Research, December 2014), www.nber.org/papers/w20750; and Kate Larsen and others, *American Climate Prospectus: Economic Risks in the United States* (Rhodium Group, October 2014), https://tinyurl.com/y6yrp4ms.

4. U.S. Global Change Research Program, *Fourth National Climate Assessment*, vol. 2, *Impacts, Risks, and Adaptation in the United States* (2018), p. 26, https://go.usa.gov/xEGxy (PDF, 118 KB).

5. Congressional Budget Office, *Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget* (June 2016), www.cbo.gov/publication/51518.

disintegration of ice sheets could dramatically raise sea levels. The sources and nature of such abrupt changes, their likelihood, and their potential impacts remain very poorly understood.[6]

Question. Between December 2017 and April 2018 the static score of the Trump tax cuts increased by $436 billion. Why did the score increase?

Answer. The estimate of the budgetary effects of the 2017 tax act that CBO published on December 15, 2017, largely relied on the staff of the Joint Committee of Taxation's (JCT's) estimates of the impact of that legislation.[7] Those estimates were measured in relation to the baseline budget projections that CBO published in January 2017.[8] As reported in a recent blog post, in April 2018 CBO made significant changes to its baseline projections to reflect new information that became available during 2017.[9] On net, those changes resulted in higher projections of GDP and of revenues from both individual and corporate taxes.

When CBO produced a new estimate of the effects of the 2017 tax act in relation to the higher baseline projections of revenues published in April 2018, the estimated impact on the deficit was larger.[10] The most notable difference between the two sets of estimates was the magnitude of the decrease in revenues projected to result from the tax act's reduction of tax rates. The decrease was estimated to be larger primarily because the tax base was larger in CBO's 2018 economic forecast than it was in the agency's 2017 forecast.

Senator Cramer

Question. Director Hall, I wanted to follow up on the discussion that we had during the January 29, 2019 hearing regarding the economic impact of a merit-based immigration system. As we discussed, the size and skillset of our labor force has a tremendous impact on the strength of our economy. Does your office have any analysis on the budgetary and economic impacts of changing our immigration system to a merit-based system? If not, please provide.

Answer. CBO has not analyzed the budgetary or economic effects of adopting a merit-based immigration system. However, in a cost estimate for H.R. 2131, the Supplying Knowledge-based Immigrants and Lifting Levels of STEM Visas Act of 2013, CBO and JCT estimated that, on net, the bill would reduce budget deficits by $110 billion over the 2014–2024 period.[11] H.R. 2131 would have made many changes to immigration law, but two in

6. Congressional Budget Office, *Potential Impacts of Climate Change in the United States* (May 2009), www.cbo.gov/publication/41180.

7. Congressional Budget Office, letter to the Honorable Kevin Brady providing a cost estimate for the conference agreement on H.R. 1, a bill to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018 (December 15, 2017), www.cbo.gov/publication/53415.

8. See Congressional Budget Office, *The Budget and Economic Outlook: 2017 to 2027* (January 2017), www.cbo.gov/publication/52370.

9. Congressional Budget Office, "How the 2017 Tax Act Has Affected CBO's GDP and Budget Projections Since January 2017," *CBO Blog* (February 28, 2019), www.cbo.gov/publication/54994.

10. See Congressional Budget Office, *The Budget and Economic Outlook: 2018 to 2028* (April 2018), www.cbo.gov/publication/53651.

11. Congressional Budget Office, cost estimate for H.R. 2131, the Supplying Knowledge-based Immigrants and Lifting Levels of STEM Visas Act (SKILLS Visa Act) (March 12, 2014), www.cbo.gov/publication/45179.

particular would have moved U.S. immigration toward a merit-based system by shifting the relative skill level of noncitizens who were permitted to live and work in the United States:

- First, the law would have significantly increased the number of workers and their dependents who could receive lawful permanent resident (LPR) status (commonly referred to as a green card) or H-1B nonimmigrant (that is, temporary) status on the basis of employment. (Dependents of workers with H-1B nonimmigrant status are granted H-4 nonimmigrant status.) CBO estimated that the number of foreign-born people who qualified for permanent or temporary immigration status through those channels and their native-born children would have increased by more than 1 million during the first decade after the law was enacted.
- Second, the law would have eliminated the diversity visa lottery, which allows 50,000 noncitizens each year to receive LPR status if they or their relative are chosen through a random-selection process. To be eligible for the lottery, a noncitizen needs only a high school education or two years of experience in an occupation that requires two years of training. CBO estimated that eliminating the lottery would have decreased the number of foreign-born people who qualified for LPR status and their native-born children by 400,000 during the first decade after the law was enacted.

In addition, in 2013, CBO analyzed the effect that an increase in immigration would have on productivity.[12] The agency estimated that the increase in immigration—particularly of highly skilled immigrants—resulting from enacting S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act, would raise productivity slightly.

CBO has not completed any similar analyses recently, and the estimated effects of a change in immigration policy today would differ from those for H.R. 2131 or S. 744.[13] Legislative and administrative changes in immigration, benefit, and tax laws made since those estimates were published would affect CBO's estimates of merit-based immigration proposals or other proposals. Additionally, the behavior of U.S. employers and foreign-born employees and students changes over time, and those changes could affect how CBO estimates the effects of immigration proposals on the population. Finally, CBO and JCT continually update their baseline projections and estimates to incorporate new research and information. CBO has discussed those and related issues in several publications.[14]

Question. Does your office have any analysis of the budgetary and economic impacts of eliminating the per country percentage caps on employment-based immigrants in the H1B visa program? If not, please provide.

12. See Congressional Budget Office, *The Economic Impact of S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act* (June 2013), www.cbo.gov/publication/44346.

