

**Office of the Actuary/National Health Statistics Group**

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Subject: The Long-Term Projection Assumptions for Medicare and Aggregate National Health Expenditures

The Office of the Actuary regularly produces 75-year projections of Medicare expenditures for the annual report of the Medicare Board of Trustees. The assumptions underlying these long-term projections have evolved over several decades through internal deliberations, the reports of three independent technical panels, ongoing discussions with the Medicare Trustees and their staffs, and the input of various external researchers. A summary of the assumptions and projection methods is regularly provided in the Medicare Trustees Report.

Because of the significance of the long-range projections for public policy makers, it is important for the projection assumptions to be as transparent and understandable as possible. The purpose of this memorandum is to promote a more complete understanding of the long-range cost growth assumptions by (i) describing the projection challenge, (ii) providing a detailed description of the current long-range assumptions, (iii) tracing the evolution of the long-range assumptions used in the Trustees Report, and (iv) evaluating the strengths and limitations of the current cost growth assumptions. It must be acknowledged that the business of making such projections is not an exact science and that any long-term projection model necessarily makes assumptions about the continuation of trends into an uncertain future. The Office of the Actuary and the Board of Trustees continue to make every effort to ensure that reasonable projections of Medicare's future are included in the annual report to Congress.

**The Long-Range Projection Challenge**

Federal law requires the Medicare Trustees to make an annual report to Congress about the financial solvency of the Medicare program. The Office of the Actuary provides professional technical assistance to the Trustees in their preparation of the annual report. Financial solvency determinations, defined conceptually as measurement of the adequacy of expected program revenues to pay for expected program obligations, are reported for the Medicare trust funds.

In general, long-term projections, which span 75 years beginning with the current year, are made under an assumption that existing institutional arrangements and program parameters embodied in current law will prevail for the entire projection period. The 75-year "current law" projections are intended to reflect a policy-neutral baseline that is useful for policy makers, researchers, health-care providers, beneficiaries, and others in considering the need for changes or adjustments in national policy.

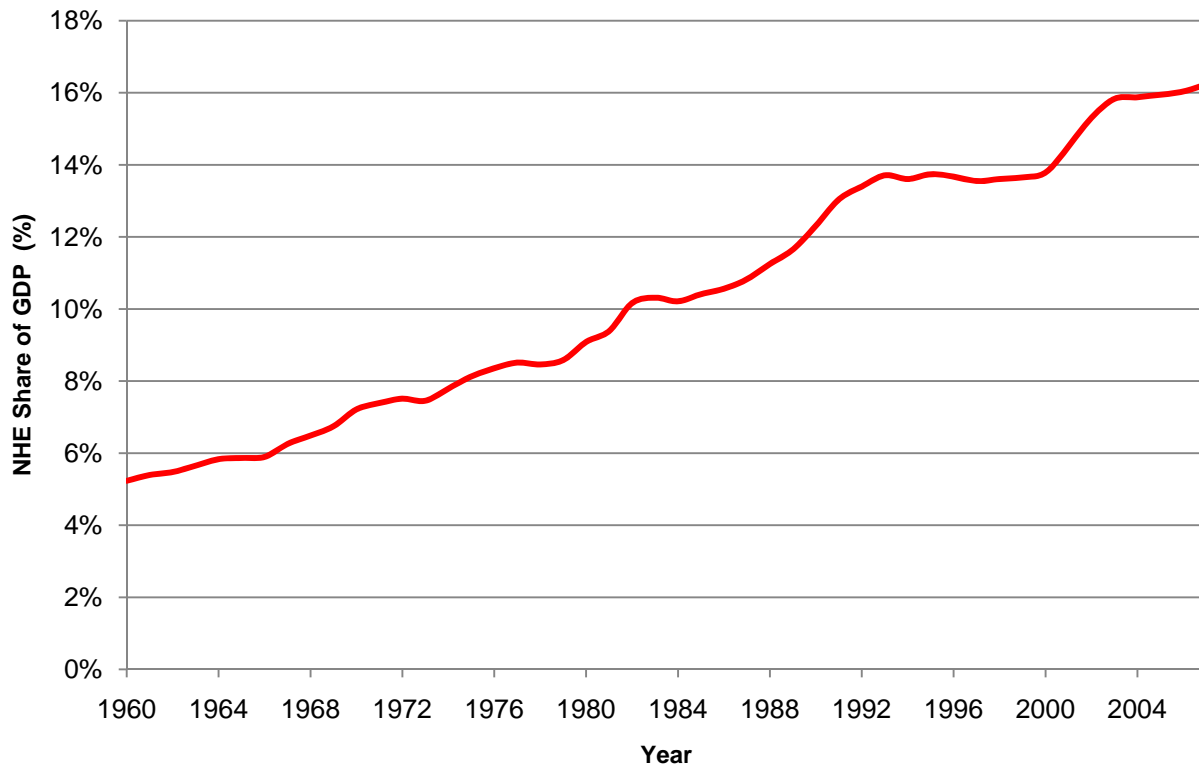
Both the time horizon and the institutional perspectives employed in long-term projections have on occasion been criticized as unrealistic. Some critics have argued that projections extending so far into the future are so uncertain as to be of limited value and that the current law perspective assumes the

perpetuation of existing policy arrangements beyond any reasonable point. But such criticisms overlook a fundamental premise of long-term solvency reporting; that is, projecting the long-term consequences of the institutional status quo affords decision makers a reasonable opportunity to investigate trends, to consider alternatives, and to implement well-conceived policy adjustments before programmatic challenges can reach crisis proportions.

Long-range projections of Medicare revenues that appear in the Trustees Report are produced using various long-range economic and demographic assumptions such as the size and age distribution of the population, the size of the work force, and the Gross Domestic Product (GDP). These economic and demographic assumptions are determined annually by the Social Security and Medicare Board of Trustees based on recommendations by the Office of the Chief Actuary at the Social Security Administration. Projection of long-term Medicare and aggregate national health expenditures by the Office of the Actuary Centers for Medicare & Medicaid Services follows a similar process, but involves additional assumptions that have been especially challenging to formulate and to validate.

