The Role of Health Care Spending in Projecting Federal Elderly Entitlement Spending

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A Technical Report

Executive Summary

Spending on Medicare and Social Security is expected to grow considerably in coming years, commanding an increasing share of the nation's output. This study begins by comparing the long-run forecasts for Medicare and Social Security made by the Congressional Budget Office (CBO) and the forecasts presented in the respective trustees' reports.

- The CBO's long-range forecast of Social Security's revenue shortfalls is more optimistic than is the trustees' forecast.

- Based on the CBO's forecast, Social Security will require a payroll tax rate increase of 7.4 percent each of the next 75 years to balance its books, while the trustees' forecast suggests that the tax rate increase will be 13.7 percent.

- In contrast to its forecast for Social Security, the CBO's long-range forecast of Medicare's revenue requirements is significantly more pessimistic than is the trustees'.

- In 2060, the CBO projects that Medicare will require revenues in addition to dedicated taxes and premium payments equal to 6.5 percent of gross domestic product (GDP) or 85 percent of federal income taxes at their historical share of GDP.

- In the same year, the trustees project that Medicare will require general revenues equal to 61 percent of federal income taxes at their historical share of GDP.

- The combined Medicare and Social Security financing requirements in 2060 based on the CBO's estimates are 93 percent of income taxes, while the trustees

estimate that the programs will require additional financing amounting to 72 percent of income taxes.

Given the quite different long-run implications of these forecasts, mostly due to the Medicare estimates, we turn to the underlying methodologies used by the CBO and the trustees. Both forecasts rely on contrasting assumptions about the rate at which excess cost growth in health care spending is assumed to decline from its historical rate over time. We propose an alternative methodology for forecasting health care that takes into account other consumption — a consideration that is absent in the CBO's and the trustee's methodologies.

In particular, our estimation methodology answers this question: If health care spending is projected to grow as a percentage of GDP, which of the other components of GDP will necessarily decline? The proposed estimation and forecasting methodology is easily updated on an annual basis. The model's estimates of the future composition of GDP calls into question the sustainability of growing health care spending in the broader context of growing consumption spending.

Our forecasts suggest that health care spending as a share of GDP will rise but not to the same degree as the CBO's and the trustees' forecasts.

- In 2082, our estimate of national health expenditures is 36 percent of GDP; the Centers for Medicare and Medicaid Services (CMS) estimates about 44 percent, and the CBO estimates 50 percent.

- Thus, the approach we use produces an ultimate estimate of health care's share of the economy that is lower than the CBO and CMS estimates, though of similar magnitude.

Importantly, though, our forecasts of health care are made in the context of forecasts of the other components of GDP. The projections suggest that other personal consumption expenditures as shares of GDP will also rise in the future. The growth in these shares will come at the expense of declining nonpersonal consumption components of GDP that include domestic investment, government consumption and net exports. In particular, the estimated substantial decline in investments beginning in the second decade of the forecast suggests that the growth in GDP would fall below the anticipated rate. Such a decline is not economically compatible with the forecasts for the other sectors of the economy, including the health care sector. Thus, the projected growth in health care spending as a share of GDP is probably not sustainable beyond the next 10 to 12 years unless there is a dramatic realignment of the historical relationships between health care consumption, other consumption spending and investment. This conclusion applies to the other CBO's and the trustees' forecasts as well.

Introduction

Among developed countries, the United States boasts the highest share of economy devoted to health care spending, accounting for over 16 percent. By some estimates, health care's share of the economy will grow to almost 27 percent within 20 years and to 32 percent within the next 30 years. Given the large and growing role of government payers in the health care system, significant increases in taxes will be needed to support the growth.

Health care spending is not the only factor driving projected government spending, however. The federal government has growing pension payments in the form of Social Security benefits, and there is and will continue to be pressure for the federal government to pick up the tab of employers' health care commitments to former employees.

Long-run Medicare and Social Security projections have historically been the domain of the programs' respective actuaries and are disseminated annually in the trustees' reports. However, the Congressional Budget Office (CBO) has recently prepared it own long-range assessments of the two programs and estimates that Social Security's future burden will be less onerous than the trustees estimate. On the other hand, the CBO's estimates of Medicare costs in 2060 are almost 25 higher than the trustees' estimates.

We begin with a comparison of the trustees' and the CBO's projections for Social Security and Medicare and then focus on forecasting future health care spending. Forecasting health care spending is highly uncertain and, as we will see, the forecasts for later years are driven by the underlying assumptions about health care spending growth relative to the rest of the economy. In the final section, we offer an alternative methodology for forecasting health care spending that takes into account the demand for other goods and services.

Two Views of the Road Ahead

The CBO and the trustees have divergent forecasts of Social Security's and Medicare's costs and revenues, but both sets of forecasts show that federal spending is anticipated to rise rapidly in coming years, far outpacing any dedicated revenues.

Social Security. The two forecasts of Social Security costs and revenues as shares of gross domestic product (GDP) are shown in Figure 1. The CBO's cost projections are lower than the trustees', and at the same time its revenue projections are higher. On the revenue side, the CBO assumes higher revenues from income taxes on Social Security benefits based on the expiration of tax reductions, while the trustees assume static income tax rates. On the cost side, the CBO calculates lower average benefits than do the Social Security actuaries, resulting in lower aggregate costs each year.[1]

Figure 1. Social Security Revenues and Costs
CBO's and Trustees' Estimates
as Percentages of GDP
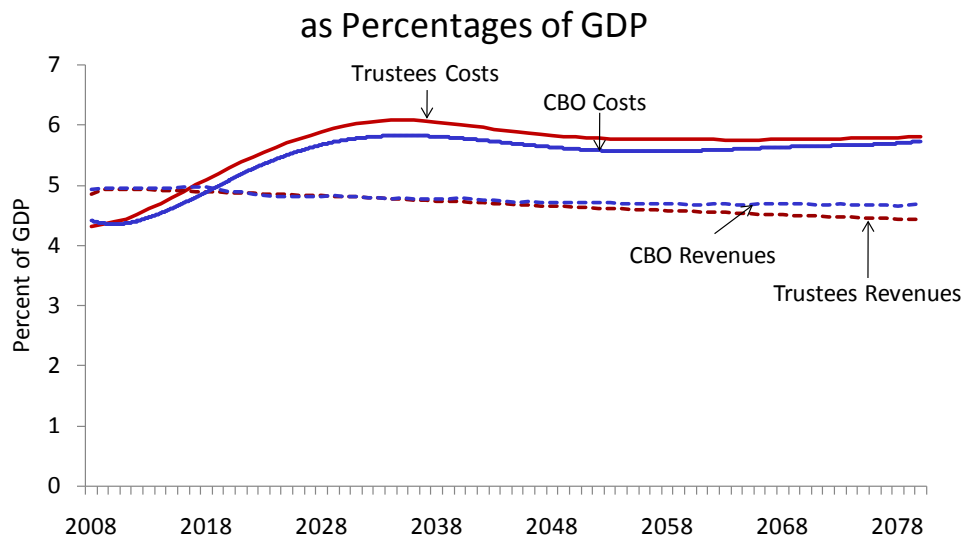
Sources: 2008 Social Security Trustees Report and *Updated Long-Term Projections for Social Security*, CBO, August 2008.