13. CBO projected the effects of a proposal similar to S. 744 in the President's 2017 budget, but that analysis was based on the agency's 2013 estimate. After adjusting that cost estimate to reflect changes in the baseline budget projections that had been made since 2013, and after taking into account other changes to the tax code proposed by the President, CBO and JCT projected that the proposal's effects on revenues and direct spending would reduce deficits by $101 billion over the 2017–2026 period. (The deficit reduction was projected to be $158 billion over the 2014–2023 period in the original cost estimate.) See Congressional Budget Office, *An Analysis of the President's 2017 Budget* (March 2016), p. 6, www.cbo.gov/publication/51383.

14. See, for example, Congressional Budget Office, *How Changes in Immigration Policy Might Affect the Federal Budget* (January 2015), www.cbo.gov/publication/49868, cost estimate for S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act (July 3, 2013), www.cbo.gov/publication/52481, and *The Economic Impact of S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act* (June 2013), www.cbo.gov/publication/44346.

Answer. Although the total number of foreign-born workers in specialty occupations who are eligible for nonimmigrant status through the H-1B program is subject to annual limits, the program does not have any country-based quotas. However, such limits (established in 8 U.S.C. 1152) apply to noncitizens who seek lawful permanent resident status through employment-based preferences (8 U.S.C. 1153(b)) or family-sponsored preferences (8 U.S.C. 1153(a)).

CBO analyzed the budgetary effects of removing the country-based limits on who can obtain LPR status through employment-based preferences in September 2018, when the House Committee on Appropriations reported H.R. 6776, a bill making appropriations for the Department of Homeland Security for fiscal year 2019. (As is the case for most cost estimates, CBO did not examine the economic effects of enacting the legislation.) Section 540 of that bill would have removed the current restriction that no more than 7 percent of all noncitizens who receive LPR status on the basis of employment in a given year can be from any single country. (Under current law, that limit can be lifted in a given year if enforcing it would prevent the United States from granting employment-based LPR status to 140,000 noncitizens.) According to CBO's estimate, enacting section 540 would increase direct spending by $22 million and decrease revenues by $11 million (stemming mostly from a reduction in receipts from visa fees) over the 2019–2028 period, thereby increasing budget deficits by $33 million over that period.

Primarily on the basis of data from the Department of Homeland Security, CBO estimated that, on net, section 540 would reduce the U.S. population below what it would be under current law. That reduction in population would occur because, with the removal of the 7 percent cap, more of the noncitizens who received employment-based LPR status would already be in the United States in another status (typically H-1B nonimmigrant status), and fewer would be arriving from abroad. In particular, noncitizens from India and China, who make up a large portion of H-1B nonimmigrants, are the most likely to be affected by the 7 percent cap. If section 540 was enacted, some of them would become LPRs—and eventually U.S. citizens—more quickly than they would under current law.[15] Thus, although the number of noncitizens who were granted employment-based LPR status would remain the same, the number of noncitizens in the United States in nonimmigrant status would decline because they would spend fewer years in that status while waiting for it to be adjusted to LPR status.

That more rapid adjustment to LPR status would have another effect. Naturalized citizens from India and China sponsor their parents for LPR status as immediate relatives of U.S. citizens at higher rates than do naturalized citizens from other countries. Thus, the number of noncitizens in the United States who received LPR status as immediate relatives of U.S. citizens would increase as well.

Unlike noncitizens who have employment-based LPR status, immediate relatives of U.S. citizens are not subject to employment or educational requirements. CBO estimates that they would have lower income than those who apply on the basis of employment and thus would be eligible for more federal benefits—most notably, subsidies under the Affordable Care Act. (Some of those subsidies reduce income tax liabilities and thus decrease revenues.)

Because there would be fewer noncitizens in nonimmigrant status, there would also be a reduction in direct spending, mostly for subsidies under the Affordable Care Act. That

15. H-1B nonimmigrants whose employers have sponsored them for employment-based LPR status can continually renew their H-1B status while waiting for their adjustment to LPR status. Such renewals do not count against any numerical limitations in the H-1B program.

reduction would be relatively small because nonimmigrants are specifically ineligible for many federal benefits and because those who would be affected by section 540 must work in specialty occupations, hold advanced degrees, or meet both of those requirements. Consequently, CBO expects that they (and their spouses and minor children) would most likely have income that was too high to qualify for various federal benefits. Thus, CBO expects that over the 10-year projection period, the increases in direct spending for those additional immediate relatives of U.S. citizens who obtained LPR status would outweigh the decreases in direct spending stemming from the decline in the number of nonimmigrants.

In addition, because fewer noncitizens would be applying for LPR status from abroad, the Department of State would collect fewer fees for immigrant visas. A portion of those fees is deposited in the Treasury and recorded in the budget as revenues. By contrast, fees paid to the Department of Homeland Security to adjust status within the United States are recorded as offsetting receipts, which reduce direct spending. Those receipts are available to be spent without future appropriation; thus, the net budgetary effect from collecting those fees is negligible.

Senator Grassley

Question. Dr. Hall, your outlook looks at recent changes in trade policy, where you consider effects of U.S.-imposed tariffs and the retaliatory tariffs other countries have imposed in response. And it looks like CBO's analysis confirms that tariffs are not good for the economy.

Your report also says that around 21 percent of goods in the Food, Feed, and Beverages group are affected by tariffs, and I presume that includes agricultural goods that are affected.

I wonder whether your analysis has factored in possible supply-chain effects of tariffs with, for example, long-term damage to U.S. agricultural exports when other countries find new places to buy agricultural goods.

Answer. In CBO's baseline projections, retaliatory tariffs imposed by the United States' trading partners reduce demand for U.S. agricultural exports and other goods because they increase the price of those exports relative to the prices of similar goods from other countries. Those trading partners are expected to replace most of their purchases of U.S. agricultural exports subject to the new tariffs with goods from other countries. However, much of that reduction in purchases is projected to be offset by increased U.S. exports to countries that did not impose new tariffs. If that offset was smaller than anticipated, or if the reduction in U.S. exports from countries' imposing retaliatory tariffs was larger than expected, the negative effect on the U.S. agricultural industry would be greater than projected. Because CBO's projections incorporated the assumption that tariffs in effect when the baseline was published would be permanent, the reduction in exports to countries that imposed retaliatory tariffs is long-lasting; however, CBO projects that over time, the United States would divert more exports to other trading partners.

