ALTARUM INSTITUTE

SYSTEMS RESEARCH FOR BETTER HEALTH

CENTER FOR SUSTAINABLE HEALTH SPENDING

RESEARCH BRIEF

June 2016

Altarum Institute is a 501(c)(3) nonprofit health care research and consulting organization. Altarum integrates independent research and client-centered consulting to deliver comprehensive, system-based solutions that improve health and health care.

Technical Notes on Triangle of Painful Choices

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Background

The triangle of painful choices was first introduced in August 2012 as a tool to provide insights about what rate of growth in health spending would be sustainable in the long term. It was based on the federal government commitment, under the Affordable Care Act (ACA), to make adequate health insurance affordable to everyone (by expanding Medicaid to all low-income individuals, subsidizing the purchase of private insurance for those not eligible for Medicaid but unable to afford the full cost of insurance, and continuing Medicare coverage for the elderly). The faster the rate of growth in health care costs, the more difficult it becomes for the government to live up to this commitment as federal health spending is pushed above its ability to pay. A sustainable rate of growth is one that keeps federal health spending within the government's ability to pay. Rates higher than this are unsustainable in the sense that government would have to abandon its ACA commitment and health insurance would become increasingly unaffordable and inadequate.

In the original triangle, I set the base year to 2011 and picked 2035 to represent the "long term." My goal was to estimate the rate of increase in health spending that would be consistent with an adequately balanced federal budget in 2035.

For this purpose, I constructed a model to forecast federal health spending in 2035 under alternative assumptions about overall health care cost growth. I made the assumption that the health care cost trend (the rate of increase in per beneficiary costs) would be the same regardless of payer. In other words, I assumed that health spending per beneficiary would increase at the same rate regardless of whether the beneficiary was covered by Medicare, Medicaid, private insurance, or no insurance (I adjusted the cost trend to account for the baby-boomer impact on the Medicare beneficiary age distribution). I adopted forecasts from the Congress Budget Office (CBO) about population shifts out of the uninsured category and into Medicaid and private insurance and estimated the increase in spending by the newly insured. With this model, I was able to determine the per-beneficiary cost trend consistent with an adequately balanced budget in 2035 and then convert this cost trend into an estimate of the rate of growth in national health expenditures.

Updating the Model Used to Create the Triangle

For the update, I have moved to a base year of 2017 and retained 2035 as the long term target for an adequately balanced federal budget. I have relied heavily upon CBO's January 2016 report *The Budget and Economic Outlook: 2016 – 2026* (BEO) and the associated data sets that they make available to the public. Other key data sources include the CBO's June 2015 report *The 2015 Long Term Budget Outlook* (LTBO), the National Health Expenditure Account (NHEA) data from Centers for Medicare & Medicaid Services (CMS) extending to 2014, and the CMS ten-year projections. The model divides the population into Medicare enrollees and all other and forecasts personal health spending, and the federal subcomponent of personal health spending, separately for each (this includes the cost of administering the

Medicare and Medicaid programs and the net cost of private insurance). The remainder of the NHEA, which includes spending on public health, medical research, and structures and equipment, are projected for the US population as a whole and forecasted separately on that basis.

Spending Tied to Medicare Enrollees

For Medicare enrollees, I estimated base year personal health spending per person in 2017 based the CMS NHEA projection for 2017, adjusted for consistency with CBO BEO projections of federal spending on Medicare and Medicaid for that year. Additional calculations were necessary to allocate the various categories of spending across the Medicare and non-Medicare populations (see Appendix for details). The categories of spending tracked in the model for the Medicare population include:

- Medicare payments including administrative costs;
- Medicaid, broken down into the federal and state portions and including administrative costs; and
- All other sources of payments for personal health spending by the Medicare population.

The cost trend for the Medicare population is a parameter in the model. Thus, total personal health spending per Medicare beneficiary is projected to grow at the rate specified by the cost trend. Because the age distribution of the Medicare population changes significantly between 2017 and 2035, the cost trend is adjusted for this aging effect (between 2017 and 2035, the aging of the Medicare population adds about 3% to spending per beneficiary—raising the annual rate of growth by about 0.16 percentage points).