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[1] See *Updated Long-Term Projections for Social Security*, Congressional Budget Office, August 2008, Appendix B, for a comparison of the CBO's and the trustees' estimates and assumptions.

Notice that the trustees anticipate that tax revenues will exceed costs until 2017 and that the crossover year is 2019, based on the CBO estimates. Paying scheduled benefits in all future years will require increased revenues in the form of higher payroll or income taxes. The two forecasts differ substantially on other measures of the program's financial health, such as the actuarial deficit and the Trust Fund exhaustion date, due to the differing cost and revenue projections as well as a different interest rate assumption — the CBO assumes a 3 percent real rate, while the trustees assume a lower 2.9 percent rate. The 75-year actuarial deficit, the payroll tax rate increase necessary to make the system solvent for 75 years using Trust Fund accounting, is 1.06 percent under the CBO assumptions but is 1.70 percent using the trustees' assumptions. The CBO estimates that the Trust Fund will be exhausted in 2049, or eight years after the trustees' estimate. However, in terms of the federal budget, the only date that really matters is the crossover year and, as we will see, when Social Security is combined with Medicare, the combined programs already require general revenue transfers under both forecasts.

Medicare. Forecasting future Medicare spending is much more difficult than forecasting expected aggregate Social Security benefits. The Social Security benefit formula is known, and benefits can be directly calculated based on workers' earnings histories. Medicare benefits are not tied to past wages and are conditional on retirees' health care consumption in a rapidly changing market. Consider the relative difficulty in forecasting current retirees' projected Social Security benefits and Medicare benefits. Projected Social Security benefits for this group are essentially retirees' benefits today inflated by projected inflation rates combined with anticipated life tables. In contrast, projected Medicare benefits over the remaining lifetimes of today's retirees are a function of advancing medical care technology, changing relative prices and

changing incentives in the health care market for both retirees and the suppliers of their health care.

The relative difficulty in estimating Medicare benefits is compounded by forecasts that move beyond current retirees. Clearly, different models and assumptions will dramatically affect the forecast path of health care spending. The CBO's and the trustees' Medicare forecasts illustrate how differing health care growth assumptions, particularly those for later years, can produce quite different outcomes. Figure 2 presents the two forecasts as they stood in 2007 rather than 2008 because the CBO has not issued an update of the November 2007 estimates. From the figure we see that the estimated spending paths are similar until about 2034, but thereafter the CBO's estimates grow more rapidly. In 2034, both the CBO and the trustees expect Medicare's total costs to equal 7.2 percent of GDP, but by 2050 the CBO expects total costs of 10.2 percent of GDP, while the trustees estimate costs of 9.0 percent of GDP. By 2082, the CBO estimates that Medicare spending alone will rise to 17 percent of GDP, which is a greater percentage than all Americans combined currently spend on health care. In contrast, the 2007 trustees' report estimated Medicare spending will be 11.4 percent of GDP by 2082, or a third less than the CBO projection. The funding shortfall between Medicare's costs and dedicated revenue sources — Part A payroll taxes, income taxes on Social Security benefits and premium payments and state transfers — grows each year by both estimates. Dedicated revenues include the current Medicare payroll tax revenues of 2.9 percent of covered earnings, for which there is no taxable maximum (unlike Social Security). Premium payments from Medicare enrollees cover approximately 25 percent of Part B costs and a similar percentage of Part D costs is covered by premiums and state transfers. General revenues of the federal

government have historically been used to cover the remaining 75 percent of Parts B and D spending.

Figure 2. Medicare Revenue and Costs CBO's and Trustees' 2007 Estimates
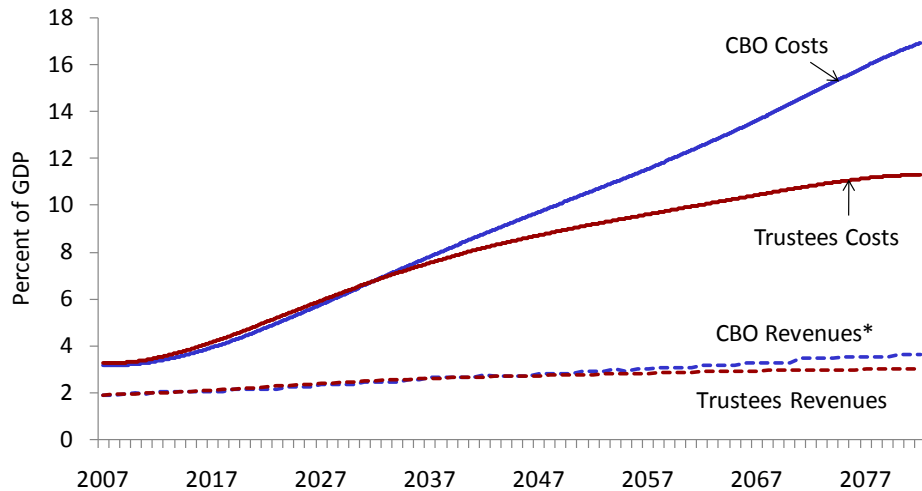
Forecasting Health Care Spending

The divergence in the long-run Medicare cost projections is driven by different assumptions about the degree to which health cost growth outpaces the growth of the rest of the economy. In this section, we discuss the two forecasting methodologies and then produce an updated 2008 estimate using the CBO's assumptions for comparison with the 2008 trustees' forecasts. Doing this allows for comparison of the two forecasts of total elderly entitlements based on 2008 estimates. Both the CBO's and the trustees' forecasts begin by recognizing that per capita health care spending has grown more rapidly than per capita GDP. Table 1 shows the

real growth rate in per capita GDP and per capita national health expenditures (NHE) for different subperiods between 1960 and 2006.