Question. Dr. Hall, part of the fiscal challenges ahead of us are growing interest costs on the debt. Under the Obama administration, there were four consecutive years of deficits well above one trillion dollars. Also, public debt held by the public ballooned over the full Obama presidency by more than eight trillion dollars.

Is it safe to say that a significant amount of that debt that was run up by the previous administration is now adding to our fiscal challenges?

Answer. Since 2008, debt and deficits have increased significantly, primarily as a result of the severe 2007–2009 recession and enacted legislation. Federal debt held by the public is now roughly twice what it was before the recession, and it continues to grow. The high and rising level of debt poses significant risks to both the economy and the federal budget. The government's interest costs are rising. The nation's capital stock will ultimately be smaller, and productivity and total wages lower, than they would have been otherwise. Lawmakers will have less flexibility to respond to unexpected challenges. And the likelihood of a fiscal crisis in the United States grows ever greater.

Much of the increase in the past decade occurred from 2009 through 2012, when deficits totaled $5.1 trillion. The large deficits stemmed in part from the reductions in revenues and increases in mandatory spending that automatically occur during and after economic downturns. Newly enacted legislation—including the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) and the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312)—also contributed significantly.

The deficit shrank to $0.4 trillion in 2015 but has been larger since then. Although the effects of the 2007–2009 recession have waned in recent years, deficits have nevertheless remained larger than they were before it occurred. In CBO's most recent baseline projections, which reflect the assumption that current laws governing revenues and spending generally remain unchanged, federal debt held by the public rises by another $13 trillion from 2018 to 2029, reaching 93 percent of GDP by the end of that period.

Question. Dr. Hall, CBO's baseline projection has total revenues as a percent of GDP rising steadily to 17.4 percent, which is the long-run historic average, by 2025. That means that with all of the recent tax reform fully in place, revenues as a share of GDP will hit the historic average. Then revenues relative to GDP rise even further as some of the temporary features of the tax code phase out.

I have two questions about that.

First, is it correct to say that revenues as a share of GDP will return to the long-run historic average by 2025, before any of the recently enacted tax reform phases out?

And, second, what is the range of uncertainty about those estimates? For example, what is the chance that the revenue-to-GDP ratio that you project could hit the historic average even well before 2025?

Answer. Yes, CBO projects that in 2025, before the expiration of most of the temporary provisions of the 2017 tax act, revenues will amount to 17.4 percent of GDP—the same as the average over the past 50 years. In CBO's baseline, they rise to an average of 18.3 percent of GDP from 2027 through 2029.

As part of its recent *Budget and Economic Outlook*, CBO projected revenues under alternative assumptions about fiscal policy, including the assumption that certain expiring provisions of the 2017 tax act remained fully in place over a longer period of time.[16] If full expensing and certain other temporary provisions of the tax act were extended, total revenues would, CBO projects, range from 17.3 percent to 17.4 percent of GDP for the years 2025 through 2029, very close to the average over the past 50 years.

16. See Congressional Budget Office, *The Budget and Economic Outlook: 2019 to 2029* (January 2019), Chapter 5, www.cbo.gov/publication/54918.

However, projections of revenues and GDP are inherently uncertain. Unexpected developments can cause revenues as a percentage of GDP to differ from projected values. Such developments might include a combination of changes in the following factors: the composition of GDP and national income, the relationship between national income and the associated tax bases, the relative growth rates of asset prices and GDP, the distribution of income among taxpayers, and the effects of recently implemented policies.

A recent analysis of CBO's revenue forecasting record showed that the mean absolute error—that is, the average of the projection errors without regard to whether they were positive or negative—was 5.0 percent for the agency's budget-year projections and 10.1 percent for its sixth-year projections.[17] In CBO's current baseline projections, errors of those magnitudes would amount to 0.8 percent of GDP in 2020 and 1.8 percent of GDP in 2024. On the basis of that analysis of forecast errors, CBO estimates that there is a roughly 25 percent chance that revenues as a percentage of GDP would be equal to or greater than the historical average of 17.4 percent in 2020—though there is a similar probability that they would be 16.0 percent of GDP or less. (In CBO's baseline, revenues are projected to total 16.7 percent of GDP in 2020.)

Question. Dr. Hall, in a recent analysis of CBO's economic forecasting record, it is identified that: "Forecasters have consistently overestimated interest rates since the early 2000s." And I believe that CBO has also overestimated interest rates in the past.

I understand that forecasting is a difficult business, but since interest costs of federal debt seem to be a growing cause of concern, and since forecasters have been consistently overestimating interest rates, what might that mean for projected interest costs on the federal debt. For example, if you are consistently overestimating longer-term interest rates by, say, a percentage point, by how much may you have overestimated interest costs over a 10-year budget window?

Answer. The trajectory of interest rates is a significant source of uncertainty in CBO's projections. If interest rates turned out to be 1 percentage point lower each year than CBO currently projects and all other economic variables were unchanged, net outlays for interest would, in CBO's assessment, be roughly $1.8 trillion less between 2020 and 2029.

To show how variations in interest rates might affect the federal budget, CBO developed an interactive workbook in which users can create their own alternative scenarios for interest rates to see how revenues, outlays, and deficits might differ from CBO's baseline budget projections.[18] Those alternative scenarios illustrate the sensitivity of the budget to changes in interest rates—including both the rate on 3-month Treasury bills and the rate on 10-year Treasury notes—when all other economic variables are left unchanged. The estimates shown in the workbook are simplified approximations of the results that CBO might produce using its broad set of economic and budget models.

Question. Dr. Hall, spending as a share of GDP is projected to average 22.0 percent over the 2020–2029 period, well above the historic average. And, your recent outlook points to two major drivers of increased spending; namely, increases in spending for Social Security and

17. Congressional Budget Office, *CBO's Revenue Forecasting Record* (November 2015), www.cbo.gov/publication/50831.

18. Congressional Budget Office, "How Changes in Economic Conditions Might Affect the Federal Budget" (interactive tool, January 2019), www.cbo.gov/publication/54934.