Spending Tied to the Non-Medicare Population

For the non-Medicare population, I estimated base year personal health spending per capita (including the cost of insurance), along with the federal component, using the 2017 CMS NHEA projection, adjusted for consistency with CBO BEO 2017 projections of federal spending on Medicaid and the Children's Health Insurance Program (CHIP). CBO BEO 2017 projections are also used for a base year estimate of ACA exchange subsidies (these subsidies are not called out in the NHEA as they are not a source of payment for personal health care).

The cost trend for the non-Medicare population is also a parameter in the model. This approach implicitly assumes that personal health spending per beneficiary will grow at the same rate for all segments of this population, regardless of source of insurance (Medicaid, private, no insurance). The CBO LTBO assumes that economic growth will slowly reduce the share of this population eligible for Medicaid (by raising incomes—LTBO page 120) and also the share eligible for exchange subsidies (LTBO page 42). The model includes adjustment factors to match CBO projections of federal Medicaid spending and exchange subsidies when cost trends are set to CBO-projected amounts. Between 2017 and 2035, these adjustments imply that the share of the non-Medicare population eligible for Medicaid falls by about 15%. The 15% reduction also holds for exchange subsidies though some of this reduction is due to smaller average subsidy percentages.[1]

Spending Tied to the US Population as a Whole

The amount the nation spends on the remaining components of NHE, which includes public health, medical research, and structures and equipment, is taken to be tied to the population as a whole. The cost trend for this spending aggregate is also a parameter in the model. Spending for this aggregate has grown at roughly the same rate as NHE over the years (its share of NHE has declined slightly over time but remained near 9% between 1985 and 2008). Thus, its historical cost trend has been quite similar to that of the rest of NHE.

Creating the Triangle

The model described above, and in the appendix, is used to project federal health spending as a share of GDP in 2035, starting from the base year of 2017.

Federal Health Spending 2017

The largest component of federal health spending in the model consists of Medicare outlays (including administrative costs) net of offsetting receipts, Medicaid outlays, and exchange subsidies. These are labeled major health programs in CBO reports.

The model also includes other federal spending within the NHEA personal health care category, consisting of health services delivered by the Department of Defense (DOD), Department of Veterans Affairs (VA), the Indian Health Service (IHS), and also spending on maternal and child health, vocational rehabilitation, other federal programs, and Substance Abuse and Mental Health Services Administration (SAMHSA). Finally, the model includes federal spending on public health, medical research, structures, and equipment. Estimated spending in 2017 for each of these categories is listed below, expressed as a percentage of gross domestic product (GDP):

- Estimated federal health spending as a percentage of GDP in 2017: 6.6%
- Major health programs (Medicare, Medicaid, exchanges): 5.6%
- Other federal personal health spending: 0.7%
- Public health + medical research+ structures & equipment: 0.3%

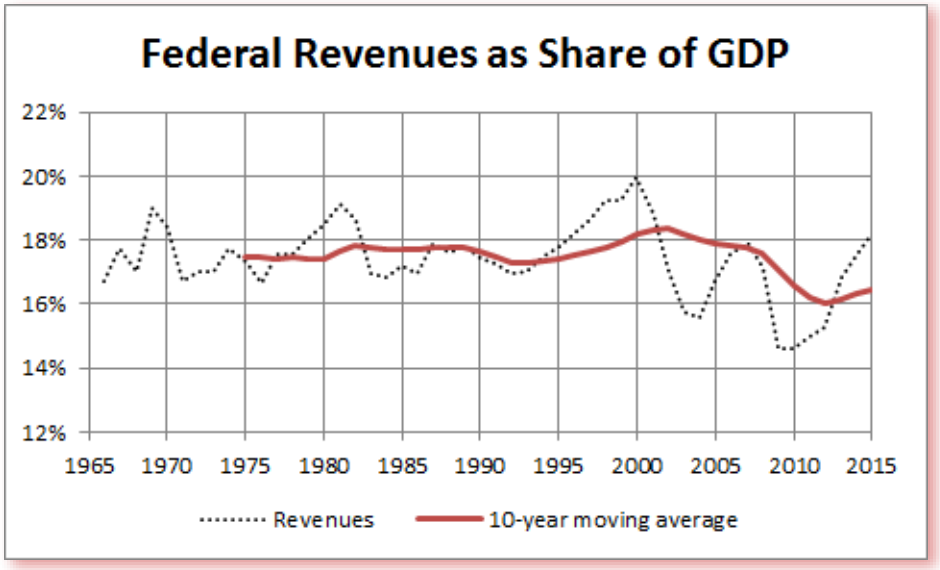
The 5.6% of GDP allocated to federal spending on major health programs in 2017 is larger than the 5.3% shown in the CBO LTBO. This is because it has been updated with the more recent January 2016 CBO BEO estimates. There is also a conversion to calendar years that makes these figures not directly comparable to CBO. Finally, note that federal health spending included in NHE but not in the major health programs adds a percentage point to the federal health spending share of GDP.