Table 1

Real Per Capita National Health Spending Compared with Real Per Capita Gross Domestic Product

Period		Per Capita Growth Rate		Difference
First Year	Last Year	GDP	NHE	NHE-GDP
1960	1969	3.40	6.37	2.96
1970	1979	2.63	4.64	2.00
1980	1989	2.43	5.30	2.87
1990	1999	2.12	3.31	1.19
2000	2006	1.40	3.90	2.50
1960	2006	2.27	4.79	2.51
1970	2006	2.09	4.37	2.28
1980	2006	2.03	4.26	2.24
1990	2006	1.88	3.55	1.67
2000	2006	1.40	3.90	2.50

Source: National Health Expenditure Data (1960–2006), Centers for Medicare and Medicaid Services. GDP implicit price deflator used to convert per capita amounts to 2000 dollars.

The top half of the table shows the average real growth during the 1960s, 1970s, 1980s, 1990s and for the period 2000–2006. Per capita health care spending grew most rapidly during the 1960s, when Medicare and Medicaid were passed. During the 1960s, the difference between per capita health spending and per capita GDP stood at 2.96 percent, and the 1980s were a close second when the differential was 2.87 percent. The bottom half of the table presents the relative growth rates for the period ending in 2006. From 1960 to 2006, the real growth rate in per capita GDP was 2.27 percent, while the growth rate in per capita national health expenditures was 4.79 percent, for a difference of 2.51 percent. Beginning in 1970, so as to exclude the startup of Medicaid and Medicare, produces a differential between per capita national health expenditures

and per capita GDP of 2.28 percent. The difference between health care cost and GDP per capita

is often referred to as the "excess health care cost growth."[2]

To forecast spending, several questions must be answered regarding the future evolution

of excess health care cost growth. First, will this relationship persist into the future, and, if so,

how long will it continue? Second, if the excess cost growth is anticipated to decline through

time, at what rate should it decline? Different answers to these questions produced the range of

outcomes reflected in the CBO's and the trustees' estimates for Medicare.

The first 10 years of the CBO's 2007 projections, 2007 to 2018, are based on its

projections in support of its analysis of the 2008 budget.[3] For the remaining years, the excess

cost growth is assumed to start at the historical average of 2.4 percent in 2018 and is assumed to

decline to 1.1 percent in 2082. These excess cost growth assumptions are coupled with GDP

growth assumptions and an age composition index to produce the long-range forecast. The age

composition index takes into account the percentage of the Medicare population in three age

groups (65 to 74, 75 to 84 and 85 and above) as well as the average health care spending by

retirees in each of these age groups.

The Office of the Actuary at the Centers for Medicare and Medicaid Services currently

uses a similarly structured methodology to produce its Medicare spending forecasts, with the

main difference being the time path of the excess cost growth assumptions.[4] The first 10 years

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[2] The differences reported in Table 1 do not remove the effects of the changing age structure of the population. See the 2004 Technical Review Panel on the Medicare Trustees Report, "Review of the Assumptions and Methods of the Medicare Trustees' Financial Projections."

[3] See "The Long-Term Outlook for Health Care Spending," Congressional Budget Office, November 2007, for a complete description of the CBO's forecasting method and assumptions.

[4] See memo report, "The Long-Term Projection Assumptions for Medicare and Aggregate National Health Expenditures," March 25, 2008, Todd G. Caldis, Office of the Actuary, Centers for Medicare and Medicaid Services. This memo provides an excellent overview of the relationship between the actuaries' current and past

of the actuaries' projections are based on applying anticipated growth rates within the component

services such as hospital care, skilled nursing care and physician services that make up

Medicare's aggregate spending. For years 11 to 24 of the forecast, separate excess cost

differentials for Medicare's three parts (A, B and D) are applied such that by the 25th year all of

the differentials converge to the same number. From that year to the 75th year of the forecast,

the differential is scaled down such that at the end of the projection period the excess cost growth

is almost eliminated. The particular excess cost growth rates in each year are determined by

calibrating with the actuaries' computable general equilibrium (CGE) model.[5] The output of the

CGE model is first determined so that the actuarial deficit of Medicare's Health Insurance (Part

A) component is consistent with the actuarial deficit that would result from the assumption that

per capita spending grew at a rate of 1 percentage point above per capita GDP.

Figure 3 depicts the 2008 trustees' estimates of Medicare's costs as a percentage of GDP

along with three other estimates. The 2008 trustees' estimates of Medicare's costs of 10.8

percent of GDP in 2082 are slightly lower than the 2007 estimates of 11.4 percent. The series

based on the CBO assumptions is developed using the CBO's updated budget projection for the

first 10 years along with the excess Medicare cost growth assumptions that begin at 2.4 percent

in 2018 and again declines to 1.1 by 2082.[6] The 2082 value of the updated CBO series is 17.3

percent of GDP, whereas the CBO's estimate from its 2007 report for the terminal year was

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forecasting techniques, the relationship between the current technique and a computable general equilibrium model
and anticipated future modeling tools.

[5] For a complete description of the general equilibrium model, see "Projecting Long-Term Medical Spending
Growth," Christine Borger, Thomas Rutherford and Gregory Y. Won, *Journal of Health Economics*, 27 (2008), pp.
66–88. The memo by Todd G. Caldis, March 25, 2008, describes the calibration method used in implementing the
model's output.

[6] The updated budget projection for Medicare between 2008 and 2018 is from "The Budget and Economic Outlook:
An Update," Congressional Budget Office, September 2008. The projection method described in "The Long-Term
Outlook for Health Care Spending," Congressional Budget Office, November 2007, is used to update the forecast,
but the economic and demographic forecasts from the Medicare and Social Security trustees are incorporated in our
estimates. The age composition index is modified to include disabled Medicare beneficiaries, and the per capita
personal health expenditures are from the 2004 Age Estimates in the National Health Expenditure Accounts.

essentially the same at 17 percent of GDP. So, the relationship between the CBO's 2007

projection and our projection for 2008 that uses the CBO's excess Medicare cost growth

assumptions is similar. For comparison purposes, two other series are depicted in the figure.