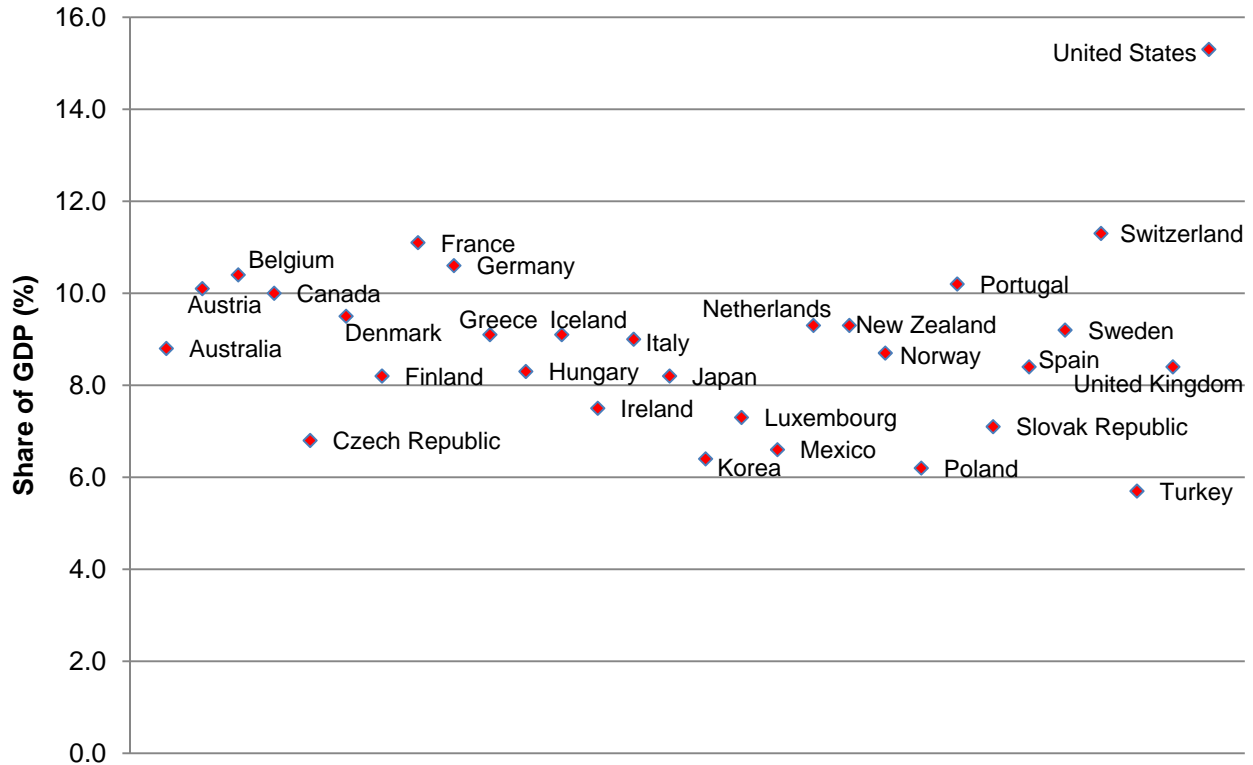
The most difficult challenge in making long-range health expenditure projections is in determining if and when a sector of the economy with a long history of rapid cost growth will stabilize relative to the rest of the economy. Since the mid-20<sup>th</sup> century, the U.S. health sector has grown substantially faster than the economy as a whole and, as a consequence, is of historically unprecedented size (Chart 1). The share of national wealth that it absorbs has long, and by far, exceeded the health sector share of any other developed nation, and there is no evidence that the outlier status of the U.S. will end. (Chart 2).

**Chart 1 - National Health Expenditures (NHE) as a Percentage of Gross Domestic Product (GDP) 1960-2007**



Source: Centers for Medicare & Medicaid Services, Office of the Actuary

**Chart 2 - Total Expenditures on Health as a Percentage Share of GDP, OECD Countries, 2006**



Source: OECD Health Data 2008.

Note: For the United States the 2006 data reported here do not match the 2006 data point for the United States in Chart 1 since the OECD uses a slightly different definition of “total expenditures on health” than that used in the National Health Expenditure Accounts.

One way of looking at this issue is to compare the growth rate of the U.S. health sector with that of the overall economy. Using a definition of “excess cost growth” as the difference between the U.S. per capita growth rate in age-gender-adjusted health-care costs minus the per capita growth rate in GDP (both in constant dollars), Table 1 shows average excess cost growth rates for selected time periods since 1975. The average excess cost growth rates exhibit some volatility depending on which time periods are used for defining averages, but except for a 5-year period in the 1990s, the excess cost growth rate for the health sector (on a per capita basis) has always been above or slightly below 2 percent. Over the entire 1975-2007 period, including the 5-year period of extraordinarily slow growth, the per capita health sector growth rate has on average exceeded that of per capita GDP by almost 2 percentage points. If the historic excess growth trend were to continue unchecked, the health sector would encompass most, if not all, of the U.S. economy within the 75-year reporting horizon.

Since a nation that produces only health care is an impossibility, any method for projecting long-range U.S. national health expenditures must include assumptions about long-term growth rates for the health sector. But available research provides little guidance concerning how much of a slowdown in growth rates might take place, the probable timing of a slowdown, the mechanisms that would cause a slowdown, and whether a slowdown can in fact occur under a current law scenario. The answers to these questions profoundly influence the outcome of the expenditure projection process.

Despite the difficulty and uncertainty involved in projecting long-range Medicare costs, projections are required for considering whether the promises made to the working population today can reasonably be expected to be fulfilled many years in the future. The balance of this memorandum describes the basis for establishing the long-range health cost growth assumptions underlying the Medicare projections used in the annual report of the Medicare Board of Trustees.

**Table 1 - Average excess cost growth rates, selected time periods 1975-2007**

Time period	Average constant-dollar, per capita growth		Average Excess Cost Growth Rate
	NHE (rounded)	GDP (rounded)	
Periods beginning with 1975:			
through 1980 (5 years)	4.5%	2.7%	1.8%
through 1985 (10 years)	4.6%	2.5%	2.2%
through 1990 (15 years)	4.9%	2.4%	2.5%
through 1995 (20 years)	4.5%	2.1%	2.4%
through 2000 (25 years)	4.2%	2.3%	1.9%
through 2007 (32 years)	4.0%	2.1%	1.9%
Periods beginning with 1980:			
through 1985 (5 years)	4.8%	2.3%	2.5%
through 1990 (10 years)	5.1%	2.3%	2.9%
through 1995 (15 years)	4.5%	1.9%	2.6%
through 2000 (20 years)	4.1%	2.2%	1.9%
through 2007 (27 years)	3.9%	2.0%	1.9%
Periods beginning with 1985:			
through 1990 (5 years)	5.5%	2.3%	3.3%
through 1995 (10 years)	4.4%	1.8%	2.6%
through 2000 (15 years)	3.9%	2.2%	1.7%
through 2007 (22 years)	3.7%	1.9%	1.8%
Periods beginning with 1990:			
through 1995 (5 years)	3.3%	1.3%	2.0%
through 2000 (10 years)	3.1%	2.2%	0.9%
through 2007 (17 years)	3.2%	1.8%	1.4%
Periods beginning with 1995:			
through 2000 (5 years)	2.9%	3.1%	-0.2%
through 2007 (12 years)	3.1%	2.1%	1.1%
Periods beginning with 2000:			
through 2007 (7 years)	3.3%	1.3%	2.0%

Note: NHE rates are adjusted for age-gender effects.

Source: Centers for Medicare and Medicaid Services, Office of the Actuary.

## Long-Range Health Cost Growth Assumptions

The purpose of this part of the memorandum is to communicate a clear understanding of excess cost growth assumptions in the projections that are made by the Office of the Actuary. Consideration of the history and reasonability of the assumptions is deferred until later sections.

The 75-year projections are constructed around the notion of excess cost growth, or the degree to which growth in Medicare or health expenditures generally is expected to exceed the growth rate of GDP. Excess cost growth is an intuitively understandable indicator of when a particular sector is increasing in size relative to the rest of the economy. By definition, as long as a sector's rate of cost growth exceeds that of GDP, that particular sector (such as health care) will be increasing as a share of the nation's total economic output.

As noted earlier in the discussion of Table 1, one way of measuring excess health cost growth is as a difference of rates of growth: the rate of age-gender-adjusted health care cost growth minus the rate of GDP growth. Another way to express the excess cost relationship involves a ratio of growth multipliers. For any year, a cost growth multiplier can be defined as the year's per capita age-gender-adjusted health costs of a particular type (for example, Medicare Part A costs) divided by the same per capita health costs for the immediately prior year, and a GDP growth multiplier can be defined similarly as the year's per capita GDP divided by per capita GDP for the immediately prior year.<sup>1</sup> The ratio of a yearly cost growth multiplier over the GDP multiplier is an excess cost ratio, which will exceed, equal, or be less than 1 depending on whether the cost that is of interest is increasing more rapidly, the same as, or more slowly than the rate of growth in GDP. Within the long-term projection model, assumptions about excess cost are expressed numerically as excess cost ratios that are used as multiplicative factors in computations that produce the final long-term projections. Chart 3 shows the excess cost ratios for the Medicare program for the years in the 75-year projection period in which excess cost ratios are used to make projections. A notational appendix that shows excess cost variables embedded in equations accompanies this memorandum for the benefit of readers who want additional detail about computational methods.

