Initial Economic Analysis and Summary Consensus Recommendations Associated With Green Mountain Care Board Budgetary Review Process

Prepared by Economic and Policy Resources, Inc. and Kavet, Rockler & Associates, LLC – August 22, 2022

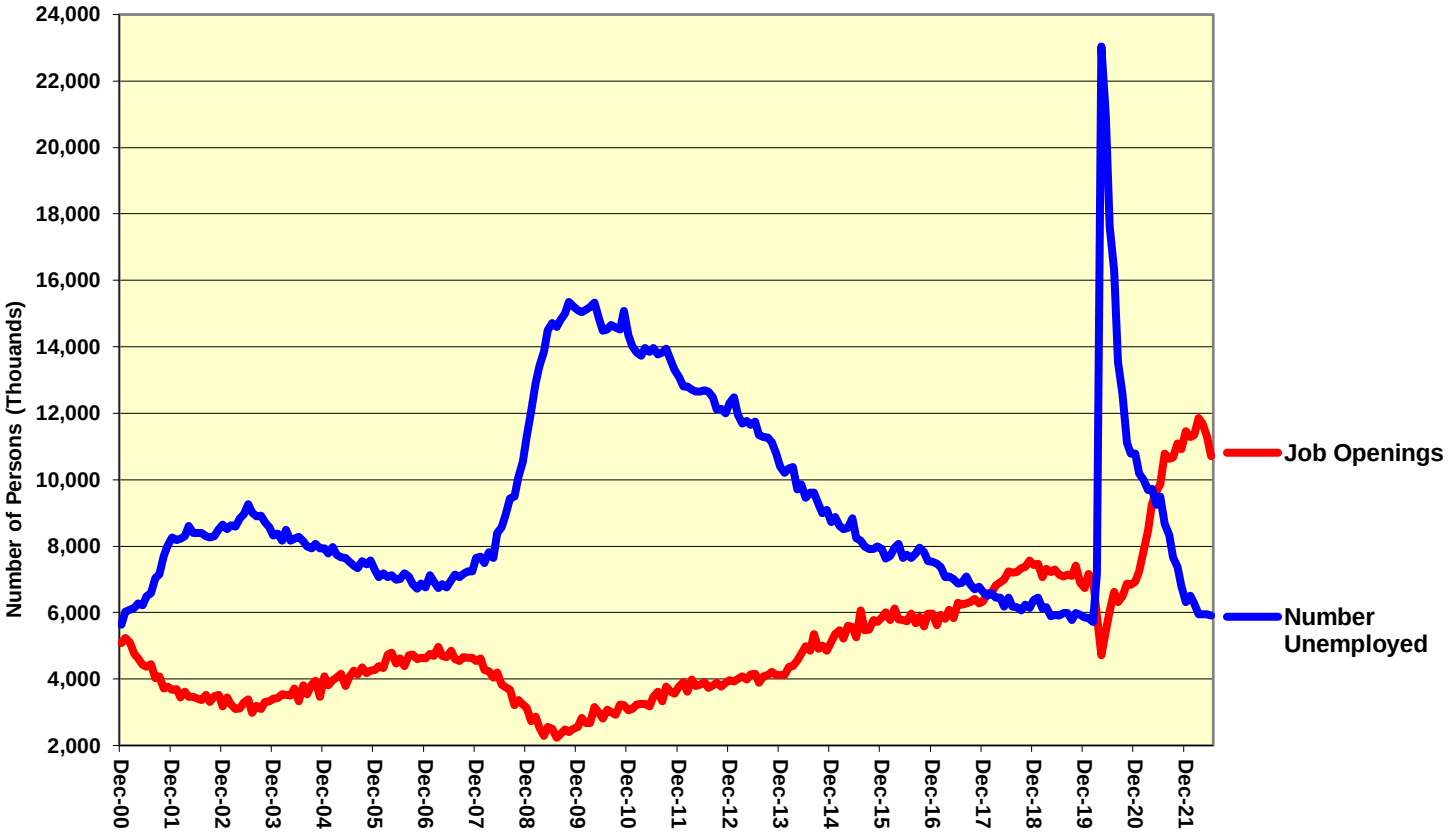
Introduction

In response to a request from the Green Mountain Care Board (GMCB), this analysis presents consensus recommendations for indicators, benchmarks, and data sources that may provide additional context for the Board's annual budgetary review responsibilities for the State's 14 community hospitals. The process involved herein is similar to that used by the State for broad budgetary purposes, utilizing a consensus analytic process between the State Economist for the Administration (Economic and Policy Resources, Inc. - hereafter "EPR"), and the State Economist for the Legislature (Kavet, Rockler & Associates, LLC - hereafter "KRA"). This process has been conducted in a very compressed timeframe and proposes further analysis in some areas that would benefit from more in-depth analysis. However, we are hopeful these perspectives offered may inform and add value to the current annual budgetary review process in a time of exceptional inflationary pressures and uncertainty.

Over the past two and a half years, prices for a wide range of products and services have fluctuated to a degree that is unprecedented in recent history, dating back roughly four decades. Dramatic swings in prices have been driven by the combination of rapid shifts in demand that overwhelmed supply chains, coupled with severe supply constraints that exacerbated these imbalances. The onset of the COVID-19 pandemic in early calendar year 2020 and the massive Federal government response to it, have both been causal factors affecting price changes in labor, assets and commodity markets. In addition, since the first quarter of 2022, additional upward pressure on prices has come from recent geopolitical developments and the associated global instability caused by the Russian invasion of Ukraine. This combination of factors has contributed to the recent surge in energy prices - up by 32.9% for the last 12 months as of July 2022, including a 44.9% year-over-year increase in energy commodities such as fuel oil (+75.6% year-over-year) and gasoline (+44.0% year-over-year). While energy prices and the overall rate of inflation have begun to ease in recent weeks, the rate of recent price increases have remained at historically high levels.

Extremely tight labor markets have also added to inflationary pressures – and are likely to be slower in receding. Per the below chart, job openings continue to exceed the number of unemployed persons in what is probably one of the best current labor market indicators. July unemployment rates in both the U.S. (3.5%) and Vermont (2.1%) matched 53-year lows, as labor force participation and immigration remain depressed, while demand is still at a boil. First in goods-producing sectors and now in services, this has pushed up wages across all income groups.

Labor Markets Remain Tight, As Job Openings Still Exceed the Number Unemployed
(Seasonally adjusted data, Source: Bureau of Labor Statistics, U.S. Department of Labor)



As a result of all this, the costs of inputs for health care providers - including hospitals – are exerting concomitant upward pressures. The complete effects of the most recent price increases, however, do not appear to have fully impacted general healthcare price indices or the formulae for Medicare and Medicaid reimbursement rates—even as providers may be contending with higher input costs as indicated by higher rates of increase in measures of general inflation. This appears to be the case whether looking at the Consumer Price Index ("CPI") for Medical Care Commodities (at +3.7% over the past twelve months ending in July 2022), the CPI for Medical Care Services (at +5.1% overall for the past 12 months ending in July 2022) which track price changes in out-of-pocket costs for urban consumers,[1] or the Personal Consumption Expenditure ("PCE") Index for Health Care (at +2.1% for the April to June 2022 quarter versus the same quarter a year ago) which tracks price changes in the health care expenditures of all consumers.

[1] See Consumer Price Index-July 2022; Available at https://www.bls.gov/news.release/pdf/cpi.pdf.

In general, health expenditures are a function of the prices charged for services-commodities and the quantity of services-commodities consumed (or allowed). One of the principal regulatory responsibilities of the GMCB is to review hospital-provided budget requests and establish allowable hospital budget growth rates for Vermont's fourteen community hospitals consistent with 18 V.S.A. § 9372. The GMCB is thus charged with the task of balancing the needs of the state's health care consumers while maintaining the financial health of the state's fourteen community hospital providers in order to ensure the availability of quality health care services for all Vermonters. The recent unforeseen growth in provider input costs tied to coincident price increases for many services and commodities in the wider economy has resulted in increased uncertainty with respect to what portion of increased health care provider budgets reflect inflationary cost pressures versus other factors.[2] Our investigation focuses on the effect of price changes - past, current, and future - and provides context to their application to various components of hospital input costs to potentially enhance the current GMCB methodology for establishing the allowable hospital budget growth rates.

Consistent with the above, EPR and KRA undertook an evaluation of a wide range of available and potentially applicable State healthcare data and price indices that could be employed in our assessment-analysis. This involved first identifying the range of available State data and price index series from the various federal reporting agencies and examining their potential applicability to a prospective, updated GMCB review process. Once the range of potential data and price indices were identified, EPR and KRA then undertook an analysis of these various measures with the objective of finding the most relevant data and federal price indices to the hospital budget expenditure categories to be reviewed and analyzed. This involved examining the key characteristics of each candidate data series and price index (including the rigor of underlying source data and methodological construct, series timeliness, and geographic applicability), and examining each index's behavior relative to changes in the subject hospital budget expenditure category. From this analysis-assessment, we have developed initial recommendations for specific indices and information that could be regularly monitored for context associated with various categories of hospital budget expenditure. We also reviewed and present various professional forecasts of some of these indicators and offer our consensus perspectives on these forecasts, consistent with official State economic and demographic projections.

As a critical part of this process, and with close collaboration with GMCB staff, we began to develop and assemble a State database of relevant historical healthcare data to inform this analysis and address other healthcare policy issues. Unfortunately, the data initially available has required considerable "cleaning" in order for it to be consistent and useable in understanding, quantifying and modeling the variables that affect healthcare costs. Such work is an arduous, but critically important process in any analysis of this nature. This has limited, however, the depth and scope of the analysis possible within the available project timeframe. Though still a work in progress, it has allowed us to make some preliminary insights into cost growth component detail, physical volume measures of output and productivity and linkages to demographic data that represent growth in the served population. Because healthcare cost increases consist of increases in the demand for services plus increases in the costs of inputs to provide these services, minus productivity gains, data on each of these pieces must be developed and forecast.

[2] Such as changes in the intensity of use of various health-related commodities and services.

While we concur with the general research conclusion of many prior analyses on this topic that there is no panacea or single gold standard price index for adjusting State health expenditure budgets for inflation,[3] we find that there are price indices and other economic and demographic metrics that can help inform the review of proposed increases in the budgets of Vermont hospitals. These indicators are presented in the "dashboard" section of this report and associated appendices. All data used in the report are available to GMCB in spreadsheet form as well. Although this work is far from complete, we hope the data and insights presented will be useful in both the immediate budget review process and provide a framework for more in-depth ongoing analyses of the factors affecting healthcare costs in Vermont.

With the above as context, the following key takeaways from the analysis to date include:

- Maximum inflationary impacts have yet to fully register in the healthcare sector's cost indices and systems in general, with wage cost pressures likely to lead the way and energy costs and some medical supply input cost categories adding to these impacts.

- Wage growth among workers with greater pricing power due to organized collective bargaining, in occupations with low frictional job switching costs and/or that are in exceptionally short supply, could reach double digit rates this year and continue to be well above "normal" in 2023 and 2024. Because more than half of all hospital costs are related to worker compensation, this will exert considerable upward pressure on hospital budgets.

- This bout of extreme inflation may be different from prior periods due to the unique nature of its causes and will continue to be highly variable among sectors and extremely volatile during some periods – both up and down.

- Most professional inflation forecasts continue to anticipate a relatively quick deceleration in in the general rate of inflation, with a return to pre-pandemic rates over the next two to three years. We consider this to be overly optimistic, with a significant risk for a slower near-term deceleration in prices and a likely three-to-five-year period of inflation exceeding pre-pandemic levels.

- Even with an aging population in Vermont, demographic analysis performed as a part of this study indicates that the demand for healthcare services in the state will increase at a rate of less than 1% per year over the next 10 years. Thus, most of the upward budgetary pressure for provider expenditure growth will be due to inflation and not physical demand growth linked to demographic change.

- Considerable additional work is needed to develop a relevant, consistent, and timely State healthcare database in support of meaningful quantitative analysis and modeling for GMCB budgetary decision-making.

[3] See **Dunn, A., S.D. Grosse, and S.H. Zuvekas**; Adjusting Health Expenditures for Inflation: A Review of Measures for Health Services Research in the United States; Health Services Research-November 2016; pp. 175-196. This is a widely quoted research paper on these issues in the literature.

Data Sources Used in the Analysis-Assessment

Assessing the reasonableness of any change, up or down, in any dollar-based expenditure time series over a number of years typically requires adjusting the values in the time series for the effects of price changes—or inflation. Adjusting for inflation standardizes the purchasing power of the dollar over time in a time series. The inflation-adjustment process therefore puts each observation in that stream of numbers on an equal purchasing power footing for the purposes of further analysis. In that regard, standardizing the purchasing power of expenditures flows in a time series allows an analyst to adjust for and understand the difference between the effects of price changes and the effects of volume changes on expenditure totals as reported for any given observation. It provides an analyst with a consistent, fixed measuring stick to be used as opposed to an uneven and malleable measure when using unadjusted (for-price-changes) current dollar (aka nominal dollar) expenditure amounts in a time series for analysis.[4]

Inflation indices, as a category of economic statistics, differ widely in scope of their "coverage." The collection of which goods and services that are included in an index can include tracking price changes for the value of goods and services of the economy as a whole for a specified period, to large swaths of purchasing or production activity for a period within broad activity aggregates of the economy, such as for total consumption activity and total investment spending. An index's coverage also can include measuring price changes for goods and services purchased by various levels of governments or for the purchases of the goods and services of the governmental sector as a whole total. These indices can also have a narrower focus and include consumption and/or production activities for individual industries, and/or specific parts of those individual sectors-industries (such as differentiating between goods in total and services in total). For the health care sector, inflation measures include indices that measure price changes across the goods and services of the industry as a whole, the consumption activities of one or more specific payers (e.g., Medicare, Medicaid, Private Insurers, and private consumers), and or for key goods and key services components of the overall health care industry. As such, there are literally hundreds of alternative price change indices published by public and private sources that could be evaluated and potentially be used to inform the hospital budget review process in Vermont. The challenge is to find the right price change index or indices (and other potential supporting benchmarks) to bring into a cohesive methodology to help inform the evolving process employed by the GMCB's determination of allowable hospital budget increases. Further, this initial list as outlined below should in all likelihood be viewed as a "living list" of price change indices and other benchmarks that should be periodically modified-augmented as needed when new and potentially more applicable data and benchmarks are developed or obtained that could brought to bear on the evolving hospital budget review process in Vermont.

Summary Overview of the Mathematics of Price Indices

Looking at measures of price change, but before diving into the wide array of different prices indices, it is important to note that these price indices share one of two common mathematical constructs which can affect the appropriateness of their application. As

[4] Although it is acknowledged that there are some analytical applications where nominal dollar spending amounts can and should be used.

highlighted in the widely referenced review of relevant indices of price change conducted by Dunn, et. al.,[5] the mathematics of inflation indices generally fall into one of two general approaches—one group that are commonly known in the world of economic statistics as *Laspeyres* indices and another category commonly known as *Paasche* indices.

A *Laspeyres* index is calculated as the mean of the price changes in a fixed bundle of goods and services for a specifically defined base period (such as the market basket of goods corresponding to calendar years 1982-84 for the Consumer Price Index-for all U.S. Urban Consumers). The fixed bundle of goods and services in a *Laspeyres* index does not change with variations in actual consumer spending patterns and has at times been criticized for over-estimating actual rates of inflation since urban consumers can logically be expected to alter their consumption by substituting lower priced items and services for more expensive ones—when prices rise faster for some items or services versus others. This is commonly referred to as substitution bias.

The second mathematical alternative index in the price change index world is called a *Paasche* Index. This index measures how much a bundle of goods and services bought in the current period would have cost in the base period. Whereas the *Laspeyres* index does not account for substitution of different goods and services in response to price changes, the *Paasche* index is essentially "post-substitution" of all bundle changes. As a result, it has a tendency to understate past price level changes and requires that the up-to-date bundles be known with proper weights for Different quantities for goods and services.

To overcome the biases of the two indices, there is a third index, the *Fisher* Index that is a compromise between the two. In technical terms, a *Fisher* Index is calculated as the geometric mean of a *Laspeyres* index of price changes for a bundle of goods and services relative to a specific base period and the *Paasche* index[6]. With the above-described mathematical construct, a *Fisher* Index is used in order to minimize the potential for distortions in the index caused by substitution bias.

Minimizing substitution bias is an important part of a practice in price indices called "chaining." Chaining is a preferred practice in price index construction because it does not use only a single base period for the market basket or bundle of goods and services used in any particular index. As a result, instead of using a single base period for the market-basket of goods and services and their corresponding "weights" within the index construction, a chained index is calculated by continually updating the composition of the bundle of goods and services (or their weights) within the index as the mix of consumption changes. Adjusting the quantity of the different goods and services that are purchased for consumption reduces the potential impacts of substitution bias in the index data being used for analysis.

Summary Overview of Major Indices of Price Change

In order to adjust inflation any time series that is presented in current dollars, researchers have a wide array of candidate inflation indices from which to choose. For this analysis,

[5] Ibid, p.176.

[6] A Paasche index, developed by German economist Hermann Paasche, is an index formula in price statistics that measures the prices of a fixed market basket of goods and services for the current period. It measures what the prices of a market basket of goods and services purchased in the current period would have cost in the base year.

we identified six general areas of price change indices available for possible use by the GMCB. We also identified a seventh area of proprietary benchmarks that could be investigated further and potentially brought into the GMCB assessment process for allowable hospital budget growth rates–time and resources permitting. These price change time series included the following:

1. **Gross Domestic Product (or "GDP") Deflators-Implicit Price Deflators:** Are comprised of a group of *Fisher* price indices developed and published on a quarterly basis by the Bureau of Economic Analysis (the "BEA") of the U.S. Department of Commerce which measures the average change in prices across the economy (including consumption, investment, and public sector expenditures) weighted to reflect the composition of output for products and services produced by the economy over a given time period. According to the National Income and Product Accounts ("NIPA") Handbook,[7] because the source data available for most components of output are measured in dollars, the estimates of quantities for most of the detailed components of output during a given period are obtained through deflating dollar values of production. The price indices can be important to help understand the changes in prices for output produced during a given period, relative to a base period, as a general measure of overall inflation. This approach can also be used to measure rates of inflation for the major activities of consumption, investment, and production of the governmental sector. Deflators of this kind are typically used as a general measure of price increases or inflation in the economy overall. "Real" GDP figures are simply GDP figures that have been adjusted for inflation (i.e., "deflated" to a constant base period.) Presently, the most current GDP deflators run through the second calendar quarter of 2022.

2. **Consumer Price Indices–for Urban Consumers ("CPI-U"):** Are a group of *Laspeyres* price indices published by the Bureau of Labor Statistics (the "BLS") of the U.S. Department of Labor that measures price changes for a fixed market basket of goods purchased by U.S. urban consumers. It is an index that reflects price changes in a fixed market basket of goods and services of constant quality and quantity that is bought, on average, by urban U.S. consumers. (These form the so-called chain-weighted CPI-U index. According to the BLS Handbook of Methods, the fixed market basket of goods and services is periodically updated to reflect changes in consumption behavior by U.S. urban consumers.[8] CPI-U indices are typically used to adjust for price change in consumers' out-of-pocket spending for specific goods and services. CPI-U indices can also be used as a gauge of the general rate of inflation. It is notable that this index excludes rural consumers. Rural consumers are an important part of the state's hospital provider care system.[9] CPI-U data are published monthly and are current through July 2022.

3. **Personal Consumption Expenditure ("PCE") Indices:** Are a group of *Fisher* price indices published monthly at the national level and on a delayed annual

[7] See Chapter 4: Estimating Methods; Quantity and Price Estimates" in the NIPA Handbook; May 2019; 30pp. NIPA in this context means **N**ational **I**ncome **P**roduct **A**ccounts.
[8] See Chapter 17: The Consumer Price Index; BLS Handbook of Methods; Updated February 14, 2018, 107 pp.; https://www.bls.gov/opub/hom/home.htm.
[9] Vermont is considered to be the most rural state in the nation. More than 8 of every 10 persons in the nation live in urban areas. In Vermont, less than 4 of every 10 persons live in urban areas.

basis at the state level by the BEA that uses the same general approach as the GDP-Implicit Price Deflators price indices, but it excludes expenditures made by groups that are non-households that are not explicitly made on behalf of households. Those excluded expenditures include those made by businesses, all levels of government, and foreign consuming units (even if it does include other types of non-household personal consumption spending such as medical expenditures,[10] education, religious, and welfare spending made on behalf of households by third party payers—including those non-household payers listed above). The composition of the market-basket of goods and services is weighted differently than is the case for the CPI-U as described above—particularly for housing expenditures. This is a useful index for identifying rates of price change in personal consumption expenditures by the household sector (and again including those made on behalf of the household sector other non-household payers). There are broad state level total annual PCE price deflators, but no disaggregated sectoral indices, and like other state level PCE data, they are not timely, with the latest data now 2020. National data (annual and quarterly), however, are up to date through June 2022.

4. **Personal Health Care Deflator and other CMS Price Indices:** Are chain-weighted, aggregate *Fisher* indices of medical price changes published by the Centers for Medicare and Medicaid Services (commonly known and referred to herein as "CMS"). The Personal Health Care Deflator ("PHC Deflator") and other CMS indices, are annual series, released with a one-year lag at the end of the calendar year. They cover a wide array of personal health care expenditures and sales of retail medical products such as over-the-counter drugs that are part of the estimate of National Health Expenditures (or "NHE"). CMS deflators use a wide range of price index data from the CPI-U index (see above), and Producer Price Index ("PPI") price data (see below) from a broad range of medical services providers in its calculations.[11] Both the PHC and NHE indices are helpful benchmarks for measuring price changes for total healthcare expenditures and household out-of-pocket and third-party health expenditures and can be used to adjust for general changes in medical prices. CMS also generates price indices for aggregate categories of healthcare expenditures, including a Hospital Price Index. Unfortunately, the CMS data and deflators are not timely, with the latest data now available only through 2020. There is limited state level expenditure data, but no price indices at the state level. We expect data for 2021 by the end of this year. CMS also produces forecasts for selected economic and other metrics on an annual basis. The latest forecasts were produced in March of 2022 and are presented in some of the initially recommended indicator tables herein. The CMS price index and forecasting methodologies are described in Appendix A.

5. **Producer Price Indices ("PPIs"):** Are a group of *Laspeyres* price indices that measures average change in selling prices received by domestic producers for their output on a monthly basis. Indices of price change reflect the price trends from a constant set of goods and services which represent the total output of

[10] Such as health care expenditures made on behalf of households by employers and governmental units,

[11] See NHE Deflator--Intermediate Summary; Centers for Medicare and Medicaid Services (CMS). Downloaded August 14, 2022.

an industry. PPIs are available for a wide range of goods-producing (such as mining and manufacturing sectors), services sectors that do not produce physical products, and include thousands of commodity-based indices organized by type or end-use. There are also PPIs organized by stage of processing that are both commodity and industry based. According to the BLS Handbook of Methods,[12] indices of price change classified by industry form the basis of the PPI program and make them particularly "on-point" for this industry specific assignment. The industry-specific price indices reflect price trends of a constant set of goods and services that are intended to reflect the total output of the industry. The PPIs are best suited for understanding price changes for specific medical commodities or services. The latest PPI indices are published monthly and currently run through July 2022.

6. **Employment Cost Indices:** Part of the National Compensation Survey from BLS, the Employment Cost Index ("ECI") is a group of indices that measure[13] changes in employer labor costs, including two components of total compensation (employer paid wages-salaries and employer paid benefits). Employment Cost Indices ("ECIs") are published quarterly by the BLS and reflects hourly straight-time wage rates, or, for workers not paid on an hourly basis, straight-time earnings divided by the corresponding hours. Straight-time wage and salary rates are total earnings before payroll deductions, including production bonuses, incentive earnings, commission payments, and cost-of-living adjustments. This component does not include premium pay for overtime and for work on weekends and holidays, shift differentials, and non-production bonuses (e.g., lump-sum payments provided in lieu of wage increases). The employer paid benefits component includes paid leave (such as leave for vacations, holidays, sick time, and other leave), supplemental and premium pay for work beyond the regular schedule (e.g., overtime and work on weekends or holidays), shift differentials, and nonproduction bonuses (e.g., referral and attendance bonuses). This component also includes insurance benefits (life, health, short-term disability, and long-term disability), retirement and savings benefits (defined-benefit and defined-contribution plans), and legally required benefits (Social Security, Medicare, federal and state unemployment insurance, and worker compensation). Currently, ECI data are indexed to the fourth quarter of calendar year 2005. Since the ECI reflects current period consumption amounts, it is Fisher Chain-like in its mathematical construction. In addition, there is an ECI total compensation data series for the New England region and the New England states which begins in the first quarter of calendar year 2006. This family of indices is helpful for understanding changes in compensation costs of business for workers in the economy overall and for workers in selected industry categories—including civilian hospital workers. The latest figures for the ECI are for the second quarter of calendar year 2022.

7. **Private Source-Proprietary Data and Indices:** In addition to those itemized above, there is a plethora of academic, non-profit, and private source data that could potentially inform this analysis. Some of these sources are available free

[12] See Chapter 14: Producer Prices; BLS Handbook of Methods; https://www.bls.gov/opub/hom/pdf/ppi-20111028.pdf; October 28, 2011; 16 pp.

[13] See National Compensation Measures; BLS Handbook of Methods; December 15, 2017. A description of these indexes can be viewed at; https://www.bls.gov/opub/hom/ncs/home.htm.

of charge (such as from the Kaiser Family Foundation), while others are proprietary and only available via purchase. New health-related metrics based on "big data" collection methods by telecommunication and technology firms were utilized by the State during the pandemic and could be sourced for some pricing issues. Relevant metrics and their costs have not been identified, but should be surveyed in any follow-up analysis. Private forecast and other data from Moody's Analytics was employed in this analysis and is used in the regular consensus State economic model and forecasts, maintained by EPR and KRA.

The above-identified inflation or price change indices run the full gamut in terms of their scope (or coverage), basic data sources, and formulation. Regarding the first, indices range from general measures of inflation which offer broad coverage of geography, economic activities (e.g., cover the value of all output across all sectors) and consuming-user categories of the economy, to those that are specific to a geographic region, particular sector, and a particular consumption and/or user category of the economy. Within a particular sector of the economy such as health care, indices of price change or inflation can include coverage of all health care goods (commodities) and services for one or more, or even all payers in the industry (e.g., Medicare, Medicaid, Private Insurance, and all other payers) or include just those that are consumed by a specific individual payer group within the health care industry.