The lower estimate is made assuming that per capita Medicare costs outpace per capita GDP

growth by 1 percentage point in all years from 2018 to 2082, and the upper series assumes an

excess cost growth assumption of 2.4 percentage points for these years.[7] The first 10 years for

these two series are set to the 2008 trustees' forecasts. The trustees' demographic (age structure,

disabled share) and economic forecasts (GDP per capita) combined with the excess cost growth

parameters are used to produce these two series for 2018 to 2082. We estimate a terminal value

for the GDP + 1 series of 11.4 percent of GDP. If Medicare spending per capita persistently

exceeds GDP growth per capita by 2.4 percentage points, the proportion of GDP taken up by

Medicarewill grow to be 27 percent by 2082. The reasonableness of any of these forecasts is

difficult to determine given the length of the horizon, the economic implications and, of course,

the uncertainty. In a later section we will return to the issue of forecasting health care spending

and offer our own estimates that take into account the consumption of other goods and services.

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[7] The CBO estimates that Medicare's excess cost growth was 2.4 percent for the years 1975 to 2005. See "The Long-Term Outlook for Health Care Spending," Congressional Budget Office, November 2007.

Figure 3. Medicare Costs
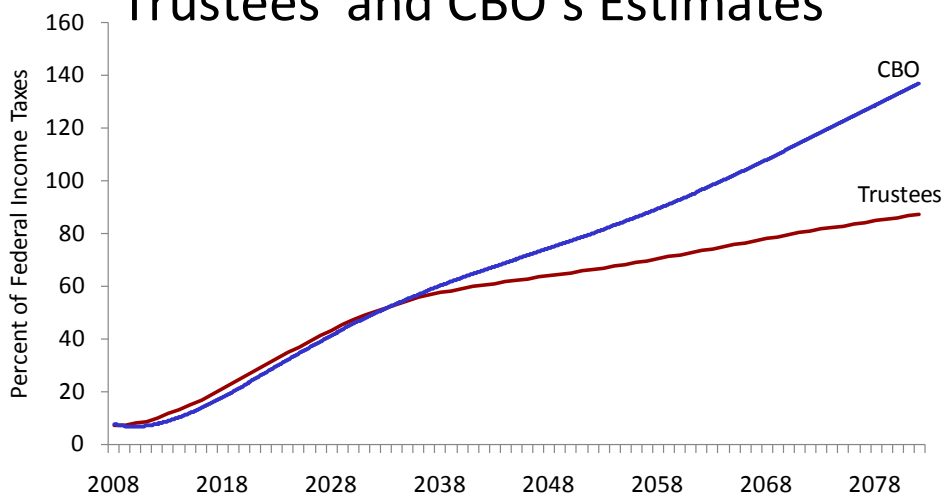## Trustees 2008 Estimates Compared to
Other Estimates
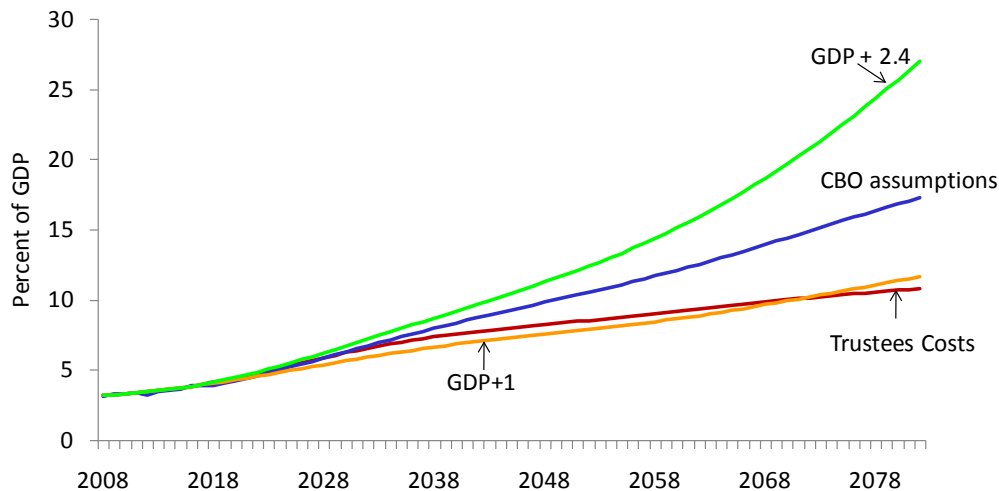
Sources: Trustees Costs from 2008 Social Security and Medicare Trustees Report. CBO assumptions - estimated using the excess cost growth assumptions in *The Long-Term Outlook for Health Care Spending,* CBO, November 2007 coupled with CBO Baseline Budget projections 2008-2018, September 2008. The GDP+1 and GDP+2.4 series are estimated using the Trustees economic and demographic assumptions.

Combined Social Security and Medicare Funding Requirements

Next we combine the trustees' 2008 Social Security and Medicare forecasts and combine the CBO's 2008 Social Security forecast with our estimates of Medicare's costs using the CBO's assumptions as described above. General revenue funding requirements are determined as the difference between forecast costs and dedicated revenues from payroll tax revenues, federal income tax revenues on Social Security benefits that are dedicated to the programs and Medicare Parts B and D premiums and state transfers in support of Part D. Figure 4 depicts the general revenue funding requirements based on the two forecasts where the funding is benchmarked relative to the historical level of federal income taxes. Over the last 50 years, federal corporate and individual income taxes have averaged 10.7 percent of GDP. The shortfalls are denominated

in terms of federal income tax revenues because they largely fund the Part A deficit and the Parts B and D general revenue transfer. Further, under the conventional understanding of Trust Fund accounting, Social Security's funding during the years the Trust Fund bonds are being exercised will come from general revenues.

Figure 4. Social Security and Medicare Combined Funding Requirements Trustees' and CBO's Estimates

The first 25 years of the two forecasts are similar, with both estimates requiring 50 percent of federal income taxes by 2032. Given that in 2008 Medicare and Social Security combined will require general revenues equal to about 7 percent of the historical level of federal income taxes, in the next 25 years income taxes will have to rise 43 percent or other programs will have to be cut to maintain current taxes levels. By 2050, the general revenue requirement will be 65 percent of income taxes based on the trustees' projections and 78 percent based on the CBO estimates. The funding requirements will reach 100 percent of federal income taxes by 2064 with the CBO forecasts. By 2082, the trustees' estimates indicate a general revenue

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funding requirement of 87 percent of the historical level of federal income taxes, while the CBO

forecast is 137 percent.

Both forecasts point out that the federal government's role in the economy will rise

significantly in coming years if these two programs continue in the current forms and if no cuts

are made in other spending. But other federal spending, particularly Medicaid, is on the same

trajectory as is Medicare spending. The two forecasts of Medicare spending imply that health

care spending in general will grow as a share of the economy. In the next section, we return to

forecasting health care spending and offer an alternative approach.