Medicare, as well as net interest costs. So, mandatory spending on entitlements is one big driver of the unsustainable growth in federal spending.

Discretionary spending, in contrast, looks like it will fall relative to GDP.

I wonder, Dr. Hall, if you can tell me how long CBO has been giving Congress the message that mandatory spending has been growing faster than GDP; has it just been in the past couple of years, or have we known this for quite some time?

Answer. Since 1970, mandatory spending has more than doubled as a share of GDP, and CBO has long provided information about both actual and projected growth in such spending. The agency identified the challenge posed by growth in mandatory spending as far back as 1980. That year, CBO Director Alice Rivlin declared, "The major force that has driven budgetary growth in the past two decades, and promises to drive it in the next decade, is the growth in entitlements and other types of spending that are difficult to modify in the short run."[19] More than two decades ago, the agency started alerting lawmakers about the budgetary pressures that would arise beginning in 2008, when the first of the baby boomers would turn 62 and become eligible to receive Social Security benefits. In May 1996, CBO noted, "In the decades after 2010 . . . the demographic shift will push up the deficit rapidly if no changes are made in entitlement benefits for the elderly or in taxes on the working population."[20]

Senator Kaine

Question. In 2013, CBO released a report titled, "The Distribution of Major Tax Expenditures in the Individual Income Tax System." This is an informative report that we rely on for information when evaluating the tax code and changes to it. Since the report was released, significant changes have occurred to the U.S. tax code, including the 2017 tax bill, which would change the substance of the 2013 report.

- Does CBO have plans to update this report?
- If not, will you commit to updating this report as soon as feasibly possible?
- When would be a reasonable timeframe for these updates?

Answer. Each year, in *The Budget and Economic Outlook*, CBO reports the overall amount of tax expenditures and identifies which tax expenditures are the largest. CBO currently has no plans for a more expansive report on tax expenditures or their distribution. However, the agency would be happy to work with the Senate Budget Committee to assess the priority of producing a report on the distribution of tax expenditures. The priority of that project relative to others would significantly affect the time frame needed to complete it. CBO anticipates that the data collection, analysis, and modeling needed to complete such a project would take at least nine months from start to finish.

19. Testimony of Alice M. Rivlin, Director, Congressional Budget Office, before the Task Force on Federal Expenditure Limits of the House Rules Committee, *Limiting the Growth of Federal Expenditures* (February 6, 1980), p. 13, www.cbo.gov/publication/21131.

20. Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1997–2006* (May 1996), p. xxii, www.cbo.gov/publication/14949.

Senator Scott

Question. The CBO estimates that net interest payments will be $383 billion in 2019 and will increase to nearly $930 billion by 2029. Rising interest payments limit lawmakers' flexibility to set spending priorities as more and more money goes to servicing the debt. As Governor, I worked hard to get Florida's fiscal house in order. As a result, the State of Florida now holds top credit ratings with each of the major rating agencies, which has lowered interest costs and created real savings for the taxpayers of Florida.

In 2011, Standard and Poor's (S&P) rating agency downgraded the general obligation credit rating of the United States Government for the first time in modern history. What effect has this had on net interest spending and what would be the budgetary and economic effects of a credit rating upgrade in your outlook? What pathways exist to improve the federal government's creditworthiness within the outlook's timeframe?

Answer. In CBO's assessment, Standard & Poor's downgrade of the federal government's credit rating in 2011 probably had a negligible effect on interest rates and net interest payments. First, it is not clear that investors in U.S. Treasuries rely on credit ratings to assess the creditworthiness of the United States in the same way that they might use credit ratings to assess borrowing by state or local governments, including Florida's state government. Second, even if investors did use credit agencies' ratings to assess the creditworthiness of the United States, the other two leading credit agencies—Moody's Investors Service and Fitch Ratings—retained their highest credit ratings for the federal government, so on its own, Standard & Poor's downgrade would have had a limited impact on market interest rates. Third, the downgrade did not seem to affect the interest rate charged on U.S. Treasuries, which in fact dropped in the days following the downgrade. Accordingly, in CBO's view, a credit rating upgrade would be unlikely to have a significant effect on U.S. Treasury rates.

Standard & Poor's reported that its downgrade in 2011 was prompted by concerns about rising federal debt and that, from the rating agency's perspective, "the effectiveness, stability, and predictability of American policymaking and political institutions have weakened," suggesting that the creditworthiness of the federal government might improve if lawmakers addressed those issues.[21] To put the federal budget on a sustainable long-term path, lawmakers would need to make significant policy changes—allowing revenues to rise more than they would under current law, reducing spending for large benefit programs to amounts less than those currently projected, or adopting some combination of those approaches.[22] In CBO's view, lowering the debt below the current-law projections would reduce interest rates and increase private investment, regardless of the federal government's credit rating.

Senator Toomey

Question. CBO's latest report makes it clear that excessive federal spending, not lack of revenue, is driving our deficits over the duration of the budget window. Revenue as a percentage of gross domestic product (GDP) exceeds the 50-year historical average over the 10-year budget window, and spending as a percentage of GDP is 1.7 percent greater than the historical average over the 10-year budget window. CBO projects that revenue will increase

21. S&P Global Ratings, "Research Update: United States of America Long-Term Rating Lowered to 'AA+' on Political Risks and Rising Debt Burden; Outlook Negative" (August 5, 2011), https://tinyurl.com/y4xh553f.

22. CBO outlined 121 possibilities for policy changes that would reduce the deficit in Congressional Budget Office, *Options for Reducing the Deficit: 2019 to 2028* (December 2018), www.cbo.gov/publication/54667.

from $3.5 trillion in 2019 to $5.7 trillion in 2029, a 61 percent increase. Meanwhile, mandatory spending is on pace to increase from $2.7 trillion in 2019 to $4.6 trillion in 2029—a 70 percent increase. Mandatory spending and net interest on the debt is projected to make up 78% of all federal outlays by 2029.