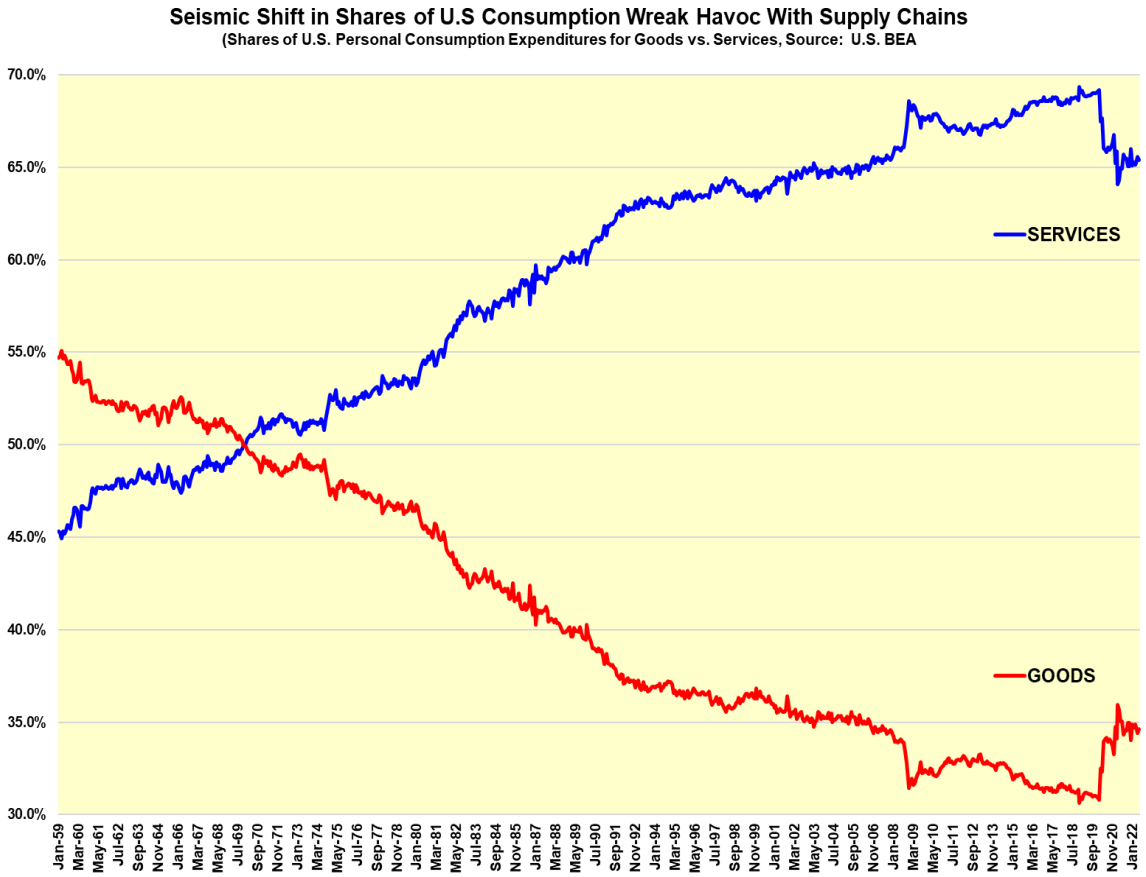
The current economic environment puts a very high premium on data timeliness, which limits the usefulness of many of the more regional, and more detailed sectoral data sources. Because current inflationary conditions have come into existence with unprecedented speed and volatility – and may fluctuate similarly in the coming years – it will be important to frequently monitor and analyze current data so as to be able to anticipate, understand and respond quickly to changing conditions.

The above discussion illustrates how researchers and analysts have a wide variety of data and benchmarks to review and assess when making choices about which price indices and benchmarks to bring to an application problem. There is no single data set that is universally used because indices vary in timeliness, scope, coverage, formula, and source providers. Using the best available inflation index data, forecasts and key relevant benchmark metrics have important implications for the findings and conclusions of any analysis in the area of health care expenditures and provider budgets analysis. The remaining sections of this report outline indicators, benchmarks and analytic approaches we believe will be most relevant to the research charge from the GMCB as outlined in the June 16, 2022 correspondence from the GMCB to EPR and KRA.

Overview of Recent Price Change Trends

Anyone who recently filled up a tank of gas, went shopping at a grocery store, purchased a used car or truck, and/or booked an airfare, a hotel, or rental car has noticed that prices for those and many other items and services have increased significantly over the last twelve to eighteen months. Prices have recently risen at historically rapid rates for a number of reasons. The key factors underpinning the initial price volatility and later price increases all derived from the pandemic, including: the rapid and extreme swings in demand caused by the combination of the health threats associated with the pandemic; the unprecedented avalanche of federal

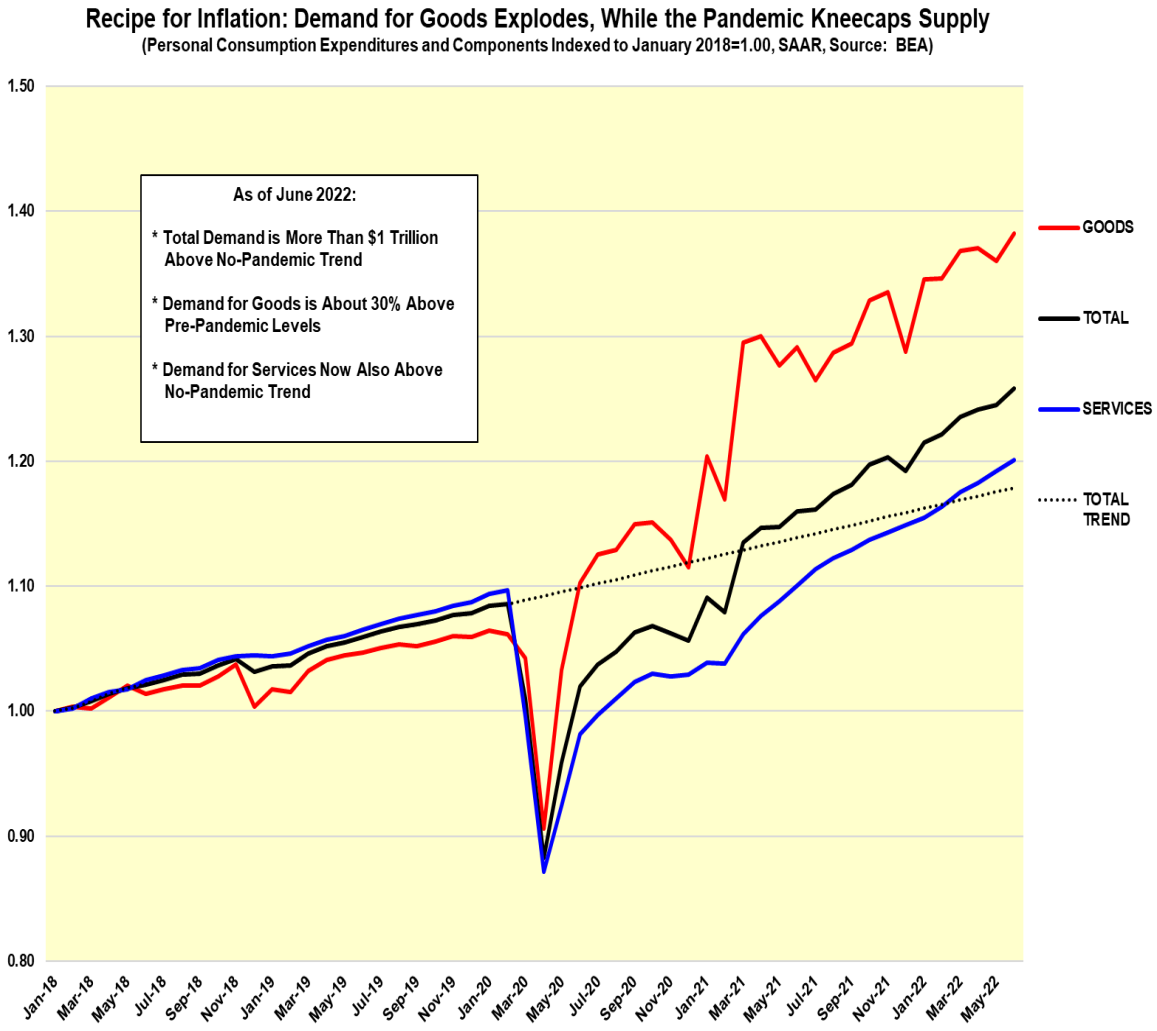
pandemic financial aid to businesses, households, and to state and local governments to address it;[14] broad-based supply chain disruptions - as households initially shifted consumption away from services and toward goods and many stayed out of work for health reasons. Pandemic-induced shifts in consumption patterns and labor markets overwhelmed the capacity of the geographically dispersed supply chains to both produce and deliver goods to the marketplace in an efficient and timely way. In addition, lack of refining capacity in the fossil fuel sector and global supply issues as suppliers struggled to quickly restart idled drilling, extraction, and production facilities pushed energy costs steadily higher during much of calendar year 2021 and into 2022, following the collapse of fossil fuel demand early on in the COVID pandemic.



These energy cost increases, along with an increase in food prices during much of calendar year 2021, were exacerbated by Russia's invasion of Ukraine in late February 2022. Since the invasion, the imposition of a set of harsh, coordinated economic sanctions against Russia by many western nations has wreaked havoc on global energy supplies—particularly in Europe. While new supplies of energy may

[14] It should be noted that much of this federal financial assistance was deficit-financed (and therefore highly expansionary for the economy), and a significant portion of this aid has yet to be deployed into the economy (which will act as a cushion against a weakening economy over the next two years). An example of these yet to be deployed federal aid dollars include significant portions of so-called ARPA—or American Rescue Act Plan Act of 2021—funds that do not have to be expended until the end of calendar year 2026 (although they must be obligated by December 31, 2024).

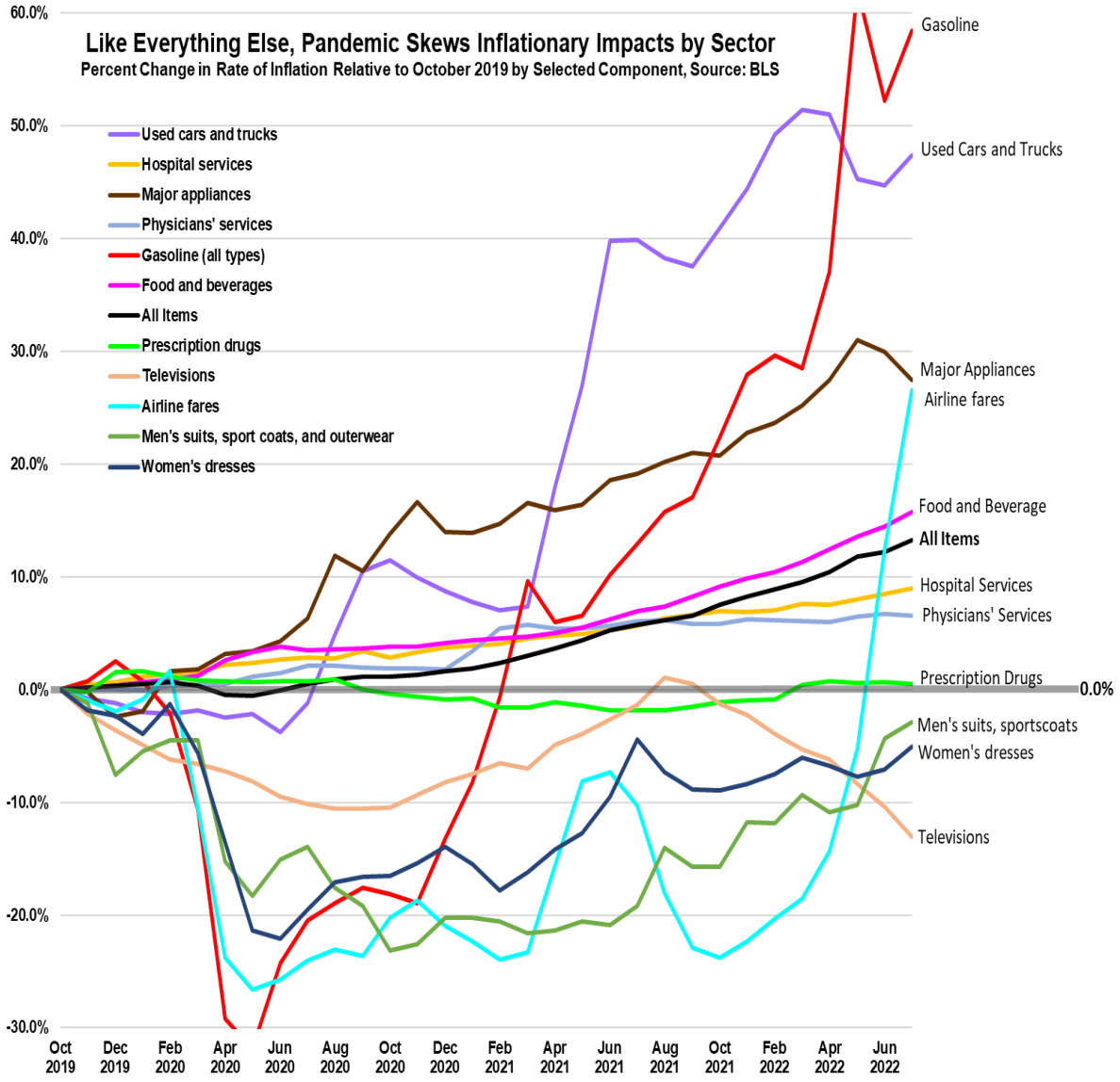
eventually come on-line and energy demand may fall as the global economy weakens to ease these recent energy price pressures, the current period of elevated price increases has proven to be more persistent than was originally expected and it is expected to continue over at least the near-term time frame. The combination of these increased prices and the factors-forces under-pinning it,[15] leaves the near-term economic and inflation outlook subject to much wider than usual levels of uncertainty.



How the above factors play out against the backdrop of the residual effects of the still on-going COVID pandemic tied to the latest variants adds even more to the already wide band of uncertainty. Recent news reports indicate that the U.S. Department of Health and Human Services (the "HHS") is soon likely to extend the national health emergency tied to the still on-going COVID pandemic.[16]

[15] Including the on-going policy pivot of the U.S. Federal Reserve and other major central banks around the globe toward "tightening measures," and with the now more protracted ground war in Ukraine than was originally expected.

[16] See https://www.politico.com/news/2022/08/1/hhs-covid-health-emergency-00052509. According to the news story, the extension of the COVID-19 Public Health Emergency (the "PHE") would ensure expanded Medicaid coverage, telehealth services, increased payments to hospitals and other pandemic measures will remain in place for at least another 60 days. The HHS has stated that they would provide at least 60 days-notice before any termination or expiration of the PHE.

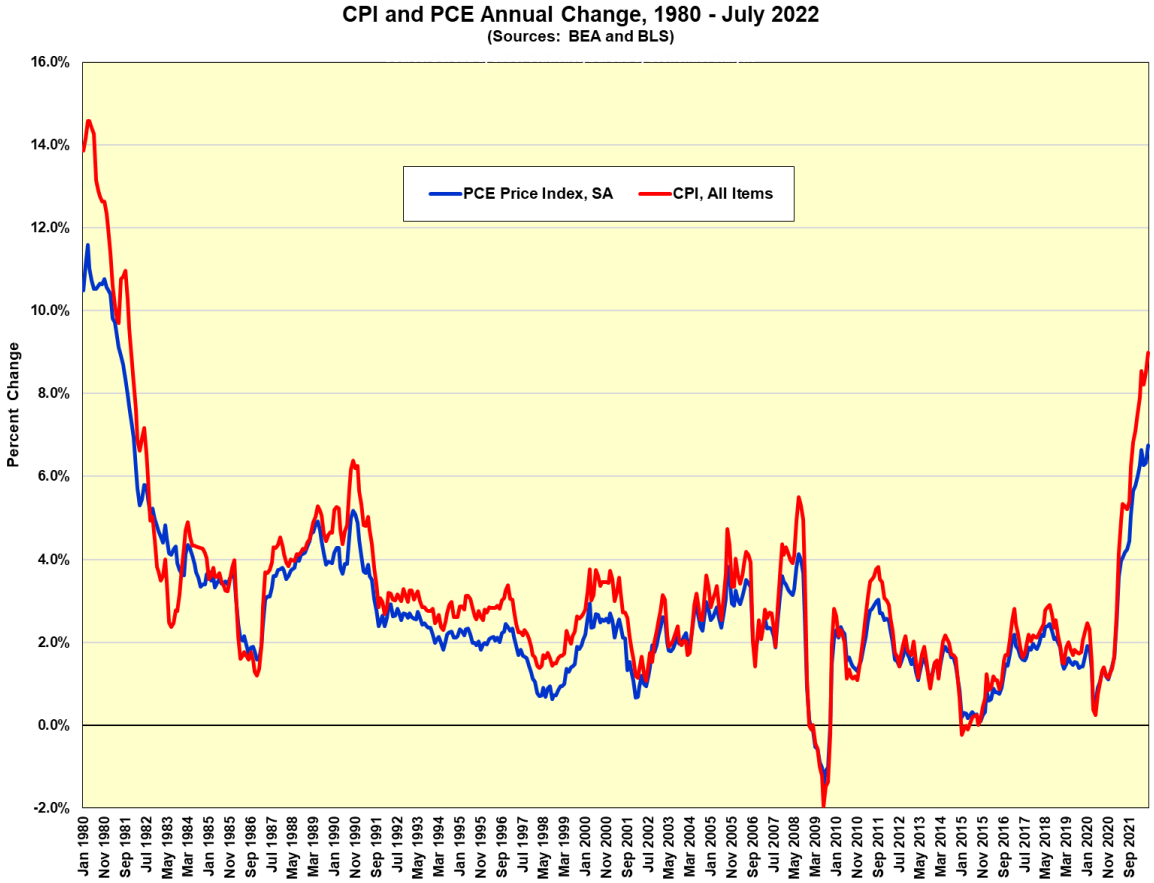


Looking at the data, key metrics of consumer prices showed that prices rose significantly over the twelve-month period ended July of 2022. The Consumer Price Index ("CPI-U") overall in July rose at the rate of +8.5% on a year over year basis (down slightly from the more than 40-year high of +9.1% in June), but still running at historically high levels. In contrast, consumer prices, as measured by the Commerce Department's PCE price index rose 6.8% in June from a year earlier,[17] up from +6.3% price increase gains registered in both April and May. The increase posted in the June PCE index marked the sharpest rise in this closely monitored measure of general inflation since January 1982. The CPI-U usually runs somewhat higher than the PCE index overall. This is tied to differences in what these two indices measure, and correspondingly, how the two indices are constructed. This difference has been

[17] With the PCE for June 2022 being the mostly current, available observation for this data series as of the date of this initial report. For some of the sub-component indexes, the most currently available observation for these indexes corresponds to the April to June 2022 quarter, or second quarter of calendar year 2022.

particularly true during the most recent run up in prices since the beginning of last calendar year.

As mentioned above, the CPI-U captures out-of-pocket expenditures for urban consumers, while the PCE price index is broader in scope. The PCE index includes both spending by and on behalf of households (and therefore includes such third-party payers for expenditures explicitly made on behalf of households such as employer-sponsored healthcare plans and expenditures by Medicare and Medicaid programs). Therefore, the PCE index has a heavier weight for medical care (at 22.0% of the index total for the PCE index[18] compared to 6.8% of the CPI-U) and a lower weighting for housing (at about a quarter of the index weighting or 23.6%). Housing costs account for a much larger share of the CPI-U (at 32.1%) relative to the PCE index.

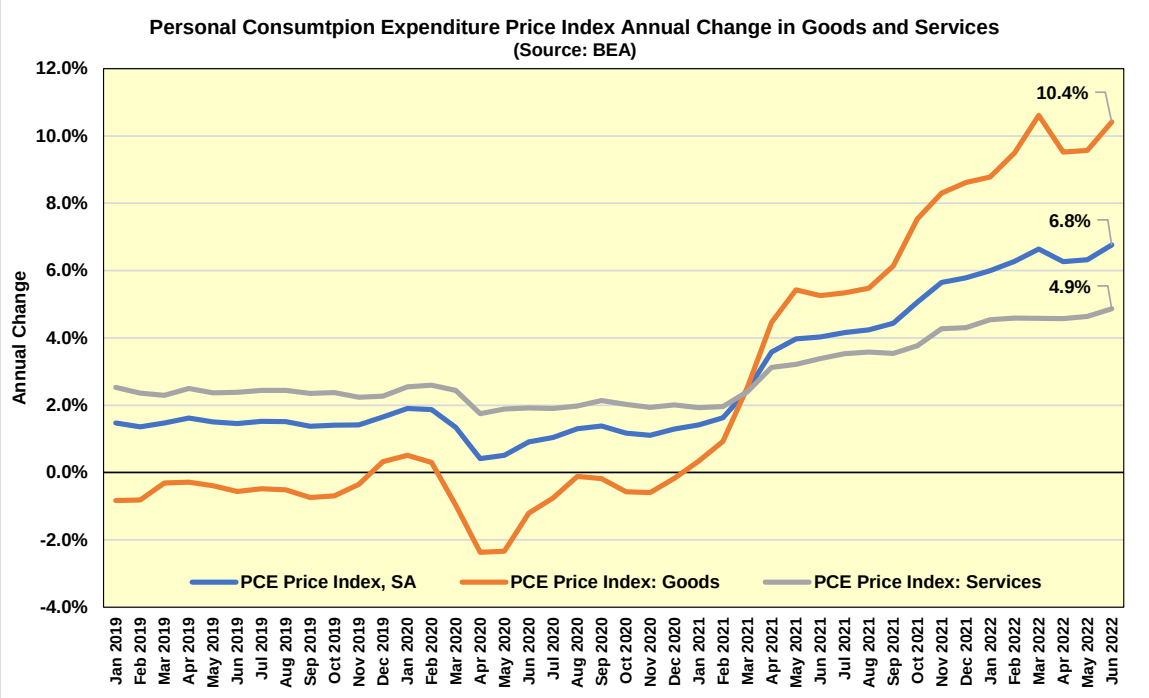


Over the years, the U.S. Federal Reserve has indicated that its policies to assure price stability tend to reflect data taken from the PCE price index data given that the PCE index tends to provide a more complete picture of the status of and changes in consumer prices. The general public and many investors tend to be more aware of the more popularly published and discussed CPI-U index figure. It should be noted that neither of these two inflation measures over the last several months have offered much evidence of a decline in the rate of inflation. However, signs have recently emerged indicating that price pressures in some key parts of the U.S. economy have begun to ease - most notably in overall energy prices and the recently declining retail

[18] For initial comparative purposes we use December 2015 PCE index weights which look to be the most recent comparison available from the BEA.

price of a gallon of gasoline. These data suggest that June's historically high readings for both of these prominent indicators of general price inflation were at, or were perhaps near, their respective peaks for this most recent period's run-up in inflation. Higher prices for goods and services in the economy overall (including labor) typically result in higher input costs for companies operating in the services sector over time - including hospital health care providers. It is therefore reasonable to expect that the input costs experienced by hospitals would rise in response to these higher rates of general inflation.

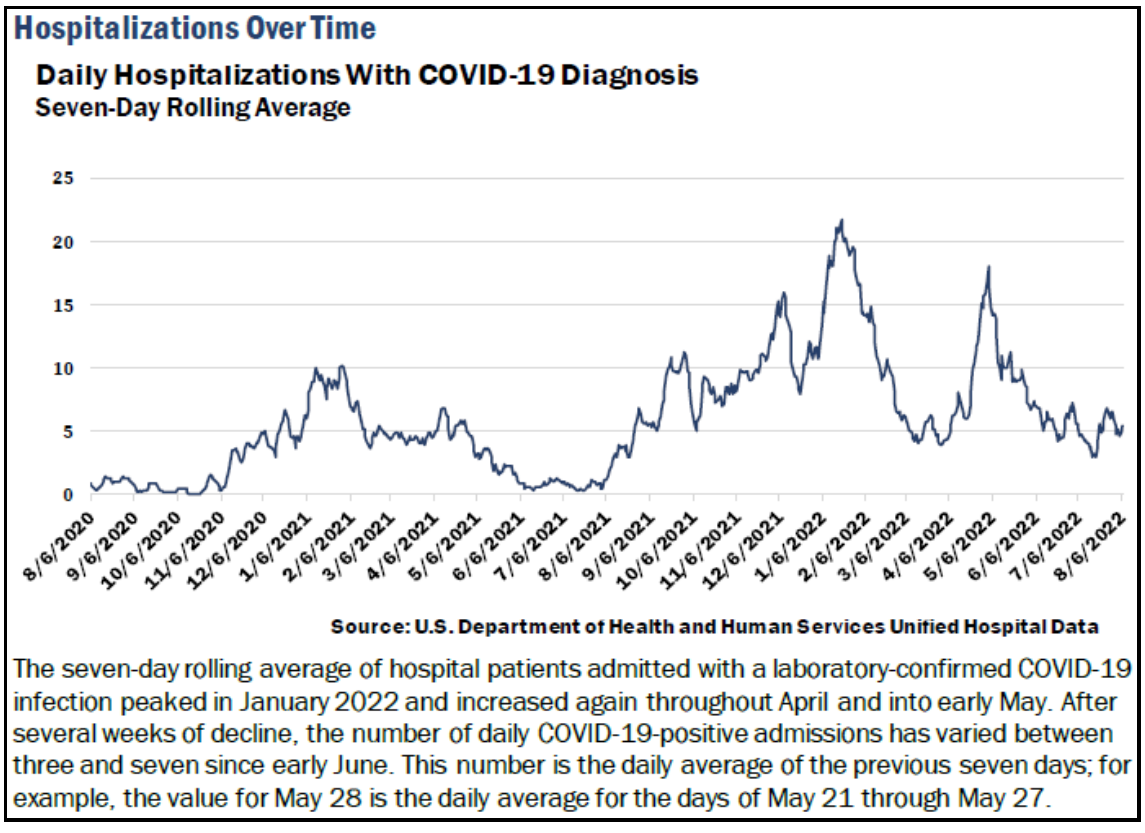
Looking at inflation rates by product type using the PCE price index, the data do, in fact, show meaningful rates of increase in the costs of goods and for services since the Spring of calendar year 2021. From the chart, the rapid recent rise of PCE index for the goods category began its string of relatively rapid increases back in the Spring of 2021 - reflecting the widely reported pandemic-induced change in household consumption preferences from services to goods - where the effect of disruptions in the supply chain added significantly to the price of goods. In fact, prior to the Spring of 2021, the price change data in the PCE price index for goods had experienced a string of ten months where the year-over-year change in the PCE price index for goods actually declined—coinciding with the initial stage of the COVID pandemic when major western economies were many parts of the economy were almost completely shut down. Month-to-month changes in the PCE price index for Goods then turned positive on a year-over-year basis beginning in January of 2021 and the price PCE index has increased at a rate equal to or higher than +4.5% (year-over-year) in every month dating back to April of 2021. In the months of March of 2022 and June of 2022, the PCE price index for goods increased at a rate that was higher than 10.0% on a year-over-year basis.



The same general pattern to year-over-year price changes is also evident for the PCE price index for services—although the rates of year-over-year price change during

the last eight months have been more restrained than was the case for goods. Over the period, the PCE price index's year-over-year changes ranged between +4.3% and +4.9% on a year-over-year basis—a relatively small amount, less than one-half of the rate of price change experienced in the PCE price change index for goods. However, those rates of year-over-year increase in the PCE price change index for services were meaningfully above the roughly +2.0% to 2.5% year-over-year price change range this index varied over the twelve months ended March of 2021—roughly corresponding to the first year of the COVID pandemic.

So far, these relatively high rates of price increase have not been evident in the PCE price index for Health Care Services. While year-over-year rates of price increase for the PCE for Health Care Services increase averaged roughly between 2.5% and 3.5% over the first year of the pandemic as hospital providers experienced an increase in hospitalizations across the period due to a large number of severe illnesses associated with the virus, the rate of year-over-year increases in the PCE price index for Health Care Services have trended in a downward direction over the half year. This easing back of upward pressure on prices in the PCE price index for Health Care Services appears to have coincided with the decline in the number of COVID case emergencies—including those of severe enough illness to require hospitalization. This followed a period where cases experienced a sharp rise during early calendar year 2022. This also reflected the recently lower levels of lethality in cases associated with recent variants of the Omicron virus using tracking data from the U.S. Department of Health Human Services.[19]



[19] Sourced through Vermont Business Magazine web-site, The hospitalization data are as of August 11, 2022; See https://vermontbiz.com/news/2022/august/11/vdh-covid-cases-rise-hospitalizations-and-deaths-low.