Cost Trend Assumptions

I derived the triangle under the assumption that from 2017 through 2035, cost trends are the same for all payers. The assumption is that per-capita spending on public health, medical research, and structures and equipment will grow at the same rate as the common cost trend. For any assumed cost trend, the model projects national health expenditures, and the federal component, for 2035. The resulting growth rate in NHE can be compared to the average projected growth rate in GDP (4.1%, using CBO projections as discussed in the appendix) to determine the excess growth rate in NHE associated with a given cost trend. Federal health spending as a share of GDP in 2035 can also be computed.

Federal Tax Revenues

I took historical data on federal tax revenues as a share of GDP from Table F-1 of the January 2016 CBO BEO data set. The chart below displays the full history along with a 10-year moving average (thus, for example, the figure for 2015 is the average for 2006 through 2015). Federal revenues as a share of GDP tend to drop during recessions and history suggests that recessions occur every ten years or so. Therefore, for a more accurate sense of historical tax policies, it is better to use a long-run moving average so that the recession impact can be incorporated. The red line shows a 10-year moving average. It peaks in 2002 at 18.3% of GDP.



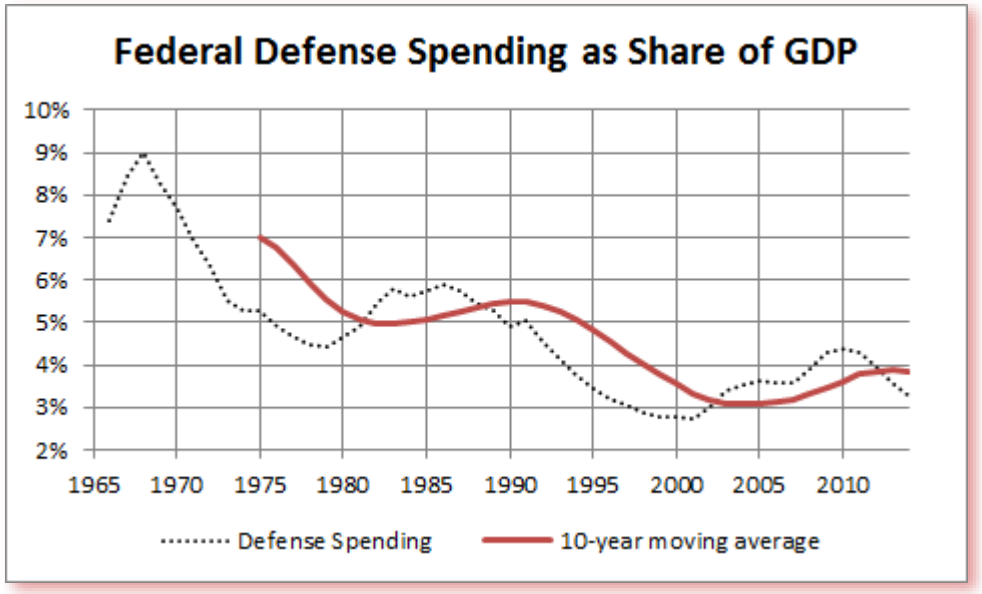
Source: Computed from CBO Budget and Economic Outlook: 2016-2026, January 2016

Federal Spending on Defense

I derived historical data on federal spending for national defense as a share of GDP from Table F-4 of the January 2016 CBO BEO data set and the December 2015 NHEA data. I adjusted CBO defense spending figures to eliminate the portion of defense spending included as health spending in the NHEA (and in the Triangle). Specifically:

- NHEA includes federal health care spending by the DOD. This spending is included as defense spending in the CBO data so it is subtracted from the CBO figures since it is included has health spending in the Triangle. This reduces the defense spending share of GDP by about 0.2 percentage points.