Dr. Hall, do you acknowledge that our fiscal situation cannot be adequately addressed without curbing the growth of some of these mandatory spending programs?

Answer. CBO has long maintained, as it most recently stated in the January 2019 *Budget and Economic Outlook,* that "to put debt on a sustainable path, lawmakers will have to make significant changes to tax and spending policies—increasing revenues more than they would under current law, reducing spending for large benefit programs below the projected amounts, or adopting some combination of those approaches."[23]

Question. CBO's latest report highlights several positive economic benefits from the 2017 tax act. This is a result of the structural changes that will have long-term benefits on economic growth. The competitive business rate and full expensing lead businesses to invest in capital equipment, making workers more productive and in turn increasing their earnings and quality of life. According to CBO, wage growth accelerated notably in 2018. Annual growth of the employment cost index for wages and salaries was 3.3 percent in 2018 and is expected to average 3.5 percent between 2019 and 2023. This is in contrast to the 2.0 percent average from 2009 to 2017.

Dr. Hall, the CBO report says that "growing demand for labor and competition for workers are expected to boost the growth of wages and salaries over the next few years." How does the tax bill contribute to this increase in wages?

Answer. CBO expects the effect of the 2017 tax act on short-term wage growth to be positive. In particular, the agency expects the growth in the employment cost index (ECI) for wages and salaries in the private sector to be slightly higher through 2023 than it would have been if the law had not been enacted. As a result, the level of the ECI is projected to be about 0.2 percent higher in 2023 than it would have been otherwise. The effect is somewhat larger in the longer term.

CBO expects the 2017 tax act's effect on wage growth to be modest in the next few years mainly because the tax act is expected to add only a small amount of inflationary pressure to the economy in general and to the labor market in particular. Although the law boosts the demand for labor in the near term, which helps push up wages, it also boosts the supply of labor by increasing the incentives to work, which mitigates that pressure on wage growth.

Over the longer term, the effect of the tax act on wages is expected to be larger because of increases in labor productivity. Productivity increases as investment gradually translates into productive capital, which boosts the return to labor.

In the near term, the tax act is projected to have more significant positive effects on the labor force participation rate, employment, and total hours worked; consequently, the effect on total (economywide) wages and salaries is also greater. The act is projected to increase total wages and salaries by 1.1 percent in 2023 (boosting labor's share of income as well) and by less in later years.

23. Congressional Budget Office, *The Budget and Economic Outlook: 2019 to 2029* (January 2019), p. 20, www.cbo.gov/publication/54918.

Question. Tit-for-tat tariff escalation hurts American consumers and threatens U.S. jobs. CBO's latest report notes that the U.S. has imposed new tariffs on 12 percent of imports, which has resulted in retaliatory tariffs on nine percent of American exports. CBO estimates that these new trade barriers will reduce real consumption by 0.1 percent, private investment by 0.3 percent, and real U.S. exports by 0.5 percent by 2022.

These projections show that there are no winners in a trade war. You may be aware that legislation has recently been introduced that would allow the U.S. to "reciprocally" increase our tariff rates to match higher tariffs imposed by foreign nations on the same product.

Dr. Hall, given the projections in CBO's latest report, do you think that raising U.S. tariffs to meet the tariff rates of our trading partners would help or hinder U.S. economic growth?

Answer. CBO has not analyzed the economic effects of increasing U.S. tariff rates to the rates of the United States' trading partners. However, in the long run, higher tariffs on imports tend to reduce domestic competition and productivity and, in turn, real (that is, inflation-adjusted) GDP. In CBO's view, they could also reduce the long-term rate of economic growth.

Senator Van Hollen

Question. CBO estimates that the shutdown cost the economy $11 billion overall, including $3 billion that will never be recovered even with the government reopened. But CBO makes clear that these estimated effects, "do not incorporate a number of indirect negative effects, which are more difficult to quantify but were probably becoming more important as the shutdown continued."

During the shutdown, I heard from small businesses throughout Maryland suffering from these types of negative effects. A catering company told me that reductions in FDA inspections increased consumer concerns about food safety, and hindered their ability to get needed certifications. A venture capital firm told me the shutdown hurt their investments in companies that bring discoveries at universities to market, because the companies lost valuable time that they need to secure bridge funding from the Small Business Innovation Research program. A hair salon was not able to get an SBA loan to expand their business and create new jobs because of the shutdown, which may cause them to lose a deposit that they put down for their new space.

If CBO was somehow able to quantify the economic damage from these types of negative effects from the shutdown, and add this to the effects that you did measure, would that increase CBO's estimate for the economic damage from the shutdown? Is there a way CBO can provide a rough estimate of those additional costs?

Answer. CBO's estimates did not incorporate indirect effects of the shutdown, such as those resulting from interrupted access to federal subsidies and loans, lags in issuing federal permits and certifications, and delayed funding for agencies that help minimize various risks. In CBO's view, those factors probably exacerbated the shutdown's effects on economic output and would have done so to an increasing extent as the shutdown continued.

However, a good deal of uncertainty surrounds the magnitude and timing of those indirect effects—particularly the effects on various federal programs and services that the private sector relies on. It is also highly uncertain how private businesses adjusted their investment and hiring decisions in response to disrupted government activities. CBO does not have enough information to quantify those effects at this time. The agency is closely monitoring new evidence and data, which may allow it to estimate those effects in the future.

Question. In April 2018, CBO estimated that the 2017 tax act would increase deficits by $1.843 trillion over 10 years. While macroeconomic feedback, excluding interest costs, reduced the cost of the bill by $571 billion in CBO's estimate, the total feedback related to interest costs increased the cost of the bill by $582 billion. So these effects are essentially a wash, and CBO estimated that the tax bill increased deficits by $1.854 trillion over 10 years after taking both of these factors into account.

Since April 2018, has CBO significantly changed its projections for the economic and budgetary effects of the 2017 tax act?