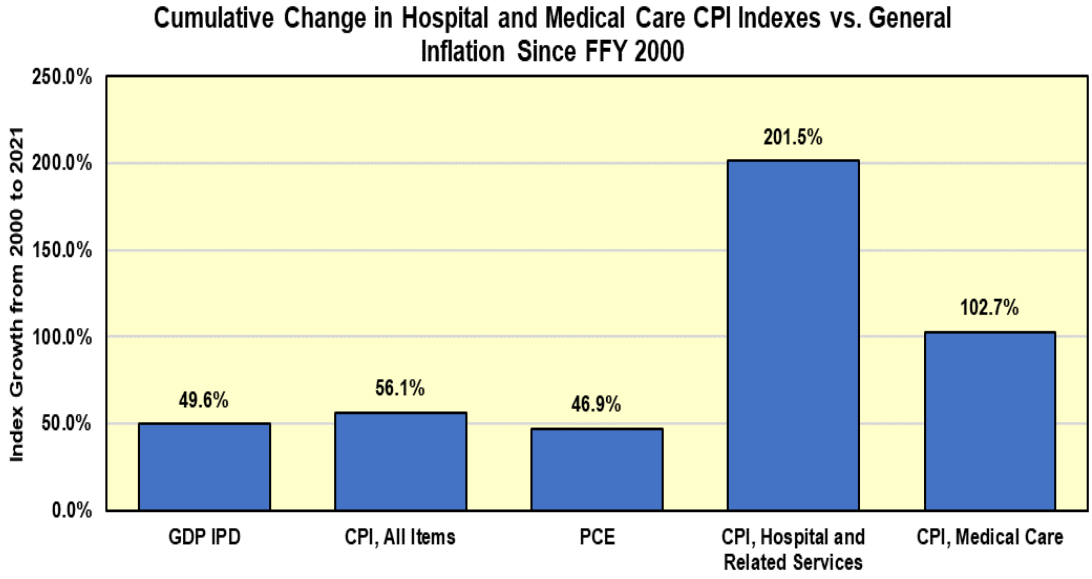
This appears to be a reflection of the peculiarities of how health care payment rates are set for the various major health care services payer categories. These include payers such as Medicare and Medicaid, as well as the periodic structured contract negotiations typically negotiated between providers and for major private insurance payers in the state. Regarding the Medicare program, prices for allowed charges are updated on an annual basis based on highly prescriptive procedures given in a set of regulations, and typically include the use of advance estimating procedures related to the projected growth of provider input costs for the year in which allowable charge and reimbursement rates are being estimated. For recent allowable charges for Medicare, projected input costs for charges in the Medicare program for federal fiscal year 2022 were finalized during a period where "projected" inflation rates were still running relatively low back in mid-calendar year 2022.[20]

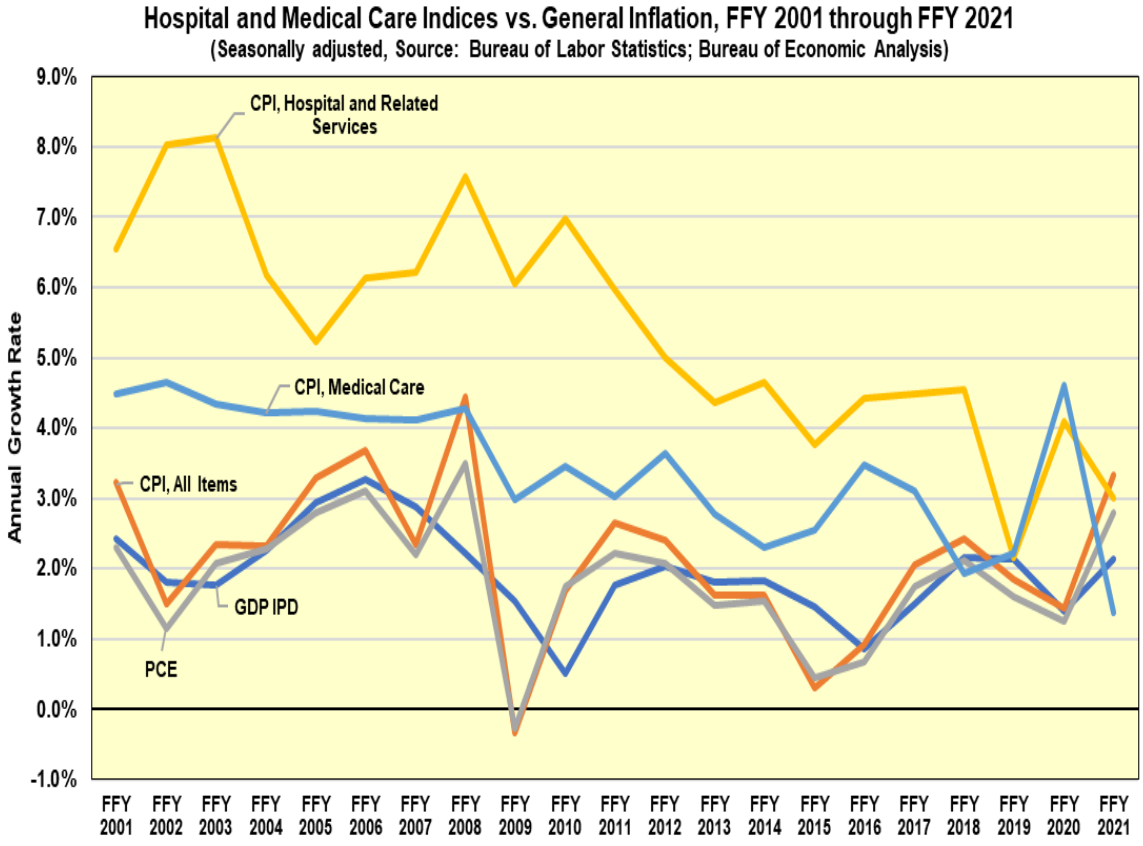
The linkage between what providers' experience in actual input cost changes and their allowed payment rates is further complicated by the regular, periodic (e.g. annual) contract negotiations in the private insurance payer category and the additional uncertainties associated with periodic payment rate changes in State Medicaid programs.[21] While these incongruities are of lesser importance during sustained periods of consistently lower rates of inflation (e.g. similar to the experience of the past 15 years) or even during periods of sustained higher rates of inflation, they can be disruptive to the stability of provider budgets during periods of price volatility.

This is especially true if allowed charges-reimbursement rates under the federal Medicare program (and by implication—maximum allowable charges for key areas of the Medicaid Program) are insufficient to cover hospital provider input costs. This puts financial strain on the operations of providers, and particularly with respect to the actual margins earned by providers for providing care. Unless this financial under-performance can be made up in subsequent years (and/or be made up with charges being shifted to other payer groups), this financial stress can have implications for the availability and quality of the health care services provided. Dating back to calendar year 2000 (and up through calendar year 2021), the differences in price pressures between the CPI-Medical Care and CPI-Hospital and Related Services has been significant (see the chart below). However, most of the difference in price change appears to have occurred prior to 2019 as illustrated by the trends presented in the second chart (also see the second chart below).

[20] See **USC-Brookings Schaffer Initiative for Health Policy**; What Does Economy-Wide Inflation Mean for Prices of health Care (and Vice Versa)?; Fielder, M. April 2022; 14 pp. In that paper-blog post, it is noted that the Medicare program sets the prices it pays to providers using formulas established by law and regulation. For calendar year 2022 allowable charges for Medicare were based on projections during the second quarter of 2021— or period when inflation expectations for service were relatively low. Further, current Medicare rules do not allow charges for many items such as charges for Physician Services to be updated for differences between projected and actual charges. As such, outside of congressional action, there is no current provision to allow those charges to "catch-up" for under-charges or be "adjusted down" for over-collections for periods when projected charges were higher than warranted by the "actuals."

[21] Ibid. Fielder, M.; April 2022; See pages 4-7.





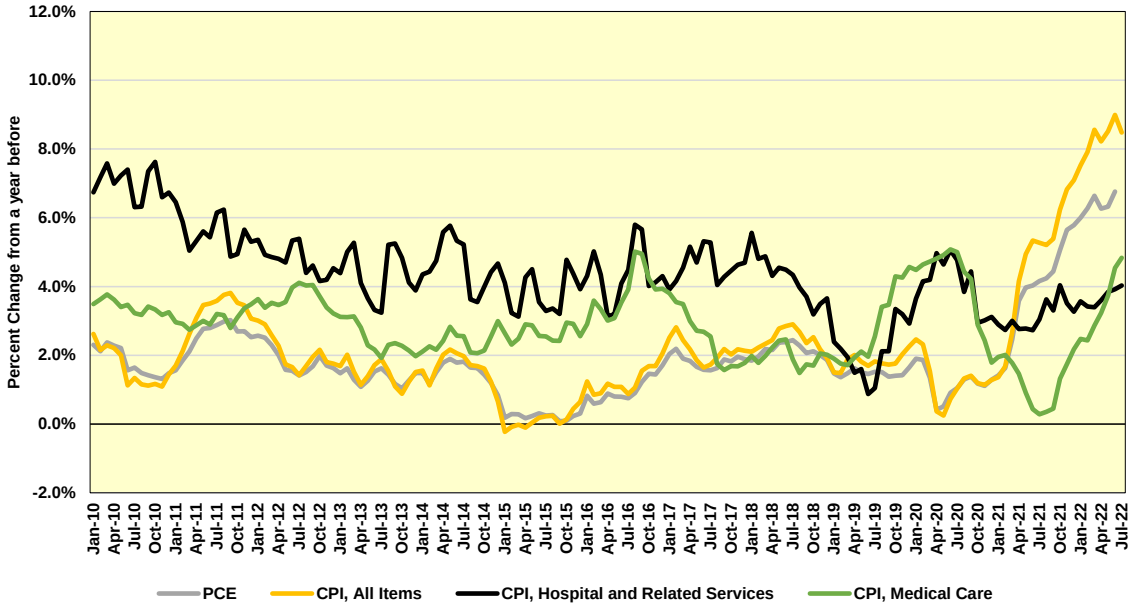
These pricing-reimbursement rate setting dynamics are well documented in the health care industry.[22] The incongruence between current period allowed charges-

[22] How Much Do Hospitals Cost Shift? A Review of the Evidence; Frakt, A.B.; March 2011; This article can be accessed at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3160596/. Also see: Hospital Resource Allocation Decisions When Market Prices Exceed Medicare Prices; Wang, Y. and G. Anderson; To be Published in April of 2023; A summary of this study can be found here: https://pubmed.ncbi.nlm.nih.gov/34806174/.

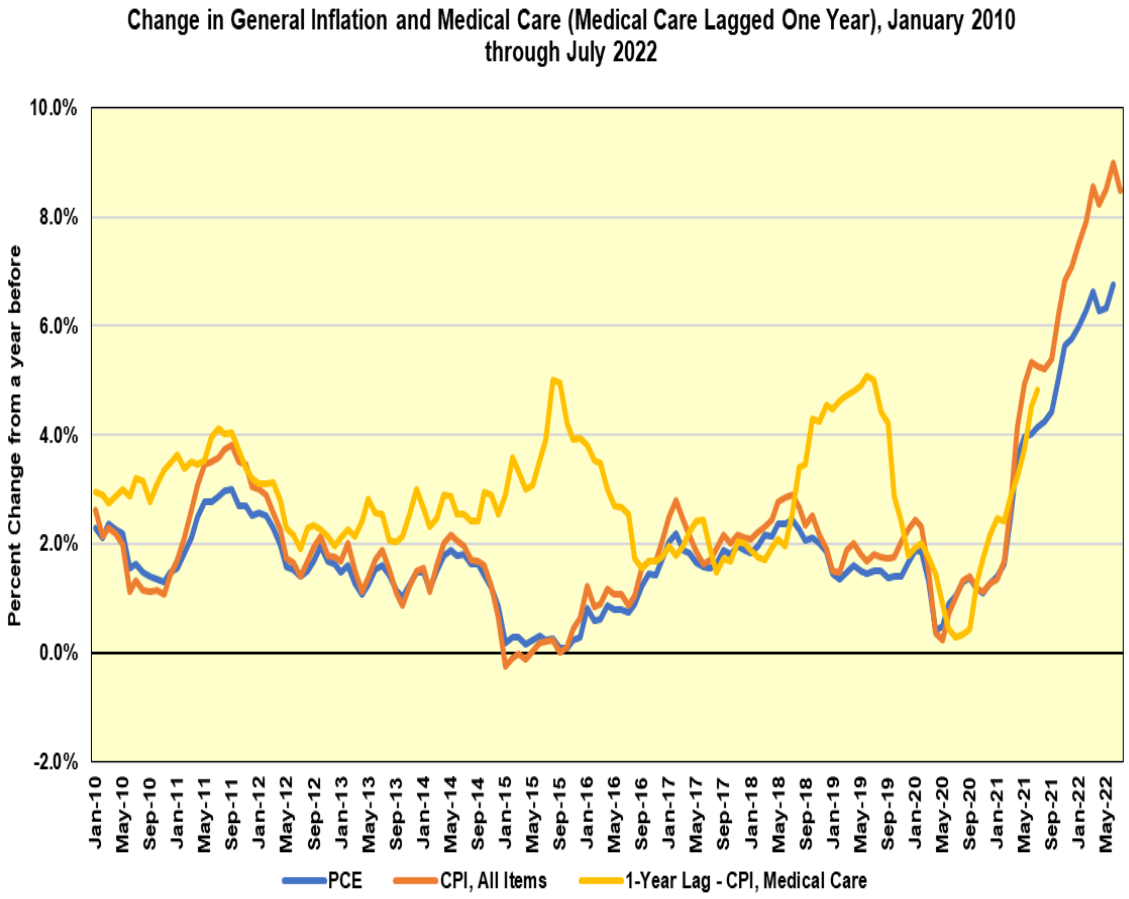
reimbursements and current period inflationary pressures (up or down) appears tied to the lagged nature of pricing-payment rate setting and the actual input cost experience of various providers (including hospital service providers). Although the lagged nature of how actual increases (and decreases) in input costs become integrated in the various measures of health services price inflation is not new and is widely understood within the industry, it does significantly complicate data-driven approaches to incorporating near-term historical or expected provider input cost increases into services reimbursement rates or allowable provider budget increases.

At the minimum, this incongruence is limiting in terms of how fast the recent and current upward pressure on provider input costs can be integrated into health care services reimbursement rates and provider budgets—particularly over a near-term time horizon in an environment where price changes are changing more rapidly or in the opposite direction of general inflation (e.g., increasing relative to general inflation-such as the period from mid-2019 through mid-2020—highlighted in the gray shaded area on the chart below) versus decreasing or increasing at a slower rate—such as during the period since early in calendar year 2021—highlighted in green on the chart below.

Year-over-Year Change in General Inflation and the CPI-U for Hospitals and Medical Care, January 2010 through July 2022

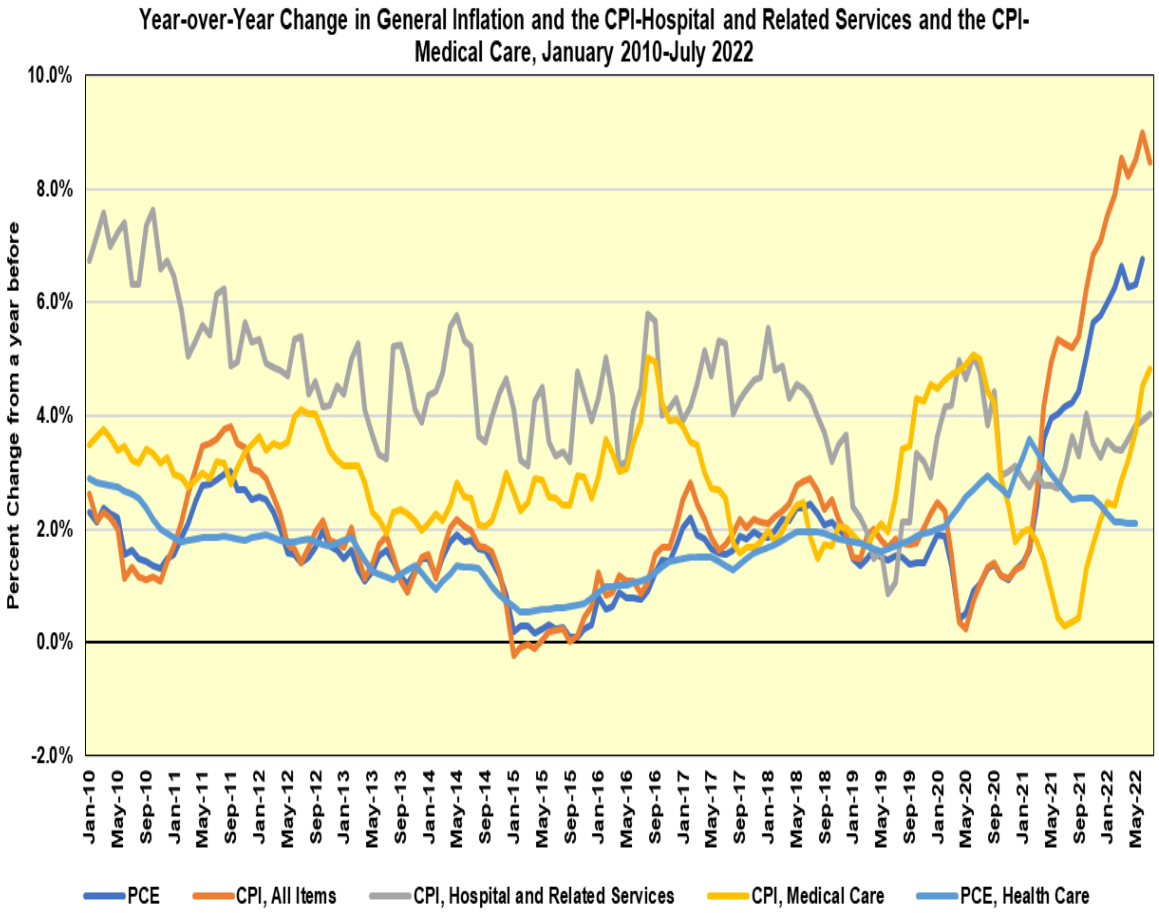


Looking at the overall CPI-U (corresponding to the out-of-pocket costs of U.S. urban consumers) and the overall PCE price change index (which measure out-of-pocket costs of all households and certain payments made on behalf of households by third party payers (such as employer costs for health care paid on behalf of their employees), rates of price change for the CPI-U for Medical Care actually track overall general rates of inflation in the economy if the CPI-U Medical Care price change index is lagged by one year versus the U.S. economy's broader, general inflation rate indicators. This was the case, except for two unusual periods between January 2015 and September 2016 and between June of 2018 and December of 2019 when price changes in the CPI for Medical Care tracked higher (see the chart below).

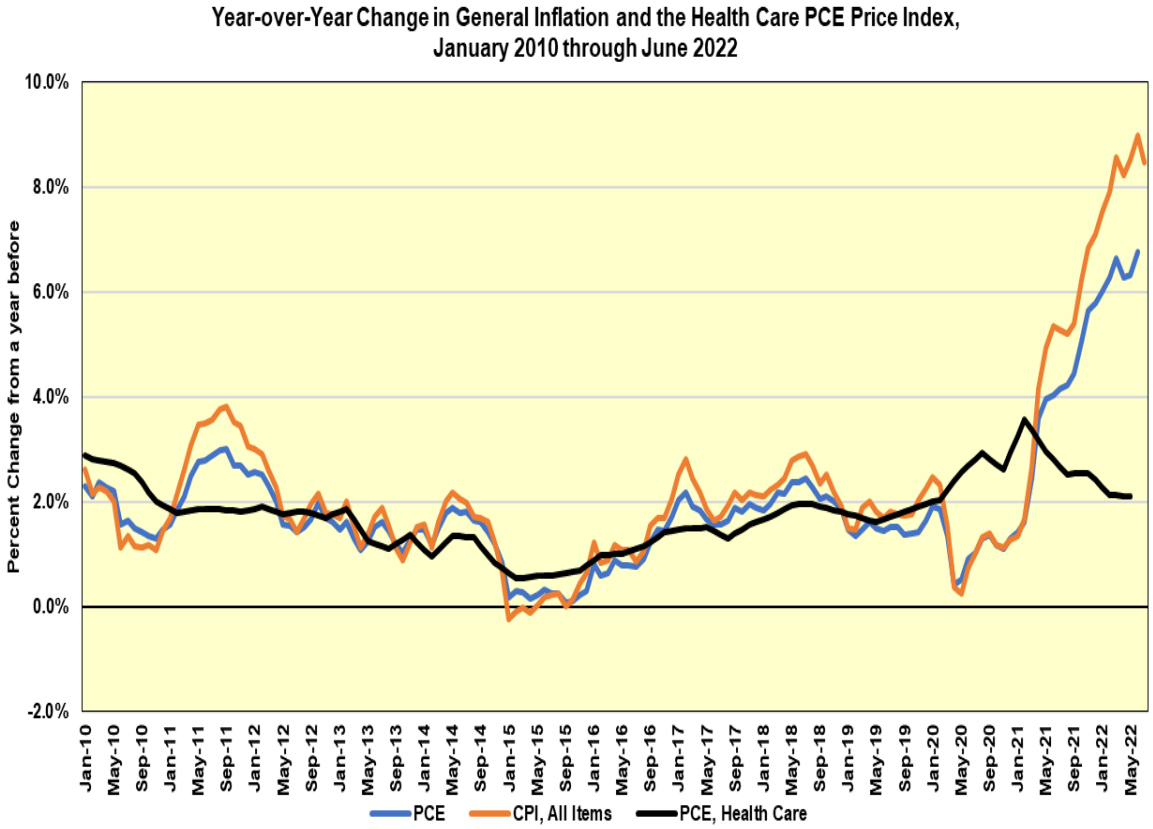


Although this may imply that there may be some catch-up potential for producer input costs relative to recent medical price inflation in terms of the level of price change in the U.S. urban consumers' out-of-pocket costs for medical care, this does not look to be the case if annual rates of price index levels are tacked back to calendar year 2010 using the various indices for tracking cumulative change in each respective index. These data are presented in the chart below.

The data show that, over the past decade dating back to the month of January of calendar year 2010, the cumulative rates of change for out-of-pocket costs paid by U.S. urban consumers generally have exceeded the overall rate of general inflation or price changes overall in the U.S. economy by a relatively wide margin. For example, these data indicate a cumulative +68.3% increase since January of calendar year 2010 in the CPI-U price index change for Hospital and Related Services, and a +43.5% cumulative rate of price increase in the CPI-U for Medical Care since January 2010. This compares to a significantly lower +35.8% cumulative rate of price change increase for the CPI-U price index overall and a +29.2% cumulative rate of price change increase through June of calendar year 2022 back to January of calendar year 2010 for the PCE price change index overall.



Looking at the broader personal consumption price change index (the PCE-Health Care Price Index) for the same January of calendar year 2010 through July of calendar year 2022 time frame (although second quarter of calendar year 2022 is the last available observation for the PCE Health Care Price Index), the data show that this broader measure of household health care expenditures price change has roughly tracked fairly closely to the overall general rate of inflation in the economy until very recently. The PCE-Health Services Price Index (with a +23.4% overall rate of price change since January 2010) recently tracked below the general rate of inflation late calendar year 2020 versus the CPI-U overall (at +43.5% overall over the period), and also during the mid-calendar year 2021 period relative to the overall PCE Price Index change (+29.2% rate of increase through June 2022 since January of 2010 overall). These data are presented in the chart below.

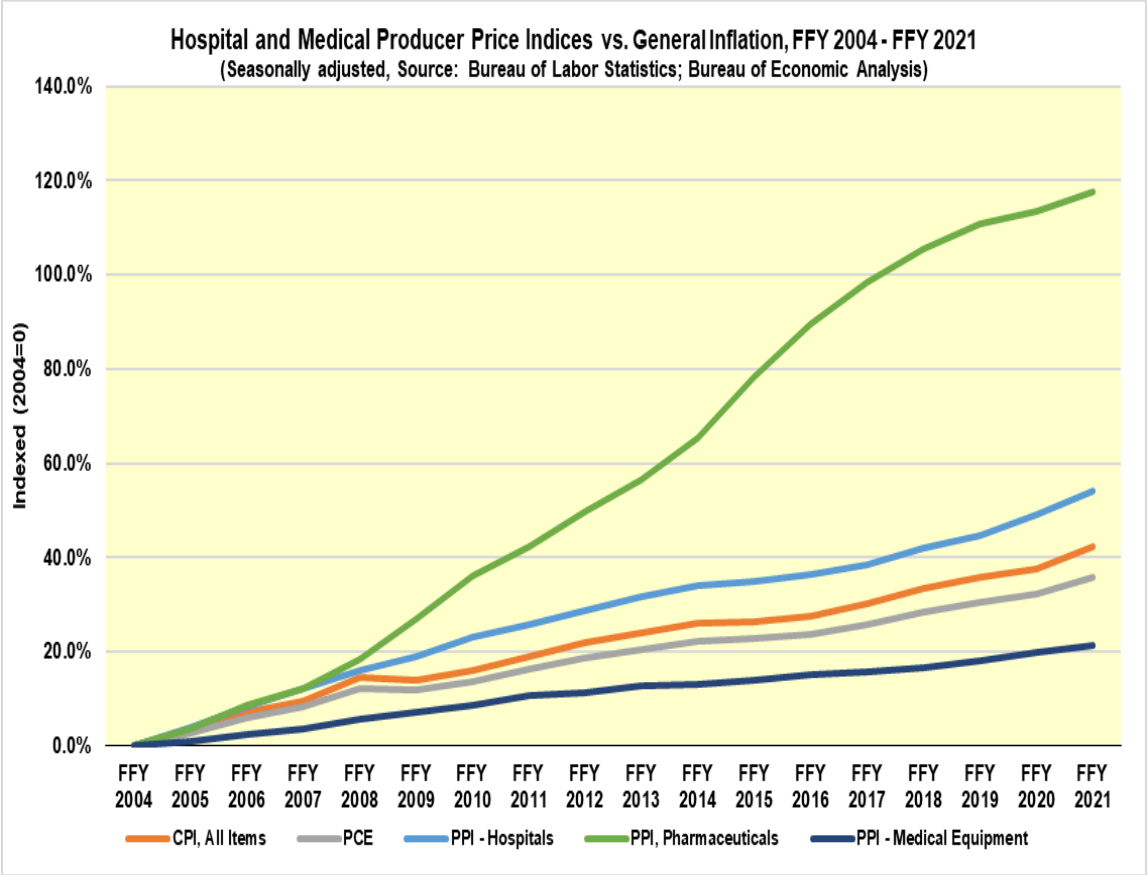


Examining trends in the data for the producer price level producer relative to the general rates of inflation in the economy overall (see the chart below),[23] the data show the substantial increase in price of Pharmaceuticals over the FFY 2004 through FFY 2021 time frame (at +117.6% during the FFY 2004 through FFY 2021 period) versus the PPI for Hospitals (at +54.0% over the FFY 2004 through FFY 2021 period) and the overall rates of CPI inflation (at +42.3% over the FFY 2004 through FFY 2021 period) and the general rate of PCE inflation (at +35.9% over the FFY 2004 through FFY 2021 time frame). Only the PPI-Medical Equipment increased at a rate than was significantly slower than the general inflation rate measures, increasing at the relatively restrained rate of +21.4% over the FFY 2004 through FFY 2021period.

All of the above reinforces the conclusions that appear in the literature regarding price change indices and other benchmarks as set forth by Dunn and others—that price change index data differ widely in terms of their scope (e.g., coverage), formulas, and sources of the data. Selecting the right data sets (including using the right deflators to adjust nominal dollar expenditures data) can have significant impacts on the findings of any research and/or analysis. The EPR and KRA team includes some initial recommendations for an objective set of metrics and benchmark indicators in subsequent sections of this report in the format of a "dashboard" that could be reasonably employed in the GMCB's hospital budget reviews to overcome some of the lack of symmetry is the availability of price change data and what is impacting producer input costs more currently and prospectively than is evident looking at the

[23] Which is likely closer to approximately the experience of health services providers' input costs in comparison to the consumer level measures of price change discussed above.

available published data and benchmarks—that by definition are somewhat backward looking in nature. In addition to those recommendations, we offer additional suggestions for how they could be augmented in the future to potentially make additional advancements in this initially recommended approach.



Evaluative Criteria Used in the Selection of Indicators

Part of the challenge of devising a usable system of data and benchmark metrics to assess inflationary pressures on providers in the state's hospital system is deciding on just what specific data series and other metrics-information can and should be brought directly to bear on the critical issues to be analyzed-assessed. This involves researching and identifying an initial list of available candidates for use in the above-refenced system of data and benchmarks and sorting through a number of key considerations regarding the scope, construction, timeliness, and source (or sources) of the data series or metric. For example, and regarding the scope-nature of a particular statistic or metric, an analyst needs to fully-consider what activity and what geographic area the data series-metric covers or reflects. More specifically, does the statistic cover all or one part of the overall activity area under examination (in this case the health care provider sector), and does the statistic reflect an estimate or reading of activity for country as a whole, the state, or some sub-state region (such as metropolitan statistical areas or a county-municipality)? In terms of construction, are the data points-metrics direct estimates of economic activity

and/or a demographic characteristic or characteristics (e.g., levels of some type such as nominal or inflation-adjusted dollars, a price change index of some kind and coverage, reflect a job or employment concept or count, and/or represent a count of some demographic concept such as residents)? Is the statistic constructed as an index or some type of rate of change, and/or are the data points-metrics expressed in another reasonable transformative format that ties to the research-analysis question? In addition, are the data points-metrics published and available on a monthly, quarterly, annual basis or are they available on some other regular or irregular time schedule?

