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The Reliability of Long-Term Budget Projections

By Rudolph G. Penner

“All models are wrong, but some are useful.” – George Box

Forecasting is a perilous activity. Forecasters often make big mistakes, whether they are forecasting the economy, the weather, or the outcome of the World Series. Budget forecasts are no better than any other²⁷ and revenue forecasts are particularly difficult.²⁸ Errors occur even when forecasting with a one-year time horizon. Does that mean that long-term budget forecasts of 25 years or more are totally worthless?

Forecasts do not have to be right—although they sometimes are—to be valuable. It may be difficult to forecast a variable’s exact value, but getting information on the direction it is moving can be very useful. Even if the forecaster gets the direction of a particular variable wrong, there may be other components of a forecast that provide valuable information.

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Long-term forecasters actually have a few advantages over short-term forecasters. In the short term, the economy is buffeted by the turbulence of business cycles, oil shocks, political upheavals, droughts, etc. Over the longer term, however, more fundamental forces exert themselves and there is some tendency for variables to return to long-term trends. Regression to the mean^l is the long-term forecaster’s best friend and policy makers often react to surprises with policy responses that keep variables within bounds.^m

^l Defined as the tendency for statistical aberrations to disappear in the long term, for example, abnormally tall fathers are likely to have sons closer to average height.

^m A strong example of this phenomenon will be discussed later—the remarkable constancy of the revenue-GDP ratio.

Unfortunately, the advantages enjoyed by long-term forecasters are not sufficient to make long-term forecasts more accurate than short-term forecasts. They are not. But they are not worthless either.

Long-term budget forecasts done by different groups may contain significant errors, but they generally reach the same conclusion. Unless they adopt combinations of very optimistic assumptions, they almost always forecast debt-GDP ratios that rise indefinitely at an increasing rate.⁸ This may be less a testimony to the accuracy of long-term projections than it is to the seriousness of our long-term budget problem.

So far, I have used the word “forecasts.” Those working on long-term budget issues prefer the word “projections” and the Government Accountability Office (GAO) talks about “scenarios.” Whether it is a projection or a scenario, it purports to show the consequences of a certain combination of economic, demographic, and policy assumptions. The projection will not be very valuable if the many underlying assumptions are not realistic and any effort to make them realistic involves making a forecast. That diminishes the difference between a projection and a forecast. One difference remains, however: People making projections make them along with a wish that their policy assumptions will not come true, because the projections inevitably imply a fiscal disaster. A major reason for making projections is to persuade policy makers to change policies.

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Notwithstanding the problems with making long-term projections, there is no shortage of them. They are provided by the Congressional Budget Office²⁹ (CBO), the GAO³⁰ and the Office of Management and Budget (OMB).³¹ These government efforts are complemented by private analyses. For example, Auerbach and Gale³² periodically produce long-term budget projections. They focus on estimating a fiscal gap. That is defined as the increase in revenues and/or decrease in noninterest spending as a percent of GDP necessary in each and every year to end up with the same debt-GDP ratio after a certain number of years as when the period begins.⁹

⁸ The administration's long-term forecast is an anomaly. It shows a rising debt-GDP ratio through 2040, but one that declines after that.

⁹ In Chapter 2 Steuerle and Quakenbush argue that aiming for the same debt-GDP ratio in some future year is not sufficient, because it is unlikely to be sustainable. They feel that policy makers should aim at a lower ratio to provide a cushion. A similar point is made later in this article.

The Committee for a Responsible Federal Budget also does numerous long-term analyses,^p and Jeffrey Miron³³ examines the difference between the present value of noninterest spending and the present value of receipts over the next 75 years. He does this for each year beginning in 1965 and finds a strong upward trend in the gap, broken only by the recovery after the Great Recession and the end of the stimulus program.

The different groups making projections use different methods and assumptions. Most produce more than one path for the budget aggregates, although they typically pay most attention to one path that might be called their base case. All do sensitivity analysis based on varying the value of certain key assumptions, but this is done in very different ways. Often the analysis is for different time periods, and that makes comparisons difficult. Policy projections are often based on extending “current law” or “current policy.”^q A major difference between these two concepts is that current law often contains temporary provisions that are scheduled to expire, but in fact have been extended year after year. Current policy assumes that many will in fact be extended. However, considerable judgment is required to translate these broad terms into precise policies for the next 25 years, and all of this results in significant differences among various projections. CBO is the only one that investigates the effects of ever increasing deficits on the future growth of incomes.