An Alternative Approach to Forecasting Health Care Spending

Although both forecasts of Medicare spending suggest substantial growth over the

coming decades, the ultimate share of the economy devoted to Medicare based on the 2008

trustees' report was 10.8 percent of GDP, while the estimate based on the CBO's assumptions

was 60 percent higher at over 17 percent of GDP in 2082. The CMS produced an aggregate

estimate of national health expenditures, consistent with the 2008 trustees' report assumptions,

that rises from 16 percent of GDP in 2006 to almost 44 percent by 2082, while the CBO estimate

of NHE reaches almost 50 percent of GDP in 2082.[8]

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[8] Our 2008 update of "The Long-Term Outlook for Health Care Spending," Congressional Budget Office, November 2007, produces a terminal value for NHE of 49.9 percent of GDP. The terminal value for NHE from the CBO's 2007 report was 48.9 percent of GDP. The CMS estimates are from Chart 4 in the memo, "The Long-Term Projection Assumptions for Medicare and Aggregate National Health Expenditures," March 25, 2008, Todd G. Caldis, Office of the Actuary, Centers for Medicare and Medicaid Services.

Such estimates imply that other types of consumption will necessarily decline as a share of GDP as health care comprises a growing share of GDP. But is a decline in the share of other consumption, of the magnitude suggested by the forecasts, reasonable and consistent with economic theory? The fact that health care spending is growing as a share of GDP suggests that it is a luxury good but that other goods and services are normal goods, so their consumption must continue to increase in real terms as real income rises. The methodologies used to forecast health care spending as described earlier are essentially built on the relationship between per capita health care spending and per capita GDP growth. The isolated treatment of relating health care to GDP in developing the forecasts omits the critical interactions between health care and other consumption.

It is essential to point out that the CBO's and the trustees' forecasts are made under the assumption that "current law" persists as it applies to federal payers such as Medicare and Medicaid. This assumption is necessary if the respective forecasts are to inform Congress of the potential long-run costs of the programs. The issue of sustainability is addressed by the CBO and the trustees. The *2004 Technical Panel Report,* which reviewed the trustees' assumption, specifically recommends that "the Trustees continue to project medical care and Medicare expenditures under current law. The Panel further recommends that judgments about the sustainability of medical services consuming particular shares of GDP play no role in those projections."[9] The CBO notes "That aspect of the projections [that Medicare and Medicaid spending grows more rapidly than other health care spending] may appear unrealistic, but it highlights the core problem — the unsustainability of current federal law. (The inherent tension

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[9] See *Review of Assumptions and Methods of the Medicare Trustees' Financial Projections*, Technical Review Panel on the Medicare Trustees Reports, December 2004, recommendation I-4.

in making long-term projections for a federal health care system that cannot be sustained in its current form must manifest itself in some way.)"[10] These assumptions are necessary to show the full impact of current law on projected federal spending, but, as we will see, the projected spending path is at odds with the underlying GDP estimates on which the health care forecasts are based.

One way to appreciate the implications of growing health care consumption is to place it in the context of other consumption. Figure 5 depicts the components of GDP from 1965 to 2008. It divides GDP between four components of personal consumption expenditures (PCE) and the rest of GDP. PCE is divided between nondurable goods, durable goods, all other services other than medical care services and medical care services.[11] The rest of GDP includes investment, net exports and government consumption. As the figure illustrates, medical care's share of GDP grew between 1965 and 2008, as did the share of all other services besides medical care. The share of GDP going to durable goods consumption was relatively stable over the time period, but the consumption share of nondurable goods and the share of the nonpersonal consumption component of GDP declined. As this illustrates, the shares of the economy associated with medical care services and other services have grown over time, and durable goods' consumption share has remained about the same. The growth in services as a share of GDP has come at expense of nondurable goods consumption and investment, government consumption and net exports. If past trends continue, increased medical care consumption would imply further reductions in nondurable goods and non-PCE consumption. Additionally, if other

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[10] See "The Long-Term Outlook for Health Care Spending," Congressional Budget Office, November 2007, p. 12.
[11] In 2006, the medical care services component of personal consumption expenditures equaled 12 percent of GDP. In 2006, national health expenditures were equal to 16 percent of GDP, and the personal health care component was equal to 13.4 percent.

services continue to expand as a share of GDP and durable goods remain at a relatively constant

share, there are distinct limits on how large health care spending can grow as a share of GDP.

Figure 5. Composition of Gross Domestic Product 1965-2008
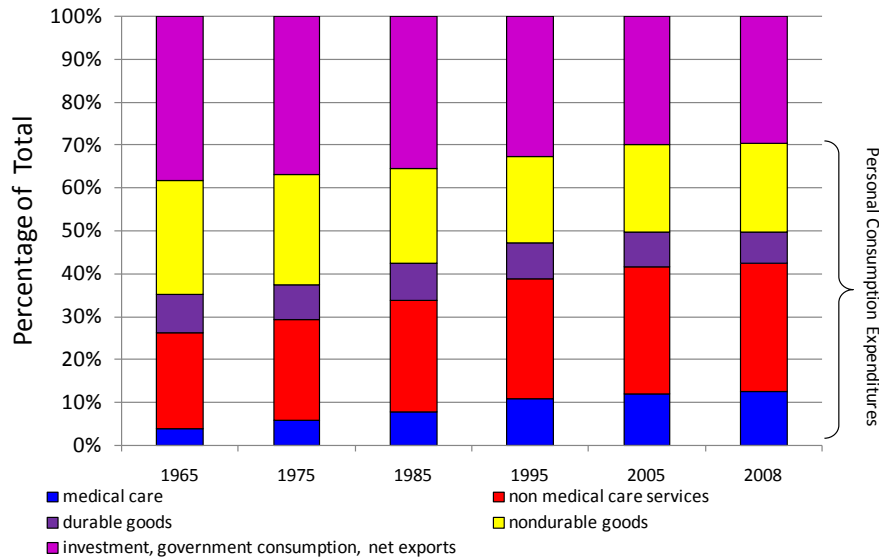
Econometric Modeling

As Figure 5 suggests, in forecasting the future composition of GDP, consideration must

be given to the interactions between its components. Including other consumption in forecasting

health care spending can be accomplished using demand system models that can be estimated

econometrically. We adopt a variant of the "almost ideal demand system" (AIDS) model

described in the seminal work by Deaton and Muellbauer (1980).[12] Since their study, the

theoretically consistent AIDS model has been used in many empirical demand system