Another critical aspect in terms of the usefulness and applicability of data and benchmarks for this particular assessment process is the timeliness and periodicity of a potential data or metric. For example, what is the typical length of time between the period represented by the data point or metric and when useable data or a usable metric becomes available for use? Further, is the length of time between the period represented by the data point-metric and the availability of useable observations consistent with the research and analysis timeline? In other words, do useful data points/enough meaningful metrics become available with fast enough turnaround so that the data consistently track with the increasingly quicker pace of change for the economy overall and within the health industry itself. We note that for some key series of health care expenditure (for example, the BEA's Health Care Satellite accounts), the lag between the availability of useful data is years, limiting their usefulness in terms of the GMCB's review of hospital budgets over a relatively short-term future time horizon of one federal fiscal year.

Finally, other critical considerations for choosing the best data sets and ensuring their proper application relates to the credibility of the data source (e.g., an unbiased federal or state agency or department), the periodicity and breadth of the source data collection instrument (e.g., survey, census or mathematical estimate) and the rigor of the methodological constructs used to assemble the data. The assessment of the myriad issues implied by the above considerations are vital to determining which data sets, metrics and information would be best suited to the research, analysis, and forecasting matters at hand for this assignment.

For the purposes of this assignment, our assessment of the above-listed considerations resulted in preference being given to data-metrics in this context that:

(1) were published by reputable sources (either a federal and/or state agency-department such as the Bureau of Labor Statistics of the U.S. Department of Labor, the Bureau of Economic Analysis of the U.S. Department of Commerce, the Centers for Medicare and Medicaid Services, and the GMCB).

(2) had appropriate scope of coverage geographically (e.g. was a national or state data point-metric) and in terms of what aspect of health care expenditures the data point-metric could accurately-appropriately be applied to;

(3) had the appropriate level of periodicity for this assignment (e.g. was not less frequent than an annual metric, with preference given to monthly and quarterly data-metrics that could be configured into a federal fiscal year) and were sufficiently consistent with the recency of the current rapidly changing price change environment (that we currently find ourselves in);

(4) had a sufficient number of historical observations to form an analytical and potentially forecastable time series looking to the next stage of this analysis,

(5) were available on a timely basis enough relative to the period they represented—with preference in this regard given to series-metrics that were available-published with a "normal time lag" for such time series data in terms of their availability of preliminary, revised, and final observations. Preference in this regard was not given to data series or metrics that relatively large gaps between the current period of activity and the most recent observation available; and

(6) demonstrated conceptual and applied congruence with the various health care provider expenditure data series that are key to the GMCB's allowable hospital budget growth rate review process. Ideally, the time series or metrics would demonstrate sufficient behavioral activity that would make them meaningful additions (e.g., statistically, and otherwise) to this assessment-review process. This means that the time series-metrics would have valid observations over a sufficient time frame—without missing data, without discontinuities, and/or without significant definitional changes—that would reduce their usefulness as part of an updated review methodology. This was a significant issue when reviewing the historical expenditures of hospital providers in the current GMCB hospital provider expenditure time series. Many line items lacked sufficient history or definitional integrity over a sufficient time historical period to be meaningfully employed in any valid modeling construct.

To reiterate a prior point in our discussion, the current rapidly changing economic environment imparts a greater sense of greater urgency into using timely data and information (such as greater use of useful monthly data where possible) in order to keep more currently abreast with the unprecedented speed and volatility that underpins the current inflationary environment—and may similarly underpins the inflationary environment for at least the near-term future. Within that context, the following sections outline the findings and conclusions, and in some cases our recommendations for future analysis and forecasting activities with respect to the research charge form the GMCB as outlined in the June 16, 2022 correspondence from the GMCB to EPR and KRA.

Indicators, Benchmarks and Other Relevant Data Sources for Monitoring and Guidance

Consistent with the above and in order to better align current provider costs with the data, we recommend that the following data series-information be regularly and ideally be more frequently collected and followed. These initial recommendations are consistent with the BEA's A. Dunn and his co-authors S.D. Grosse (of the Centers for Disease Control and Prevention), and S.H. Zuvekas (of the Agency of Health Care Research and Quality) in their widely quoted work-article; "Adjusting Health Expenditures for Inflation: A Review of Measures for Health Services Research in the United States;" Health Services Research, November 2016; which the GMCB has already obtained and reviewed. This review offers sound guidance for researchers and analysts studying health care costs, differential rates of inflation, and/or spending issues such as the GMCB's annual allowable hospital budget growth rates analysis. The particular data series or metric employed in research and/or analysis is dependent upon the objective of the analysis, research, or assessment.

Our initial recommendations for the GMCB to -track-use consistent with its analysis goals include the following key metrics or benchmarks as follows:

a. General Inflation Metrics-Benchmarks:

The first area of price change metrics or benchmarks concerns three categories of measures, including the Consumer Price Index ("CPI-U"), the Personal Consumption Expenditures Price Index (the "PCE"), and the Gross Domestic Product ("GDP") Deflators.

1. **GDP Deflators:** GDP Deflators are prepared by the BEA that measure price change across all sectors of economic activity—including consumption, investment expenditures by the business sector, and expenditures by the public sector at the federal, state, and local levels. These indexes measure price change with the average change in prices weighted by the composition of goods and services produced each quarter. They are timely in that preliminary estimates for each are published each quarter generally within the month immediately following the end of the calendar year quarter. Revised and final estimates are published over time, and the series is prone to significant revision as final estimates of the output of goods and services are periodically updated by the economic censuses and other information. The GDP Deflator and sector deflators are routinely forecasted by reputable organizations such as the Congressional Budget Office, many private forecasters such as Moody's Analytics, IHS Global Insights, other major U.S. economic forecasting firms and academic institutions. These indices are used to adjust for the overall price changes associated with the total output of goods and services produced in the economy over time.

2. **CPI-U Price Indices:**

   The CPI-U is a well-constructed and timely measure of consumer out-of-pocket expenditures made by urban consumers published by the U.S. Bureau of Labor Statistics of the U.S. Department of Labor. Published monthly in the month immediately following the observed monthly period, it is a robust measure for what it covers. As an urban consumer index, it excludes rural consumers that are important to Vermont hospital providers. It also excludes expenditures by businesses and governmental units. This index and parts of the overall index are widely forecasted by reputable organizations such as the Congressional Budget Office, many private reputable forecasters such as Moody's Analytics, IHS Global Insights, other major U.S. economic forecasting firms, and academic institutions. It is perhaps best used to adjust for consumer households' purchasing power relative to a range of goods and services in the household sector made by urban households.

3. **PCE Price Indices:**

   The BEA's PCE Price Index is best suited to measuring the effect of price changes at the consumer household level for all consumers—and does not exclude rural consumers as is the case with the CPI-U. The construction of the PCE index is the same as the GDP Deflator (see above), but it excludes the expenditures made by businesses, governmental units and foreigners that the GDP Deflator includes. In addition to actual spending by households, the PCE index also include expenditures made by other payers on behalf of households—even if they are made by the excluded groups as identified above. The PCE is widely used by a number of key institutions which also forecast the total and components of these indices, including the Congressional Budget Office, the Board of Governors of the U.S. Federal Reserve, and private and academic institutions. This index is

perhaps best used to adjust for consumer households' purchasing power relative to a range of expenditures for all households—including both urban and rural—in contrast to the urban consumer orientation of the CPI-U.

b. Metrics-Benchmarks of Health Care/Medical Care Inflation:

The second area of price change metrics or benchmarks concerns five general categories of data that measure price changes or inflation in the medical care sector. These indices include: the Medical Care Consumer Price Index ("CPI-U") or so-called Med CPI, the Personal Health Care Deflator ("PHC Deflator"), the broad National Health Expenditures Deflator and sectoral deflators (the "NHE Deflators"), the Personal Consumption Expenditures Health Price Index (the "PCEH"), and the Hospital Price Index and Other CMS Price Indices.

1. Medical CPI-U Indices:

Published by the U.S. BLS, the Med-CPI covers price changes in out-of-pocket expenditure categories such as medications, professional services, hospital services, and health insurance using weights of a fixed market basket of out-of-pocket spending for the base period (corresponding to calendar years 1982-84). For hospitals, it includes only charges related to consumers—such as hospital charges for self-pay patients. This index is published monthly and is widely available for use as a measure of out-of-pocket medical care services-costs for urban U.S. consumers. There are regional indexes with less frequent publication and reliability. As a member of the family of CPIs, this index gets wide exposure as a measure of price changes for medical care.

2. PHC Deflator:

The PHC Deflator is constructed by the Centers for Medicare and Medicaid Services ("CMS"), and is function-based price deflator index that measures price change personal health care expenditures for hospital, physician and clinical, dental and other professional care services expenditures (including government administration expenditures) but excluding net of administrative costs of public and private health insurance plans government public heath activity expenditures and noncommercial biomedical research (Dunn et al. reports that commercial expenditures are "implicitly captured" in this estimate)[24]. The PHC Deflator also reportedly covers health expenditures for home health care, nursing care, and other residential and personal care services. It also includes price changes for expenditures retail sales of medical products such as "over-the-counter" drugs. It is therefore very comprehensive in scope and uses sector-specific PPIs[25] and some sector-specific CPIs[26] in its construction. The CMS also provides periodic forecasts of the deflator and key components on a lagged basis (see below). However, the most recent set of forecasts are dated, and reflect forecasts from the timeframe when the consensus view was that the recent run-up in inflation was likely to be "transitory" in nature. That analysis is therefore "dated" in nature and the value of those forecasts is very now in comparison to more recent forecasts.

[24] See Dunn et al.; Page 182

[25] For example, Dunn et al. reports that the CMS uses the PPI for Hospitals, Offices of Physicians, Medical and Diagnostic Labs, Home Health Care Services, and Nursing Care in tis construction (see pp. 180-181).

[26] For example, Dunn et al. reports that the CMS uses several CPIs in the PHC Deflator's construction, including the CPI for Other Professional Services, Dental Services, Personal Care, Prescription Drugs, Durable Medical Equipment, and Non-Durable Medical Products foin the construction of this index (see page 181).

3. NHE Deflators:

The NHE Deflator is a chained *Fisher* Price Index that uses a wide range of price indices from the PPI and CPI that measures price change related to the purchase of health care goods and services during a given year along with expenditures invested to procure future health care services. Available back to 2004, this index is intended to compliment the PCE index by covering several areas of the non-personal health care categories of spending. To develop a price measure for those sectors, composite measures were developed for each non-PHC expenditure category. By using this approach, this index covers all of the various expenditure categories in the NHE expenditure estimates and sets weights equal to the share of NHE spending accounted for by type of expenditure. The index is available at the sector level. The NHE Deflator is similar in construction and behaves very similarly to the PHC Deflator described above. The NHE Deflator is also periodically forecasted by the Office of the Actuary in the CMS. The most recent projections were released on March 22. 2022 (see Projections of National Health Expenditures and Health Insurance Enrollment: Methodology and Model Specification). However, the projections for the deflators appear to be based on assumptions that were part of the "transitory school of thought" with respect to the current period of historically high rates of inflation and appear to emphasize the recent period of relatively restrained price increases in the health care sector for the current set of price change projections.[27] This index is very comprehensive in its coverage and including comprehensive coverage health care provider input costs. However, the index is somewhat lacking in terms of its periodicity and recency that may limit its usefulness in real-time provider costs monitoring and assessment.

4. PCE Health Price Index:

Published by the BEA, this index is a by function price index similar to the PHC Deflator Index (see above) in its construction—in that it uses sector-specific PPIs and some sector-specific CPIs in its construction. Although there are some definitional differences with the PHC Deflator in tis construction, the two price indices are similar in their respective overall change performance over time. The PCE Health Services index offers a close conceptual match to hospital care costs and offers value in terms of its prospective use for measuring medical care price changes over time (see the example application of selected prices indices below).

5. The Hospital Price Index and Other CMS Price Indices:

CMS price indices for broad aggregations of healthcare expenditures are also useful metrics – especially the Hospital Price Index. Constructed along the same guidelines as other CMS price indices, they share the same strengths and weaknesses for purposes of GMCB budget review analyses.

c. Metrics-Benchmarks of Health Care/Medical Care Inflation

The third area of price change metrics or benchmarks concerns three categories of data that measure price changes or inflation in the medical care sector. These indices include: the Consumer Price Index component indices for key segments of medical care—including certain services and goods ("CPI-U"), the various PPI indices for specific types of medical care services at the producer level.

[27] See: Analysis of National Health Expenditure Projections Accuracy (cms.gov).

1. CPI-U Component Indices:

Published by the U.S. BLS, the Med-CPI and related price indices for four areas of medical care expenditures (and some sub-components) are published monthly. The four areas covered within the Med-CPI area include the following: (1) Prescription and Non-Prescription Drugs, (2) Medical Equipment and Supplies, (3) Medical Professional Services, and (4) Hospital and Related Services. Since the Medical Care CPI focuses on out-ot-pocket expenditures by urban consumers, this index includes key information about price changes for key areas of out-of-pocket U.S. urban consumer expense categories for medical care. Because this category of price change reflects consumer level out-of-pocket costs this category includes estimates of the potentially significant out-of-pocket expenditures made by self-pay patients. Like the broader CPI categories, this category of indices is available on a timely basis and can be helpful in understanding trends in price changes for these categories of out-of-pocket medical care-based expenditures by U.S. consumers. The reader is reminded, however, that this category of indices excludes rural U.S. consumers—a very important group of consumers in Vermont.

2. PPI Component Indices:

As indicated above, the PPI is published by the U.S. BLS which is intended to measure price change for specific types of medical care services from providers using actual payment data from transactions at the producer level. The PPI includes prices from all types of payers—including Medicare, Medicaid, private insurers, and consumers (that are insured). It is widely available and is published on a monthly basis in a timely way similar to the CPI-U. There are compositional differences in the CPI and PPI indices in terms of their coverage of the included expenditure in each index (the PPI includes third party payers like Medicare and Medicaid and the CPI does not) and level of the economy's or industry's production function where they are measured (the CPI is measured at the consumer level and the PPI measures activity at the fabricator or provider level—and is probably more on point for assessing hospital providers' input costs). The best application for the PPI is as a measure of price change for certain specific medical services categories.

Dunn et al. also noted there were other component measures of price change in provider input costs. These include the Medicare Hospital Inpatient Prospective Payment System market basket and the Medicare Economic Index.[28] The former is reported to measure "…relative proportions of all hospital input costs and combines them with estimates of wage inflation and PPI measures for most nonlabor inputs to calculate weighted changes in hospital prices."[29] The latter is also reported by Dunn, et al. to be a similarly index that tracks physician's input costs. Neither of these indices was included in the system of benchmarks at this point in part because their coverage (for use in the Medicare program only, and the latter's apparent focus on adjusting Medicare cancer costs-of-illness estimates for Part A and Part B of Medicare) and time in the compressed assignment timeline did not allow for a thorough review of these data series.[30]

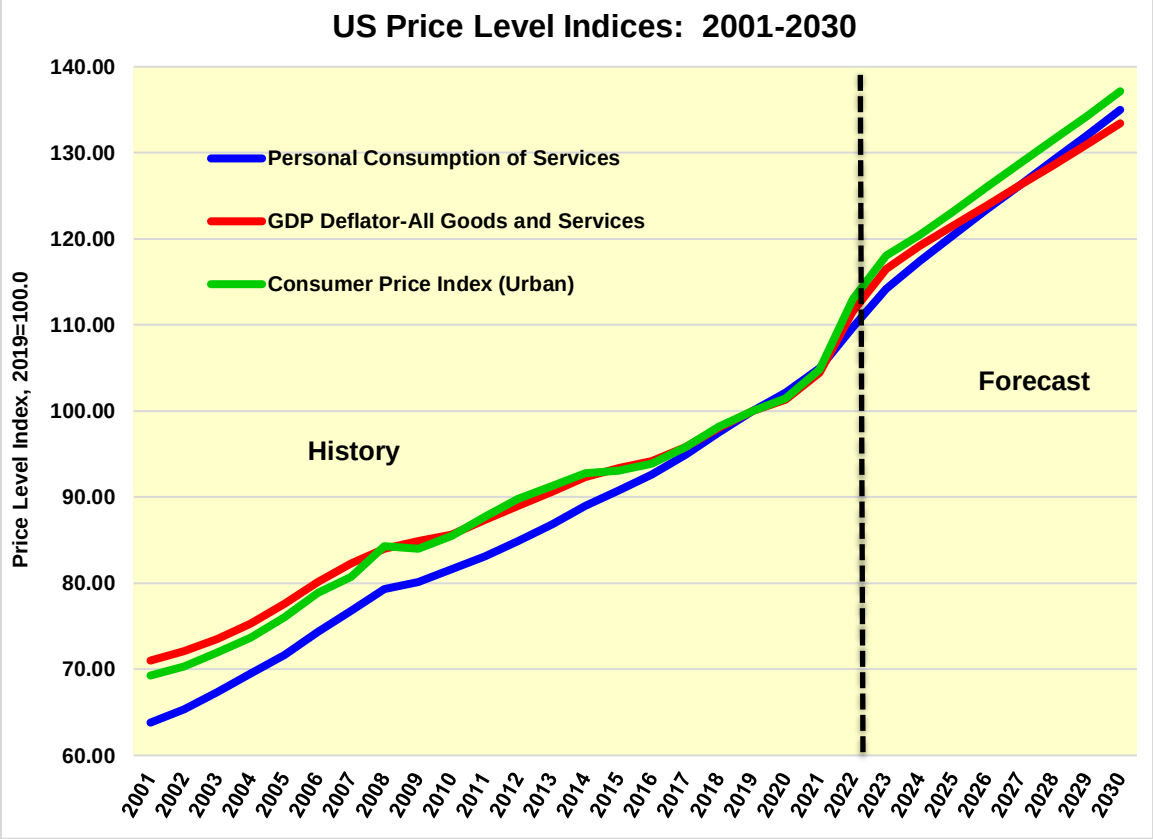
In addition, as part of the EPR-KRA review and assessment process, we also obtained data from the BEA Health Care Satellite Accounts and data from the BEA on health care input-output accounts for the purposes of comparing the structures of the Vermont health

[28] See Dunn ret al. p. 183.
[29] Ibid, p. 183.
[30] See https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareProgramRatesStats/MarketBasketResearch.

care industry with the U.S. averages. Both of the above were initially obtained as part of the prospective forward-looking forecast modeling tasks originally envisioned prior to the assessment of the exiting hospital provider which postponed that portion of the original EPR-KRA assignment. While the development of specific forecasting models was not able to be completed in the assignment's compressed timeline, enough initial testing of concepts was completed to understand that the construction of such useable models would likely be possible following the completion of additional work to make sure the GMCB hospital budget data time series are suitable for forecasting purposes.

d. Illustrative Example of Using Price Indices for Analysis

Looking beyond the characteristics of the data series as described above, the EPR-KRA team provides the following example application for three selected indices (as described above) that are forecasted by Moody's Analytics, Inc. in their August 2022 U.S. Macroeconomic Baseline Forecast. Three price indexes that are forecasted by Moody's Analytics, Inc. are shown in the chart below. The three display generally similar but not identical behavior from 2000 to 2022 and are forecast to diverge slightly from 2022 to 2030, after a period of near complete convergence from 2016 to 2020.



Historically, the GPD deflator index showed smallest range of price level changes, with a value of approximately 71 in 2001, rising to 133 in 2030. The GDP index is the most inclusive measure of the three shown here, incorporating price changes from consumers, business, and governments for goods and services which are used for both consumption and investment purposes. The widest price level changes are seen for the Personal Consumption Expenditures for Services (PCE-Services) index, which is shown in 2001 to

be 63 and which rises to 135 in 2030, slightly higher than GDP level by the end of the period. It includes all form of consumption expenditures for goods and services. It excludes price level changes incurred by non-households (e.g., businesses and governments) except when paid on behalf of households. Thus, it does include business- and government-paid health insurance premiums and copayments on behalf of consumers.

Historically, the Consumer Price Index has levels that are between those of the GDP index and the Personal Consumption Expenditure index. The Consumer Price Index is probably the best known of the indexes shown here, and certainly the most frequently publicized. This index measures prices paid by consumers for goods and services in urban areas of the country. Here, the index is shown to range from 69 in 2001 to 137 in 2030, maintaining the highest level of the three indexes during in the forecast period from 2023 to 2030. Higher consumer prices are seen to have grown most since 2021 relative to the other two indexes and are expected to increase fastest this year, rising an additional 8 percent in 2022. During the forecast period, it remains at the highest level, neither increasing further nor converging towards the other two series.

The near identical growth in price levels forecast for 2023 to 2030 indicates several important considerations for the GMCB as regards likely hospital expenditure levels and their changes over the next eight years:

- The PCE-Services index offers the measure of inflation that is conceptually closest to what will be seen for hospital care costs. Its other advantages are that is issued in up-to-date and high frequency fashion. As a monthly series, however, it is subject to seasonal variation and should be monitored for most purposes in its seasonally adjusted form.

- The CPI-U, as discussed above, has a more limited scope in the price level changes used for its construction relative to the PCE-Services measure, but because of its high visibility, often influences what the population at large believes inflation levels to be. It has a direct effect on individuals' outlays and conditions expectations as to what represents fair and necessary adjustments of wages and benefits to "keep-up."

- There are important timing differences between the price level indexes shown here and those for either the CPI for Hospital and Related Services, or the CPI for Medical Care discussed elsewhere in this report. Although not always consistently, the general CPI-U leads the other CPI series when price-level growth rates change direction. In the most recent upturn in the CPI-U starting in May 2020, the CPI-U led the CPI for Hospitals and Related services by one full year, and led that of the CPI for Medical Care by five quarters. This portends a period of rapid inflation in these latter two measures over the upcoming quarters in view of the drastic price level increases seen in the CPI-U over the past three quarters.

Results of Initial Age-Based Demographic Analysis

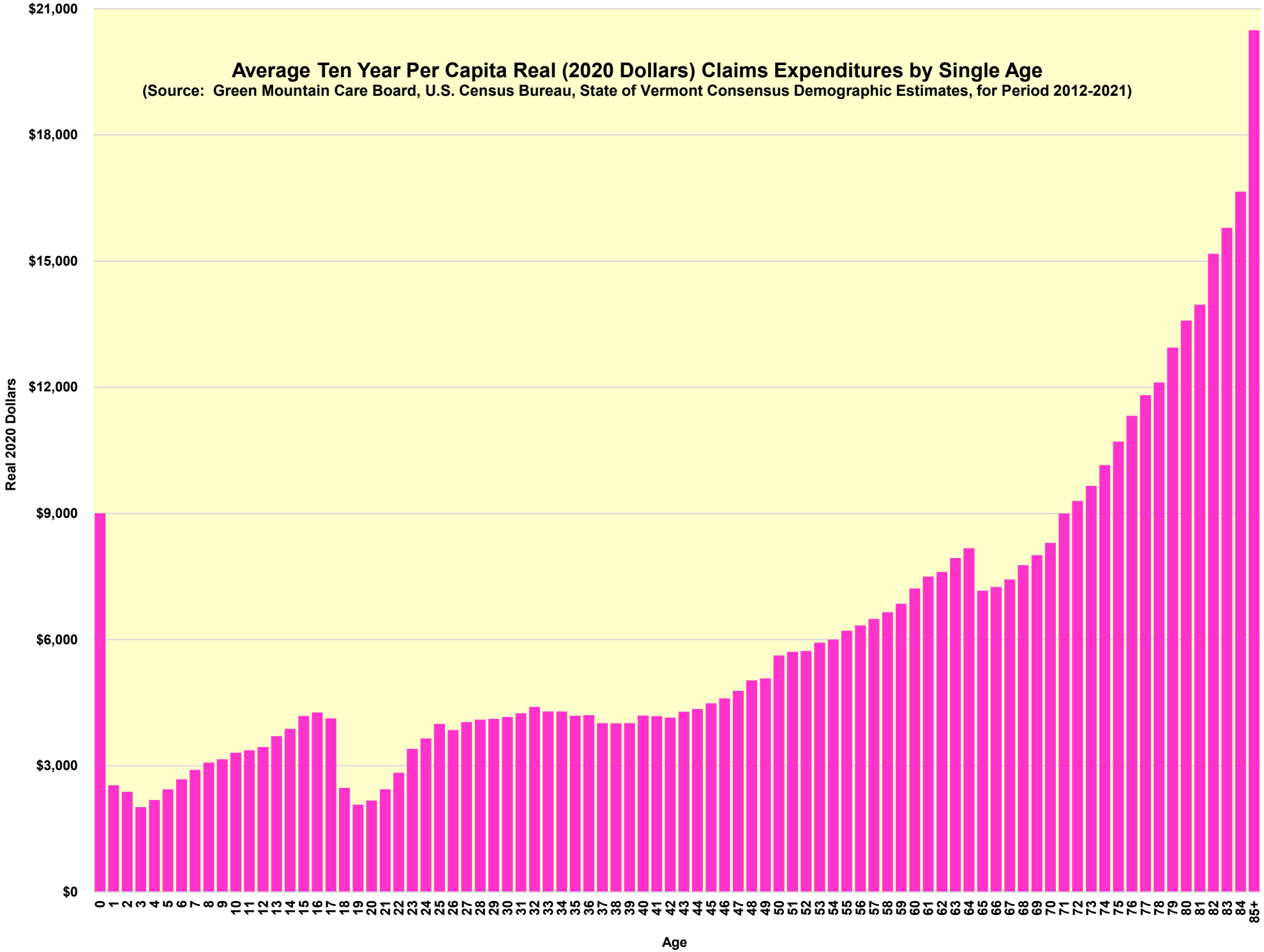
Most economic analysis is grounded in demographic realities. Accordingly, we have made an initial effort to analyze the impacts of potential changes in demand and costs to Vermont hospitals using the latest 2020 Census data and detailed GMCB claims expenditures by single age and year. As might be expected, there are significant differences in health care demand by single age cohort, with the lowest average annual expenditure at age 3 (at 35% of the all-age average) and the highest at age 85+ (at 357% of the all-age average). Ten-year average real (2020 dollar) Vermont per capita healthcare expenditures by single age are shown in the table on the following page.

In order to estimate demand derived from the changing age structure of the Vermont population, we utilized consensus single age population estimates regularly prepared for the State as a part of the biannual Economic and Revenue Updates used for budgeting and policy analysis, also prepared by EPR and KRA. We aggregated total GMCB claims data by year for the ten-year period from 2012 to 2021 and deflated annual expenditures using the GDP chain-weighted implicit price deflator. We could then calculate an inflation-adjusted average annual per capita real expenditure by single age. Using State population projections, we then extended the analysis to 2030 to generate real demand increases and inflated to current dollars using a forecast of the GDP deflator from Moody's Analytics.

Of note, there have been significant changes in Vermont population both as a result of the 2020 Census and as a result of the pandemic. The 2020 Census revealed that there were more than 19,148 more people in the State in 2020 than had been previously estimated. Census has yet to revise their intercensal 2011 to 2019 estimates, but we have generated provisional estimates consistent with the new 2020 data in the interim. The other significant change is that there were significantly fewer people age 85+ in 2020 than had been originally estimated. The new 2020 Census estimate for this age cohort was about the same level as originally estimated in 2013. Most notably, this cohort experienced a rare decline in 2021 – likely due to elevated mortality rates connected to the pandemic. At the national level U.S. life expectancy declined by more than a whole year between 2019 and 2021. While Vermont life expectancy is generally about a year greater than the U.S. average, it is likely to have declined during this period as well.