For the first 10 years of the 75-year projection period, short-range projections of Medicare costs are made separately for each category of health spending (for example, inpatient hospital, physician, home health care, etc.) and are built up from assumptions about general price inflation, excess medical inflation for each category of spending, changes in utilization of services, and changes in the "intensity" or average complexity of services. (These methods are described in detail in the Medicare Trustees Report, as are the short-range projections.) For year 10 of the projections (2018 in this year's report), excess cost ratios are computed for each part of the Medicare program to establish a starting point for projecting excess cost growth ratios for years 11 through 24 of the 75-year projection horizon. Costs are aggregated for each part of Medicare (A, B, and D), and excess cost ratios for each part are then computed.

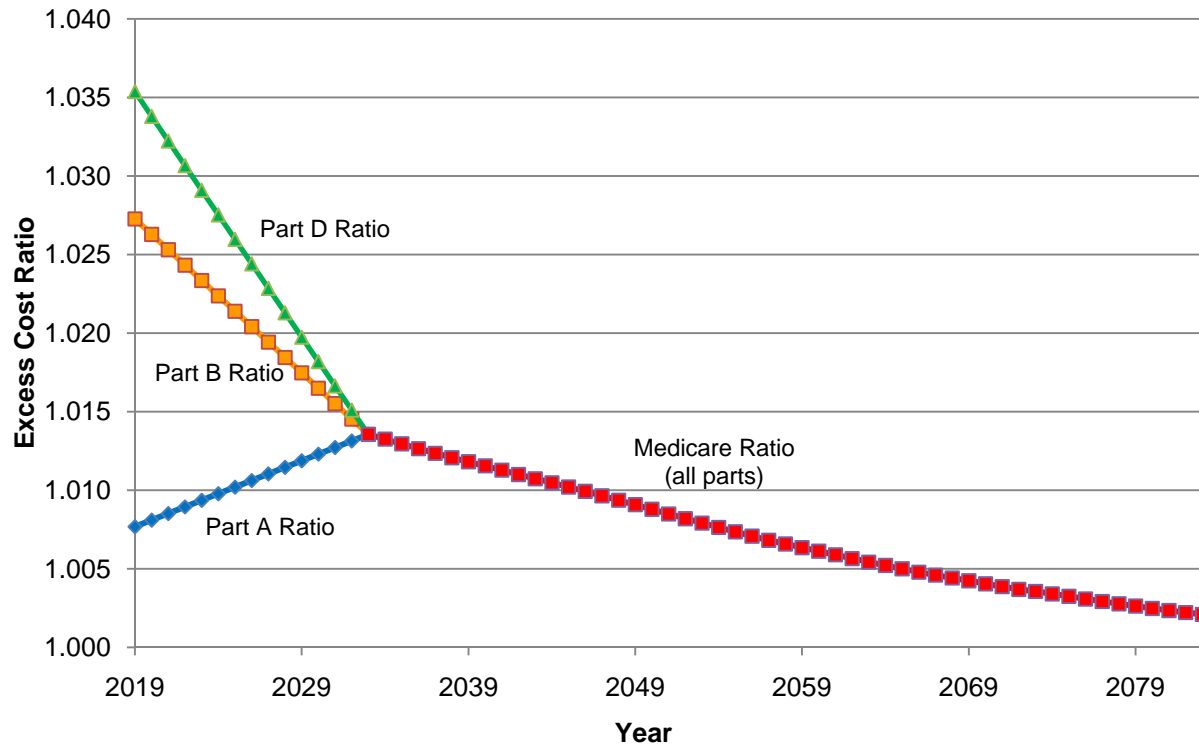
For the last 51 years of the 75-year period, the yearly expected excess cost ratios for the overall health sector, exclusive of age-gender effects, are derived from the constrained solution of a stylized macroeconomic model—the OACT computable general equilibrium (CGE) model. The OACT CGE model's economic output allocation between health and non-health consumption is based on the

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<sup>1</sup> Costs are always measured by relevant person units. For example, if the domain is Part A costs, those costs will be measured per Part A enrollee; if Part B, then per Part B enrollee, and so forth. In addition, cost growth multipliers always exclude age-gender effects. Per capita GDP is measured with reference to the entire U.S. population.

preferences of a single agent who, in a stylized manner, represents all of American society. On the production side of the economy, the model incorporates a secular pattern of technological change in the health sector and the resulting cost effects.<sup>2</sup>

**Chart 3 - Medicare Projected Excess Cost Ratios, 2019-2083**



Source: Centers for Medicare & Medicaid Services, Office of the Actuary

NOTE: An excess cost ratio is a ratio formed by dividing a per enrollee cost multiplier (cost in the current year over the cost in the previous year) by a per capita GDP multiplier (GDP in the current year over GDP in the previous year). A cost multiplier is computed exclusive of age-gender effects. Excess cost ratios are used to make projections for Medicare parts A, B, and D and after 2033 is a ratio common to all Parts of Medicare.

Because an identifying assumption must be imposed to reach a usable solution, the current OACT CGE model is not used independently to project long-range health expenditures. As described in the Trustees Report, the model is constrained to replicate the same long-range HI actuarial balance that would be generated under an assumption of constant per beneficiary health cost growth for years 25 to 75 of the projection period equal to the rate of per capita GDP growth plus 1 percent (often expressed as the GDP+1 assumption).

What the model does, without altering the cumulative 75-year actuarial balance under a GDP+1 assumption, is translate a constant pattern of excess growth into a financially equivalent, smoothly

<sup>2</sup> The detailed structure of the model, but not how it is used in the Trustees Reports, is described in "Projecting long-term medical spending growth," by Christine Borger, Thomas F. Rutherford, and Gregory Y. Won, *Journal of Health Economics*, Volume 27, Issue 1, pages 69-88 (2008).

decelerating series of yearly excess cost growth ratios until an excess cost growth ratio close to the Trustees' infinite horizon assumption is attained (currently assumed to be zero excess cost growth beginning in the 76<sup>th</sup> year and every year after that).<sup>3</sup> The OACT CGE-determined excess cost ratios that are shared by all parts of the Medicare program in the years 2033 to 2083 are shown in Chart 3. As the chart shows, the excess cost ratio under the CGE solution starts at 1.013 in 2033 and declines gradually to approximately 1.002 in 2083, a terminal point at which per capita health costs are increasing at almost the same rate as per capita GDP.

A last point concerning the use of the OACT CGE model pertains to the feasibility of deriving projections of per enrollee excess cost growth ratios for the Medicare program from the model's projections for per capita U.S. health expenditures. It is assumed that on a per capita basis over the long run an identical rate of excess cost growth is shared by all parts of the health sector including Medicare, exclusive of age and demographic factors. The reasonability of this assumption is considered later in this memorandum.

The derivation of excess cost growth ratios for years 11 through 24 of the projection period remains to be explained. Excess cost growth ratios for years 11 through 24 are computed as smooth transitions from the excess growth ratios for Medicare Parts A, B, and D in year 10 of the projection period (currently 2018) to the excess cost growth ratio that is common to all parts of the Medicare program and that is shown in year 25 (currently 2033), the first projection year for which OACT CGE-determined excess cost ratios are used. In this way, the intermediate year projections for excess cost growth ratios are produced.

From this exposition of how excess cost ratios are derived and used, it is critical to note that the most important factor affecting the path of excess cost growth ratios is the identifying constraint used to solve the CGE model—that is, the requirement that the CGE solution for a path of excess growth ratios yield the same HI actuarial balance as would an assumption of 1-percentage-point excess health cost growth for the last 51 years of the projection period. The GDP+1 assumption is thus the most important substantive assumption in determining the results of the Office of the Actuary's excess cost growth projection method.