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[12] Angus Deaton and John Muellbauer, "An Almost Ideal Demand System," *American Economic Review,* June 1980.

applications. We estimate a demand system model and use the results to forecast medical care service shares of GDP as well as the shares of the other components. [13]

Although the data underlying the series depicted in Figure 5 are available back to 1929 along with associated price indices necessary for estimating the model, the estimation period will have bearing on the forecasts. In particular, the introduction of Medicare and Medicaid likely led to structural changes in both the supply and demand sides of the health care market.[14] Therefore, we focus on the period from 1975 to 2008 to avoid the startup period after the introduction of Medicare and Medicaid. This is also the same period considered by the CBO in establishing the base excess cost growth assumptions used in its forecasts. Given the sample size, we consider a relatively small-scale AIDS system with the following five commodities/services, as are depicted in Figure 5: medical care services, other nonmedical care services, durable goods, nondurable goods and all other nonpersonal consumption expenditure components of GDP. Expenditure and price index data are from the National Income and Products Account (NIPA). Besides the NIPA data, other exogenous variables include the percentage of the population ages 20–64, 65–74, 75–84 and 85 and above. We also include an out-of-pocket share of health expenditure variable in the medical care share equation. The population variables are from the Social Security Administration, and the out-of-pocket share is from the 2006 national health expenditure data from the CMS.

We estimate the demand system model and use the parameter estimates to generate out-of-sample forecasts of the budget shares. The forecasts require, as in all other static demand systems, future values of prices, income (GDP), the age variables and out-of-pocket share of
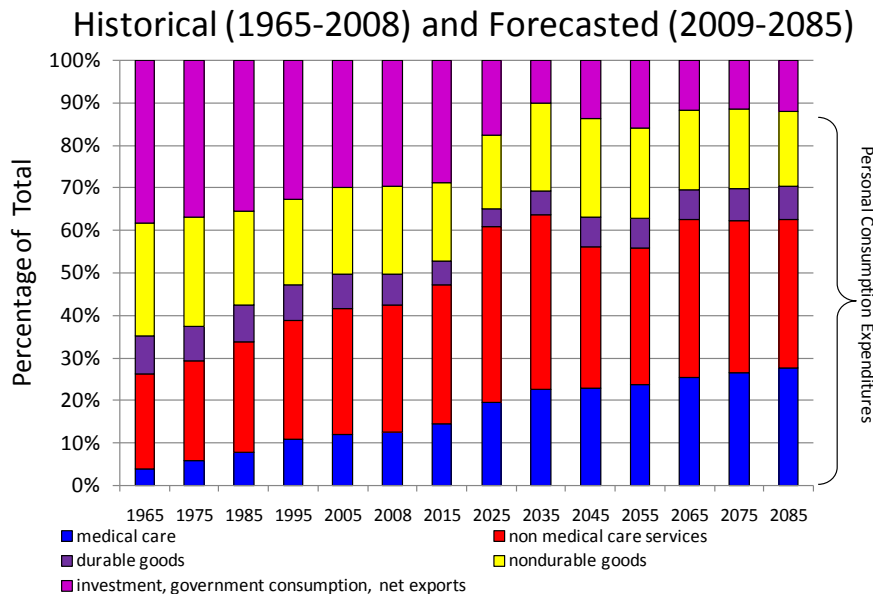
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[13] See Rettenmaier and Wang (2009), "Projecting Long-Term Health Care Expenditures: A Theoretically Consistent Demand System Approach," for a description of how we implement the model. The paper is available at http://www.tamu.edu/perc/perc/Publication/0901.pdf.
[14] See Amy Finkelstein, "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare," *Quarterly Journal of Economics*, February 2007.

health expenditure. We obtain out-of-sample GDP and its price deflator from the 2008 Social

Security trustees' report and the age structure from the Social Security Administration. Out-of-

pocket share is assumed to be static at its 2006 level. To generate out-of-sample price indexes

for the five commodity/service components, we regress their in-sample values on a constant and

the current period GDP price index. The predicted relations are then used to predict the out-of-

sample component prices based on the out-of-sample GDP price index from the trustees' report.

   Forecast. The forecast shares of GDP based on our demand system model are depicted

in Figure 6. Growth in the share of forecast personal consumption expenditures comes at the

expense of a decline in the share of non-PCE GDP. The forecast suggests that investment, net

exports and government consumption will decline from almost 30 percent of GDP in 2008 to 12

percent by 2085. The nondurable goods component of PCE is also forecast to decrease slightly

from about 21 percent of GDP in 2008 to about 18 percent by 2085.

Figure 6. Composition of Gross Domestic Product
Historical (1965-2008) and Forecasted (2009-2085)

medical care ∎ non medical care services
durable goods ∎ nondurable goods
investment, government consumption, net exports

Durable goods as a percent of GDP are forecast to remain relatively static starting at about 7.2 percent in 2008 and ending at about 8 percent in 2085. Services other than health care will rise to as much as 43 percent of GDP in 2031 from about 30 percent in 2008, and by 2085 they are forecast to be 35 percent GDP, or 17 percent higher than in 2008. Of particular interest for this study, medical care services will rise from 12 percent of GDP in 2008 to 23 percent by 2035 and to 38 percent by 2085.

Recall that the medical care services component of PCE is less than national health expenditures and is slightly less than personal health care expenditures. To derive an estimate of national health care expenditures' share of GDP, we assume that the ratio of national health care expenditures (16 percent of GDP in 2006) and medical care expenditures (11.96 percent of GDP) remains constant throughout the out-of-sample period. Figure 7 depicts our estimates of national health expenditures alongside the estimate by the CMS and our estimate based on the CBO assumptions. The first 10 years of all three forecasts are similar. From 2017 to 2033, our estimates are higher than the estimates by both the CBO and the CMS. In 2034 and later years, our estimates are below the CBO's estimates, and in 2040 and beyond our estimates are below the estimates produced by the CMS. As a point of comparison, Robert W. Fogel (September 2008) estimates that health care spending in 2040 will be in the neighborhood of 29 percent of GDP.[15] In that year, the CBO forecasts that national health expenditures will consume 33 percent of GDP, and the CMS and our forecasts indicate a 31 percent share of GDP. In 2082, our estimate of national health expenditures is 36 percent of GDP, the CMS estimates about 44

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[15] See Robert W. Fogel, "Forecasting the Cost of U.S. Health Care in 2040," NBER working paper #14361, September 2008.

percent, and the CBO estimates 50 percent.[16] Thus, the demand system approach we use

produces an ultimate estimate of health care's share of the economy that is lower than, but of the

same order of magnitude as, the CBO and CMS estimates.