The net effect of the population derived expenditure estimates is that even with a large and aging State population, the inflation-adjusted demand for healthcare services over the next decade will grow at a rate of less than 1% per year. Thus, most of the total expenditure increases will likely come from cost increases, not growth in demand. Even with low real growth, FFY 2022 could experience nominal expenditure growth of 8% or more, given expected inflation of about 7%, and in FFY 2023, nominal growth of about 5.2%.

There are still some data refinements that are needed before finalizing these estimates, but they are not likely to change the broad conclusions drawn from this aspect of the analysis.


Average Ten Year Per Capita Real (2020 Dollars) Claims Expenditures by Single Age
(Source: Green Mountain Care Board, U.S. Census Bureau, State of Vermont Consensus Demographic Estimates, for Period 2012-2021)
$21,000
$18,000
$15,000
$12,000
$9,000
$6,000
$3,000
$0
Real 2020 Dollars
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85+
Age

VERMONT GMCB CLAIMS EXPENDITURES BY AGE		
Relative to Total	10 Year (2012-2021) Average Real (2020$) Per Capita Expenditures	Age
157%	$9,004	0
44%	$2,540	1
42%	$2,384	2
35%	$2,018	3
38%	$2,187	4
43%	$2,441	5
47%	$2,678	6
51%	$2,902	7
54%	$3,076	8
55%	$3,154	9
58%	$3,314	10
59%	$3,368	11
60%	$3,449	12
65%	$3,703	13
68%	$3,881	14
73%	$4,185	15
74%	$4,269	16
72%	$4,129	17
43%	$2,475	18
36%	$2,077	19
38%	$2,174	20
43%	$2,440	21
49%	$2,836	22
59%	$3,403	23
64%	$3,654	24
70%	$3,997	25
67%	$3,850	26
70%	$4,040	27
71%	$4,100	28
72%	$4,117	29
73%	$4,161	30
74%	$4,248	31
77%	$4,400	32
75%	$4,291	33
75%	$4,295	34
73%	$4,191	35
73%	$4,203	36
70%	$4,018	37
70%	$4,012	38
70%	$4,014	39
73%	$4,197	40
73%	$4,179	41
72%	$4,147	42
75%	$4,289	43
76%	$4,350	44
78%	$4,489	45
80%	$4,601	46
83%	$4,783	47
88%	$5,032	48
89%	$5,082	49
98%	$5,623	50
100%	$5,712	51
100%	$5,732	52
103%	$5,928	53
105%	$6,003	54
108%	$6,211	55
111%	$6,339	56
113%	$6,494	57
116%	$6,655	58
119%	$6,851	59
126%	$7,218	60
131%	$7,499	61
133%	$7,610	62
138%	$7,940	63
142%	$8,173	64
125%	$7,162	65
126%	$7,252	66
130%	$7,429	67
136%	$7,772	68
140%	$8,010	69
145%	$8,301	70
157%	$9,001	71
162%	$9,294	72
168%	$9,655	73
177%	$10,150	74
187%	$10,708	75
197%	$11,321	76
206%	$11,813	77
211%	$12,114	78
226%	$12,944	79
237%	$13,584	80
243%	$13,962	81
265%	$15,172	82
275%	$15,790	83
290%	$16,648	84
357%	$20,489	85+
100%	$5,735	TOTAL

Input/Output Analysis

Production functions form the basis of many cost indices and understanding inputs of production can help in the analysis of inflationary impacts. While detailed input/output data exists for the nation (see table on following page), no such data exist for Vermont.

Proportion of Input Value Supplied by Industry/Product
Vermont vs. U.S. Hospitals, 2012

Purpose of Expenditure	VT (GMCB)	U.S. (BEA)
Compensation of employees	0.5921	0.4653
Gross operating surplus	0.0549	0.0775
Insurance carriers, except direct life	0.0111	0.0469
Services (Other real estate, Employment, Management Consulting, Management of Companies, Legal, Accounting, Admin, computer services, building services)	0.2759	0.1436
Taxes on Production (GMCB=Health Care Provider)	0.0552	0.0125
Advertising, public relations, and related services	0.0013	0.0053
Utilities	NA	0.0202
Not Specifically Identified	0.0095	0.2287
Total	1.0000	1.0000

Source: Green Mountain Care Board, Income Statement, July 2022 and U.S. Department of Commerce, Bureau of Economic Analysis, Input-Output Accounts of the U.S., 2012 https://www.bea.gov/industry/input-output-accounts-data#supplemental-estimate-tables

- Per the above table, the composition of hospital expenditures in Vermont is based on data provided to us by GMCB. These expenditures differ significantly from that of U.S. hospitals taken as a whole. These differences may help the GMCB better anticipate the effect of inflation originating in wages, other services, utilities, etc. and allow development of State-specific cost indices that more accurately track State conditions.

- Hospitals in Vermont spend 25% more of their total expenditures on wages and benefits (which define employee compensation) than do hospitals as a group in the U.S. As a consequence, wage rate changes will have greater effect on Vermont hospital budgets than the hospital industry in general.

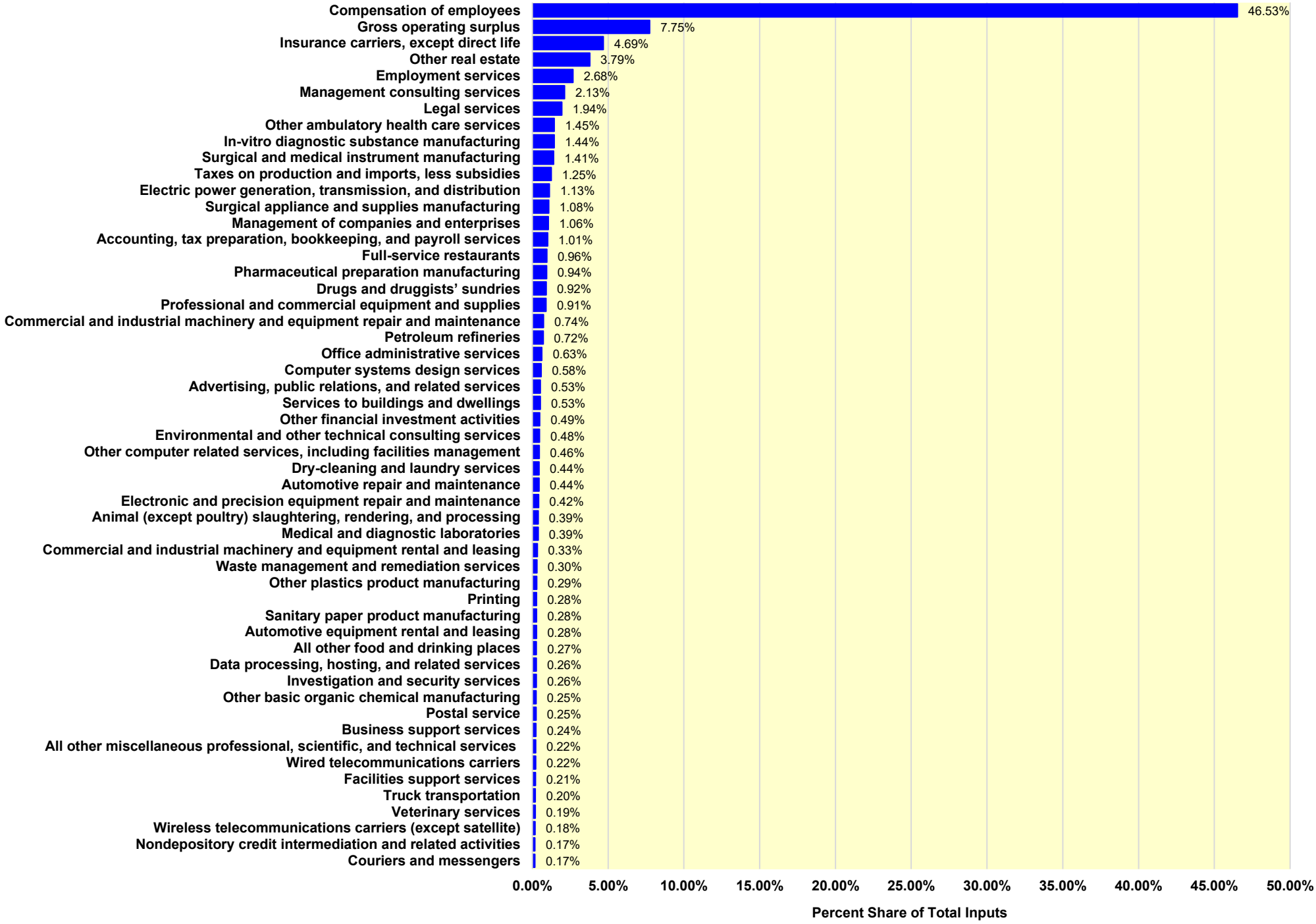
- Vermont hospitals spend almost double what U.S. hospitals spend on outside services. Some of this may be definitional. Any future comparative analysis would be aided by greater detail on Vermont expenditure data by disaggregated expenditure accounts by function or purpose.

- Some categories of expenditure for Vermont hospitals are not complete or embedded within other categories. Some, like utilities, are likely to experience volatile price movements from time-to-time. At present, detailed impacts from sectoral price changes cannot be readily anticipated.

- Accordingly, we recommend the development of a Vermont-specific production function for the hospital sector using standard Bureau of Economic Analysis industry definitions.

Industry Input Categories Supplying 95 Percent of Total Inputs to U.S. Hospitals

(Source: U.S. Department of Commerce, Bureau of Economic Analysis, Input-Output Accounts of the U.S., 2012)



Other Recommendations and Observations

The implications of the above findings include the overarching consequence that there appears to be a significant mismatch between how providers' actual "current" input cost experience aligns - or perhaps it is better described as "does not align" - with the way the health care system currently attempts to objectively measure the change in providers' actual input costs and the current way the system currently establishes provider reimbursement rates and allowable budgeted amounts. This disconnect can be especially evident during periods of relatively rapid economic or price change change—such is currently the case on the upside of pricing pressures which the economy is experiencing now. This also can work in the reverse, where actual current period provider costs could experience a period where they decline or increase at a significantly slower rate than current institutional arrangements for objectively monitoring price change and or changes in reimbursement rates and provider budget oversight can address on a timely basis. While the former condition can have the downstream effect of reducing burdens on certain payers-groups for health care (e.g., some combination of governmental payers, employers, and out-of-pocket costs for households), it could result in a period of placing providers in a financial squeeze—where providers would have to either accept lower margins and/or reduce their costs which could have implications for quality or access. Conversely, if the second condition were to be sustained over a period of time, providers budgets would likely claim a level of resource allocation that is unjustified by their actual input costs, to the detriment of the efficient allocation of the economy's resources which would unnecessarily reduce the "quality of life" of state residents.

While the assessment of whether or not the above-described misalignment results in a "positive" or a "negative" overall is beyond the scope of our analysis, we do understand that the system will work better if the misalignments can be reduced or eliminated over the longer run. Any financial system works better when the major determinants of revenues and costs are substantially in alignment. To lower the probability of both unfavorable misalignment conditions described above, we offer the earlier observations and takeaways, and provide additional analyses, observations, and preliminary recommendations as possible advancements in the current GMCB methodology of reviewing allowable hospital budget increases.

In that regard and in addition to those already provided, we recommend that the GMCB consider a few additional EPR-KRA suggestions that could add significant value to an updated methodology for reviewing and establishing allowable hospital budget growth rates. These include:

1. Because wages and benefits are more than half of current hospital budgets, the GMCB may consider devising a system to routinely collect relevant data relating to the coverage of the current collective bargaining agreements in effect at each provider in the state. In addition, the GMCB may also consider collecting any relevant information regarding collective bargaining proposals currently being negotiated by providers within the system and any other collective bargaining activity at "peer organizations" that could provide insight into future bargaining agreements. Lastly, and also as part of this data collection, the GMCB may also find it beneficial to build a historical data set of previous collective bargaining agreements reached (and their coverage) for all providers in the GMCB hospital expenditure data time series currently

maintained by the GMCB. These past, current, and future collective bargaining agreements may be useful in monitoring a significant part of the underlying drivers of wages-salaries for key groups of employees within the hospital provider system;

2. Similarly, and because the adequacy of current and future staffing at many Vermont employers remains as a key issue throughout the state, we also recommend that the GMCB consider collecting key health care sector worker demographic information at the state's providers. These may include characteristics such as age, gender, educational attainment, working status, and similar items in order to understand and collaboratively identify and monitor any existing contrasts in the work force of health care providers with other sectors of the Vermont economy. These data may also be helpful for identifying any emerging issues of consequence to current and future provider budgets for employee compensation; and

3. Since the majority of the upward budget pressures are going to come from prices, we recommend consideration of undertaking an effort to construct a coincident, monthly price index of hospital provider costs using CMS PHE methodologies (see Appendix A). Once a valid coincident index is constructed, it could potentially be used to: (1) monitor current trends in price change for hospital providers in a more timely way, and (2) be employed to potentially develop a forward-looking, price change forecasting system to assist in the GMCB's review of allowable hospital budget growth rates in a structured and more timely way.

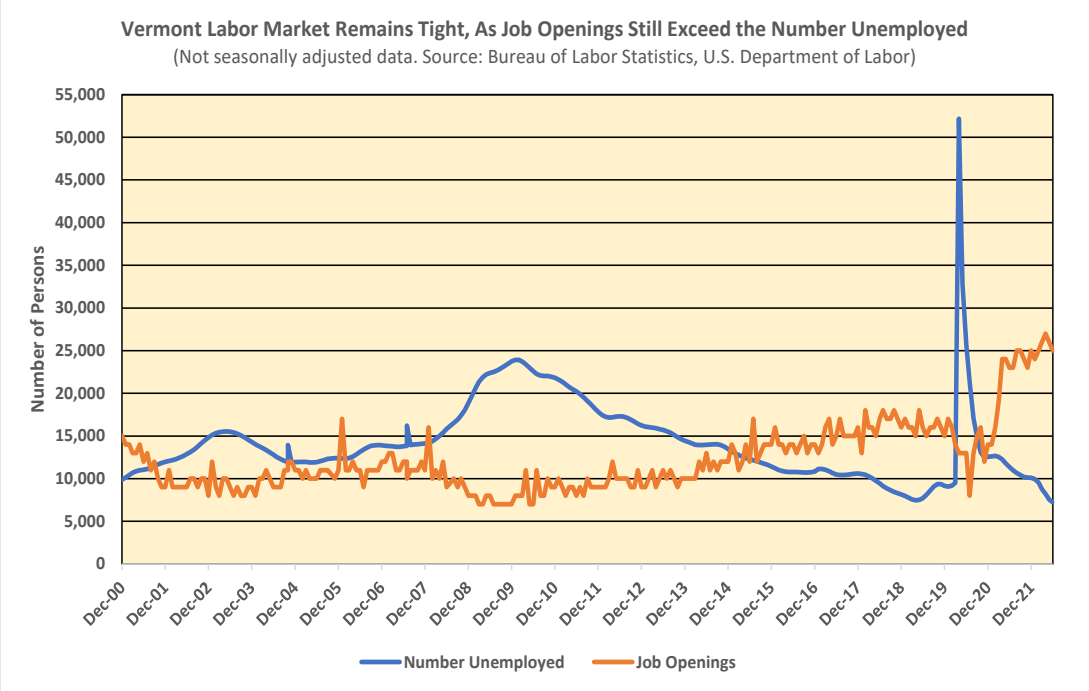
A Concluding Area of Concern:

The reader will note that a key area of focus for our analysis and for many of our observations-recommendations in this report have pertained to wages-salaries—as one of the largest parts of hospital providers budgets. Wages-salaries and staffing issues among the state's providers reflect labor market conditions—both nationally and in the state. The following charts and discussion provide additional information pertaining to the current tight labor market conditions in Vermont and national labor markets—which are likely to continue to be reflected in the wages-salaries portion of provider budgets submissions for at least the near-term time horizon. The data further suggest that these pressures are likely to increase on providers for at least the near-term future unless something changes to move the needle to increase labor force numbers over that same time frame.

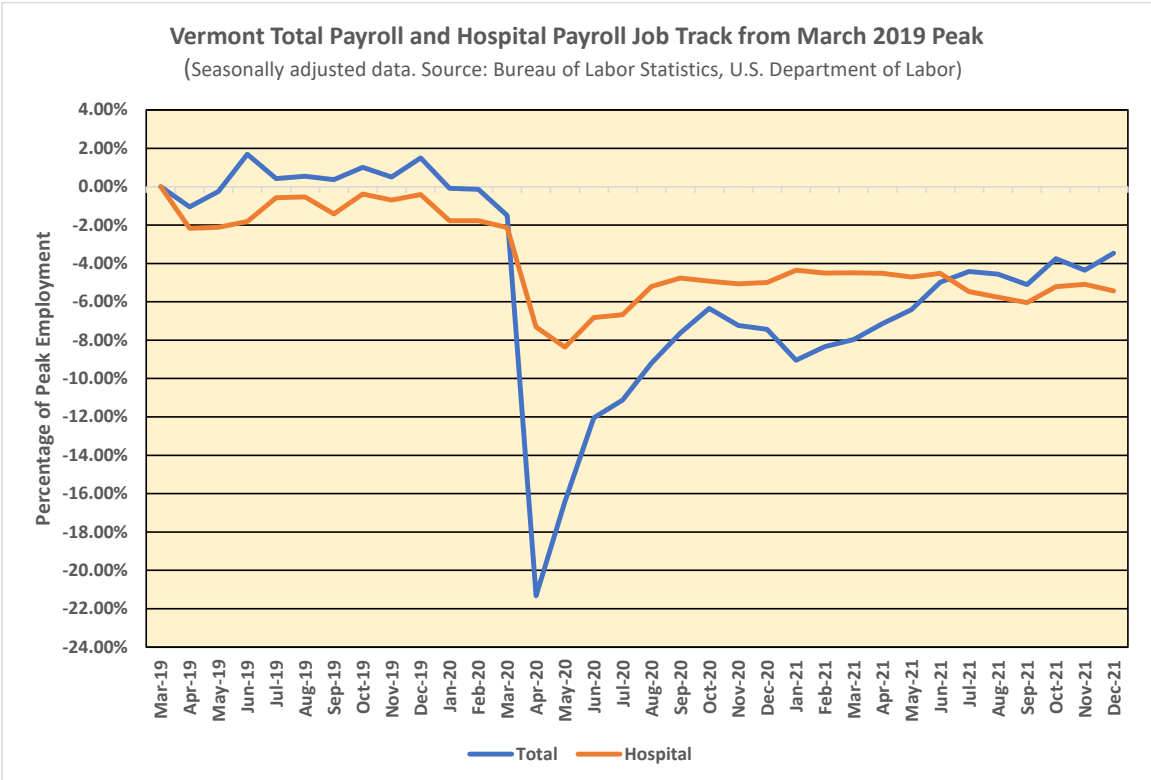
- Vermont's tight labor market tends to mirror that of the national labor market, particularly with respect to the number of job openings which have recently exceeded the number of persons unemployed.

- For example, the number of unemployed persons as of June 2022 were at its lowest level in 22 years, while job openings remained at historically high levels. The latest data for July 2022 in Vermont indicated that the unemployed further declined, numbering a total of 6,976 persons.

- During the same time frame, the number of openings have exceeded number of persons unemployed by more than 200 percent. In other words, there were more than three job openings for every unemployed person in Vermont.



- On a national level, job openings in the healthcare and social assistance sector persisted at the relatively high level of 1.92 million openings in June 2022; only slightly down from a previous historic high of 2.15 million in April 2022.



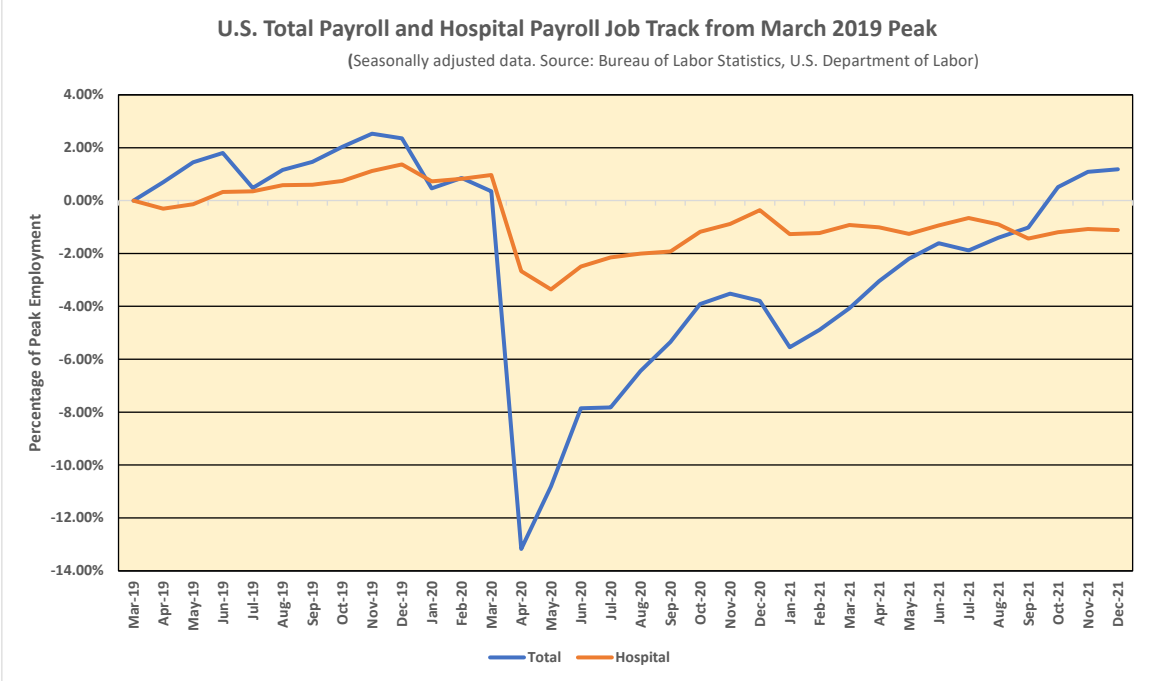
- While Vermont's economy continues to regain jobs in its recovery, total payroll jobs last month still remained (3.5 percent) below its March 2019 peak.

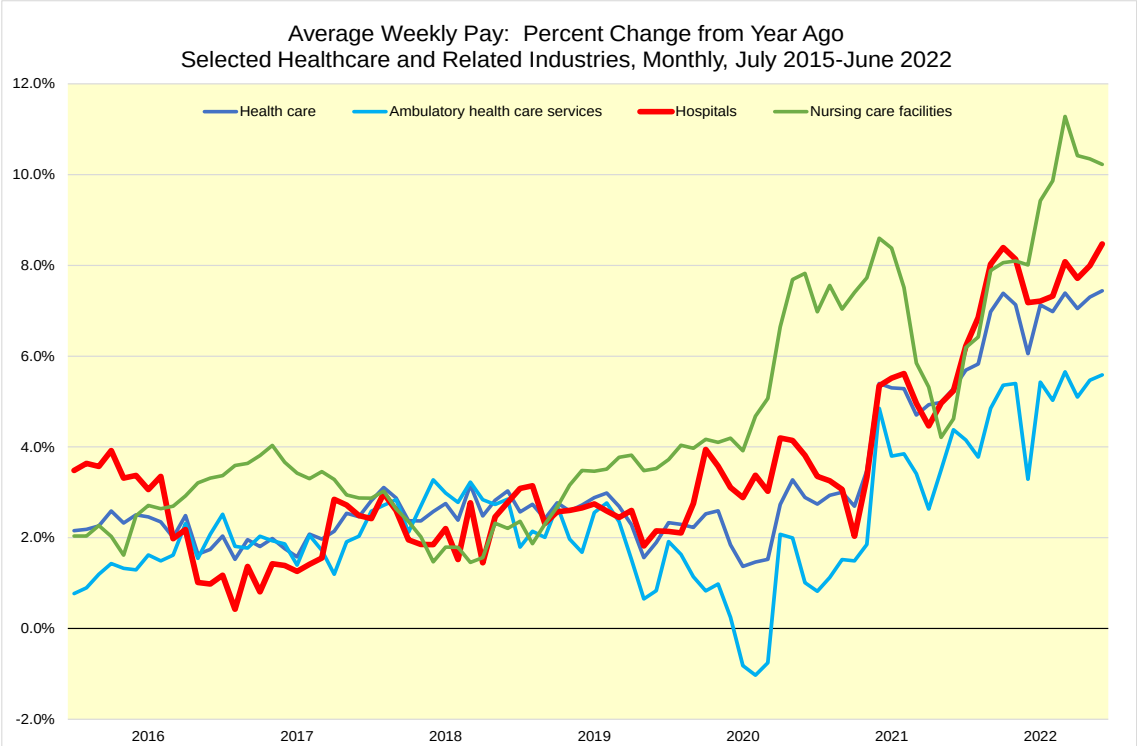
- In addition, nonfarm payroll jobs in the Hospital sector in Vermont numbered 13,835 in December 2021, about 800 jobs (or 5.4 percent) below its March 2019 level.

- In comparison, the U.S. economy through last month has regained all of the nonfarm payroll jobs that were lost during the COVID19 pandemic and then more. Total payroll jobs in December 2021 were at the level of 1.2 percent above its prior peak of March 2019.

- Hospital jobs in the U.S. have not yet reached its previous March 2019 level in December 2021. Last month's U.S. labor market report indicated that jobs in private hospitals were at 98.9 percent of their level in March 2019.

- From these data, it is apparent that very tight conditions in U.S. and Vermont labor markets are likely to continue, and are very likely to continue to put upward pressure on wages for at least the near-term time frame.





At this point, we make one additional concluding observation. These additional observations-recommendations, along with the ones presented earlier in this document, for now represent a "living list" of observations, findings, and recommendations for consideration by the GMCB. We hope to augment these with the opportunity for some additional analysis over the next several weeks to assist in the full development of a system of data and benchmarks that would be part of an updated and more robust review system to assist in facilitating an overall informed and fully-considered decision-making process in this area of the GMCB's review.