### **History of the Medicare Trustees Long-Range Health Cost Growth Assumptions**

Officially convened Technical Panels of distinguished economists and actuaries have reviewed the long-range Medicare projection and reporting methods on three different occasions—in 1991, 2000, and 2004. In addition, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 required that the Medicare Trustees Report compare projected growth rates for Medicare to those for aggregate national health expenditures, private health insurance expenditures, and GDP.<sup>4</sup> Accordingly, the years 1991, 2000, and 2004 serve as milestone years in the evolution of methods that are employed to project Medicare and national health expenditures over a 75-year reporting period. This section traces the evolution of projection methods through regular and responsible consultation with recognized subject matter experts and through thoughtful implementation of advice received in light of the reporting responsibilities that exist.

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<sup>3</sup> Financial equivalence means the same present value of the HI actuarial balance at the end of 75 years for the constrained solution to the OACT CGE model as from implementation of a pure GDP+1 scenario.

<sup>4</sup> Section 801 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (Pub.L. 108-173, 117 Stat. 2066), 42 U.S.C. 1395i.

## A. Stage I: Basic Structure of Long-Term Projections

No long-range projections of any kind were made by the Medicare Trustees before 1983. In 1983, the Board of Trustees decided for the first time to report the substantial increase in HI costs that could reasonably be expected for Medicare as a result of demographic changes alone—in particular, the retirement and subsequent aging of the post-World War II “baby boom” generation.<sup>5</sup> Since existing research still had little to say concerning the likely long-term path of health care spending as it might be affected by non-demographic factors, it was determined that initial long-term projections would implement a neutral position concerning the effects of such factors. Accordingly, starting in 1983 long-range HI projections were made under the assumption that long-range costs per unit of service would increase at the rate of average hourly earnings. No long-range projections for SMI were reported by the Medicare Trustees until after the 1991 Medicare Technical Review Panel.<sup>6</sup>

The 1991 Medicare Technical Review Panel was the first formally convened body to consider long-range projection methods to be used in the Medicare Trustees Reports.<sup>7, 8</sup> A fundamental theme of the panel’s report is coordination of projection methods for HI and SMI in order to facilitate a combination of the results into a comprehensive understanding of the status of the entire Medicare program. The use of a 75-year projection period was affirmed because, for the average person entering the workforce in any reporting year, this period of time will encompass his/her years as a contributor to the HI fund and as a Medicare beneficiary. The panel thus saw a 75-year reporting horizon as a reasonable period of analysis for evaluating the financial ability of the program to deliver benefits promised to beneficiaries from the inception of their working lives. The panel found the use of short-term projections based on trends that are gradually tapered to meet long-run growth assumptions to be reasonable. The panel cautiously endorsed the long-range assumption that HI payments per unit of service would grow at the same rate as average hourly earnings and expressed similar approval for a long-range assumption that per capita SMI costs would grow at the same rate as per capita GDP. With regard to each long-run assumption, the panel recommended that regular monitoring for continuing plausibility should occur.

The approach to long-range projections described in the report of the 1991 Technical Panel was reflected in succeeding Medicare Trustees Reports up to and including the HI and SMI reports for 2000. Consistent with the recommendation to coordinate the HI and SMI projections, the annual reports from starting in 1994 show 75-year projections of HI and SMI as percentages of GDP. The nature of the long-range assumptions meant that HI and SMI would grow more rapidly as a percentage of GDP in the first 25 years of the projection period than in the last 50 years. In the case of HI, the assumption that increases in per unit of service costs would equal the rate of increase of average hourly income in the last 50 years of the projection period meant that costs would be relatively stable in the long run. Other long-range assumptions related to

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<sup>5</sup> HI refers to Hospital Insurance and is synonymous with Medicare Part A.

<sup>6</sup> SMI refers to Supplementary Medical Insurance, which was synonymous with Medicare Part B until 2004, when separate accounts for Medicare Parts B and D were assigned within the SMI Trust Fund.

<sup>7</sup> Before 2002 there was an annual Trustees Report for HI and another for SMI; since 2002 there has been a single annual Trustees Report that includes all parts of the Medicare program.

<sup>8</sup> *Report on Medicare Projections* by the Health Technical Panel to the 1991 Advisory Council on Social Security (March, 1991: Washington, D.C.).



demographics and expected changes in admissions per Medicare enrollee still allowed for substantial growth in HI's share of GDP. In the case of SMI, the long-range assumption meant that growth as a share of GDP would largely halt after the first 25 years, except to the degree that changing demographics would continue to boost SMI's share of GDP.<sup>9</sup>

Although the 1991 Technical Panel had not explicitly discussed implementation of an excess cost growth method to model long-range Medicare costs, the elements of the method are discernable in the panel report and in the subsequent reports of the Medicare Trustees. The long-range assumption for SMI was effectually a GDP+0 assumption that was substantially below historic rates of SMI growth, a fact that had prompted the Technical Panel to recommend regular review of the assumption and that evoked regular cautionary commentary in Trustees Reports during the 1992-2000 period. And even though the long-range assumption for the HI growth rate was not directly related to GDP, the idea of connecting HI's growth to that of a macroeconomically important aggregate was present. On these foundations, moving to an explicit excess growth method for long-range projections for all parts of the Medicare program would prove to be a natural next step.

## B. Stage II: Addition of the GDP+1 Projection Method

The 2000 Medicare Technical Review Panel deliberated extensively about the long-term rate of excess cost growth and ultimately recommended an assumption of long-range cost growth equal to 1 percentage point in excess of per capita GDP growth (GDP+1) exclusive of age-gender effects for both HI and SMI. The panel viewed its mission as one of delivering credible and usable assumptions concerning an inherently uncertain issue. The conceptual innovation was in seeing the long-range assumption for both HI and SMI as explicitly a question of the rate of excess cost growth relative to GDP under current law. Within the conceptual framework, the practical task for the panel became a matter of arriving at a consensus for the value to assign to the key projection variable that had been defined.

To achieve a consensus, the experts considered many factors that are thoroughly documented in their written report.<sup>10</sup> Most telling for the panel were long-term time-series expenditure trends when considered in light of causal evidence. Long-term time-series evidence showed that in any multi-year time period examined by the Technical Panel, real per capita health expenditures had never grown at a rate less than 1 percent in excess of real per capita GDP growth. As for determinants of expenditure growth, the panel looked to aggregate and micro-level health economics studies, which pointed to technological change as the primary driver of real growth in health expenditures. The panel report concluded that technological change alone may account for a percentage point of real growth in excess of the rate of real GDP growth.

Also considered by the panel were factors that might in the future slow or accelerate the rate of excess medical expenditure growth through the diffusion of technological change. For example, the spread of managed care in the 1990s was seen as a short-term aberration in a long period of

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<sup>9</sup> The resulting projection pattern of HI growth versus SMI growth as a share of GDP is illustrated in Table III.B.1 of the *2000 HI Trustees Report*.

<sup>10</sup> *Review of Assumptions and Methods of the Medicare Trustees' Financial Projections* by Technical Review Panel on the Medicare Trustees Reports (Baltimore: 2000) available at: <http://www.cms.hhs.gov/ReportsTrustFunds/downloads/TechnicalPanelReport2000.pdf>

excess cost growth relative to GDP growth rates and, thus, as unlikely to have an enduring effect. The experts did not find evidence for a long-term differential among types of payers that would affect their conclusion about the long-term excess growth rate. The panel also noted that other forecasters showed a range of excess growth in health expenditures of between 0.8 to 1.5 percentage points, with most of the studies congregating around a value of 1 percentage point.

Finally, the panel report discusses the sustainability of excess cost growth of 1 percent for the duration of a 75-year projection period. Concerning this issue, the report notes that excess growth of 1 percent per year over 75 years would lead to a health sector of unprecedented size as a share of the economy, but since such a growth pattern would still be consistent with increases in the absolute level of real consumption for non-health expenditure, the panel saw little grounds for expecting consumers as a group to reach some point of satiety concerning health expenditures.