Figure 7. Forecasts of National Health Care Spending as a Percent of GDP
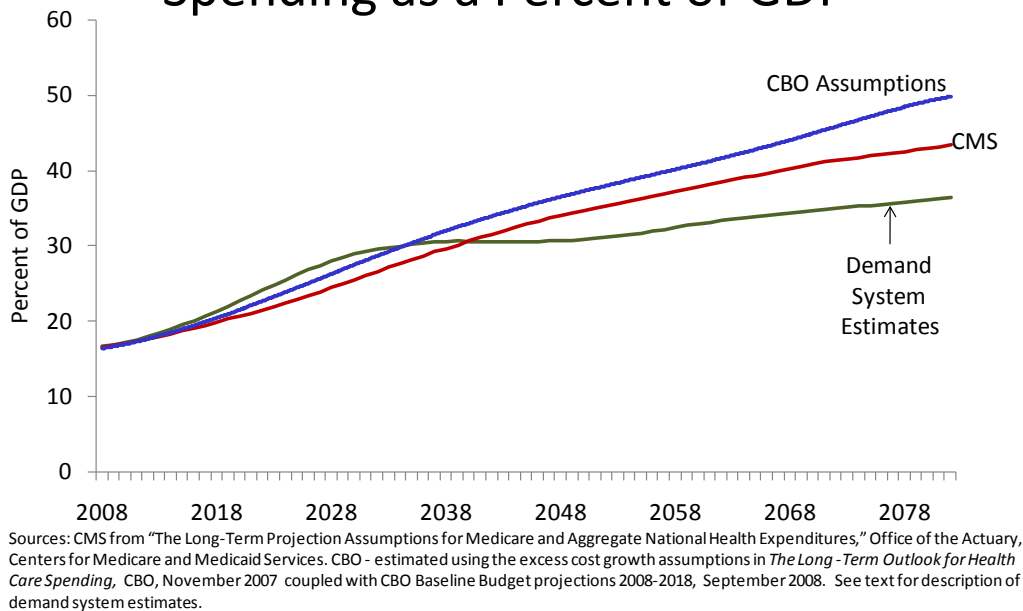
These three forecasts imply differing paths of excess cost growth across all age groups.

Figure 8 shows the age-adjusted excess cost growth over and above per capita GDP growth

implied by each of the three forecasts presented in Figure 7. The CMS forecast produces a time

path of excess cost growth that begins at about 1.5 percent in 2009 declines to about 0.4 percent

by 2082. The CBO excess cost rate begins at 2.1 percent and declines to 0.7 percent at the end

of the forecasting horizon. As seen in the figure, both the CBO and the CMS excess cost rates

follow the same path between 2036 and 2051. In contrast to the CBO and CMS forecasts, which

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[16] It is important to note that though the CBO's ultimate NHE estimate as a share of GDP is only 6 percentage points higher, the differential is due primarily to forecast Medicare spending. As indicated in Figure 3, the CBO assumptions' estimate for Medicare was also 6 percentage points higher than the trustees' estimate. This is due to the higher relative growth rate applied to Medicare spending.

are essentially built up from assumptions about the excess cost growth rates, the demand system

estimates are based on the interactions between the estimated coefficients and the forecasts of

future prices, GDP and the population age structure forecast. The interactions between the

population forecast and the respective age coefficients produce the implied excess cost rates

shown in the figure. The initial excess cost growth rate will be 2.2 percent in 2009 and will

increase to 2.46 percent by 2014. Thereafter, it will decline more rapidly than the other two

forecasts, such that by 2027 it will be below the excess cost growth rates in the CMS and CBO

forecasts. For the years 2039 to 2046, health care spending per capita will grow at about the

same rate as GDP per capita. Ultimately the implied excess cost growth rate from the demand

system model will be 0.3 in 2082.

Figure 8. Age-Adjusted Per Capita Excess Growth Rates for Health Care Spending
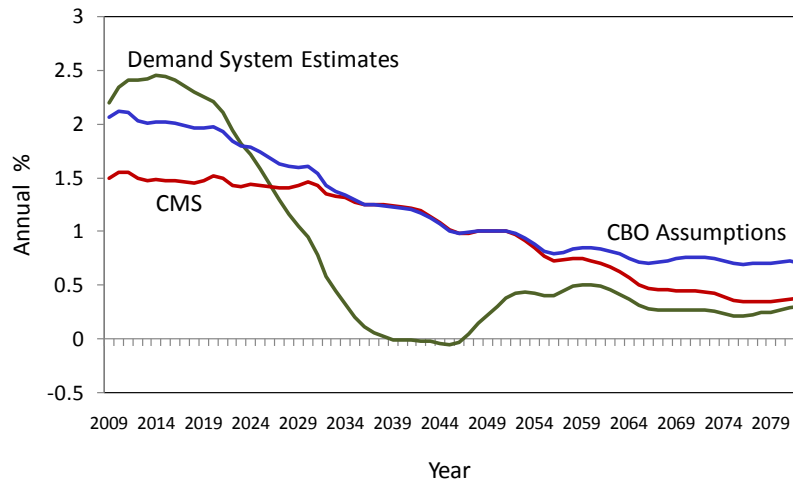
These annual age-adjusted excess cost growth rates are derived from the aggregate forecasts presented in Figure 7.

Sustainability. While our long-run estimates of national health spending are in line with

the other estimates, our forecasts of the other components of GDP raise the important question of

the sustainability of the present consumption path. Follette and Sheiner (2005) addressed the

sustainability of forecast health care spending as it related to excess cost growth ranging from

GDP + 0 to GDP + 2.5.[17] They concluded that the GDP + 1 assumption produced an aggregate

health care spending at the maximum of the sustainable range. A growth path was deemed to be

sustainable in their analysis if all other real per capita nonhealth consumption grew with real per

capita GDP. They found that any excess growth rate above 1 implied a fall in real nonhealth

consumption at some point in the forecast horizon.

Their approach allowed for implied substitution between health care and other

consumption. The estimates from our demand system model suggest that health care

consumption and the other categories of personal consumption expenditures are complements

and that the substitution is between PCE and the non-PCE components.[18] This is reflected in our

forecast declining share of non-PCE GDP.