Economic Indicators, Benchmarks and Data Sources of Relevance

Data and Forecasts for Selected Economic, Price and Demographic Indicators

August 2022

CMS and Moody's Analytics Forecasts for

Selected Health Care Expenditure and Economic Indicators, Levels and Annual Percent Change: Calendar Years (except as noted)

Sources: Moody's Analytics August 2022 Macroeconomic Control Forecast and The Centers for Medicare & Medicaid Services, March 2022 Projections

PAGE 1

Calendar Year	U.S. Hospital Care (Millions of Current Dollars)	%CHYA	U.S. Hospital Care (Millions of Constant 2020 Dollars)	%CHYA	Vermont Hospital Care (Millions of Current Dollars)	%CHYA	Vermont Hospital Care (Millions of Constant 2020 Dollars)	%CHYA	National Health Expenditures (Billions of Current Dollars)	%CHYA	National Health Expenditures (Billions of Constant 2020 Dollars)	%CHYA	Nominal Per Capita Health Expenditures (CMS Pop Basis)	%CHYA
2003	$525,892				$1,191				$1,769.9				$6,103	
2004	$565,327	7.5%			$1,279	7.4%			$1,894.1	7.0%			$6,487	6.3%
2005	$608,600	7.7%			$1,426	11.5%			$2,025.9	7.0%			$6,867	5.9%
2006	$651,209	7.0%			$1,573	10.3%			$2,164.4	6.8%			$7,263	5.8%
2007	$691,887	6.2%			$1,651	5.0%			$2,305.0	6.5%			$7,658	5.4%
2008	$721,630	4.3%			$1,722	4.3%			$2,402.0	4.2%			$7,901	3.2%
2009	$771,040	6.8%			$1,842	7.0%			$2,492.5	3.8%			$8,145	3.1%
2010	$808,795	4.9%	$981,564		$1,925	4.5%	$2,336		$2,589.4	3.9%	$3,052.9		$8,380	2.9%
2011	$833,246	3.0%	$989,480	0.8%	$1,995	3.6%	$2,369	1.4%	$2,676.2	3.4%	$3,081.4	0.9%	$8,605	2.7%
2012	$877,968	5.4%	$1,017,565	2.8%	$2,107	5.6%	$2,442	3.1%	$2,782.8	4.0%	$3,152.9	2.3%	$8,862	3.0%
2013	$906,804	3.3%	$1,028,362	1.1%	$2,229	5.8%	$2,528	3.5%	$2,855.8	2.6%	$3,194.1	1.3%	$9,037	2.0%
2014	$940,526	3.7%	$1,053,207	2.4%	$2,268	1.7%	$2,540	0.5%	$3,001.4	5.1%	$3,301.5	3.4%	$9,438	4.4%
2015	$988,971	5.2%	$1,096,859	4.1%	$2,358	4.0%	$2,615	3.0%	$3,163.6	5.4%	$3,453.1	4.6%	$9,886	4.7%
2016	$1,035,398	4.7%	$1,135,313	3.5%	$2,438	3.4%	$2,673	2.2%	$3,305.6	4.5%	$3,560.1	3.1%	$10,234	3.5%
2017	$1,077,580	4.1%	$1,161,782	2.3%	$2,580	5.8%	$2,782	4.1%	$3,446.5	4.3%	$3,673.5	3.2%	$10,605	3.6%
2018	$1,122,633	4.2%	$1,181,773	1.7%	$2,698	4.6%	$2,840	2.1%	$3,604.5	4.6%	$3,757.0	2.3%	$11,057	4.3%
2019	$1,193,716	6.3%	$1,231,983	4.2%	$2,817	4.4%	$2,907	2.4%	$3,759.1	4.3%	$3,875.4	3.2%	$11,461	3.7%
2020	$1,270,149	6.4%	$1,270,149	3.1%	$2,904	3.1%	$2,904	-0.1%	$4,124.0	9.7%	$4,124.0	6.4%	$12,535	9.4%
2021	$1,342,100	5.7%							$4,297.1	4.2%	$4,186.3	1.5%	$13,022	3.9%
2022	$1,435,200	6.9%							$4,496.6	4.6%	$4,227.9	1.0%	$13,585	4.3%
2023	$1,516,300	5.7%							$4,720.5	5.0%	$4,320.1	2.2%	$14,176	4.3%
2024	$1,601,100	5.6%							$4,962.1	5.1%	$4,426.8	2.5%	$14,768	4.2%
2025	$1,695,600	5.9%							$5,231.0	5.4%	$4,545.0	2.7%	$15,431	4.5%
2026	$1,791,900	5.7%							$5,510.8	5.3%	$4,666.5	2.7%	$16,161	4.7%
2027	$1,890,200	5.5%							$5,802.4	5.3%	$4,784.7	2.5%	$16,867	4.4%
2028	$2,002,400	5.9%							$6,120.9	5.5%	$4,911.5	2.7%	$17,690	4.9%
2029	$2,113,600	5.6%							$6,450.9	5.4%	$5,040.6	2.6%	$18,537	4.8%
2030	$2,210,100	4.6%							$6,751.5	4.7%	$5,133.9	1.9%	$19,290	4.1%

CMS and Moody's Analytics Forecasts for

Selected Health Care Expenditure and Economic Indicators, Levels and Annual Percent Change: Calendar Years (except as noted)

Sources: Moody's Analytics August 2022 Macroeconomic Control Forecast and The Centers for Medicare & Medicaid Services, March 2022 Projections

PAGE 2

Calendar Year	Real Per Capita Health Expenditures (CMS Pop Basis)	%CHYA	Private Health Insurance - National Health Expenditures	Private Health Insurance - Personal Health Care	CMS Gross Domestic Product	%CHYA	Moodys GDP	%CHYA	CMS Personal Income	%CHYA	Moodys Personal Income	%CHYA	CMS Disposable Personal Income	%CHYA	Moodys Disposable Personal Income	%CHYA
2003							11,456.4				9,498.5				8,495.0	
2004							12,217.2	6.6%			10,044.3	5.7%			8,995.5	5.9%
2005							13,039.2	6.7%			10,604.9	5.6%			9,392.5	4.4%
2006							13,815.6	6.0%			11,384.7	7.4%			10,027.7	6.8%
2007							14,474.2	4.8%			12,021.4	5.6%			10,528.9	5.0%
2008							14,769.9	2.0%			12,477.6	3.8%			10,970.1	4.2%
2009							14,478.1	-2.0%			12,080.4	-3.2%			10,928.0	-0.4%
2010	$9,880						15,049.0	3.9%			12,594.5	4.3%			11,356.9	3.9%
2011	$9,908	0.3%					15,599.7	3.7%			13,339.3	5.9%			11,885.6	4.7%
2012	$10,041	1.3%					16,254.0	4.2%			14,014.3	5.1%			12,504.8	5.2%
2013	$10,108	0.7%	878.9	779.4	16,843.2		16,843.2	3.6%	14,193.6		14,193.7	1.3%	12,517.3		12,517.3	0.1%
2014	$10,382	2.7%	921.9	814.5	17,550.7	4.2%	17,550.7	4.2%	14,976.6	5.5%	14,976.6	5.5%	13,192.0	5.4%	13,192.0	5.4%
2015	$10,791	3.9%	975.6	869.1	18,206.0	3.7%	18,206.0	3.7%	15,685.2	4.7%	15,685.2	4.7%	13,745.3	4.2%	13,745.3	4.2%
2016	$11,022	2.1%	1,029.8	917.7	18,695.1	2.7%	18,695.1	2.7%	16,096.9	2.6%	16,096.9	2.6%	14,138.7	2.9%	14,138.7	2.9%
2017	$11,303	2.5%	1,079.1	956.7	19,479.6	4.2%	19,479.6	4.2%	16,850.2	4.7%	16,850.2	4.7%	14,801.2	4.7%	14,801.2	4.7%
2018	$11,525	2.0%	1,131.0	990.9	20,527.2	5.4%	20,527.2	5.4%	17,706.0	5.1%	17,706.0	5.1%	15,629.7	5.6%	15,629.7	5.6%
2019	$11,815	2.5%	1,165.6	1,036.1	21,372.6	4.1%	21,372.6	4.1%	18,424.4	4.1%	18,424.4	4.1%	16,219.3	3.8%	16,219.3	3.8%
2020	$12,535	6.1%	1,151.4	1,000.2	20,893.7	-2.2%	20,893.7	-2.2%	19,627.6	6.5%	19,627.6	6.5%	17,432.0	7.5%	17,432.0	7.5%
2021	$12,686	1.2%	1,224.2	1,079.8	22,899.5	9.6%	22,996.1	10.1%	20,973.8	6.9%	21,092.8	7.5%	18,483.1	6.0%	18,507.6	6.2%
2022	$12,773	0.7%	1,326.2	1,178.7	24,662.8	7.7%	25,009.8	8.8%	21,441.6	2.2%	21,744.2	3.1%	18,753.5	1.5%	18,647.8	0.8%
2023	$12,973	1.6%	1,420.7	1,262.8	25,920.6	5.1%	26,270.2	5.0%	22,399.2	4.5%	22,897.4	5.3%	19,511.2	4.0%	19,769.0	6.0%
2024	$13,175	1.6%	1,508.5	1,341.0	27,048.1	4.3%	27,555.0	4.9%	23,423.6	4.6%	24,073.8	5.1%	20,339.3	4.2%	20,827.2	5.4%
2025	$13,407	1.8%	1,589.8	1,413.0	28,224.7	4.4%	28,894.5	4.9%	24,494.1	4.6%	25,193.0	4.6%	21,213.1	4.3%	21,816.0	4.7%
2026	$13,685	2.1%	1,668.0	1,482.3	29,424.2	4.2%	30,283.9	4.8%	25,599.6	4.5%	26,359.2	4.6%	22,137.9	4.4%	22,813.6	4.6%
2027	$13,909	1.6%	1,743.0	1,548.9	30,615.9	4.1%	31,681.1	4.6%	26,738.6	4.4%	27,529.0	4.4%	23,091.8	4.3%	23,829.7	4.5%
2028	$14,195	2.1%	1,823.7	1,620.7	31,886.5	4.2%	33,099.7	4.5%	27,910.0	4.4%	28,730.4	4.4%	24,077.2	4.3%	24,877.0	4.4%
2029	$14,484	2.0%	1,909.3	1,697.1	33,177.9	4.0%	34,527.5	4.3%	29,096.4	4.3%	29,979.8	4.3%	25,074.0	4.1%	25,967.1	4.4%
2030	$14,668	1.3%	1,997.5	1,775.6	34,521.6	4.0%	35,934.5	4.1%	30,324.2	4.2%	31,244.8	4.2%	26,109.4	4.1%	27,067.8	4.2%

CMS and Moody's Analytics Forecasts for

Selected Health Care Expenditure and Economic Indicators, Levels and Annual Percent Change: Calendar Years (except as noted)

Sources: Moody's Analytics August 2022 Macroeconomic Control Forecast and The Centers for Medicare & Medicaid Services, March 2022 Projections

PAGE 3

Calendar Year	CMS National Health Expenditure Price Index, chain weighted 2020 base year	CMS National Health Expenditure Price Index, chain weighted 2012 base year	%CHYA	CMS Personal Health Care Price Index, chain weighted 2020 base year	CMS Personal Health Care Price Index, chain weighted 2012 base year	%CHYA	CMS Hospital Care Price Index - 2020 Base	CMS Hospital Care Price Index - 2012 Base	%CHYA	CMS GDP Deflator - chain weighted	%CHYA	Moodys GDP Deflator - chain weighted	%CHYA	Moodys GDP Deflator - chain weighted - FFY Basis	%CHYA	CMS Consumer Price Index	%CHYA	Moodys Consumer Price Index	%CHYA
2003												82.6		82.2				184.0	
2004												84.8	2.7%	84.2	2.4%			188.9	2.7%
2005												87.5	3.1%	86.8	3.0%			195.3	3.4%
2006												90.2	3.1%	89.6	3.3%			201.6	3.2%
2007												92.7	2.7%	92.1	2.7%			207.3	2.9%
2008												94.4	1.9%	94.0	2.1%			215.3	3.8%
2009												95.0	0.7%	94.9	1.0%			214.6	-0.3%
2010	0.85	96.1		0.86	96.2		0.82	95.5				96.2	1.2%	95.8	0.9%			218.1	1.6%
2011	0.87	98.4	2.4%	0.88	98.2	2.1%	0.84	97.6	2.2%			98.2	2.1%	97.7	2.0%			224.9	3.1%
2012	0.88	100.0	1.6%	0.90	100.0	1.8%	0.86	100.0	2.5%			100.0	1.9%	99.5	1.8%			229.6	2.1%
2013	0.89	101.3	1.3%	0.91	101.5	1.5%	0.88	102.2	2.2%	101.8		101.8	1.8%	101.3	1.8%	233.0		233.0	1.5%
2014	0.91	103.0	1.7%	0.92	102.9	1.4%	0.89	103.5	1.3%	103.7	1.9%	103.7	1.9%	103.3	1.9%	236.7	1.6%	236.7	1.6%
2015	0.92	103.8	0.8%	0.93	103.5	0.6%	0.90	104.5	1.0%	104.7	1.0%	104.7	1.0%	104.5	1.1%	237.0	0.1%	237.0	0.1%
2016	0.93	105.2	1.3%	0.94	104.7	1.2%	0.91	105.7	1.1%	105.7	1.0%	105.7	1.0%	105.3	0.8%	240.0	1.3%	240.0	1.3%
2017	0.94	106.3	1.0%	0.95	106.1	1.3%	0.93	107.5	1.7%	107.7	1.9%	107.7	1.9%	107.2	1.8%	245.1	2.1%	245.1	2.1%
2018	0.96	108.7	2.3%	0.96	107.6	1.4%	0.95	110.1	2.4%	110.3	2.4%	110.3	2.4%	109.7	2.3%	251.1	2.4%	251.1	2.4%
2019	0.97	109.9	1.1%	0.98	109.2	1.5%	0.97	112.3	2.0%	112.3	1.8%	112.3	1.8%	111.8	2.0%	255.7	1.8%	255.6	1.8%
2020	1.00	113.3	3.1%	1.00	111.6	2.2%	1.00	115.9	3.2%	113.7	1.2%	113.7	1.3%	113.3	1.3%	258.8	1.2%	258.8	1.2%
2021	1.03	116.3	2.6%	1.03	114.5	2.6%				118.3	4.0%	118.5	4.2%	116.8	3.1%	270.7	4.6%	271.0	4.7%
2022	1.06	120.5	3.6%	1.06	118.7	3.7%				122.7	3.7%	126.8	7.0%	124.8	6.9%	282.6	4.4%	292.2	7.8%
2023	1.09	123.8	2.7%	1.09	122.0	2.8%				125.9	2.6%	131.1	3.5%	130.3	4.4%	291.1	3.0%	302.0	3.4%
2024	1.12	127.0	2.6%	1.12	125.1	2.5%				128.4	2.0%	133.9	2.1%	133.2	2.2%	298.1	2.4%	308.1	2.0%
2025	1.15	130.4	2.7%	1.15	128.4	2.6%				131.1	2.1%	136.6	2.0%	135.9	2.0%	305.2	2.4%	315.2	2.3%
2026	1.18	133.8	2.6%	1.18	131.8	2.6%				133.8	2.1%	139.2	1.9%	138.5	1.9%	312.6	2.4%	322.3	2.3%
2027	1.21	137.4	2.7%	1.21	135.4	2.7%				136.5	2.0%	141.8	1.9%	141.2	1.9%	320.1	2.4%	329.2	2.1%
2028	1.25	141.2	2.8%	1.25	139.1	2.7%				139.3	2.1%	144.4	1.9%	143.8	1.9%	327.8	2.4%	336.2	2.1%
2029	1.28	145.0	2.7%	1.28	142.9	2.7%				142.2	2.1%	147.2	1.9%	146.5	1.9%	335.6	2.4%	343.4	2.1%
2030	1.32	149.0	2.8%	1.32	146.8	2.7%				145.1	2.0%	149.9	1.9%	149.2	1.9%	343.7	2.4%	350.8	2.1%

CMS and Moody's Analytics Forecasts for

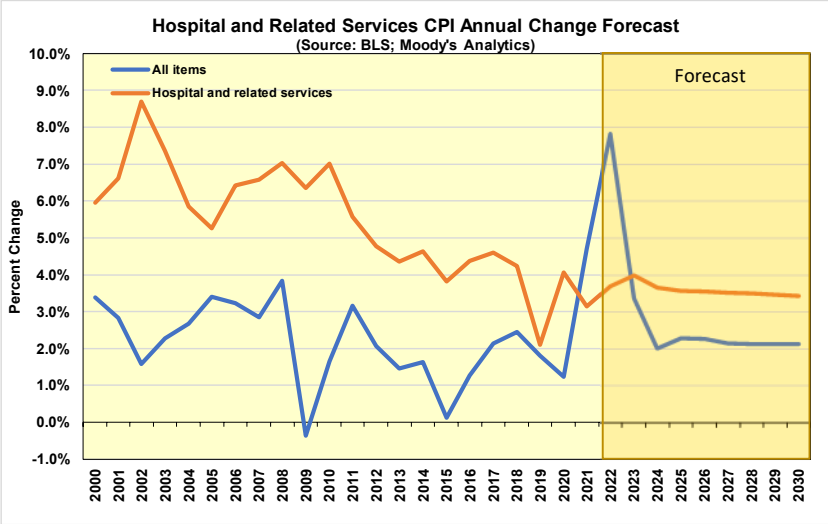
Selected Health Care Expenditure and Economic Indicators, Levels and Annual Percent Change: Calendar Years (except as noted)

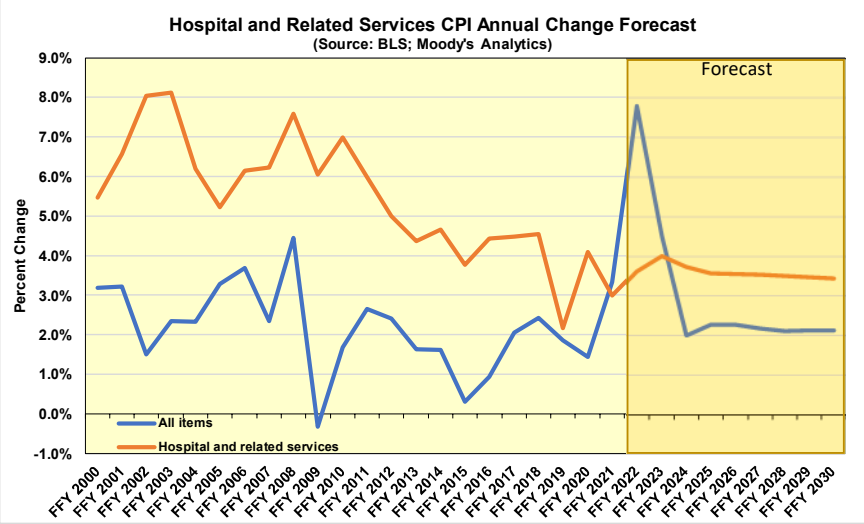
Sources: Moody's Analytics August 2022 Macroeconomic Control Forecast and The Centers for Medicare & Medicaid Services, March 2022 Projections

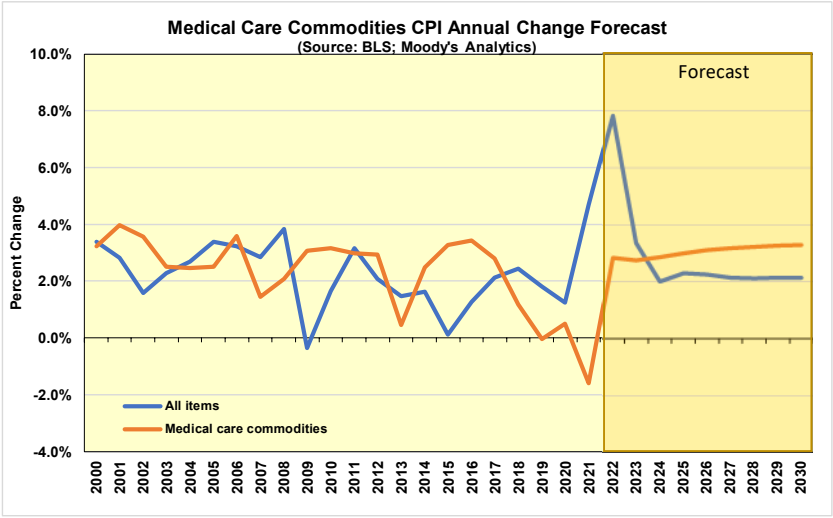
Calendar Year	CMS U.S. Population(Millions)	%CHYA	Moodys U.S. Population (Millions)	%CHYA	Population age 65 years and older	%CHYA	Moodys Pop 65+	%CHYA	Population age less than 65 years	%CHYA	Moodys Pop Under 65	%CHYA	Prescription Drug Expenditures (Excludes IRA Effects)	%CHYA	Durable Medical Equipment Expenditures	%CHYA	Other Non-Durable Medical Equipment Expenditures	%CHYA	Physicians and Clinical Services Expenditures	%CHYA	Other Professional Services Expenditures	%CHYA	Home Healthcare Expenditures	%CHYA
2003	290		290.4				35.9				254.5													
2004	292	0.7%	293.1	0.9%			36.3	1.0%			256.9	0.9%												
2005	295	1.0%	295.9	0.9%			36.7	1.3%			259.2	0.9%												
2006	298	1.0%	298.7	1.0%			37.2	1.4%			261.5	0.9%												
2007	301	1.0%	301.6	1.0%			37.9	1.9%			263.6	0.8%												
2008	304	1.0%	304.4	0.9%			38.9	2.5%			265.5	0.7%												
2009	306	0.7%	307.1	0.9%			39.7	2.2%			267.4	0.7%												
2010	309	1.0%	309.6	0.8%			40.6	2.1%			269.0	0.6%												
2011	311	0.6%	311.9	0.7%			41.6	2.5%			270.3	0.5%												
2012	314	1.0%	314.1	0.7%			43.3	4.2%			270.8	0.2%												
2013	316	0.6%	316.4	0.7%	44		44.8	3.5%	272		271.5	0.3%												
2014	318	0.6%	318.7	0.7%	45	2.3%	46.4	3.4%	273	0.4%	272.3	0.3%	$290.6		$46.6		$65.5		$597.7		$82.4		$84.6	
2015	320	0.6%	321.0	0.7%	47	4.4%	47.9	3.3%	274	0.4%	273.2	0.3%	$312.2	7.4%	$48.7	4.5%	$69.3	5.8%	$636.4	6.5%	$87.4	6.1%	$89.6	5.9%
2016	323	0.9%	323.3	0.7%	48	2.1%	49.4	3.2%	274	0.0%	273.9	0.3%	$313.3	0.4%	$50.6	3.9%	$71.9	3.8%	$675.3	6.1%	$92.2	5.5%	$93.7	4.6%
2017	325	0.6%	325.3	0.6%	50	4.2%	51.0	3.2%	275	0.4%	274.4	0.2%	$315.9	0.8%	$51.9	2.6%	$74.5	3.6%	$709.4	5.0%	$96.9	5.1%	$99.4	6.1%
2018	326	0.3%	327.0	0.5%	52	4.0%	52.6	3.2%	275	0.0%	274.4	0.0%	$324.2	2.6%	$54.4	4.8%	$77.5	4.0%	$736.9	3.9%	$104.5	7.8%	$105.6	6.2%
2019	328	0.6%	328.5	0.4%	53	1.9%	54.3	3.2%	275	0.0%	274.2	-0.1%	$338.1	4.3%	$57.0	4.8%	$81.1	4.6%	$767.9	4.2%	$111.3	6.5%	$113.0	7.0%
2020	329	0.3%	329.6	0.3%	55	3.8%	55.9	3.0%	274	-0.4%	273.7	-0.2%	$348.4	3.0%	$54.9	-3.7%	$85.7	5.7%	$809.5	5.4%	$117.4	5.5%	$123.7	9.5%
2021	330	0.3%	330.8	0.4%	56	1.8%	57.6	3.0%	273	-0.4%	273.2	-0.2%	$364.8	4.7%	$57.1	4.0%	$88.5	3.3%	$850.4	5.1%	$127.6	8.7%	$121.6	-1.7%
2022	331	0.3%	332.6	0.6%	58	3.6%	59.4	3.2%	273	0.0%	273.2	0.0%	$380.4	4.3%	$59.5	4.2%	$95.0	7.3%	$903.0	6.2%	$132.2	3.6%	$129.1	6.2%
2023	333	0.6%	334.5	0.6%	59	1.7%	61.2	3.0%	274	0.4%	273.3	0.0%	$398.2	4.7%	$62.5	5.0%	$99.7	4.9%	$959.0	6.2%	$140.1	6.0%	$139.1	7.7%
2024	336	0.9%	336.0	0.5%	61	3.4%	62.9	2.8%	275	0.4%	273.1	-0.1%	$418.6	5.1%	$65.6	5.0%	$104.4	4.7%	$1,016.3	6.0%	$148.5	6.0%	$148.9	7.0%
2025	339	0.9%	337.3	0.4%	63	3.3%	64.6	2.7%	276	0.4%	272.7	-0.1%	$440.0	5.1%	$69.5	5.9%	$109.5	4.9%	$1,077.0	6.0%	$156.6	5.5%	$159.9	7.4%
2026	341	0.6%	338.6	0.4%	65	3.2%	66.2	2.5%	277	0.4%	272.4	-0.1%	$462.4	5.1%	$73.3	5.5%	$114.7	4.7%	$1,139.5	5.8%	$165.2	5.5%	$171.6	7.3%
2027	344	0.9%	339.9	0.4%	66	1.5%	67.7	2.2%	277	0.0%	272.2	-0.1%	$485.9	5.1%	$76.9	4.9%	$120.0	4.6%	$1,202.1	5.5%	$173.7	5.1%	$184.2	7.3%
2028	346	0.6%	341.1	0.4%	68	3.0%	69.1	2.1%	278	0.4%	272.1	0.0%	$511.3	5.2%	$80.7	4.9%	$125.6	4.7%	$1,267.5	5.4%	$182.6	5.1%	$198.0	7.5%
2029	348	0.6%	342.4	0.4%	69	1.5%	70.4	1.9%	278	0.0%	272.0	0.0%	$538.5	5.3%	$84.4	4.6%	$131.3	4.5%	$1,337.2	5.5%	$191.9	5.1%	$212.7	7.4%
2030	350	0.6%	343.7	0.4%	71	2.9%	71.6	1.7%	279	0.4%	272.1	0.0%	$567.1	5.3%	$87.6	3.8%	$137.3	4.6%	$1,397.6	4.5%	$199.6	4.0%	$226.4	6.4%

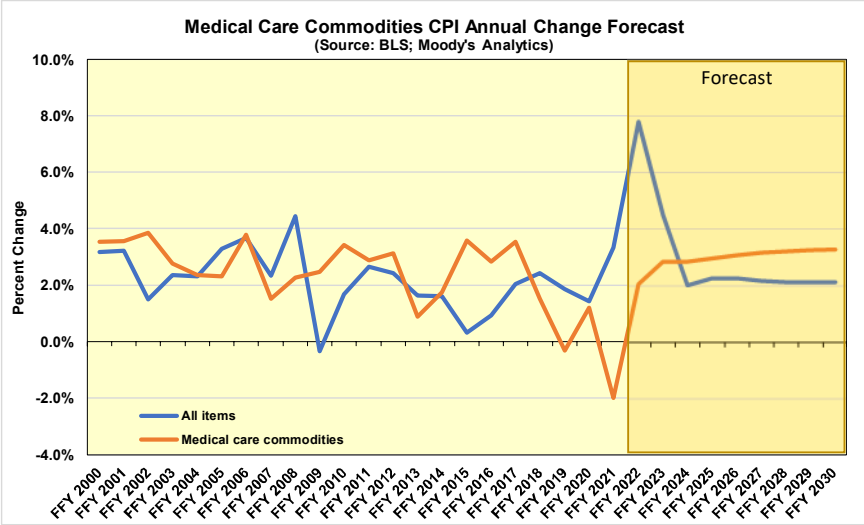
Consumer Price Index, Not Seasonally Adjusted