Based upon their thorough review of relevant factors, the 2000 Technical Panel unanimously recommended adoption of a long-term excess cost assumption of a full percentage point of excess growth in per capita HI and SMI costs above the rate of growth of per capita GDP exclusive of age-gender effects. Their recommendation was supported by the Office of the Actuary in its assumption recommendations in the Fall of 2000 to the last Medicare Board of Trustees under the Clinton Administration and was adopted formally by that Board. With the changes in Board membership under the incoming Bush Administration, the Office of the Actuary again recommended the GDP + 1 long-range growth assumption, and it was again adopted by the new Board and implemented in the 2001 Medicare Trustees Reports.<sup>11</sup> As was to be expected, the change to a more costly long-term assumption had a substantial effect on the reported financial status of the Medicare program. In 2001, the Medicare share of GDP at the end of 75 years was projected at 8.49 percent, as compared with 5.28 percent projected in the 2000 Report. The GDP+1 assumption as applied in the 2001 HI and SMI Trustees Reports was also used in the annual reports issued in 2002, 2003, 2004, and 2005.

### C. Phase III: Refinement of the GDP+1 Projection Method

A new Medicare Technical Panel was convened in 2004; it reviewed and reaffirmed the long-term GDP+1 assumption as implemented by the Office of the Actuary, but also made suggestions for research into long-term projection methods.<sup>12</sup> In addition, the MMA required that the Medicare Trustees compare past and projected Medicare cost growth rates with annual rates of growth in GDP, private health insurance costs, national health expenditures, and other appropriate measures. Together, the changes in statutory reporting requirements and the suggestions of the 2004 Technical Panel provided impetus for refinement of how the GDP+1 assumption is implemented.

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<sup>11</sup> By law, the members of the Medicare (and Social Security) Board of Trustees are the Secretary of the Treasury, Secretary of Labor, Secretary of Health and Human Services, Commissioner of Social Security, and two members representing the public. Dr. John L. Palmer and Dr. Thomas R. Saving served as Public Trustees on both the 2000 and 2001 Boards of Trustees (as well as subsequent Boards through 2007).

<sup>12</sup> *Review of Assumptions and Methods of the Medicare Trustees' Financial Projections* by 2004 Technical Review Panel on the Medicare Trustees Reports (Baltimore: December, 2004) available at: [http://www.aspe.hhs.gov/health/medpanel/2004/2004\\_Technical\\_Review\\_Panel\\_on\\_the\\_Medicare\\_Trustees\\_Report.pdf](http://www.aspe.hhs.gov/health/medpanel/2004/2004_Technical_Review_Panel_on_the_Medicare_Trustees_Report.pdf)

The 2004 Technical Panel considered the analysis of excess cost trends that had appeared in the report of the 2000 Technical Panel and found that analysis to be persuasive. The 2004 panel was comfortable with the existing framework and concluded that the existing GDP+1 long-range assumption was “within the range of the reasonable assumptions, given the limits of current knowledge.” However, the panel also found future promise in extramural general equilibrium modeling projects already in progress under the supervision and sponsorship of the Office of the Actuary, and accordingly the experts encouraged the pursuit of additional research to build insight into the behavioral dynamics of underlying health expenditure growth.<sup>13</sup>

It was eventually determined that the OACT CGE model then being developed under an extramural contract could be used as a tool for improving the long-range Medicare cost growth assumptions and for complying with new reporting responsibilities. First, since available evidence indicated long-term identity of growth rates across health subsectors (for example, Medicare and private commercial), the output of the OACT CGE model could reasonably be used as a projection tool for both long-term national health expenditures and long-term Medicare expenditures. Moreover, not only could the GDP+1 assumption be used to identify a solution path for the OACT CGE model (that is, one that did not alter the HI actuarial balance), but the resulting solution would also translate the constant rate of excess cost growth into a temporally more plausible, smoothly decelerating series of excess growth ratios converging on the infinite horizon excess growth assumption. Based upon these determinations and following a review by independent health economists convened for this purpose, the OACT CGE model was adopted as a tool in the production of long-term estimates starting with the 2006 Medicare Trustees Report. With the incorporation of the OACT CGE model into the projections, the methods used by the Office of the Actuary to make long-range projections on behalf of the Medicare Trustees attained their present form.

## **Evaluation of the Long-Range Cost Growth Assumptions**

In previous sections of this memorandum, the long-range projection challenge, the mechanics of setting the long-range cost growth assumptions, and the evolution of the current long-range assumptions have been examined. In this section the reasonability of the key long-range assumptions and the projections that result are discussed. Current efforts toward further improvement of long-range cost growth assumptions are also briefly considered.

### **A. The Long-Range Assumptions**

When the term “excess cost growth” is used by the Office of the Actuary, it is used in a descriptive rather than a normative sense. In other words, the term does not mean that there is anything intrinsically bad or inherently unreasonable with faster growth for the health sector than for the rest of the U.S. economy. But, as explained earlier in this memorandum, long-run historic trends in excess cost growth rates for the health sector are ultimately unsustainable. The appropriate long-range question is therefore how much more excess cost growth is likely to occur under current law within the 75-year reporting horizon.

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<sup>13</sup> The recommendation to explore many possible lines of insight with simple models was reiterated several years later by members of an informal advisory group of distinguished economists and actuaries convened by the Office of the Actuary in 2007.

From a conventional, current law perspective, there are, of course, institutional and financial constraints on the continuation of excess cost growth, particularly at a rate experienced historically by the Medicare program. According to the 2009 Trustees Report, under existing revenue and benefit provisions, the HI trust fund is projected to be exhausted in the year 2017 under the Trustees' intermediate scenario.

Projecting Medicare expenditures subsequent to the exhaustion of the HI trust fund requires a decision regarding what level of HI expenditures to include. Strictly speaking, if the HI trust fund were actually exhausted, then it could expend amounts only up to the level of ongoing revenues from payroll and other taxes. There is no provision in current law that would permit payment of full benefits under such a scenario.<sup>14</sup> Since the purpose of the Medicare and Social Security Trustees Reports is to evaluate the adequacy of program financing, however, the Trustees have always made projections of (i) the benefits specified under current law (and the associated costs of administering the program) and (ii) the revenues specified under current law. The annual report then compares these two projections to evaluate whether financing is sufficient. Thus, the Trustees' application of current law does not follow a strict interpretation of what would actually happen in the event of trust fund depletion; rather, it compares expenditure and income levels under the implicit assumption that full benefits would be paid.

The current long-range assumption is that there will be a slowdown from historic rates of excess cost growth if there are no changes in the Medicare benefits promised under current law. But the Technical Review Panels have provided little analysis of specific mechanisms that might cause a slowdown of excess cost growth. The 2000 Technical Review Panel attributed some cost-restraining impact to Medicare Prospective Payment Systems (PPS), though the impact envisioned appears to be relatively small and in need of empirical documentation. The 2000 Technical Panel was also impressed by evidence that an excess cost growth rate of 1 percent (GDP+1) would still be consistent with maintaining some positive real growth in an absolute sense in other sectors of the economy. Maintenance of positive real growth in per capita non-health expenditures might therefore be interpreted as defining an outer limit on social willingness to pay for additional health care. However, the existing Medicare program contains numerous features by which consumer preferences for slower expansion in health care could eventually reduce the rate of excess cost growth in line with the expectations of the Technical Review Panels.

By way of illustration, consider the potential effects of cost-sharing provisions of current law Medicare, which are more substantial and more extensive than is often recognized. At present, large numbers of Medicare beneficiaries are insured against point-of-service cost-sharing obligations through supplemental private insurance programs paid for by the beneficiaries themselves or by their former employers. As the costs of comprehensive supplemental coverage rise relative to the growth of personal income and business income, the comprehensiveness and the prevalence of such coverage are likely to diminish and point-of-service cost sharing faced by Medicare beneficiaries is likely to become more frequent and more burdensome. Accordingly, as time passes, beneficiaries may choose more frequently not to seek health care perceived by them to be of limited marginal value or to decline health care offered by providers.