CBO’s base estimate is called the “extended baseline” and is essentially based on current law. This leads to a relatively small fiscal gap for the 2017-2041 period of 1.7 percent of GDP and a debt-GDP ratio in 2040 of 122 percent. Auerbach-Gale project current policy and their projection results in larger medium-term deficits than derived by CBO. They estimate a fiscal gap of 3.0 percent and a 2040 debt-GDP ratio of 152 percent. They do a large number of variants on this base case. OMB’s “current policy”^r estimates a fiscal gap of 1.7 percent of GDP, identical to CBO’s by coincidence, and a 2040 debt-GDP ratio of 115 percent. GAO provides a 75-year fiscal gap estimate of 3.0 percent for an extended baseline case, but no estimate for 25 years. The estimated debt-GDP ratio in 2040 is very close to that of CBO’s. Although the individual estimates vary, the bottom line is almost always the same. The debt-GDP ratio is on its way to an explosion.^s A notable exception is OMB’s very long-term projection. Their debt-GDP ratio rises toward the middle of the century and then starts a decline after baby boomers have passed from the scene.

^p For example, see Committee for a Responsible Federal Budget, “The Very, Very Long-Term Budget Outlook,” July 19, 2016. Available at: <http://crfb.org/blogs/very-very-long-term-budget-outlook>.

^q The administration refers to one of its projections as being based on current policy, but the policy assumptions differ little from what CBO calls baseline extended.

^r OMB’s definition of “current policy” is close to what others call “current law.”

^s See Figure 3.1 for the history of the debt-GDP ratio and for a typical long-term projection.

Looking Backward

The most important single force driving the debt-GDP ratio upward in essentially all long-term projections is the rapid growth of the elderly population. It propels the growth of three large spending programs—Social Security, Medicare and Medicaid—to the point that their spending growth exceeds that of the rest of the budget and the GDP. As shown in Figure 3.2, the growth in the number of retirees, which exceeds the growth in the working-age population, also slows economic growth and the growth in revenues. In addition, the projections assume that the resulting increase in debt rapidly increases the interest bill facing the government relative to GDP.

The accuracy of these basic predictions will be examined for the past 20 years. That also happens to be the length of time that CBO has been making long-term projections, while GAO has done it for a slightly longer period.

For a time horizon of 20 years, the aging of the population is quite predictable, even though there are minor uncertainties surrounding mortality rates and immigration. Health costs are more difficult to forecast. Costs per beneficiary have been growing faster over the long term than GDP per capita. The growth is greater than would be expected looking only at the aging of the population. The growth above that due to aging is known as “excess cost growth.” It has slowed unexpectedly in recent years and it is hard to know how much of the slowdown, if any, will continue. Interest rates are even more uncertain than excess cost growth, thus making the interest bill facing the government especially difficult to project.

Despite being too pessimistic in projecting excess cost growth, those making long-term projections have been basically right that the growth of spending on Social Security, Medicare, and Medicaid would exceed the growth of the rest of spending and the growth of GDP. In 1996, spending on Social Security, Medicare, and Medicaid amounted to about 40 percent of total spending and 8 percent of GDP. By 2015 the importance of the three programs had risen to 51 percent of total spending and 10.6 percent of GDP.

The generally correct prediction about the growth of Social Security, Medicare, and Medicaid has been overwhelmed by three very big surprises—two good and one bad. First, contrary to past projections, a precipitous fall in interest rates caused the interest bill facing the government to fall as a percent of GDP from 3.0 percent in 1996 to 1.3 percent in 2015 despite a very large increase in the debt-GDP ratio.¹ Note that the fall in the interest bill

¹ While the low interest rate may have been good news for the budget, it reflected bad news regarding economic growth all over the world.

relative to GDP offsets approximately two-thirds of the rise in spending on Social Security, Medicare and Medicaid relative to GDP. The second surprise involved a huge unexpected surge in revenues related to the dot-com boom. As a result, budget surpluses emerged for four years following 1997. The debt-GDP ratio fell substantially from 48.6 percent in 1996 to 31.4 percent in 2001 instead of rising, as almost all long-term projections had predicted. Third, the Great Recession and the associated stimulus program caused a doubling of the debt-GDP ratio from 35.2 percent in 2007 to 73.6 percent in 2015. Only a small part of that increase was the result of the growth of Social Security, Medicare and Medicaid.