Answer. CBO has not revised its estimate of how the 2017 tax act would affect the budget or economic growth since *The Budget and Economic Outlook: 2018 to 2028* was published in April 2018. Over the past year, the economy has performed much as CBO anticipated at that time. Uncertainty about the timing of the tax act's budgetary effects makes it difficult to infer from recent tax collections whether the act's eventual cost will be larger or smaller than CBO projected. Corporate tax revenues in fiscal year 2018 were weaker than expected, but the extent to which that weakness was a continuation of a multiyear trend or a consequence of effects of the 2017 tax act that differed from prior estimates—or some combination of those two factors—is unclear.

Question. Advocates of the 2017 tax act claimed that the law would increase the rate of economic growth, as measured by real gross domestic product, to 3% in the long-term.

Is there even one private sector forecast among the roughly 50 included in the Blue Chip survey that shows 3% economic growth in 2020?

Answer. None of the roughly 50 respondents who contributed to the January 10, 2019, *Blue Chip* survey projected that real GDP growth would reach 3.0 percent in 2020. In those forecasts, estimated growth for 2020 ranged from a low of 0.4 percent to a high of 2.7 percent. Estimates in the middle two-thirds of that range extended from 1.5 percent to 2.3 percent.

Senator Warner

Question. Throughout the course of the record-breaking 35 day government shutdown, it is estimated that the US economy suffered a GDP reduction of $11 billion. While these projections indicate that much of that loss will be regained, it is also projected that $3 billion, or .02% of the projected annual GDP, may never be fully recovered—that value is gone forever.

In addition, the shutdown exposed with stark clarity the number of people in this country unable to miss a paycheck without painful negative economic consequences. And while federal workers are beginning to receive back pay, there are still more than one million federal contractors who will never receive compensation for the income they lost.

Director Hall, based on your analysis what are some things the government can do to avoid this kind of cost to the economy in the future?

Answer. In CBO's estimation, the partial shutdown that ended on January 25, 2019, dampened economic activity mainly because of the loss of furloughed federal workers' contribution to GDP, the delay in federal spending on goods and services, and the reduction in the overall demand for goods and services in the economy (which dampened private-sector activity). Avoiding a lapse in discretionary funding for federal agencies would prevent such consequences in the future.

CBO's estimate of the effects of the five-week partial shutdown does not incorporate a number of indirect negative effects, which are more difficult to quantify but were probably becoming more significant as the shutdown continued. For example, during the shutdown, some businesses could not obtain federal permits and certifications, and some faced interrupted access to subsidies and loans provided by the federal government. Those types of disruptions were probably beginning to reduce economic output. Avoiding an extended shutdown would prevent those sorts of negative indirect effects from reemerging.

Question. According to the Congressional Budget Office's 2019–2029 report on The Budget and Economic Outlook, the federal budget deficit is about $900 billion in 2019 and will exceed $1 trillion each year starting in 2022. The deficits in the next ten years are well above the average over the past 50 years, fluctuating between 4.1 and 4.7 percent of GDP. 2019 has the largest single deficit increase of any year—an increase of over $280 billion in the deficit under the Republican tax bill for 2019, according to JCT. While the tax cuts carried out may have created a "sugar-high", it is clear that the economic growth experienced is not sustainable.

Given this unsustainable deficit-spending, how could we maintain the short-term economic boost produced by the tax cuts once the "sugar-high" expires?

Answer. CBO projects that from 2019 through 2021, economic output will exceed its potential—that is, its maximum sustainable amount—in part because of stimulus provided by the 2017 tax act and by increases in spending enacted in 2018. Over the longer term, real GDP tends to grow at the same rate as potential GDP, which is determined by factors such as the size of the labor force, the average number of labor hours per worker, capital investment, and productivity. New policies that increased incentives to work and invest and that raised productivity would drive potential and actual GDP growth up above CBO's current-law projections of such growth in the longer term.

Senator Whitehouse

Question. As you can see in the attached chart, CBO projects federal health spending over the next decade will be $4.7 billion lower than its 2010 estimates extrapolated out to this budget window. While a portion of this difference relates to the repeal of the individual mandate and other policy changes, much of it appears to result from a sustained slowdown in health spending growth in recent years. As CBO noted in the current budget outlook, "The reasons for that slowdown are not clear."

I think the slowdown is evidence that structural changes in the delivery of care—many of which were ushered in by the Affordable Care Act—have taken hold and we are seeing lower federal spending as a result. For example, Coastal Medical in Rhode Island, a Medicare Accountable Care Organization, has saved $30 million over five years, and has done so while increasing services and improving the quality of care their patients receive.

As I've raised with you before, I think it's important for CBO to tease out what is responsible for this significant, sustained slowdown in federal health spending growth. What is CBO doing to better understand the causes of the sustained slowdown in federal health care spending? Would you agree that comparing the current CBO baseline with the 2010 baseline extrapolated out to the current window is a logical way to estimate changes in health projections?

Answer. Because the reasons for the slowdown in health care spending growth are not well understood, it has been challenging for CBO to project whether the slowdown would persist or growth in health care spending would return to historical levels.[24] To better understand the causes of the slowdown, CBO will solicit input on the topic from the agency's Panel of Health Advisers—which comprises widely recognized experts in health policy and the health care sector—when that panel meets next in the fall. CBO also continues to monitor the latest research on the causes of the slowdown.

That research sheds some light on whether certain changes in how care is paid for and delivered have affected federal health care spending. One important change has been the growth of accountable care organizations (ACOs), which are groups of doctors, hospitals, and other health care providers that assume collective responsibility for the costs and quality of care furnished to their patients. ACOs are intended to give providers incentives to improve the quality and coordination of care and eliminate unnecessary spending. However, the available evidence indicates that ACOs have had little or no net effect on Medicare spending.[25] To date, nearly all ACOs that have operated in the Medicare system have employed a "one-sided" risk model. Under that model, ACOs receive bonus payments from Medicare if the total Medicare payments for their patients are below a benchmark amount, but they do not face a penalty if the total payments for their patients are above the benchmark. The evaluations of Medicare ACOs have found that, on average, they reduced spending on Medicare benefits by a modest amount, but those savings have been largely offset by bonus payments.