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<sup>14</sup> In practice, Congress has never allowed the HI trust fund to be exhausted, and it is likely that action would be forthcoming to prevent exhaustion at a future date.

That cost sharing can have substantial effects on demand for health care is an established proposition. The results of the well-known RAND Health Insurance Experiment persuasively confirm that substantial effects on demand for health care arise from point-of-service cost obligations borne by patients.<sup>15</sup> Moreover, an important recent study indicates that the scope of insurance coverage is likely to have had an even greater effect on health sector size than could be identified by the study design used in the original RAND Health Insurance Experiment.<sup>16</sup> Further consumption-side brakes on Medicare as excess costs accumulate might include decisions not to enroll in Medicare Part B or Part D.<sup>17</sup> Such individuals would face even more substantial point-of-service obligations that would have significant effects on their access to health care.

The Office of the Actuary is aware that even now the share of national health expenditures paid by point-of-service cost sharing continues a long secular decline, a phenomenon driven most recently by the spread of public and private pharmaceutical coverage plans. But the reasonable expectation is that the trend away from point-of-service cost sharing borne by patients will reverse as the economic burden of health spending growth continues to mount and the costs of health care increasingly collide with competing preferences for a level of non-health expenditure that is also still rising. Coupled with similar cost-sharing trends among the private commercially insured population, cost sharing at point-of-service in Medicare is expected by the Office of the Actuary to contribute significantly to a slowdown in excess cost growth in the entire health care sector.

Cost-saving spillovers into Medicare from private sector initiatives that are focused on rationalization of treatment around best practices are another foreseeable brake on excess cost growth. The theory is that, as efficient methods of care become more widely diffused throughout the health sector, such methods would be applied by health care practitioners to patients, regardless of insurance plan. It is also possible that Medicare itself could contribute to this kind of progress, resulting in cost savings that would benefit of private health plans financially.

These examples of natural brakes are expected to result in a slowdown of excess cost growth to an average rate of GDP+1 even in the face of some foreseeable cost-increasing effects. For example, persons who do not have or who choose to forgo a private supplemental Medicare insurance policy may obtain extra coverage by enrolling in a Medicare Part C managed care type of health plan, whose government-paid premiums (at least currently) often exceed average per enrollee fee-for-service Medicare costs. To the degree that pharmaceutical coverage sponsored by former employers of Medicare beneficiaries becomes less available or less comprehensive, enrollment in the Medicare Part D plans may also grow, increasing total Medicare outlays. Also, if a disenrollment trend emerged for Part B or Part D, it might be mitigated by payments by States of premiums on behalf of dual eligibles—that is, Medicare beneficiaries who are also eligible for Medicaid.

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<sup>15</sup>W.G. Manning, J.P. Newhouse, N. Duan et. al., “Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment,” *American Economic Review*, Volume 77(3), pages 251-277 (1987).

<sup>16</sup> Amy Finkelstein, “The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare,” *Quarterly Journal of Economics*, Volume 122(1), pages 1-37 (2007).

<sup>17</sup> See Figure III.C1, *2009 Trustees Report*, at page 86 available at: <http://www.cms.hhs.gov/ReportsTrustFunds/>

While there are natural brakes in the current Medicare system that are likely to slow excess cost growth, the “out-of-sample” nature of the health expenditure projection problem makes it especially difficult to project the magnitude and speed of a slowdown in the rate of excess cost growth. Given the current state of knowledge and the recommendations of distinguished panels of technical experts, the Office of the Actuary is satisfied that the GDP+1 assumption of a long-range average cost growth rate that is now used to constrain the solution of the CGE macroeconomic model is plausible, reasonable, and consistent with benefits promised under current law.

It is also reasonable to expect that the factors acting to slow future cost growth would develop gradually. The OACT CGE model, therefore, provides a useful tool for redistributing projected excess growth rates along a more plausible, smoothly decelerating path that is initially above the GDP+1 excess growth rate, converges towards GDP+0 at the end of the 75-year horizon, and has financial results substantially equivalent to a pure GDP+1 scenario. It should be noted that the constrained solution of the model leads to a projection of health sector shares in the 75<sup>th</sup> year that is several (3.5) percentage points smaller than would follow from implementation of a pure GDP+1 scenario. However, the gains in behavioral coherence and consistency for the long-term projections are judged by the Office of the Actuary and its consulting experts to make the use of the OACT CGE model appropriate.

Finally, there is the assumption that the excess growth rate for Medicare and for the health sector in its entirety is similar for the last 51 years of the long-run projection timeframe. The Office of the Actuary has closely reviewed the literature comparing private health insurance cost growth rates with Medicare.<sup>18</sup> Updated data show that on a per enrollee basis for comparable services, private health insurance spending has grown faster than Medicare spending by an average of 1.2 percentage points per year from 1970 to 2007. However, during this period private health insurance has paid for an increasing percentage of the health costs of the persons it covers, has expanded benefits to a larger degree, and experienced a larger increase in the average age of its covered population than Medicare has. Once these caveats are considered, private health insurance spending still grew faster than Medicare spending from 1970 to 2007, but the average annual difference in growth rates is smaller. For future years, the Office of the Actuary continues to be unpersuaded that there is an adequate basis for projecting a significant, sustained divergence in cost growth rates between Medicare and the U.S. health sector as a whole. In particular, under current law there is the prospect of long-term cost-sharing effects in both Medicare and the private health insurance sector; these effects would make an effort to forecast systematically different long-term excess growth rates for the two sectors a highly uncertain exercise. The Office of the Actuary continues to be satisfied that for the purpose of current long-range projections, the rates of per capita cost increase in Medicare and in the rest of the health sector are best modeled as being the same.

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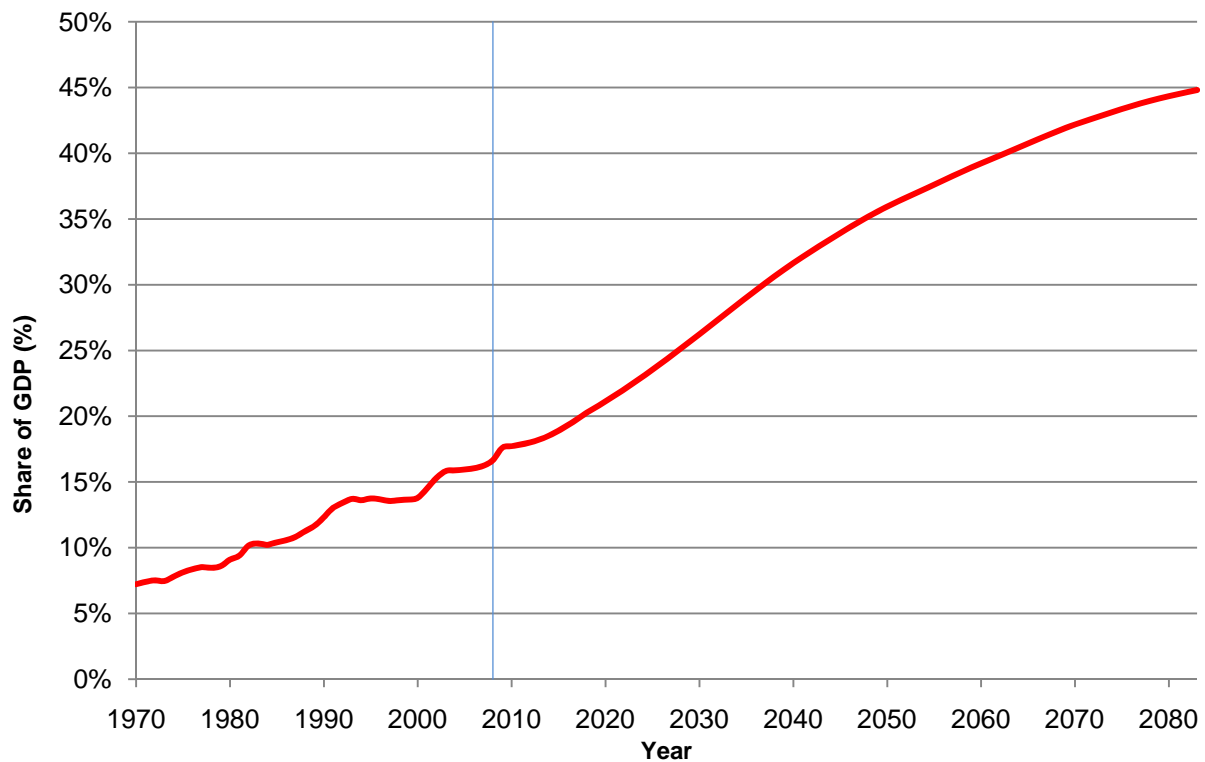
<sup>18</sup> Cristina Boccuti and Marilyn Moon, “Comparing Medicare and Private Insurers: Growth Rates in Spending Over Three Decades,” *Health Affairs*, Volume 22(2), pages 230-237 (2003); Joseph Antos, “The Role of Market Competition in Strengthening Medicare,” *Testimony Before The Senate Special Committee on Aging*, May 6, 2003; Joint Economic Committee, “Health Insurance Spending — How Does Medicare Compare?” *Economic Policy Research*, June 10, 2003.