Looking Forward

It was earlier said that a wrong projection can have a valuable component. That is true about the projected increases in spending on Social Security,^u Medicare, and Medicaid, even though projections of the debt-GDP ratio have not been very accurate. As we look forward, the effect of aging on spending will grow over the next 25 years because of longer expected life and the large number of baby boomers that will become beneficiaries of the three programs. The people affected are already with us and therefore, it is unlikely that projections of the future number of beneficiaries will be very far off. As the three programs grow as a proportion of total spending, it also becomes less probable, although not impossible, that their bad effects on total spending and the deficit will be overwhelmed by good surprises. The fact that two important variables, excess health cost growth and interest rates, are remarkably low relative to levels experienced over past decades would seem to reduce the probability that they could go very much lower. However, we have seen negative interest rates in Europe and Japan and brief periods of health cost growth in the United States falling far below forecasts, so it is true that very surprising good things can happen. But saying that surprising good things can happen is very different from saying that we should count on them.

The analysis will now shift to what those making projections assume about the future of the many variables underlying their analysis. CBO provides considerable detail regarding their assumptions and they will be examined most carefully. Space limitations prevent a detailed examination of all relevant assumptions and only a sampling will be discussed.

Macroeconomic Uncertainty

All major projections show rising deficits and debt through 2040. It is important to understand how this affects the macroeconomy and how those effects have secondary feedback effects on the budget. This is no simple task and only CBO attempts it explicitly. CBO assumes that

^u All projections assume that scheduled Social Security benefits will be paid after trust funds are emptied around 2030. This will require a change in current law.

increased deficits increase aggregate demand and GDP growth in the short term, but because this analysis focuses on the long-term, the short-term impact of deficits will not be analyzed.

In the long term, deficits represent a reduction in national saving. This implies increased interest rates and a reduction in investment with an accompanying negative effect on economic growth and the growth of wages. These effects are mitigated by borrowing from foreigners. CBO assumes that a one dollar increase in federal government borrowing attracts 24 cents in foreign private capital. Although the borrowing from foreigners reduces the fall in wages that would otherwise occur if all borrowing were done within the United States, it does mean that more of Americans' future income must be used to pay interest and dividends abroad.

Increased interest rates are assumed to induce more private saving, thus reducing the fall in national saving caused by the deficit. There are other complicated, but probably minor, effects on private saving and work effort because of changes in after-tax income, transfer payments, and worries about large policy changes induced by growing deficits.

The CBO analysis of the macroeconomic effects of larger deficits assumes that the relationship between deficits and increased foreign capital inflows remains as in past history. That may not be true if a continually rising debt-GDP ratio begins to affect foreign confidence in the United States. If foreigners reduce their investments in the United States, or—in a worst-case scenario—begin to withdraw their capital, it will have negative consequences for economic growth and future government deficits. This may be an area in which CBO is overly optimistic. In addition, our heavy reliance on foreign investors may reduce our flexibility in foreign policy.

Policy Uncertainty

In previous years CBO provided projections based both on their extended baseline and on an alternative fiscal path. In its most recent report of July 2016, CBO decided that there was not a sufficient difference between the two policy scenarios to warrant doing projections for both, so the report now only includes the extended baseline. This assumes that certain temporary tax cuts will not be extended beyond their current expiration date. In fact, in the past such temporary cuts have been extended routinely and some that were once temporary, such as the research and experimentation tax credit, have been made permanent. The extended baseline also assumes that Congress will, through 2021, abide by the caps placed on discretionary spending in 2011 and reduced in 2013. From 2022 through 2025 discretionary spending is assumed to rise with the rate of inflation and after that to remain constant relative to GDP. Subsequent legislation relaxed the caps in 2014, 2015, 2016, and 2017. It is probably reasonable to assume that they will be relaxed further before 2021 and may rise with both

inflation and the population during 2022-2025. The extended baseline also assumes that revenues will increase faster than GDP because of real bracket creep. As will be discussed later, Congress has never allowed that to happen over extended periods.

If the extended baseline assumptions prove accurate, defense spending after 2025 will be at the lowest level relative to GDP since before World War II and nondefense discretionary spending will be 2.6 percent, the lowest level since at least 1962—the first year for which comparable data is available. Over the past 54 years, nondefense discretionary peaked relative to GDP in 1980 when it was 5.2 percent.