Defense spending tends to grow as a share of GDP during recessions and, therefore, a long run moving average is a better indicator of policy. The chart below displays the full history along with a 10-year moving average (thus, for example, the figure for 2015 is the average for 2006 through 2015). The minimum of the moving average is 3.1% and occurs in 2004.



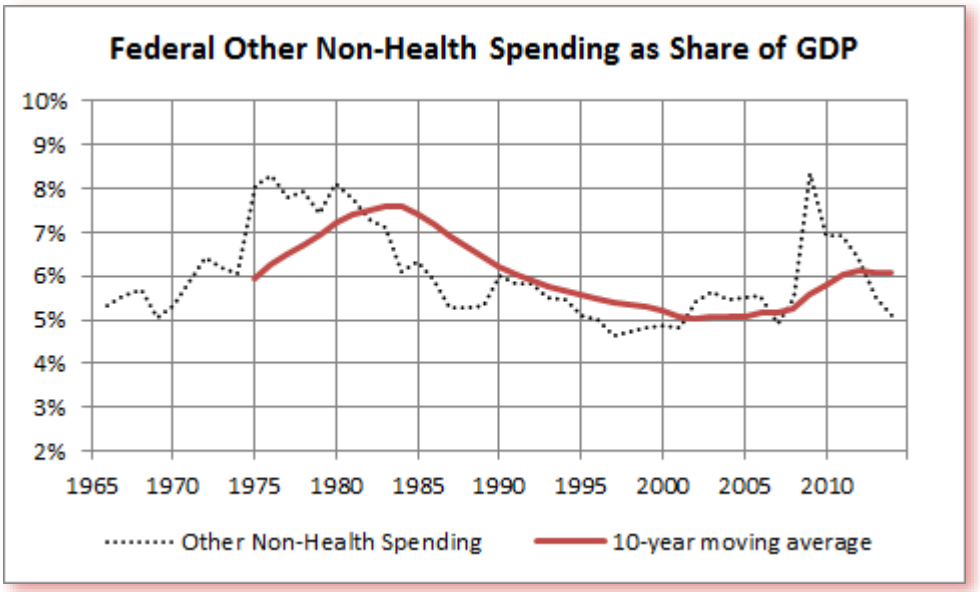
Source: Computed from CBO Budget and Economic Outlook: 2016-2026, January 2016 and NHEA December 2015. Note: NHEA spending on health by DOD is subtracted from CBO defense spending.

Federal Spending on Other Non-Health Items (Excluding Social Security and Interest)

I derived historical data on federal spending for other non-health programs as a share of GDP from Table F-4 and F-5 of the January 2016 CBO BEO data set and the December 2015 NHEA data. I adjusted CBO other non-health spending figures to eliminate the portion of this spending included as health spending in the NHEA (and in the Triangle). Specifically:

- Other non-health federal spending, as defined by CBO, includes NHEA federal spending on care delivered by VA and IHS as well as spending on maternal and child health, vocational rehabilitation, other federal programs, SAMHSA, public health, medical research, structures, and equipment.
- NHEA federal spending for these categories has amounted to about 0.8% of GDP in recent years, with VA and medical research accounting for more than half.

The other non-health share of GDP tends to rise during recessions so a 10-year moving average seems appropriate. This moving average bottoms out at 5.0% in 2002.



Source: Computed from CBO Budget and Economic Outlook: 2016-2026, January 2016 and NHEA December 2015. Note: NHEA federal spending on health that is included in CBO other non-health figures is subtracted.

Since both defense and other non-health reached their moving average minima at about the same time, the minimum of the combined series is the sum of the individual minima, 8.1%.