CBO analyzes changes in its baseline projections by comparing projections for particular years published at different points in time. Differences between those projections are classified into three types of changes: legislative changes, which result from the enactment of new laws; economic changes, which stem from updates to the agency's economic forecast; and technical changes, which reflect all other updates to the agency's projections. In CBO's baseline projections from August 2010—the first projections published after the enactment of the Affordable Care Act—two years, 2019 and 2020, overlap with CBO's current baseline projections, making a comparison of the two baselines possible for those years.

In its August 2010 projections, CBO estimated that mandatory spending for the two broad budget categories covering the major health care programs would be $1,489 billion, or 6.7 percent of GDP, in 2020. In CBO's January 2019 baseline projections, the agency

24. In 2013, CBO released an analysis of the slowdown in growth of spending on Medicare. That analysis resulted in the following findings: Spending per beneficiary in Medicare Part A (Hospital Insurance) and Part B (Medical Insurance) grew at a much slower rate from 2007 through 2012 than the average rate of growth in earlier years, only a small part of the slowdown could be accounted for by observable factors that would be expected to influence beneficiaries' demand for health care, and much of the slowdown was due to unidentified factors that changed beneficiaries' demand for care or providers' behavior. See Michael Levine and Melinda Buntin, *Why Has Growth in Spending for Fee-for-Service Medicare Slowed?* Working Paper 2013-06 (Congressional Budget Office, August 2013), www.cbo.gov/publication/44513.

25. See J. Michael McWilliams, "Changes in Medicare Shared Savings Program Savings From 2013 to 2014," *Journal of the American Medical Association*, vol. 316, no. 16 (October 2016), pp. 1711–1713, http://dx.doi.org/10.1001/jama.2016.12049; and J. Michael McWilliams and others, "Early Performance of Accountable Care Organizations in Medicare," *The New England Journal of Medicine*, vol. 374, no. 24 (June 2016), pp. 2357–2366, http://dx.doi.org/10.1056/NEJMsa1600142.

estimated that such spending would total $1,202 billion, or 5.4 percent of GDP, in 2020. Of the $287 billion difference between those projections for 2020, $18 billion is attributable to legislative changes and $269 billion to economic and technical changes. The slowdown in health care spending growth was the largest technical revision that CBO incorporated into its baseline projections of federal health spending; however, there were many other technical revisions. For example, CBO reduced its projections of subsidies through the marketplaces because the actual number of people receiving subsidies was lower than anticipated.

Table 1 compares CBO's August 2010 projections of mandatory spending for the two broad budget functions covering major health programs (after an adjustment to incorporate the estimated effects of legislation enacted since the projections were prepared) with the actual amounts of such spending. That adjustment is necessary because although CBO does not attempt to predict future legislative changes or their effects on spending when preparing its baseline budget projections, actual spending is nevertheless affected by those changes. Adjusting its projections to incorporate the effects of subsequently enacted legislation before comparing them allows CBO to focus on the economic and technical factors responsible for changes to the agency's projections.

Extrapolating the August 2010 projections beyond 2020 to increase the number of years of overlap is challenging. Ideally, the growth rates used for that extrapolation would reflect the growth rates (adjusted to incorporate the effects of subsequently enacted legislation) underlying CBO's 2010 *Long-Term Budget Outlook*, which extends to 2035. However, the growth rates embedded in those long-term projections do not reflect enacted legislation that has changed projected growth in spending for major health care programs. CBO has not separately estimated the longer-term effects of such legislation in a way that would allow the agency to subtract those effects from the growth rates underlying the long-term projections. The agency's health analysts would be happy to meet with you to discuss further the challenges in extrapolating the 2010 projections.

Question. President Obama worked with Congress to reduce the annual deficit from $1.4 trillion in 2009 to $665 billion in 2017. In your testimony you project that deficits will again rise above $1 trillion by 2022 and the deficit in out years could be even higher if provisions such as the individual tax cuts are made permanent or extended. What effect does the Tax Cuts and Jobs Act have on our nation's deficit and debt outlook? Would making the temporary provisions of the law permanent lower or raise our national debt?

Answer. In April 2018, CBO estimated that the 2017 tax act would increase deficits by about $1.9 trillion between 2018 and 2028. Extending certain provisions of the tax act and maintaining bonus depreciation—a provision that allows businesses to deduct a portion of the costs of equipment from their taxable income—at 100 percent would increase deficits by about $300 billion in 2029 and by about $1.1 trillion in total over the next decade. Added debt-service costs would further increase deficits and debt. CBO included estimates of the budgetary effects of those extensions in its projections of budgetary outcomes under alternative fiscal policies published in its recent *Budget and Economic Outlook*.[26]

Question. CBO's outlook projects Real GDP growth to slow down in 2019 to 2.3% from 3.1% in 2018, and drop further to an average of 1.7% through 2023. What effect does the Tax Cuts and Jobs Act have on your economic growth projections over the next decade?

26. Congressional Budget Office, *The Budget and Economic Outlook: 2019 to 2029* (January 2019), Chapter 5, www.cbo.gov/publication/54918.

Table 1.