Our estimates of the future shares of GDP take the GDP forecasts that underlie the Social

Security and Medicare trustees' reports as given. That is, the estimated future composition of

GDP does not affect the assumed growth in GDP. But our forecast suggests that the non-PCE

components of GDP, investment, government consumption and net exports will decline from 30

percent of GDP to only 12 percent.[19] Is such a decline sustainable?

Our estimates of the future composition of non-PCE GDP are presented in Figure 9.[20] As

suggested in the figure, both investment and government consumption are forecast to decline,

while the net exports will rise for the next 20 years and then will be negative again. Over the

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[17] See G. Follette and L. Sheiner, "The Sustainability of Health Spending Growth," *National Tax Journal,* 58(3), September 2005, pp. 391–408.

[18] See Rettenmaier and Wang (2009) Private Enterprise Research Center, working paper #0901.

[19] Follette and Sheiner (2005) also use the GDP estimates from the trustees' reports but make several assumptions about the future shares of GDP devoted to investments, government consumption and net exports that are consistent with the underlying growth in the GDP forecasts. Ultimately, they assume that these three components account for 30 percent of GDP in the long run, leaving PCE with 70 percent of GDP.

[20] The shares of non-PCE GDP are estimated using a secondary demand system model. The procedure includes investment, government consumption, exports and imports and their prices in the estimation and forecasting phase.

next 10 years, the shares of each component will be within their respective historical ranges, but thereafter investment in particular will drop dramatically. By 2032, gross private domestic investment will be zero, having dropped from 14 percent in 2008. In the later years, investment will rebound but will be only 8.5 percent of GDP in 2085. The forecast investment and government consumption shares would support the GDP growth in the trustees' assumptions for the next 10 to 12 years, but beyond that horizon, the decline in investments would not support the GDP series on which our forecast relies. This incompatibility applies to the forecasts made by the CBO and the trustees as well.

Figure 9. Composition of the non PCE Component of GDP
Historical (1965-2008) and Forecasted (2009-2085)
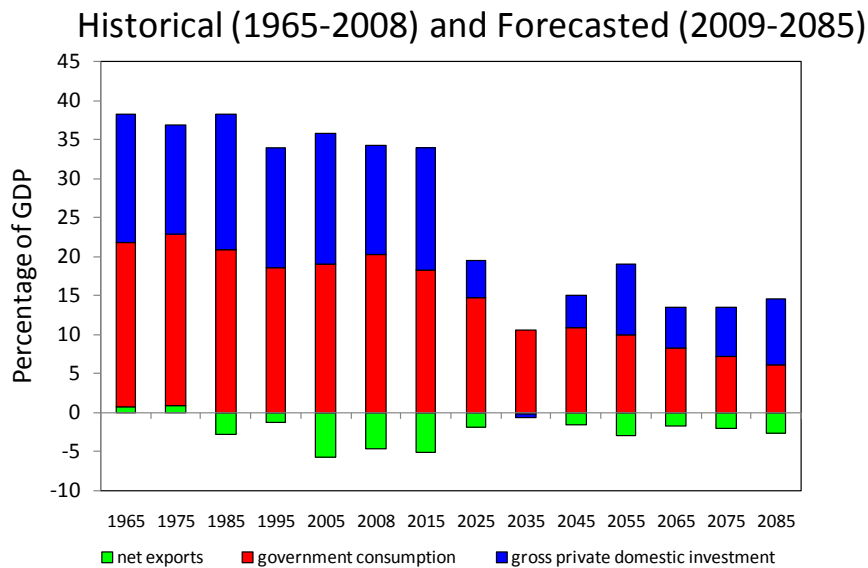
Conclusions

We have outlined the implications of the growth in Social Security and Medicare spending based on estimates by the Congressional Budget Office and by the Social Security and

Medicare trustees. Both entities anticipate significant elderly entitlement spending growth, but, as we have seen, the CBO's estimates of Social Security's funding requirement in addition to its dedicated funding sources are more optimistic than are the trustees' estimates. In contrast, though, the CBO's estimates of Medicare spending and the consequent funding requirements are much more pessimistic than are the trustees'. By 2082, the CBO's estimate of Medicare spending as a share of GDP is 17 percent, or 60 percent higher than the trustees' estimate.

Combining the forecasts for Social Security and Medicare by the CBO and by the trustees provides two differing views of the future for federal elderly entitlement spending. When we benchmarked the general revenue spending requirements relative to the historical level of federal income taxes, we saw that with the CBO forecasts an amount equal to 137 percent of federal income taxes is projected for 2082. In contrast, the trustees' estimates suggest that the programs will have a general revenue funding requirement of 87 percent of the historical level of federal income taxes by 2082.

Given the divergent health care spending forecasts, particularly for Medicare, we developed an alternative way of forecasting health care spending that is based on a system of demand equations that take into account the consumption of other goods and services. The technique recognizes that health care consumption must be estimated in light of its interactions with other product types within consumers' budgets. Our ultimate estimates of national health care spending as a share of GDP are lower than the estimates by the CBO and the CMS but still imply that health care spending could reach 36 percent of GDP by 2082. Our estimates also suggest that projections that assume persistent excess spending growth of the magnitude that existed in past years will produce unrealistic forecasts.

The approach we use produces an ultimate estimate of health care's share of the economy that is lower than the CBO and CMS estimates. Importantly, though, our forecasts of health care are made in the context of forecasts of the other components of GDP. The projections suggest that other personal consumption expenditures as shares of GDP will also rise in the future. The growth in these shares will come at the expense of declining nonpersonal consumption components of GDP that include domestic investment, government consumption and net exports. In particular, the estimated substantial decline in investments beginning in the second decade of the forecast suggests that the growth in GDP would fall below the anticipated rate. Such a decline is not economically compatible with the forecasts for the other sectors of the economy, including the health care sector. Thus, the projected growth in health care spending as a share of GDP is probably not sustainable beyond the next 10 to 12 years unless there is a dramatic realignment of the historical relationships between health care consumption, other consumption spending and investment. This conclusion applies to the other forecasts as well.

The CBO and the trustees must make their forecasts under the assumption that current law benefits for Medicare and Medicaid will continue indefinitely. This assumption is necessary to convey the full impact of the programs to members of Congress. However, given that the current path of GDP and consumption appears to be sustainable for only another decade, reform of the federal health care programs and a realignment of the health care sector will occur soon.