It is difficult to believe the discretionary numbers projected for the next decade will be realized. Could defense sink so low when there so many threats in the world, especially from Russia and China—whose defense budget has been rising at double digit rates? It is also difficult to be confident about the nondefense numbers given strong calls for additional infrastructure and education spending. Of course, spending in excess of the levels being assumed might be paid for with increased taxes, but Congress is not good at that.

There are other reasons to think that the extended baseline deficits may be exceeded. It is believed by some that remarkably low interest rates make deficits less harmful than they would be otherwise and that we should be more relaxed about borrowing for things like infrastructure investments.³⁴ The amount gained from this strategy depends on:

1. How easy it will be to reverse the extra borrowing if interest rates again rise toward historical norms; and
2. On allocating the extra spending efficiently—something that we have not done well in the past.

Revenues

Since World War II revenues have been remarkably constant relative to GDP, almost always varying between 17 and 19 percent. When the ratio went below 17 percent it was usually because of recessions. There were some temporary tax increases in the past 50 years related to war and a few permanent tax increases. Otherwise, the tax burden was pressured upward by inflation and real growth that pushed income tax payers into higher tax brackets. The effects of inflation were neutralized in the early 1980s when individual income tax brackets, exemptions and standard deductions were indexed to the CPI. But whatever the cause, every time the total tax burden was pushed above 19 percent, a tax cut followed. That happened after World War II and after the Vietnam War. It happened again after the effects of the high inflation of the late 1970s were countered by the Reagan tax cuts, and yet again with the Bush

tax cuts after the turn of the century. Just before the Bush tax cuts, the tax burden had been above 19 percent for three successive years (1998-2000)—the longest period in U.S. history.

In the CBO analysis, the tax burden reaches 19 percent in 2040 and will surpass it later as real bracket creep continues. Given the past aversion to such a high tax burden, it is reasonable to ask whether this is a realistic assumption. On the other hand, the debt will be rising inexorably and that may deter the tax cuts necessary to keep the burden below 19 percent. If tax cuts do occur, the debt-GDP ratio will rise above the 122 percent estimated for 2040 in the base case.

Health Costs

There has been a significant slowdown in the rate of excess health cost growth in recent years. For the 38 years between 1975 and 2014 it averaged 1.8 percent per year, but in the last 23 years of the period, from 1990 to 2014, it slowed to 1.2 percent per year. Because the slowdown is not well understood, it is not known if it will be a lasting phenomenon or one that is reversed in the near future. CBO assumptions for the long term are that Medicare excess cost growth rises from 0.7 to 0.9 percent per year over the next 10 years. Medicaid excess cost growth starts at 1.4 percent per year as more states cooperate with the Affordable Care Act and then falls to 0.7 percent per year. In the very long term, excess cost growth in both Medicare and Medicaid slowly converges to 1.0 percent, reaching that level in 2046. If excess cost growth is 1.0 percentage point higher per year, all else equal, the estimate of the debt-GDP ratio for 2040 is 130 percent instead of 122 percent in the base case. If it is 1.0 percentage point lower, the estimated debt-GDP ratio becomes 99 percent.

Economic and Demographic Assumptions

Table 3.1 provides the value that CBO assumes for important economic and demographic variables. Because of space limitations I shall briefly discuss only a few assumptions. CBO provides a much more detailed discussion in their 2016 report on the long-term budget outlook.

Immigration

CBO assumes that the rate of legal and illegal immigration per 1,000 U.S. residents will mimic that of the past two centuries. They admit that past data is highly variable. There is a wave of anti-immigrant fervor now sweeping Europe and indications that it is spreading to the United States. If immigration falls short of assumed levels, estimates of potential economic growth will also be lowered and the long-term budget outlook will deteriorate.