## B. Reasonability of 75-Year Long-Range Projections

The long-range assumptions about excess cost growth (implicitly assuming also the absence of government revenue constraints) largely determine the magnitudes of resulting projections. Even if the long-range assumptions are believed to be within the range of the reasonable, it is fair to consider the degree to which the outputs of the projection model are reasonable and credible.

The current excess cost growth assumption produces a Medicare share of the economy that is projected to increase from a 3.19 percent share of GDP in 2007 to 11.36 percent in 2083 and a health sector share of GDP that is expected to increase from 16.23 percent in 2007 to more than a 40 percent share of GDP in 2083 (Charts 4 and 5). Such magnitudes have no historical precedent and are even more astonishing when it is considered that these increased economic shares would be from an economy that, in real terms, is projected to be at least twice the size that it is today.

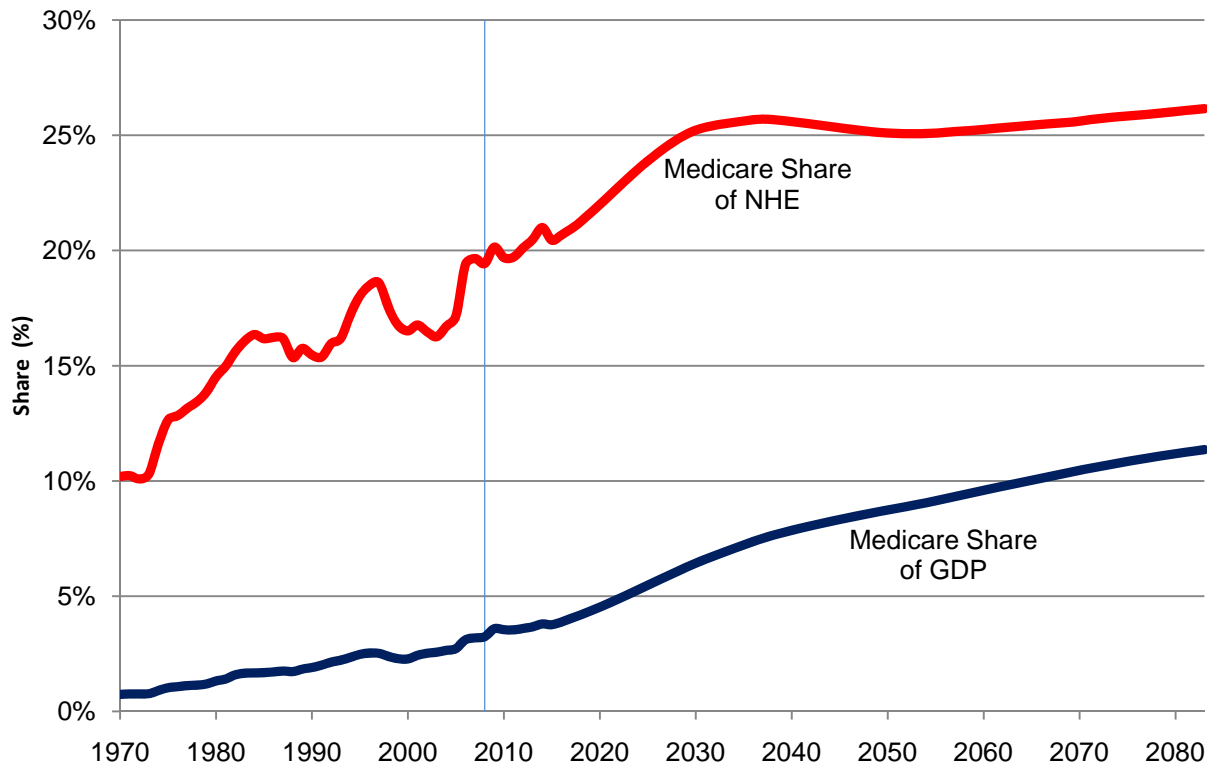
**Chart 4 - National Health Expenditures (NHE) as a Percentage Share of GDP  
1970-2083**



Source: Centers for Medicare & Medicaid Services, Office of the Actuary.

NOTE: Historical data are used before 2008 and projections from 2008 forward.

**Chart 5 - Medicare as a Percentage Share of Gross Domestic Product (GDP)  
and as a Percentage Share of National Health Expenditures (NHE)  
1970-2083**



Source: Centers for Medicare & Medicaid Services, Office of the Actuary.

NOTE: For Medicare share of GDP historical data are used before 2009 and projections from 2009 forward. For Medicare share of NHE, historical data are used before 2008 and projections from 2008 forward.

It is fair to question, as some researchers have, whether a GDP+1 state of the world would be macroeconomically sustainable to the end of the 75-year projection horizon.<sup>19</sup> It is true that when GDP+1 scenarios have been run by the INFORUM group at the University of Maryland with their detailed, bottom-up macroeconomic model (Long-Run Interindustry Forecasting Tool, or LIFT), maintenance of current law benefit-level arrangements has been found sustainable within the parameterized sphere of the model in the sense that some real growth in the non-health sectors of the economy would still be feasible.<sup>20</sup> But that analysis, consistent with a benefits-promised view of current law, also purposely ignored feedback effects on investment, interest rates, and labor supply of tax rates and government debt levels needed to finance Medicare and

<sup>19</sup> Glenn Follette and Louise Sheiner, “The Sustainability of Health Spending Growth,” *National Tax Journal*, Volume 58, pages 391-408 (2005).

<sup>20</sup> Mark Freeland, Greg Won, Stephen Heffler, and Margaret McCarthy, “Issues on the Sustainability of Long-Term Health Spending Projections,” Paper delivered at 2002 SGE/ASSA/AEA Conference session on “Long-Term Projections of Health Care and Medicare Costs.”



Medicaid in a GDP+1 world.<sup>21</sup> The more significant that those macroeconomic effects are, the more likely a slowdown in excess cost growth even below GDP+1. Distributional issues are also likely to emerge, even under a GDP+1 state of the world, as Medicare Part B premiums and cost sharing start to consume 50 percent or more of monthly Social Security benefits for some beneficiaries.<sup>22</sup> In the final analysis, though, these issues go to the ultimate sustainability of current law Medicare benefits, and to the degree that they could lead to a slowdown below GDP+1, they would perhaps involve consideration of policy changes from which no part of the existing current law institutional structure would be exempt.