Federal spending on Social Security

The CBO LTBO projects spending on Social Security to be 6.3% of GDP in 2035 and I have adopted that figure for the Triangle. I used 5.8% in one version of the triangle to represent the projections under proposed reforms at the time. But there have been no reforms presented lately so I am simply using the CBO projection.

An Adequately Balanced Budget (One that Protects Against an Ever-Increasing Debt to GDP Ratio)

Back when I first began analyzing sustainable health spending along these lines, Donald Marron (then with the Tax Policy Center at the Urban Institute) advised me to require a small primary budget surplus (about 0.5% of GDP) and I have done so in all previous versions of the Triangle.

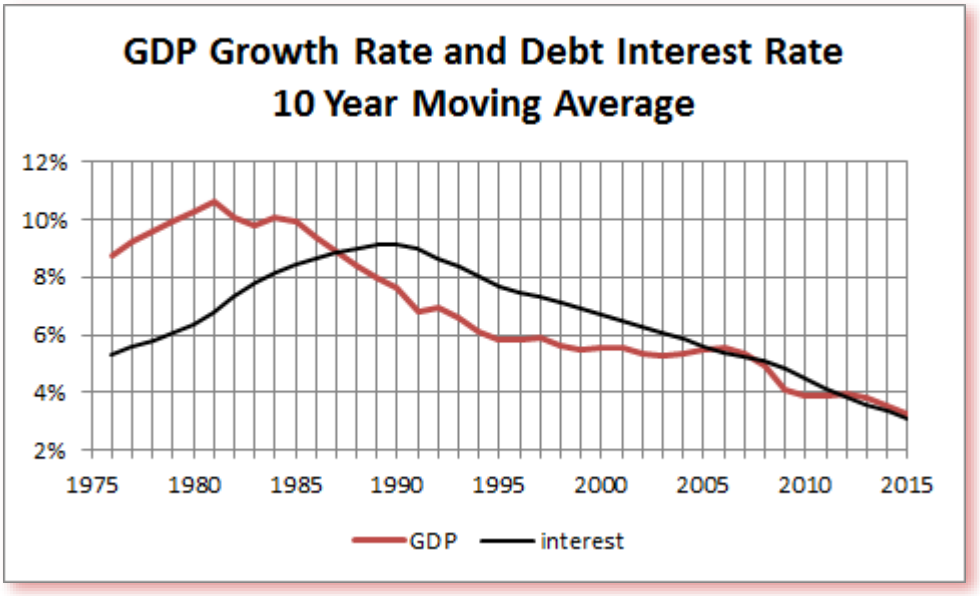
For the current version, I provide some additional analysis to justify this requirement. The idea is to determine what primary budget surplus would be needed to stabilize the debt to GDP ratio. This is a reasonable requirement since, for lesser surpluses, the debt to GDP ratio would be on a continual upward path leading, eventually, to financial collapse.

The debt to GDP ratio will be stable when debt grows at the same rate as GDP. The following formula gives the primary budget surplus (stated as a percentage of GDP) required to hold the rate of growth in the debt to the rate of growth in GDP.[2]

required surplus = (interest rate – GDPgrowth.rate)*(debt/GDP)

If the interest rate on the debt is equal to the growth rate in GDP, then the primary budget surplus required for a stable debt to GDP ratio is zero. The government can simply borrow what is needed to pay interest and this additional borrowing will cause the debt to grow at the same rate as GDP. If the interest rate exceeds the growth in GDP, some surplus is required to keep the debt to GDP ratio from increasing. On the other hand, if GDP grows faster than the interest rate, the government could run a primary budget deficit and still maintain a stable debt to GDP ratio. A lot hinges upon the relative growth rates in GDP and the interest rate on the debt.

The chart below provides a historical comparison of the interest rate on the debt and the growth in GDP using a 10-year moving average to smooth noise associated with business cycles. I computed the annual debt interest rate from the CBO January 2016 BEO supplemental data, taking the ratio of interest outlays to the previous year's debt (interest was from Table 3: Outlays, By Major Category, Since 1966) while debt was from Table 1:1. Revenues, Outlays, Deficits, Surpluses, and Debt Held by the Public Since 1966).