Inflation

CBO assumes that the inflation rate stays low through 2040 at near the Federal Reserve's target of 2.0 percent. In a separate analysis CBO shows that a rate above that assumed has negative consequences for the budget deficit over the next ten years because it would increase the assumed growth of discretionary spending and the amount that has to be spent on cost-of-living adjustments (COLAs) for indexed entitlement programs. The negative effect is offset as inflation reduces the nominal debt-GDP ratio by increasing nominal GDP. If the average maturity of the debt is lengthened, that reduces the negative effects of higher inflation by reducing the need for refinancing at higher nominal interest rates. Inflation's beneficial effect on the deficit and the debt would be even greater, if the rate brackets, personal exemptions, and the standard deductions in the personal income tax had not been indexed for inflation in the early 1980s. Analyses of the fall in the national debt from slightly above 100 percent of GDP at the end of World War II to 23 percent in 1974 attribute much of the fall to inflation.

“ If the average maturity of the debt is lengthened, that reduces the negative effects of higher inflation by reducing the need for refinancing at higher nominal interest rates. ”

Interest Rates

Interest rates are extraordinarily low compared to past history and the once unthinkable prospect of negative nominal interest rates has now become thinkable because of European and Japanese experience. CBO assumes a steady rise through 2019, but to levels below historical averages. Over the past few years CBO has continually lowered its interest rate assumptions. If actual interest rates do not increase as much as currently assumed, long-term budget problems will become less dangerous. For example, in an alternative to their base case that adopts CBO assumptions, Auerbach and Gale assume no interest rate increase from current levels. Their estimate of the fiscal gap falls from 3.0 percent of GDP to 1.8 percent. The budget problem is lessened, but it does not go away.

Productivity

CBO assumes that labor productivity will increase at a steady pace of 1.7 percent through 2040. Since 2010 the growth of labor productivity in the business sector has been abysmal. It has varied year-to-year between 0.1 and 0.7 percent. It is dangerous to place a large weight on recent experience, but five years of very bad experiences tend to make one nervous. If CBO is significantly too optimistic about future productivity growth, it will have significantly underestimated the seriousness of our long-term budget problems.

Sensitivity Analysis

CBO does an elaborate sensitivity analysis, but on only four of the variables included in Table 3.1—labor force participation rates, productivity growth, the interest rate on the government debt, and excess cost growth for spending on Medicare and Medicaid. CBO shows how deviations of the individual variables from assumed values affect the debt-GDP ratio projected for 2040. I shall focus on their example where the four variables jointly become more or less optimistic.

To decide on an appropriate range of possible values for the variables going forward, CBO examines their actual values over the past 30 years. CBO's base assumption for the labor force participation rate has it gradually declining from 63 percent in 2015 to 58 percent in 2046. The range of uncertainty is based on different paths that end up in 2046 three percentage points higher or lower than 58 percent. The plausible range for the interest rates on the debt and for excess cost growth in Medicare and Medicaid is one percentage point above or below base-case values. The range for productivity growth is 0.5 percentage point above or below. CBO then takes 60 percent of the ranges and asks what happens if labor force participation is on the lower path described above, excess cost growth and interest rates are 0.6 percentage points above the assumed values, and productivity growth is 0.3 percent per year below assumed values. With these most pessimistic values, the debt-GDP ratio reaches 160 percent rather than the 122 percent reached in the extended baseline case. With all four variables at the most optimistic end of the range the debt-GDP ratio in 2040 is 88 percent.

The range of uncertainty used by CBO is quite narrow. It would be interesting to see how vulnerable the nation is to more extreme events. For example, CBO could “stress test” their results by assuming another Great Recession and stimulus program, or assuming another Iraq War.

Coping with Uncertainty

The previous discussion has identified numerous reasons to be uncertain about the long-term outlook and it merely skimmed the surface, discussing but a small portion of the multitude of assumptions necessary to make a long-term projection. One could think of many budget targets for the next 40 years, but if there is any concern over the possibility of a fiscal crisis, it is important to have a target for the debt-GDP ratio. Let us suppose that Congress decides that 60 percent is an appropriate goal for the debt-GDP ratio in 2040. That was the frequently-violated upper limit imposed by the Maastricht Treaty for Eurozone countries. Should policymakers design policies that put us on a track for 60 percent given long-term projections or should policies aim at something lower, like 50 or 40 percent, in order to increase the probability that 60 percent or better will be achieved?

A strong case can be made for aiming for something below 60 percent because the risks associated with doing better or worse than expected are not symmetrical.³⁵ Assume that we are aiming at 60 percent and we do better than expected. There may be a brief period when we have unnecessarily deprived people of benefits and imposed too high a tax burden, but it should be the easiest thing in the world to persuade policymakers to correct by increasing benefits and cutting taxes. Moreover, while we are adjusting, the deficit will be below the expected level and that will be good for the growth of incomes.