It must also be remembered that the Office of the Actuary's long-range projection process does not explicitly include many of variables that might affect the trajectory of expenditure growth in the health sector and in Medicare. To the degree that such variables affect expenditure levels, they do so through the judgments of the experts who helped to formulate and validate the current GDP+1 assumption, which is best seen as an informed summary of expectations concerning the net effects of all relevant variables. As with any uncertain measure of central tendency, movement around an average long-term trend of GDP+1 must be assumed to be present.

An important source of uncertainty is how quickly consumers will respond to the increased costs that they eventually must confront for insurance coverage and for copayments at points of service. If such responses emerge in the near term, then the current assumption may in retrospect be found to have been too high; if they unfold in the more distant future, then the current assumption may be found to have been too low. The same kind of uncertainty exists regarding the effects of other conceivable natural brakes on health expenditure growth under current law.

Actual long-range Medicare costs are virtually certain to differ from current projections and, as this consideration of sources of variability would suggest, perhaps to a very significant degree. Such variation, however, is unlikely to be sufficient to alter the conclusion that the Medicare program faces serious and enduring fiscal challenges that will become worse the longer that it continues under the institutional arrangements in current law.

### C. Improvement of the OACT Long-Range Assumptions

The 2000 and 2004 Medicare Technical Panels and the Office of the Actuary's Advisory Group that met in 2007 recommended the development of models informed by specific behavioral theories. Ideally, testable behavioral models could provide more detailed insight into the mechanisms for the deceleration of expenditure growth and a better sense of the timing. However, the estimates of such models have thus far not provided an adequate basis for drawing clear and persuasive conclusions about the future. The Office of the Actuary continues to work both internally and with external researchers to develop models that will provide deeper understanding of the behavioral mechanisms by which health expenditure patterns will change.

Consistent with the expectation expressed in the March 25, 2008 memorandum about long-range excess cost growth assumptions, the Office of the Actuary took final delivery in 2008 of a large macroeconomic model that had been under construction for many years by an external

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<sup>21</sup> When such factors were reflected in LIFT model runs, the macroeconomic impacts of tax increases and increased federal borrowing resulted in long-range economic growth that was substantially slower than assumed in the Trustees Reports.

<sup>22</sup> See Figure III.C1, *2009 Trustees Report*, at page 86 available at: <http://www.cms.hhs.gov/ReportsTrustFunds/>

contractor. Project results to date have not led to any modification of the existing long-range projection assumptions or methods.

Three other external research efforts, one of long-standing and two that began last year, will continue in 2009. For LIFT, analysis will be expanded to more fully analyze alternative scenarios under various economic and health-related assumptions. One of the new research contracts aims to advance understanding of the potential relevance of modern time series and other econometric methods to long-range projection of health expenditures. The other new contract is directed at evaluating prospects for cost spillovers between Medicare and other parts of the health sector such as private health insurance, particularly spillovers that could conceivably affect the rate of long-range excess cost growth.

The Office of the Actuary continues work on developing a capability for modeling the long-range effect of current law cost-sharing provisions on the level of medical utilization of Medicare beneficiaries. A prototype Cost Sharing Cost Growth model (CSCG) was received from an external contractor in September 2008. The purpose of the CSCG model is to investigate the long-term effects of different assumptions about the out-of-pocket price sensitivity of beneficiaries who have different levels of supplemental insurance and their propensity to transition into insurance categories associated with lower per capita levels of medical consumption and higher personal out-of-pocket obligations. Internal work to develop and refine the model is focused on implementing appropriate age-gender calibrations to assure age-gender neutral measurement of cost growth, evaluating the reasonability of assumptions and formulas needed to parameterize the model, and devising methods for decomposing the degree to which different factors (for example, insurance transitions or beneficiary point-of-service price sensitivity) contribute to the model's reported aggregate excess cost growth rate. OACT expects to refine the CSCG model this year with the hope of using results in evaluating the reasonableness of the current long-range assumptions.

In 2009, the Office of the Actuary will also expend internal and external effort toward the development of a long-range health expenditures projection interface. The goal is to develop a user-friendly tool for considering alternative excess cost growth scenarios for national health expenditures and to synthesize results from our ongoing research efforts.

The research that is in progress is expected to contribute to improved understanding of long-term health expenditure trends that the Office of the Actuary hopes will result in refinements of key model assumptions and in the modalities for presentation of long-range projection results.

## **Conclusion**

The Medicare Trustees have statutory responsibility to report on the long-term solvency of the Medicare program in the context of broader growth trends in the U.S. health sector. To discharge this responsibility, projections must be made of long-term health expenditures. The long-range projections are driven fundamentally by an assumption about the rate of excess health expenditure growth: namely, that over the last 51 years of the 75-year projection period, health expenditures will continue to grow at an average rate of 1 percentage point in excess of the rate of GDP growth. This assumption is used to constrain a solution of the OACT CGE model so as to obtain a financially equivalent, smoothly decelerating series of excess cost growth ratios. Projected excess cost ratios can then be used to project health sector shares and Medicare expenditures to the 75<sup>th</sup> year of the long-term projection horizon.

The long-range cost growth assumptions have evolved through regular processes of expert review, and improvements, refinements, and alternative approaches to the projection method continue to be considered. In their present form, the long-range assumptions lead to current law projections of health expenditures that provide a sound basis for evaluating long-range fiscal challenges for the Medicare program.

## Notational Appendix

This appendix contains notation and formulas by which readers may obtain a more concrete idea of how excess cost projection methods are implemented.

The excess cost growth rate can be thought of as the difference in the rate of growth in age-gender-adjusted per capita health expenditures and the rate of growth in per capita Gross Domestic Product (GDP):

$$XCost_t = \frac{\left(\frac{HealthExp_t}{HealthExp_{t-1}}\right)}{\left(\frac{AgeGender_t}{AgeGender_{t-1}}\right)} - \frac{GDP_t}{GDP_{t-1}} \quad (1)$$

The GDP+1 assumption referenced in the memorandum is the same as assuming that the difference that  $XCost$  represents will equal .01 (or 1 percent) in every year from year 25 to year 75 of the 75-year projection period. Algebraic manipulation of the forgoing formula leads straightforwardly to a formula from which current period per capita health expenditures can be projected, provided that usable values for variables on the righthand side of the equation are available:

$$HealthExp_t = \left(\frac{AgeGender_t}{AgeGender_{t-1}}\right) \times \left(XCost_t + \frac{GDP_t}{GDP_{t-1}}\right) \times HealthExp_{t-1} \quad (2)$$

In practice it has proved computationally convenient to re-express (2) in an exactly equivalent equation that employs a multiplier referred to in the memorandum as the  $XRatio$ , which is related to the excess cost growth rate  $XCost$ :

$$HealthExp_t = \left(\frac{AgeGender_t}{AgeGender_{t-1}}\right) \times \left(\frac{GDP_t}{GDP_{t-1}}\right) \times (XRatio_t) \times HealthExp_{t-1} \quad (3)$$

Where

$$XRatio_t = \frac{XCost_t}{\left(\frac{GDP_t}{GDP_{t-1}}\right)} + 1 \quad (4)$$

Substitution of the expression for the  $XRatio$  into equation (3) leads back to equation (2). Equation (4) clarifies why  $XRatio_t$  can only equal 1 if the excess cost growth rate,  $XCost_t$ , equals zero. At such a point the size of the health sector relative to the rest of the economy would no longer be growing.

In implementing the Office of the Actuary's excess cost growth projection method, the OACT CGE model is solved to obtain a smoothly decelerating sequence of yearly  $XRatios$  (from a value above 1 to a value virtually equal to 1) that yield a cumulative 75-year Hospital Insurance (HI) trust fund balance identical to the outcome of a constant 1 percent rate of excess cost growth, that is, an  $XCost = .01$ , for the last 51 years of the projection period. That series of  $XRatios$  is then used in equation (3) to project expenditures for the corresponding years.