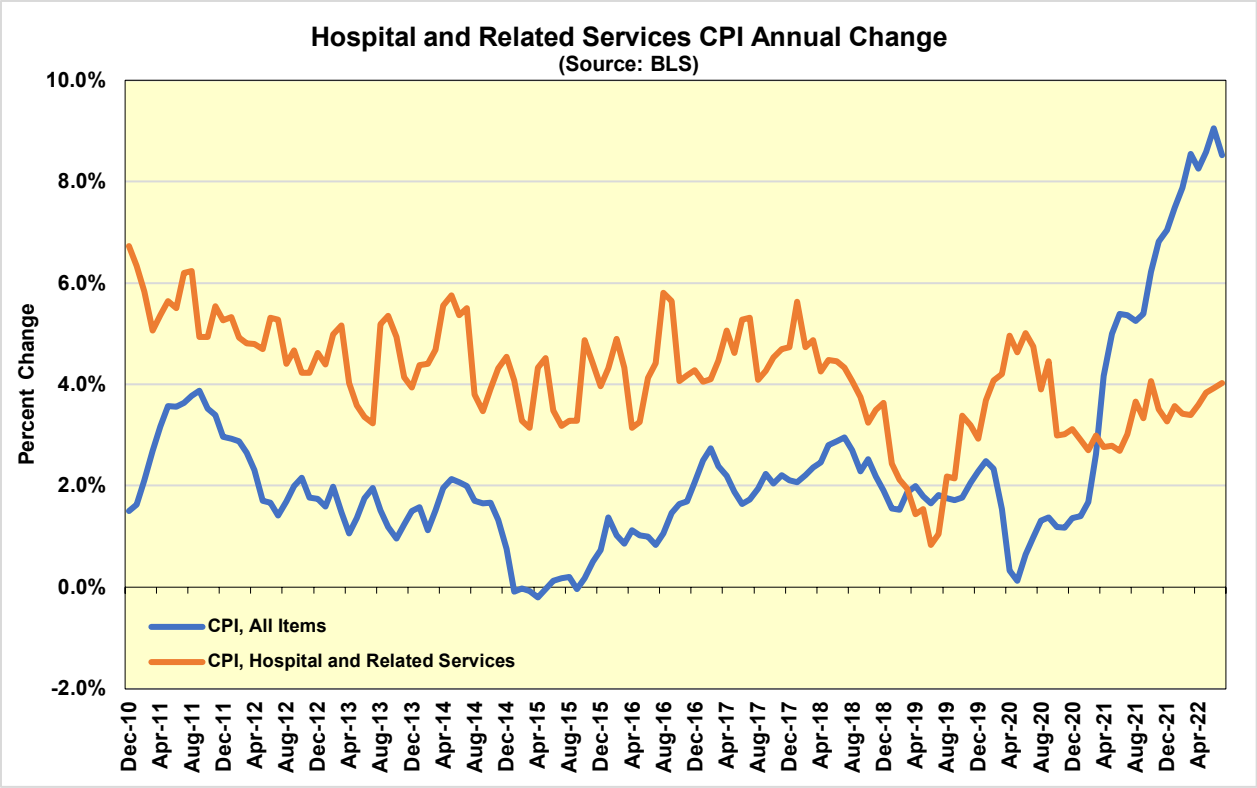
	All items		Hospital and related services		Hospital services		Inpatient hospital services		Outpatient hospital services		Medical care		Medical care commodities		Medical care services		Services by other medical professionals		Medicinal drugs		Medical equipment and supplies		Prescription drugs		Nonprescription drugs	
	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA
FFY 1999	165.5		296.1		108.1		106.7		242.2		248.4		228.4		252.9		157.9						269.5			
FFY 2000	170.8	3.2%	312.3	5.5%	114.0	5.5%	112.1	5.0%	259.0	6.9%	258.1	3.9%	236.5	3.5%	263.0	4.0%	161.0	1.9%					282.9	5.0%		
FFY 2001	176.3	3.2%	332.7	6.6%	121.6	6.6%	119.0	6.2%	276.8	6.9%	269.7	4.5%	244.9	3.6%	275.5	4.8%	165.9	3.1%					296.4	4.8%		
FFY 2002	178.9	1.5%	359.5	8.0%	131.6	8.2%	128.4	7.9%	300.8	8.7%	282.2	4.6%	254.4	3.9%	289.0	4.9%	170.5	2.7%					312.9	5.6%		
FFY 2003	183.1	2.3%	388.7	8.1%	142.5	8.3%	138.1	7.6%	332.5	10.6%	294.4	4.3%	261.4	2.8%	302.9	4.8%	175.9	3.2%					324.3	3.6%		
FFY 2004	187.4	2.3%	412.7	6.2%	151.4	6.3%	146.2	5.9%	352.3	5.9%	306.8	4.2%	267.6	2.4%	317.5	4.8%	180.7	2.7%					334.1	3.0%		
FFY 2005	193.5	3.3%	434.3	5.2%	159.5	5.3%	154.5	5.7%	368.3	4.5%	319.9	4.2%	273.8	2.3%	332.9	4.9%	185.6	2.7%					345.5	3.4%		
FFY 2006	200.6	3.7%	460.9	6.1%	169.5	6.3%	164.6	6.5%	389.8	5.8%	333.1	4.1%	284.2	3.8%	347.1	4.3%	190.7	2.7%					361.4	4.6%		
FFY 2007	205.3	2.3%	489.6	6.2%	180.0	6.2%	174.9	6.3%	414.6	6.3%	346.8	4.1%	288.5	1.5%	364.1	4.9%	196.1	2.9%					367.1	1.6%		
FFY 2008	214.5	4.4%	526.7	7.6%	194.3	7.9%	188.1	7.5%	450.5	8.7%	361.6	4.3%	295.0	2.3%	382.0	4.9%	203.4	3.7%					376.8	2.6%		
FFY 2009	213.8	-0.3%	558.6	6.0%	207.0	6.5%	200.0	6.3%	481.4	6.8%	372.4	3.0%	302.3	2.5%	394.0	3.2%	208.9	2.7%					386.8	2.7%		
FFY 2010	217.4	1.7%	597.6	7.0%	223.0	7.7%	216.7	8.4%	513.7	6.7%	385.3	3.5%	312.6	3.4%	407.7	3.5%	213.3	2.1%					403.9	4.4%		
FFY 2011	223.1	2.7%	633.4	6.0%	237.9	6.6%	233.0	7.5%	540.4	5.2%	397.0	3.0%	321.6	2.9%	420.3	3.1%	216.8	1.6%	104.6		99.2		420.7	4.2%	98.7	
FFY 2012	228.5	2.4%	665.0	5.0%	250.7	5.4%	246.3	5.7%	566.9	4.9%	411.4	3.6%	331.7	3.1%	436.3	3.8%	219.1	1.0%	108.0	3.2%	100.3	1.1%	437.2	3.9%	99.1	0.4%
FFY 2013	232.2	1.6%	694.0	4.4%	262.4	4.7%	256.8	4.2%	595.1	5.0%	422.9	2.8%	334.6	0.9%	451.0	3.4%	222.2	1.4%	109.0	0.9%	101.2	0.9%	441.6	1.0%	99.5	0.4%
FFY 2014	236.0	1.6%	726.3	4.7%	275.7	5.0%	271.1	5.6%	622.5	4.6%	432.6	2.3%	340.5	1.7%	462.2	2.5%	225.4	1.5%	111.0	1.9%	100.4	-0.8%	452.8	2.5%	98.8	-0.6%
FFY 2015	236.7	0.3%	753.7	3.8%	286.8	4.0%	281.8	3.9%	647.0	3.9%	443.6	2.6%	352.7	3.6%	472.7	2.3%	228.2	1.2%	115.2	3.8%	100.1	-0.3%	475.6	5.0%	97.9	-1.0%
FFY 2016	238.9	0.9%	787.1	4.4%	300.1	4.6%	296.3	5.1%	667.1	3.1%	459.0	3.5%	362.6	2.8%	490.0	3.7%	229.9	0.7%	118.6	3.0%	99.3	-0.8%	494.8	4.0%	96.9	-1.0%
FFY 2017	243.8	2.1%	822.3	4.5%	314.3	4.7%	309.4	4.4%	697.6	4.6%	473.3	3.1%	375.5	3.5%	504.6	3.0%	235.3	2.3%	122.9	3.7%	99.5	0.1%	517.1	4.5%	97.3	0.4%
FFY 2018	249.7	2.4%	859.7	4.5%	329.4	4.8%	322.3	4.2%	729.2	4.5%	482.4	1.9%	381.2	1.5%	514.9	2.0%	237.4	0.9%	124.8	1.6%	99.7	0.3%	527.7	2.1%	96.9	-0.4%
FFY 2019	254.4	1.9%	878.3	2.2%	336.1	2.0%	327.5	1.6%	743.4	2.0%	493.1	2.2%	380.0	-0.3%	529.5	2.8%	238.7	0.6%	124.3	-0.4%	101.8	2.1%	524.8	-0.5%	97.1	0.2%
FFY 2020	258.0	1.4%	914.2	4.1%	350.4	4.3%	340.7	4.0%	767.3	3.2%	515.9	4.6%	384.6	1.2%	558.2	5.4%	241.2	1.1%	125.9	1.3%	101.6	-0.2%	533.5	1.7%	96.9	-0.2%
FFY 2021	266.6	3.3%	941.6	3.0%	360.3	2.8%	348.6	2.3%	785.2	2.3%	523.0	1.4%	377.0	-2.0%	570.1	2.1%	246.5	2.2%	123.7	-1.8%	95.4	-6.1%	522.8	-2.0%	95.7	-1.2%
FFY 2022	287.4	7.8%	975.7	3.6%							539.7	3.2%	384.7	2.1%	589.8	3.4%										
FFY 2023	300.4	4.5%	1014.8	4.0%							562.6	4.2%	395.7	2.9%	616.8	4.6%										
FFY 2024	306.4	2.0%	1052.6	3.7%							583.6	3.7%	407.0	2.9%	641.2	4.0%										
FFY 2025	313.4	2.3%	1090.2	3.6%							604.4	3.6%	419.1	3.0%	665.1	3.7%										
FFY 2026	320.5	2.3%	1129.0	3.6%							625.9	3.6%	432.0	3.1%	689.6	3.7%										
FFY 2027	327.5	2.2%	1169.0	3.5%							648.1	3.5%	445.7	3.2%	714.7	3.6%										
FFY 2028	334.5	2.1%	1210.0	3.5%							670.8	3.5%	460.0	3.2%	740.3	3.6%										
FFY 2029	341.6	2.1%	1252.1	3.5%							694.2	3.5%	475.1	3.3%	766.4	3.5%										
FFY 2030	348.9	2.1%	1295.3	3.4%							718.1	3.4%	490.7	3.3%	793.2	3.5%										


Hospital and Related Services CPI Annual Change Forecast
(Source: BLS; Moody's Analytics)
Forecast
All items
Hospital and related services
Percent Change


Hospital and Related Services CPI Annual Change Forecast
(Source: BLS; Moody's Analytics)
Forecast
All items
Hospital and related services
Percent Change


Medical Care Commodities CPI Annual Change Forecast
(Source: BLS; Moody's Analytics)
Forecast
All items
Medical care commodities
Percent Change


Medical Care Commodities CPI Annual Change Forecast
(Source: BLS; Moody's Analytics)
Forecast
All items
Medical care commodities
Percent Change


Hospital and Related Services CPI Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
CPI, All Items
CPI, Hospital and Related Services
Dec-10
Apr-11
Aug-11
Dec-11
Apr-12
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
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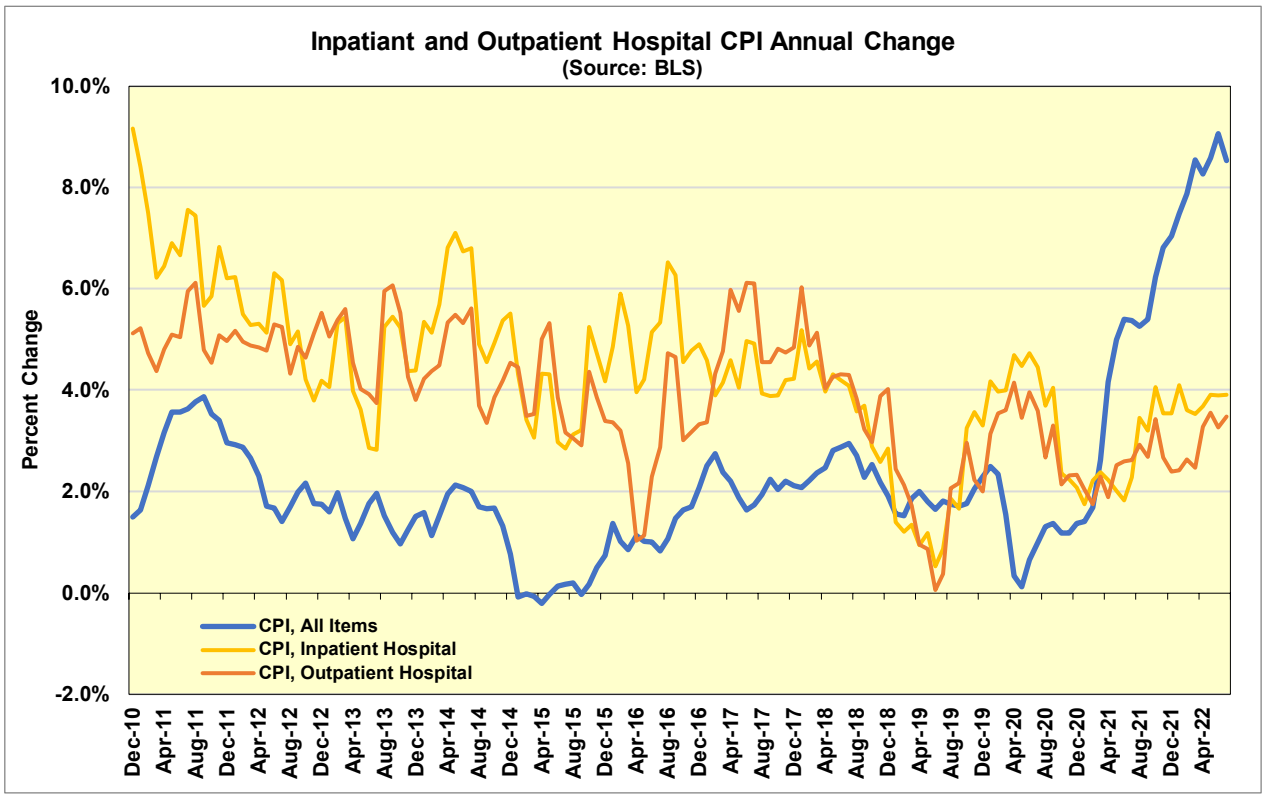
Aug-20
Dec-20
Apr-21
Aug-21
Dec-21
Apr-22


Inpatiant and Outpatient Hospital CPI Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
CPI, All Items
CPI, Inpatient Hospital
CPI, Outpatient Hospital
Dec-10
Apr-11
Aug-11
Dec-11
Apr-12
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
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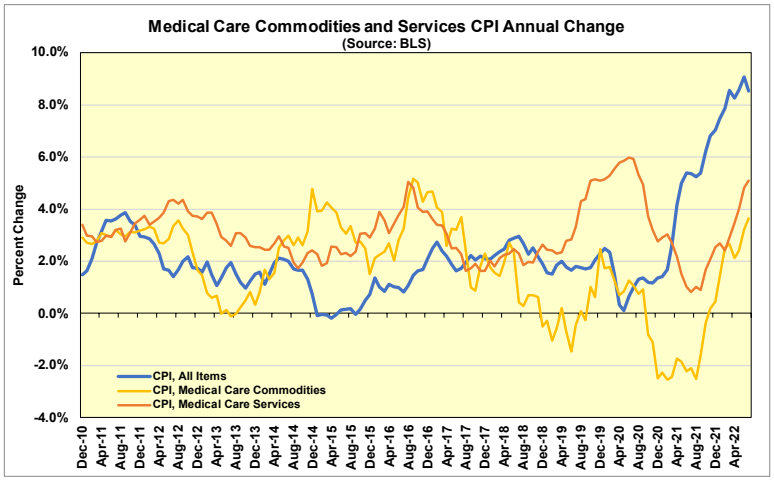
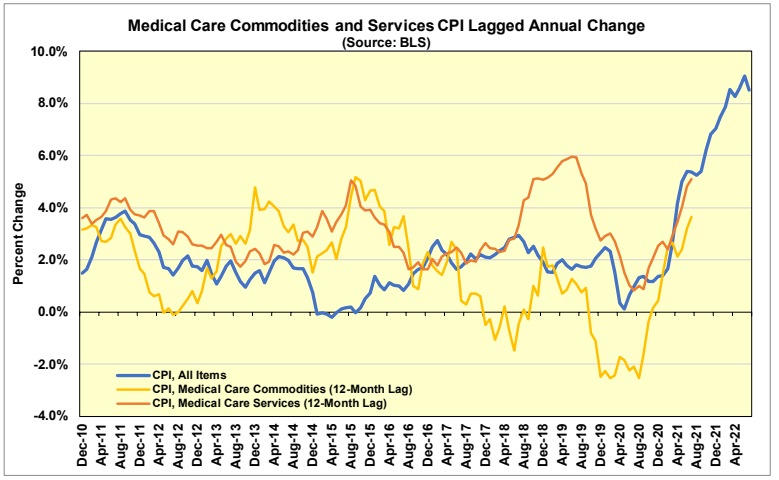
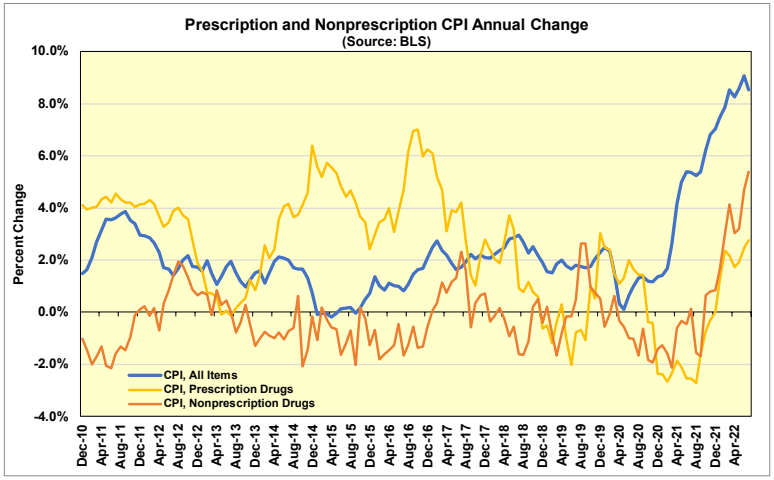
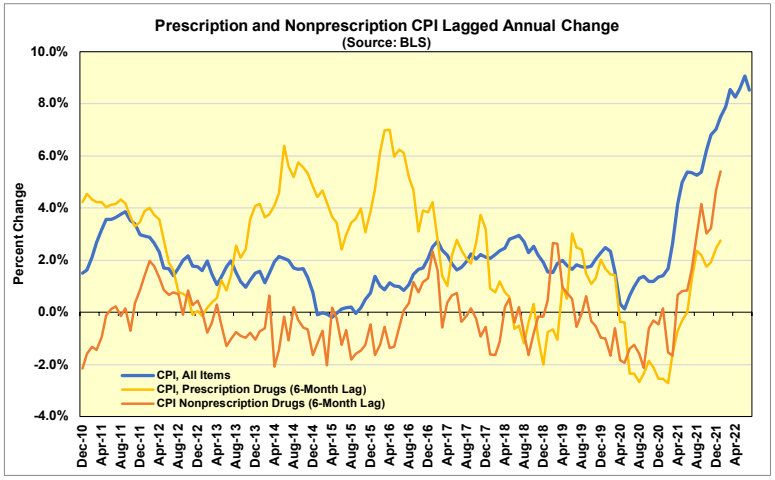
Aug-20
Dec-20
Apr-21
Aug-21
Dec-21
Apr-22


Medical Care Commodities and Services CPI Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
CPI, All Items
CPI, Medical Care Commodities
CPI, Medical Care Services
Dec-10 Apr-11 Aug-11 Dec-11 Apr-12 Aug-12 Dec-12 Apr-13 Aug-13 Dec-13 Apr-14 Aug-14 Dec-14 Apr-15 Aug-15 Dec-15 Apr-16 Aug-16 Dec-16 Apr-17 Aug-17 Dec-17 Apr-18 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22

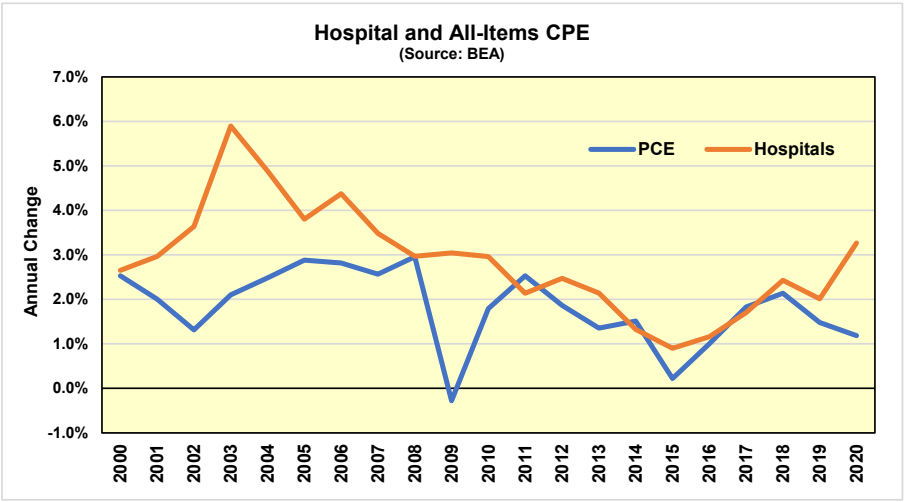

Medical Care Commodities and Services CPI Lagged Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
CPI, All Items
CPI, Medical Care Commodities (12-Month Lag)
CPI, Medical Care Services (12-Month Lag)
Dec-10 Apr-11 Aug-11 Dec-11 Apr-12 Aug-12 Dec-12 Apr-13 Aug-13 Dec-13 Apr-14 Aug-14 Dec-14 Apr-15 Aug-15 Dec-15 Apr-16 Aug-16 Dec-16 Apr-17 Aug-17 Dec-17 Apr-18 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22

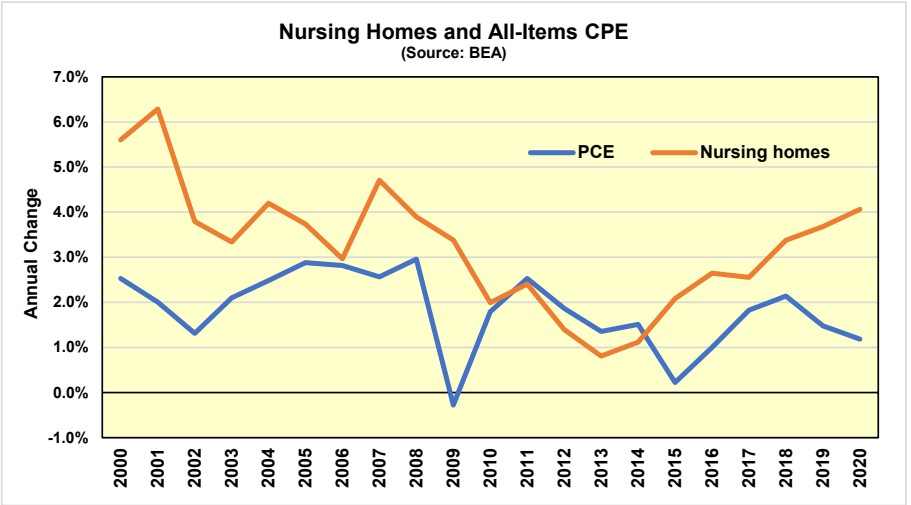

Prescription and Nonprescription CPI Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
CPI, All Items
CPI, Prescription Drugs
CPI, Nonprescription Drugs
Dec-10 Apr-11 Aug-11 Dec-11 Apr-12 Aug-12 Dec-12 Apr-13 Aug-13 Dec-13 Apr-14 Aug-14 Dec-14 Apr-15 Aug-15 Dec-15 Apr-16 Aug-16 Dec-16 Apr-17 Aug-17 Dec-17 Apr-18 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22

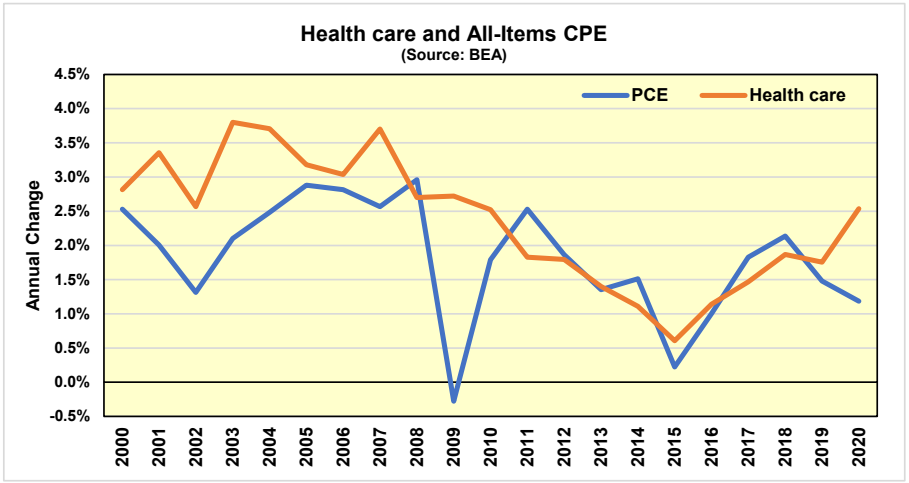

Prescription and Nonprescription CPI Lagged Annual Change
(Source: BLS)
Percent Change
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
CPI, All Items
CPI, Prescription Drugs (6-Month Lag)
CPI Nonprescription Drugs (6-Month Lag)
Dec-10 Apr-11 Aug-11 Dec-11 Apr-12 Aug-12 Dec-12 Apr-13 Aug-13 Dec-13 Apr-14 Aug-14 Dec-14 Apr-15 Aug-15 Dec-15 Apr-16 Aug-16 Dec-16 Apr-17 Aug-17 Dec-17 Apr-18 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22

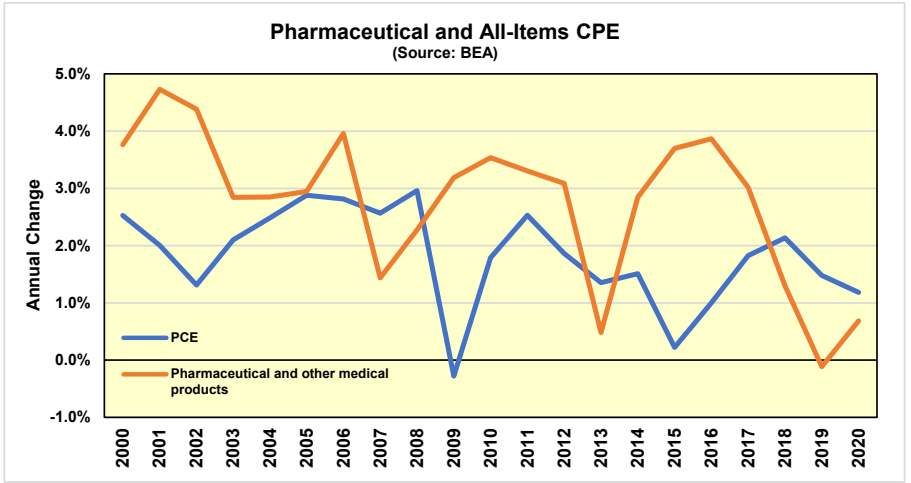
Personal Consumption Expenditure (PCE)