“ A strong case can be made for aiming for something below 60 percent (debt-GDP ratio) because the risks associated with doing better or worse than expected are not symmetrical. ”

Contrast that with a situation in which we are doing worse than expected. It will be excruciatingly difficult to persuade politicians to increase taxes and slow the growth of benefits. The situation may get out of hand and leave us heading for a fiscal crisis. We have seen from recent experience in Europe that fiscal crises are horribly painful as countries respond with abrupt cuts in social benefits and public pensions and taxes are raised quickly and sometimes arbitrarily.

Conservatism in setting goals can be accompanied by conservatism in interpreting deviations from the target path to the goal. Presumably the assumptions underlying the long-term projections will be re-evaluated frequently—perhaps every year. When there is a negative deviation from the optimum path, it may be because of a statistical aberration that does not require corrective action or a structural change that does. Often it will be uncertain which it is. A conservative approach would lean in the direction of assuming that it is a structural change that demands attention.

The effects of uncertainty can also be mitigated by carefully designing programs. For example, if programs and taxes are reformed to put us on a path to a 60 percent debt-GDP ratio, triggers can be built into programs, especially those that are growing rapidly, to automatically make them more or less generous or change revenues if there is a deviation from the desired path. For example, the indexing of Social Security can automatically be made less generous with some notice if benefits are growing faster than planned. If benefits later grow more slowly, some or all of the cuts can be restored.³⁶

Unfortunately, triggers have often failed, because they have been waived by Congress when they turn out to be too painful. That means that they have to be designed with care. They cannot be too painful, but they must be stringent enough to have a good chance of correcting deviations from the desired spending or revenue path.³⁷

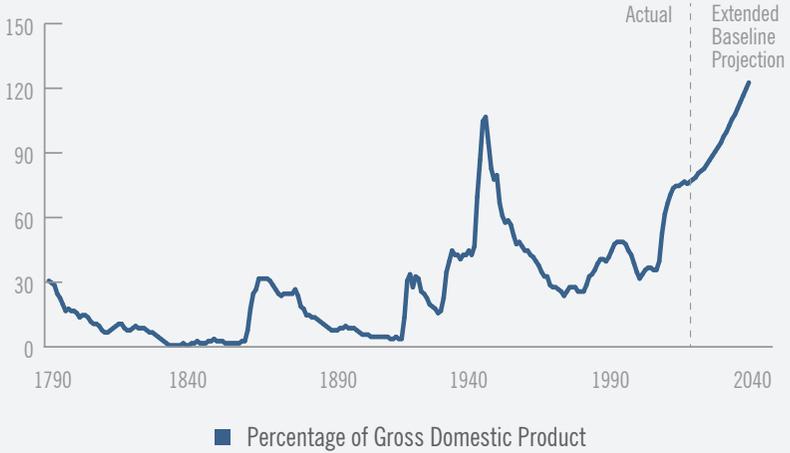
A more fundamental approach would initially design programs so that they are easier to reform. Before Social Security's initial benefits were indexed to wages and existing benefits were indexed to the CPI, Social Security's actuary would predict soaring surpluses in future years. Congress then had the happy task of increasing benefits to absorb the surpluses.^v Since indexing they face the painful task of limiting benefit growth or increasing revenues, if they wish to make the program sustainable financially.

Conclusions

Long-term budget projections may not be very reliable, but they are valuable. They identify the most predictable force driving us toward a fiscal crisis: the aging of the population. Aging's effect on Social Security, Medicare, Medicaid, and the future debt may be offset for limited periods by pleasant surprises. But negative surprises are just as likely. In the longer term, the dire effects of aging might be offset by large efficiencies in the delivery of health care, by robust economic growth, by extraordinarily low interest rates, or by the coincidental movement of a whole array of less important variables in an optimistic direction. But such events would be outside the realm of historical experience. It would be extremely foolish to count on them.