Comparison of CBO's August 2010 Projections and Actual Amounts of Mandatory Spending for Budget Functions 550 (Health) and 570 (Medicare), by Fiscal Year

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
					In Billions of Dollars						
CBO's August 2010 Projections, Adjusted to Incorporate the Effects of Subsequently Enacted Legislation	751	810	798	851	940	1,034	1,162	1,238	1,296	1,396	1,471
Actual and Projected Amounts as of January 2019[a]	750	790	752	793	859	966	1,043	1,064	1,071	1,149	1,202
Difference	1	20	46	58	81	68	119	173	225	247	269
Memorandum:											
CBO's August 2010 Projections	751	798	778	831	930	1,026	1,148	1,224	1,287	1,395	1,489
					As a Percentage of Gross Domestic Product						
CBO's August 2010 Projections, Adjusted to Incorporate the Effects of Subsequently Enacted Legislation	5.1	5.3	5.0	5.1	5.4	5.7	6.3	6.4	6.4	6.6	6.6
Actual and Projected Amounts as of January 2019[a]	5.1	5.1	4.7	4.8	5.0	5.3	5.6	5.5	5.3	5.4	5.4
Difference	*	0.1	0.3	0.3	0.5	0.4	0.6	0.9	1.1	1.2	1.2
Memorandum:											
Gross Domestic Product (Billions of dollars)[a]	14,839	15,404	16,056	16,604	17,333	18,090	18,551	19,272	20,236	21,252	22,120

Source: Congressional Budget Office.

* = between zero and 0.05 percent.

a. Actual amounts are reported through 2018; the values for 2019 and 2020 reflect CBO's current projections as published in *The Budget and Economic Outlook: 2019 to 2029* (January 2019), www.cbo.gov/publication/54918.

Answer. CBO published a detailed description of its estimates of the effects of the 2017 tax act on its economic and budget projections in April 2018.[27] The agency projected that the tax act would raise real GDP above what it would have otherwise been by an average of 0.7 percent each year over the 2018–2028 period. The additional GDP attributable to the tax act would be largest in 2022—amounting to 1.0 percent of GDP—and decline in subsequent years.

That pattern reflects CBO's projections that the 2017 tax act would have positive effects on real GDP growth over the first five years of the projection period and negative effects over the remaining six years. Specifically, in the agency's projections, the legislation boosts annual real GDP growth by 0.3 percentage points in both 2018 and 2019, by about 0.2 percentage points in 2020, and by 0.1 percentage point in both 2021 and 2022. Over the 2023–2028 period, however, the tax act slows real GDP growth by an average of about 0.1 percentage point per year. The actual data reported thus far have generally been consistent with those estimates.

Question. Numerous experts are warning of the significant economic risks of climate change. The first of these risks relates to rising seas and the likelihood that hundreds of billions of

27. See Congressional Budget Office, *The Budget and Economic Outlook: 2018 to 2028* (April 2018), Appendix B, www.cbo.gov/publication/53651.

dollars' worth of coastal real estate becomes uninhabitable. Freddie Mac has this to say on the subject:

> "[R]ising sea levels and spreading flood plains nonetheless appear likely to destroy billions of dollars in property and to displace millions of people. The economic losses and social disruption may happen gradually, but they are likely to be greater in total than those experienced in the housing crisis and Great Recession."

Has CBO considered the economic and budgetary risks posed by such a coastal real estate crash?

We're already seeing the early warning signs of this up and down the East Coast. The First Street Foundation looked at the effect of rising seas and increased coastal flooding on Rhode Island property values and found that since 2005, Rhode Island coastal real estate has already lost $45 million in expected value. Total losses along the East Coast already exceed $15 billion. Is CBO studying how falling coastal property values may affect economic growth and federal revenues?

Answer. CBO has not estimated the potential loss in property values due to rising sea levels or investigated how such losses might affect the economy. In 2016, however, the agency published a report that examined the effects of climate change and coastal development on the total cost of hurricane damage in the United States, including projections of such costs in 2025, 2050, and 2075.[28] In addition, CBO has examined the financial soundness and affordability of the National Flood Insurance Program, a topic that is often discussed in conjunction with coastal real estate values.[29] Currently, CBO is researching the economic and budgetary costs imposed by hurricane-related winds, storm surges, and heavy precipitation. (The effects of heavy precipitation were not included in the 2016 report.) Finally, the agency has been exploring available data that would allow it to estimate the economic costs associated with effects of rising sea levels on high-tide flooding.

Question. The second climate-related risk of which experts are warning is the so-called "carbon bubble." This refers to an over-investment in fossil fuel assets that then dramatically decline in value as the world economy is forced to wean itself off of fossil fuel in order to combat climate change. The Bank of England warns:

> "As the world increasingly limits carbon emissions, and moves to alternative energy sources, investments in fossil fuels and related technologies […] may take a huge hit."

Economists have modeled what a bursting of the carbon bubble might look like, and they warn that it might result in a loss comparable to the 2008 financial crisis. In your budget and economic outlook, do you consider the economic and budgetary risks posed by such a carbon bubble?

28. See Congressional Budget Office, *Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget* (June 2016), www.cbo.gov/publication/51518.

29. See Congressional Budget Office, *The National Flood Insurance Program: Financial Soundness and Affordability* (September 2017), www.cbo.gov/publication/53028.

Answer. For a carbon bubble to burst and cause an economic disruption comparable to the financial crisis in 2008, policy changes both in the United States and overseas would probably have to be implemented quickly, leaving owners of and investors in fossil fuel assets, such as coal mines, oil wells, and fossil-fuel power plants, with minimal time to adjust. CBO's *Budget and Economic Outlook* incorporates the assumption that current federal laws will generally remain unchanged, so it does not account for possible changes in federal law related to fossil fuels that might precipitate such a crisis.

That said, policies that limit emissions of carbon dioxide could result in the early retirement of fossil-fuel power plants and decrease the market value of fossil fuels, causing producers to abandon such facilities or to deplete energy reserves sooner than they might have otherwise. The energy market has experienced such a decline in the value of assets—often referred to as "stranded costs"—in the past. For example, in 1998, CBO examined the implications of compensating electric power utilities for stranded costs resulting from the deregulation of the retail market for electricity.[30]

The potential magnitude of stranded costs is uncertain. Such costs would depend on how lawmakers designed future policies to reduce emissions—specifically, on the stringency of such policies—as well as investors' expectations about how those policies might affect the returns from investing in fossil fuels. The budgetary effects of stranded costs would depend on lawmakers' decisions about whether to provide federal compensation for such costs.

30. See Congressional Budget Office, *Electric Utilities: Deregulation and Stranded Costs* (October 1998), www.cbo.gov/publication/11252.