While these moving averages have been quite similar since 2005, there was an extended period where the interest rate exceeded the GDP growth rate. Further back, the gap went in the other direction. Over the past 30 years, the gap is 0.6 percentage points. The current debt to GDP ratio is about .74 CBO projects it to grow to .79 by 2025 (CBO BEO Jan 2016, page 2, Table 1). Assuming the debt to GDP ratio is 0.8 in 2035 and using the 30-year average gap between the interest rate and GDP growth of 0.6 yields 0.48 as the primary budget surplus required for a stable debt to GDP ratio.

It is worth noting that the 20- and 10-year average gaps are close to zero (the average interest rate has been roughly equal to the average growth rate in GDP. If one is willing to bet on this for the long term, one could eliminate the 0.5% primary budget surplus and tax revenue requirements would fall by a like amount. I think it is safer to set aside the surplus—particularly if the debt to GDP ratio continues to grow.

There are other items that CBO projects will add to the deficit each year through 2026. The line item is "other means of financing" and is detailed in table 1-3 in the January 2016 BEO report. It averages 0.2 percentage points of GDP during the period 2021-2026 and appears to be mainly borrowing support student loans. However, in the out years of the LTBO, this seems to be set to zero so it should not be a factor for the triangle.

APPENDIX: LIST OF MODEL VARIABLES AND DATA SOURCES

US Population: CBO LTBO 2015 tab 2. Because the CBO numbers were rounded to the nearest million, I used a five-year moving average with the 2017 estimate as the average of the 2015–2019 figures from CBO.

Population Enrolled in Medicare: Medicare enrollment by part and in total (in millions) - downloaded from CMS. It contains actual data from 1967 through 2013 and projections through 2087 (calendar year).

GDP: CBO BEO 2016 tab 2. This projects calendar year GDP through 2026. I apply the 2026 growth rate for subsequent years (4.14% annual growth)

Economy-wide Inflation: CBO BEO tab 2. This projects the GDP deflator through 2026. I apply the 2026 growth rate for subsequent years (2.1% annual growth). (So real GDP growth is projected at about 2% from 2026 through 2035.)

Medicare Age-Adjustment Index: I found data on per capita spending by Medicare beneficiaries by age group and applied them to projections of the Medicare population by age group to compute the change in spending per capita that would occur strictly due to the changing age composition. Here are the spending indexes by age group where I indexed to 65-74 = 1.0. Note that the under 65 have spending on the order of the 85+. Between 2017 and 2035, spending per beneficiary increases by 2.9 percent due to aging. The minimum occurs in 2021—less than a percent lower than in 2017.

Under 65	1.9
65-74	1.0
75-84	1.7
85+	1.9

Exchange Enrollee Adjustment Index: This is essentially an index reflecting changes in the share of the population enrolled in exchanges but also weighted for changes in the average subsidy percentage. It was constructed so that when I applied the cost trend assumed by the CBO for this population, I matched the CBO projection of the spending on exchange subsidies as a share of GDP. This index is 1.0 in 2017, rises to 1.03 in 2018, and then steadily declines, reaching .85 in 2035. This is essentially a 15% reduction in the share of the population in exchanges by 2035 compared to 2017. CBO cites real per capita economic growth causing a reduction in needs for subsidies (LTBO page 42).

Medicaid Enrollee Adjustment Index for Non-Duals: This is similar to the exchange enrollee index above but for Medicaid beneficiaries who are not also eligible for Medicare. It was estimated in a similar way and also declines from 1.0 in 2017 to .85 in 2035. The idea, I believe, is that a smaller share of the population will be in poverty in 2035 due to real economic growth and this reduces the Medicaid population (LTBO page 120).

2017 National Health Expenditures

- I took federal spending for Medicare, Medicaid, and CHIP from CBO BEO tab 9 (Table 3-2). This table provides fiscal year data. I estimated calendar year 2017 using the weighted average of fiscal years 2017 and 2018 with weights of .75 and .25.
- CBO estimated that 63% of Medicaid spending was federal so I estimated total Medicaid as federal/.63.
- I found that the federal match rate for CHIP ranged between 88% and 100% so I assumed 95%. Thus I estimated total CHIP as federal/.95.
- For the remaining components of NHE, I used the 2015 CMS projections for 2017. These projections were $27 billion higher than CBO for Medicare and $45 billion lower for Medicaid. Thus, the model estimate of NHE for 2017 was $19 billion higher than that projected by CMS.