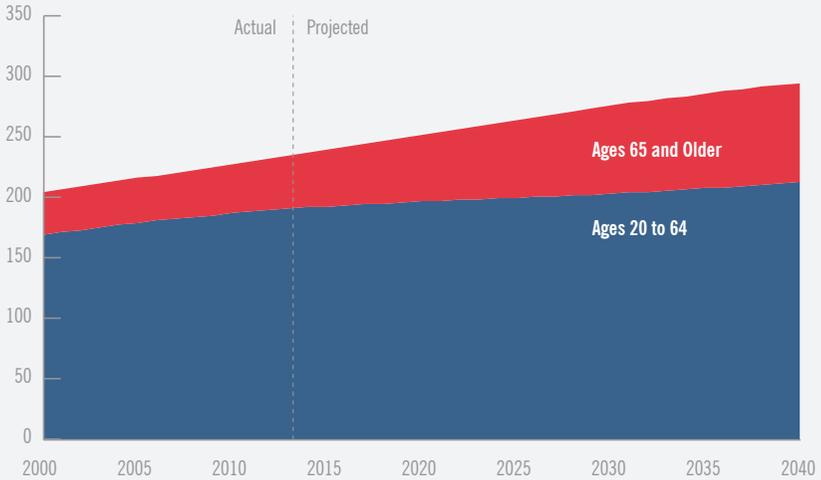
^v Ironically, indexing was first introduced in the hope that it would save money. It was thought that Congress could not resist being too generous when it periodically raised benefits. That was because of some very large increases passed in the late 1960s and early 1970s. In retrospect that appears to have been an unusual time. Congress had not been nearly as generous earlier in the program's history and has not increased benefits relative to wages since indexing began.

Figure 3.1. Federal Debt Held by the Public



Source: Congressional Budget Office. For details about the sources of data used for past debt held by the public, see Congressional Budget Office, *Historical Data on Federal Debt Held by the Public* (July 2010). Available at: www.cbo.gov/publication/21728.

Figure 3.2. Population, by Age Group, in Millions



Source: Congressional Budget Office, *The 2016 Long-Term Budget Outlook*, July 2016, at 26.

Table 3.1. Average Annual Values for Economic and Demographic Variables That Underlie CBO’s Extended Baseline

	2016– 2026	2026– 2040	Overall, 2016–2040
Economic Variables (Percent)			
Growth of GDP			
Real GDP	2.1	2.0	2.1
Nominal GDP	4.1	4.1	4.1
Growth of the Labor Force	0.6	0.3	0.4
Unemployment			
Unemployment Rate	4.9	4.9	4.9
Natural Rate of Unemployment	4.8	4.7	4.7
Growth of Average Hours Worked	-0.1	-0.1	-0.1
Growth of Total Hours Worked	0.5	0.3	0.4
Earnings as a Share of Compensation	81	81	81
Growth of Real Earnings per Worker	1.2	1.3	1.3
Share of Earnings Below the Taxable Maximum	80	77.5	78.4
Growth of Capital Services	2.4	1.8	2.0
Growth of Productivity			
Total Factor Productivity	1.3	1.3	1.3
Labor Productivity	1.6	1.7	1.7
Inflation			
Growth of the CPI-U	2.3	2.4	2.4
Growth of the GDP Price Index	2.0	2.0	2.0
Interest Rates			
<i>Real Rates</i>			
On 10-year Treasury Notes and the OASDI Trust Funds	1.6	1.9	1.8
On All Federal Debt Held by the Public	0.8	1.6	1.3

(Table 3.1 continues on next page.)

Table 3.1. Average Annual Values for Economic and Demographic Variables That Underlie CBO's Extended Baseline

	2016– 2026	2026– 2040	Overall, 2016–2040
Economic Variables (Percent)			
<i>Nominal Rates</i>			
On 10-year Treasury Notes and the OASDI Trust Funds	3.9	4.4	4.2
On All Federal Debt Held by the Public	3.1	4.0	3.6
Demographic Variables			
Growth of the Population (Percent)	0.8	0.7	0.7
Fertility Rate (Children per Woman)	1.9	1.9	1.9
Immigration Rate (Per 1,000 People in the U.S. Population)	3.9	3.9	3.9
Life Expectancy at Birth, End of Period (Years) ^a	80.6	81.4	80.8
Life Expectancy at Age 65, End of Period (Years) ^a	20.2	20.7	20.3

Source: Congressional Budget Office, *The 2016 Long-Term Budget Outlook*, July 2016, 96.

Note:

^a Life expectancy as used here is period life expectancy, which is the amount of time that a person in a given year would expect to survive beyond his or her current age on the basis of that year's mortality rates for various ages.