Allocation of NHE to the Medicare Population: The model allocates various components of NHE between the Medicare population and the rest of the population.

- All Medicare spending was allocated to the Medicare population.
- For Medicaid, the federal component was estimated as 15.9% of Medicare spending and the total component was 27.6% of Medicare spending. These percentages came from an earlier analysis of 2013 NHE data in which I assumed that 36% of Medicaid spending was for dual eligibles (a figure I found in a Kaiser Family Foundation fact sheet). It was inappropriate to use this 36% figure in 2017 because Medicaid expansion increased spending by non-duals. In the model, the share of

Medicaid allocated to duals in 2017 turns out to be 30% using the approach described above. This is smaller than the 36% in 2013 as expected due to Medicaid expansion.

- To estimate total personal health spending and the cost of insurance for the Medicare population, I assumed that 70% of such spending was paid by Medicare and Medicaid based upon 2008 data from the Medicare Beneficiary Survey. This is old and somewhat rough but was the best estimate I could find. Thus, I estimated total personal health spending plus the cost of insurance as (Medicare spending + Medicaid dual spending)/.70.
- The remainder of NHE, consisting of public health, research, structures, and equipment, was taken from the CMS projection for 2017 and allocated to the Medicare population in proportion to the Medicare share of the total population in 2017 (17.8%).

Allocation of NHE to the Non-Medicare Population: I estimated allocations to the non-Medicare population by subtracting the Medicare population allocation from the total amount from the 2017 NHE projections by component. As noted above, I took these 2017 NHE projections from the CMS projection except for Medicare, Medicaid, and CHIP which were from CBO BEO.

- The allocation to the non-Medicare population included a component for other federal health spending in the NHE personal health care expenditures (other than Medicare, Medicaid, and CHIP). This consists of federal health spending on the DOD, VA, IHS, maternal and child health, vocational rehabilitation, other federal programs, and SAMHSA. In the 2014 NHE, these amounted to 4.3% of total personal health spending plus cost of insurance and this percentage was used to estimate this spending in 2017.

Medicare Premium Offset: CBO BEO tab 9 (Table 3-2) includes estimates of revenues that offset Medicare spending. This table provides fiscal year data. I estimated calendar year 2017 using the weighted average of fiscal years 2017 and 2018 with weights of .75 and .25. Most of the offset comes from part B premiums but there are other sources as well.

- CBO note states that the offset includes premium payments, recoveries of overpayments made to providers, and amounts paid by states from savings on Medicaid's prescription drug costs.
- CBO fiscal year estimates from Table 3-2 run through 2026 and my calendar year calculations were therefore through 2025. I held the offset percentage steady from 2025 through 2035 (16.3%).

[1] Because private insurers pay higher prices than Medicaid, this shifting to private insurance could increase the overall cost trend for the non-Medicare population. However, Medicaid spending accounts for about 22% of spending for the non-Medicare population. So 15% of the non-dual Medicaid population (projected to switch to private coverage) would be the equivalent of about 3% of spending by the non-Medicare population. If their spending were to increase by 50%, spending by this population would be 1.5% higher in 2035 due to the shift. This would increase the overall cost trend by less than 0.1 percentage points. It is difficult to know what the true impact on spending would be since those shifting to private coverage would likely be a bit healthier (higher income) than before and could be subject to deductibles and copays that are not present under Medicaid. Because the adjustment would, in any case, be small, I decided not to adjust the trend factor for this projected shift.

[2] The growth rate in the debt is equal to (interest costs minus surplus)/debt = interest rate minus surplus/debt. Setting this equal to the GDP growth and solving yields: surplus/debt = (interest rate minus GDP growth rate). Multiply both sides of this equation by the debt to GDP ratio and we have surplus/GDP = (interest rate minus GDP growth rate)*(debt/GDP).