Calendar Year	PCE		Pharmaceutical and other medical products		**Health care**		Outpatient services		Physician services		Dental services		Paramedical services		Hospital and nursing home services		Hospitals		Nursing homes	
	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA
1999	76.2		56.86		62.85		71.00		77.96		49.84		70.81		56.49		57.12		53.38	
2000	78.1	2.5%	59.00	3.8%	64.62	2.8%	72.71	2.4%	79.31	1.7%	52.11	4.6%	72.62	2.5%	58.28	3.2%	58.64	2.7%	56.36	5.6%
2001	79.7	2.0%	61.79	4.7%	66.78	3.4%	74.98	3.1%	81.57	2.8%	54.22	4.1%	74.93	3.2%	60.36	3.6%	60.37	3.0%	59.91	6.3%
2002	80.7	1.3%	64.50	4.4%	68.50	2.6%	76.02	1.4%	81.47	-0.1%	56.64	4.5%	76.76	2.4%	62.57	3.7%	62.57	3.6%	62.18	3.8%
2003	82.4	2.1%	66.33	2.8%	71.10	3.8%	77.55	2.0%	82.58	1.4%	58.96	4.1%	78.41	2.2%	65.98	5.4%	66.26	5.9%	64.25	3.3%
2004	84.4	2.5%	68.22	2.8%	73.74	3.7%	79.53	2.6%	84.25	2.0%	61.86	4.9%	80.31	2.4%	69.12	4.8%	69.49	4.9%	66.95	4.2%
2005	86.9	2.9%	70.23	2.9%	76.08	3.2%	81.52	2.5%	85.77	1.8%	65.30	5.6%	82.20	2.4%	71.74	3.8%	72.14	3.8%	69.45	3.7%
2006	89.3	2.8%	73.01	4.0%	78.39	3.0%	83.00	1.8%	86.54	0.9%	68.70	5.2%	83.75	1.9%	74.70	4.1%	75.29	4.4%	71.51	3.0%
2007	91.6	2.6%	74.07	1.4%	81.29	3.7%	86.09	3.7%	90.10	4.1%	72.23	5.1%	85.82	2.5%	77.46	3.7%	77.91	3.5%	74.88	4.7%
2008	94.3	3.0%	75.75	2.3%	83.49	2.7%	87.99	2.2%	91.05	1.1%	75.95	5.1%	88.28	2.9%	79.88	3.1%	80.22	3.0%	77.79	3.9%
2009	94.1	-0.3%	78.16	3.2%	85.76	2.7%	90.00	2.3%	93.25	2.4%	78.21	3.0%	89.84	1.8%	82.36	3.1%	82.66	3.0%	80.43	3.4%
2010	95.7	1.8%	80.93	3.5%	87.92	2.5%	91.98	2.2%	95.54	2.5%	80.36	2.8%	91.26	1.6%	84.66	2.8%	85.11	3.0%	82.03	2.0%
2011	98.2	2.5%	83.61	3.3%	89.53	1.8%	93.27	1.4%	97.00	1.5%	82.23	2.3%	92.03	0.9%	86.51	2.2%	86.93	2.1%	84.00	2.4%
2012	100.0	1.9%	86.19	3.1%	91.14	1.8%	94.39	1.2%	98.14	1.2%	84.13	2.3%	92.79	0.8%	88.49	2.3%	89.08	2.5%	85.18	1.4%
2013	101.4	1.4%	86.60	0.5%	92.41	1.4%	95.12	0.8%	98.27	0.1%	87.02	3.4%	93.49	0.8%	90.20	1.9%	90.99	2.1%	85.87	0.8%
2014	102.9	1.5%	89.07	2.8%	93.44	1.1%	95.97	0.9%	98.82	0.6%	88.89	2.1%	94.37	0.9%	91.36	1.3%	92.19	1.3%	86.83	1.1%
2015	103.1	0.2%	92.36	3.7%	94.01	0.6%	96.00	0.0%	97.69	-1.1%	91.14	2.5%	95.24	0.9%	92.35	1.1%	93.02	0.9%	88.63	2.1%
2016	104.1	1.0%	95.93	3.9%	95.08	1.1%	96.81	0.8%	97.88	0.2%	93.72	2.8%	96.33	1.1%	93.63	1.4%	94.10	1.2%	90.98	2.6%
2017	106.1	1.8%	98.83	3.0%	96.47	1.5%	97.81	1.0%	98.33	0.5%	95.24	1.6%	97.98	1.7%	95.34	1.8%	95.70	1.7%	93.30	2.6%
2018	108.3	2.1%	100.11	1.3%	98.27	1.9%	98.84	1.0%	99.13	0.8%	97.84	2.7%	98.76	0.8%	97.79	2.6%	98.03	2.4%	96.45	3.4%
2019	109.9	1.5%	100.00	-0.1%	100.00	1.8%	100.00	1.2%	100.00	0.9%	100.00	2.2%	100.00	1.3%	100.00	2.3%	100.00	2.0%	100.00	3.7%
2020	111.2	1.2%	100.69	0.7%	102.54	2.5%	101.55	1.6%	101.16	1.2%	102.98	3.0%	101.67	1.7%	103.38	3.4%	103.27	3.3%	104.06	4.1%
2021	115.5	3.9%	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	


Hospital and All-Items CPE
(Source: BEA)
Annual Change
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-1.0%
PCE
Hospitals
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

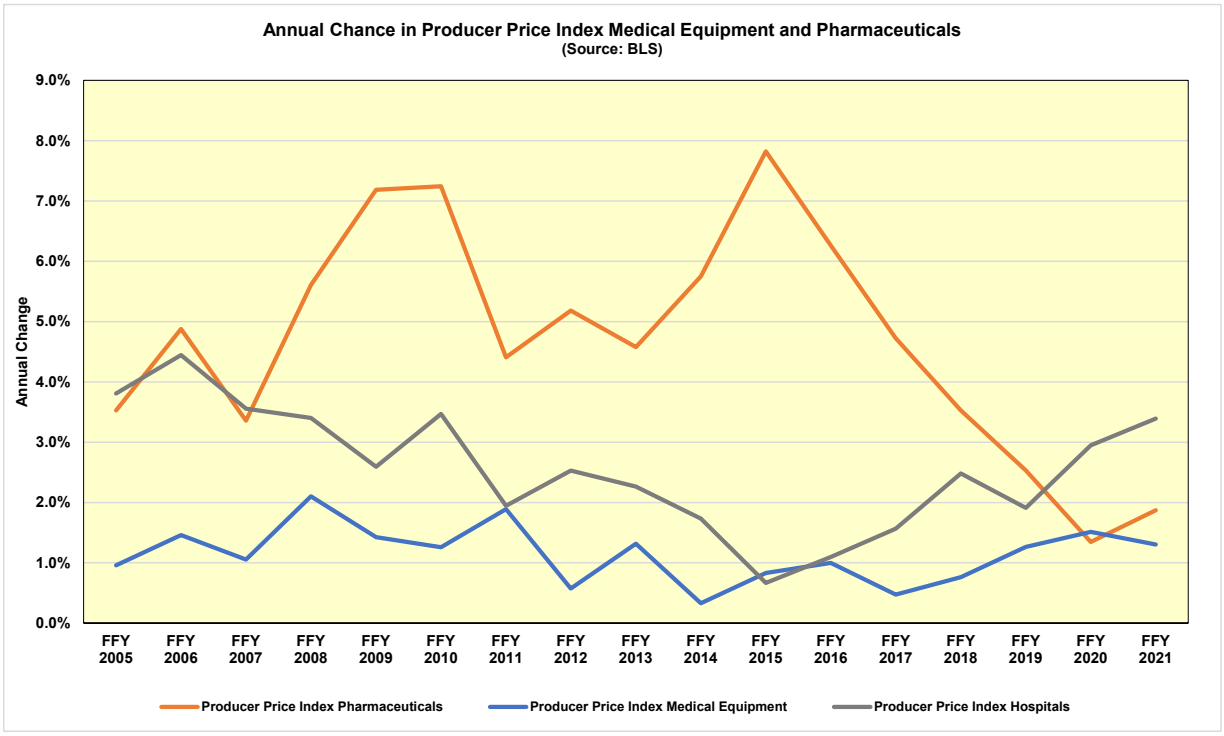

Nursing Homes and All-Items CPE
(Source: BEA)
Annual Change
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-1.0%
PCE
Nursing homes
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

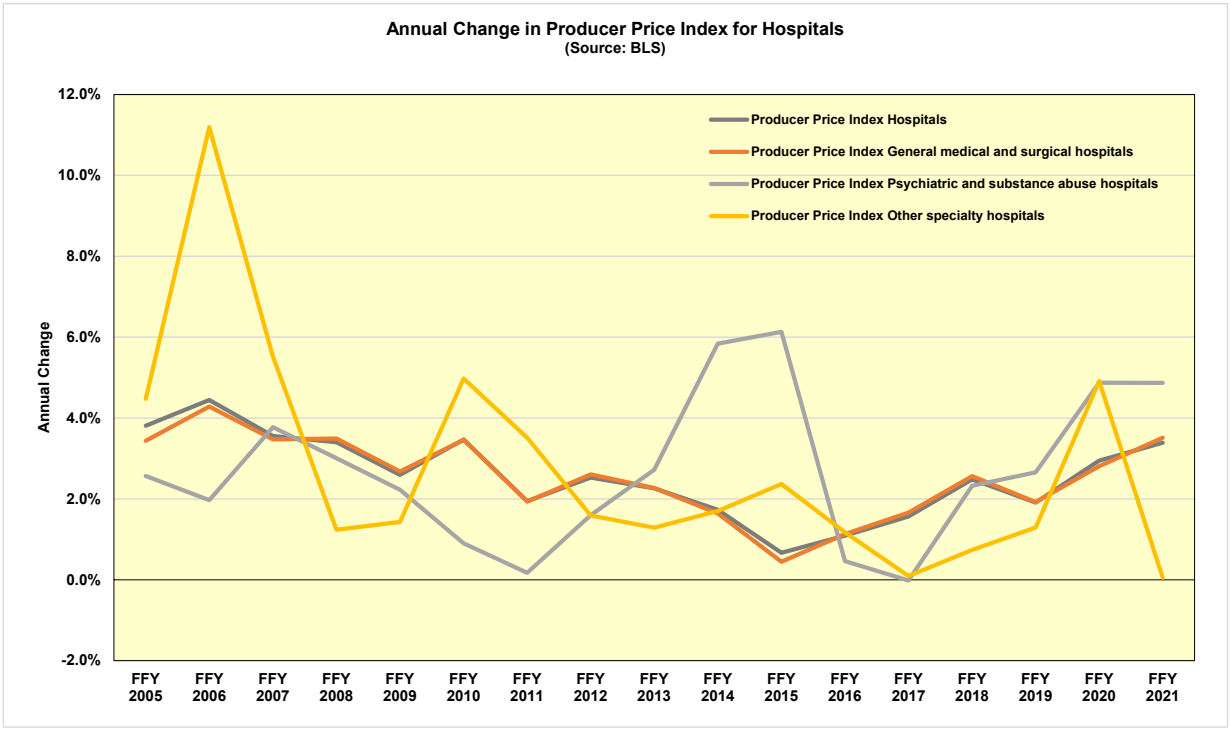

Health care and All-Items CPE
(Source: BEA)
Annual Change
4.5%
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
PCE
Health care
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020


Pharmaceutical and All-Items CPE
(Source: BEA)
Annual Change
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-1.0%
PCE
Pharmaceutical and other medical products
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Producer Price Index

FFY	Home Health Care		Hospitals		General medical and surgical hospitals		Psychiatric and substance abuse hospitals		Other specialty hospitals		Nursing care facilities & Residnetial Developmental Disability Homes		Nursing Care Facilities		Residential developmental disability homes		Pharmaceuticals		Medical Equipment	
	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA	Index	%CHYA
FFY 2000	110.3		118.5										129.0							
FFY 2001	113.1	2.5%	122.2	3.1%									137.4	6.6%						
FFY 2002	116.5	3.0%	126.0	3.1%									143.7	4.6%						
FFY 2003	116.4	-0.1%	133.1	5.7%									147.8	2.9%						
FFY 2004	119.5	2.7%	140.0	5.1%	102.1		100.6		103.1		101.9		154.1	4.2%	100.8		102.0		101.1	
FFY 2005	120.7	1.1%	145.3	3.8%	105.6	3.4%	103.2	2.6%	107.7	4.5%	105.5	3.5%	160.0	3.9%	103.8	3.0%	105.6	3.5%	102.1	1.0%
FFY 2006	121.7	0.8%	151.8	4.4%	110.2	4.3%	105.3	2.0%	119.7	11.2%	108.8	3.1%	165.0	3.1%	107.5	3.6%	110.7	4.9%	103.6	1.5%
FFY 2007	123.3	1.3%	157.2	3.6%	114.0	3.5%	109.2	3.8%	126.3	5.5%	113.3	4.1%	171.8	4.1%	111.6	3.8%	114.4	3.4%	104.7	1.1%
FFY 2008	125.6	1.8%	162.5	3.4%	118.0	3.5%	112.5	3.0%	127.9	1.2%	118.2	4.4%	179.3	4.4%	117.0	4.9%	120.8	5.6%	106.9	2.1%
FFY 2009	127.7	1.7%	166.8	2.6%	121.1	2.7%	115.0	2.2%	129.7	1.4%	122.4	3.5%	185.6	3.5%	121.3	3.6%	129.5	7.2%	108.4	1.4%
FFY 2010	129.2	1.2%	172.5	3.5%	125.3	3.5%	116.1	0.9%	136.2	5.0%	125.0	2.1%	189.6	2.1%	128.6	6.0%	138.9	7.2%	109.8	1.3%
FFY 2011	129.6	0.3%	175.9	1.9%	127.7	1.9%	116.3	0.2%	141.0	3.5%	128.4	2.7%	194.8	2.7%	135.6	5.5%	145.0	4.4%	111.9	1.9%
FFY 2012	130.1	0.3%	180.3	2.5%	131.1	2.6%	118.1	1.6%	143.2	1.6%	129.8	1.1%	197.0	1.1%	139.5	2.8%	152.6	5.2%	112.5	0.6%
FFY 2013	130.5	0.4%	184.4	2.3%	134.1	2.3%	121.3	2.7%	145.1	1.3%	131.3	1.2%	199.2	1.1%	145.7	4.5%	159.5	4.6%	114.0	1.3%
FFY 2014	130.9	0.3%	187.6	1.7%	136.3	1.6%	128.4	5.8%	147.5	1.7%	132.5	0.9%	201.0	0.9%	152.0	4.3%	168.7	5.8%	114.4	0.3%
FFY 2015	132.7	1.3%	188.9	0.7%	136.9	0.4%	136.3	6.1%	151.0	2.4%	135.1	1.9%	204.9	1.9%	157.4	3.5%	181.9	7.8%	115.3	0.8%
FFY 2016	134.6	1.5%	190.9	1.1%	138.4	1.1%	136.9	0.5%	152.8	1.2%	138.3	2.4%	209.9	2.4%	163.8	4.0%	193.3	6.3%	116.5	1.0%
FFY 2017	136.0	1.0%	193.9	1.6%	140.7	1.7%	136.9	0.0%	153.0	0.1%	142.2	2.8%	215.7	2.8%	170.0	3.8%	202.4	4.7%	117.0	0.5%
FFY 2018	138.7	2.0%	198.8	2.5%	144.3	2.6%	140.1	2.3%	154.1	0.7%	146.0	2.7%	221.5	2.7%	175.1	3.0%	209.6	3.5%	117.9	0.8%
FFY 2019	142.3	2.6%	202.6	1.9%	147.1	1.9%	143.8	2.7%	156.1	1.3%	152.2	4.3%	230.9	4.3%	179.2	2.3%	214.9	2.5%	119.4	1.3%
FFY 2020	147.1	3.3%	208.5	2.9%	151.2	2.8%	150.8	4.9%	163.7	4.9%	157.9	3.7%	239.5	3.7%	185.3	3.4%	217.8	1.3%	121.2	1.5%
FFY 2021	150.2	2.1%	215.6	3.4%	156.5	3.5%	158.2	4.9%	163.8	0.1%	161.7	2.4%	245.3	2.4%	192.6	3.9%	221.9	1.9%	122.8	1.3%


Annual Chance in Producer Price Index Medical Equipment and Pharmaceuticals
(Source: BLS)
Annual Change
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
FFY 2005
FFY 2006
FFY 2007
FFY 2008
FFY 2009
FFY 2010
FFY 2011
FFY 2012
FFY 2013
FFY 2014
FFY 2015
FFY 2016
FFY 2017
FFY 2018
FFY 2019
FFY 2020
FFY 2021
Producer Price Index Pharmaceuticals
Producer Price Index Medical Equipment
Producer Price Index Hospitals

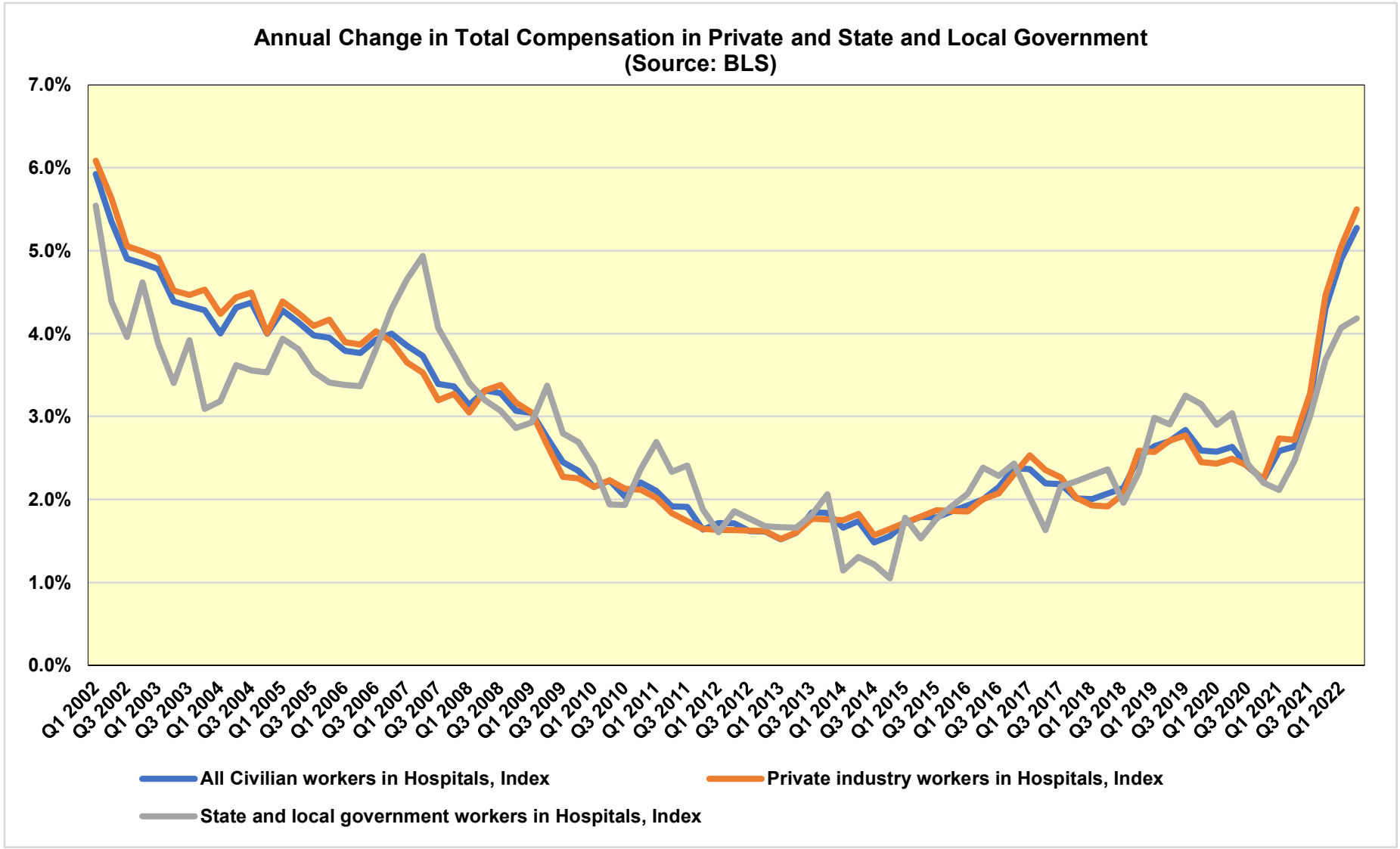

Annual Change in Producer Price Index for Hospitals
(Source: BLS)
Annual Change
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
Producer Price Index Hospitals
Producer Price Index General medical and surgical hospitals
Producer Price Index Psychiatric and substance abuse hospitals
Producer Price Index Other specialty hospitals
FFY 2005
FFY 2006
FFY 2007
FFY 2008
FFY 2009
FFY 2010
FFY 2011
FFY 2012
FFY 2013
FFY 2014
FFY 2015
FFY 2016
FFY 2017
FFY 2018
FFY 2019
FFY 2020
FFY 2021

Employer Cost Index, Total Compensation

Calendar Year	All Civilian workers in Hospitals, Index		Private industry workers in Hospitals, Index		State and local government workers in Hospitals, Index	
	Index	%CHYA	Index	%CHYA	Index	%CHYA
2001	82.9		82.4		85.0	
2002	87.2	5.3%	86.8	5.4%	88.9	4.6%
2003	91.1	4.4%	90.8	4.6%	92.1	3.6%
2004	94.9	4.2%	94.7	4.3%	95.3	3.5%
2005	98.8	4.1%	98.7	4.2%	98.8	3.7%
2006	102.6	3.9%	102.6	3.9%	102.5	3.7%
2007	106.3	3.6%	106.1	3.4%	106.9	4.3%
2008	109.7	3.2%	109.5	3.2%	110.3	3.1%
2009	112.6	2.6%	112.3	2.6%	113.5	2.9%
2010	115.0	2.2%	114.8	2.2%	116.0	2.2%
2011	117.2	1.9%	116.8	1.8%	118.7	2.3%
2012	119.1	1.7%	118.7	1.6%	120.7	1.7%
2013	121.1	1.7%	120.7	1.7%	122.9	1.8%
2014	123.1	1.6%	122.8	1.7%	124.3	1.2%
2015	125.3	1.8%	125.0	1.8%	126.5	1.7%
2016	127.9	2.1%	127.6	2.1%	129.4	2.3%
2017	130.7	2.2%	130.5	2.3%	132.0	2.0%
2018	133.6	2.2%	133.3	2.1%	135.0	2.2%
2019	137.2	2.7%	136.8	2.6%	139.1	3.1%
2020	140.6	2.5%	140.0	2.4%	142.8	2.6%
2021	145.0	3.2%	144.7	3.3%	146.8	2.8%

Employer Cost Index, Total Compensation

	All Civilian workers in Hospitals, Index		Private industry workers in Hospitals, Index		State and local government workers in Hospitals, Index	
	Index	%CHYA	Index	%CHYA	Index	%CHYA
FFY 2001						
FFY 2002	86.2		85.8		87.9	
FFY 2003	90.1	4.6%	89.8	4.7%	91.4	4.0%
FFY 2004	94.0	4.2%	93.8	4.4%	94.5	3.4%
FFY 2005	97.8	4.1%	97.7	4.2%	98.0	3.7%
FFY 2006	101.6	3.9%	101.6	4.0%	101.4	3.5%
FFY 2007	105.4	3.7%	105.3	3.6%	105.9	4.5%
FFY 2008	108.8	3.3%	108.7	3.3%	109.5	3.4%
FFY 2009	111.9	2.8%	111.7	2.8%	112.8	3.0%
FFY 2010	114.4	2.2%	114.2	2.2%	115.3	2.2%
FFY 2011	116.7	2.0%	116.4	1.9%	118.1	2.5%
FFY 2012	118.6	1.7%	118.3	1.6%	120.2	1.8%
FFY 2013	120.6	1.6%	120.2	1.6%	122.3	1.7%
FFY 2014	122.6	1.7%	122.3	1.7%	124.0	1.4%
FFY 2015	124.7	1.7%	124.4	1.8%	125.9	1.5%
FFY 2016	127.2	2.0%	126.8	1.9%	128.6	2.2%
FFY 2017	130.1	2.3%	129.8	2.4%	131.3	2.1%
FFY 2018	132.8	2.1%	132.4	2.0%	134.2	2.2%
FFY 2019	136.3	2.7%	135.9	2.7%	138.0	2.9%
FFY 2020	139.8	2.5%	139.3	2.4%	142.0	2.9%
FFY 2021	143.5	2.7%	143.1	2.7%	145.5	2.4%


Annual Change in Total Compensation in Private and State and Local Government
(Source: BLS)
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
Q1 2002
Q3 2002
Q1 2003
Q3 2003
Q1 2004
Q3 2004
Q1 2005
Q3 2005
Q1 2006
Q3 2006
Q1 2007
Q3 2007
Q1 2008
Q3 2008
Q1 2009
Q3 2009
Q1 2010
Q3 2010
Q1 2011
Q3 2011
Q1 2012
Q3 2012
Q1 2013
Q3 2013
Q1 2014
Q3 2014
Q1 2015
Q3 2015
Q1 2016
Q3 2016
Q1 2017
Q3 2017
Q1 2018
Q3 2018
Q1 2019
Q3 2019
Q1 2020
Q3 2020
Q1 2021
Q3 2021
Q1 2022
All Civilian workers in Hospitals, Index
Private industry workers in Hospitals, Index
State and local government workers in Hospitals, Index

Selected Occupational Employment and Wage Metrics

Source: OEWS data from the U.S. Bureau of Labor Statistics

Vermont Employment 2021	Vermont Average Annual Income 2021	Occupation	VT Average Wage % of US Average Wage 2003	2019	2020	2021
283,990	$ 55,450	All Occupations	93%	96%	95%	95%
19,690	$ 87,920	Healthcare practitioners and technical occupations	103%	97%	98%	97%
11,530	$ 36,680	Healthcare support occupations	100%	110%	108%	110%
5,370	$ 35,490	Home Health and Personal Care Aides	101%	123%	120%	121%
7,210	$ 75,160	Registered Nurses	90%	91%	90%	91%
2,620	$ 34,600	Nursing Assistants	102%	103%	104%	104%
1,320	$ 39,220	Medical assistants	109%	101%	101%	103%
910	$ 54,180	Licensed practical and licensed vocational nurses	93%	104%	102%	104%
1,080	$ 116,600	Medical and health services managers	106%	91%	93%	97%
730	$ 36,500	Pharmacy technicians	94%	102%	98%	96%
690	$ 45,230	Dental assistants	104%	105%	108%	106%
770	$ 59,180	Clinical Laboratory Technologists and Technicians		107%	103%	104%
420	$ 130,460	Pharmacists	98%	108%	105%	104%
1,030	$ 37,482	Emergency Medical Technicians and Paramedics	85%	92%	91%	90%
530	$ 217,500	Physicians, All Other				94%
720	$ 112,540	Nurse Practitioners		95%	95%	95%
630	$ 85,440	Physical therapists	88%	90%	89%	92%
420	$ 66,100	Radiologic technologists and technicians	97%	99%	99%	99%
520	$ 73,650	Dental Hygienists		97%	95%	91%
470	$ 45,090	Medical Records Specialists				93%
900	$ 36,070	Emergency Medical Technicians				98%
380	$ 84,290	Speech-language pathologists	94%	91%	101%	98%
140	$ 47,690	Health Technologists and Technicians, All Other				97%
190	$ 67,090	Respiratory Therapists		100%	99%	98%
310	$ 125,580	Physician assistants	103%	107%	110%	105%
210	$ 37,530	Phlebotomists		94%	94%	98%
230	$ 77,740	Occupational therapists	90%	89%	86%	87%
340	$ 35,140	Veterinary technologists and technicians	123%	93%	92%	92%
80	$ 46,350	Surgical technologists	97%	82%	93%	86%
250	$ 190,030	Dentists, General		147%	141%	114%
240	$ 36,140	Healthcare Support Workers, All Other		102%	99%	89%
270	$ 204,400	Family Medicine Physicians		96%	96%	87%
190	$ 31,130	Veterinary assistants and laboratory animal caretakers	96%	107%	105%	98%
130	$ 47,260	Paramedics				95%
100	$ 62,260	Physical therapist assistants	89%	100%	102%	103%
280	$ 41,900	Psychiatric technicians	111%	107%	107%	110%
50	$ 51,200	Massage therapists	91%	101%	96%	104%
100	$ 83,870	Diagnostic Medical Sonographers		105%	104%	104%
400	$ 100,730	Veterinarians	92%	90%	98%	92%
80	$ 54,820	Opticians, dispensing	119%	111%	118%	127%
130	$ 70,450	Dietitians and nutritionists	103%	99%	101%	107%
210	$ 43,550	Ophthalmic Medical Technicians		111%	113%	106%
100	$ 41,200	Medical Equipment Preparers		99%	98%	97%
40	$ 280,490	General Internal Medicine Physicians		103%	101%	116%
50	$ 42,380	Medical transcriptionists	99%	117%	115%	124%
60	$ 59,970	Cardiovascular Technologists and Technicians		96%	96%	97%
110	$ 30,600	Orderlies		92%	93%	92%
30	$ 65,450	Healthcare Practitioners and Technical Workers, All Other				101%
100	$ 196,240	Nurse Anesthetists			100%	97%
90	$ 30,880	Pharmacy aides	85%	83%	82%	89%
30	$ 36,450	Physical therapist aides	99%	115%	117%	120%
40	$ 63,400	Occupational Therapy Assistants		97%	94%	100%
320	$ 34,990	Psychiatric Aides		106%	101%	101%
100	$ 112,530	Optometrists	103%	118%	100%	90%
50	$ 80,910	Magnetic Resonance Imaging Technologists		102%	102%	104%
60	$ 61,710	Health Information Technologists and Medical Registrars				100%
80	$ 78,080	Chiropractors	35%	89%	83%	96%
90	$ 305,820	Anesthesiologists			87%	92%
80	$ 260,210	Surgeons, All Other				87%
120	$ 77,280	Healthcare Diagnosing or Treating Practitioners, All Other				68%
80	$ 59,060	Athletic trainers	95%	103%	105%	108%
90	$ 219,860	Psychiatrists		92%	87%	88%
110	$ 33,260	Dietetic technicians	99%	96%	101%	97%
60	$ 283,310	Obstetricians and Gynecologists				96%
40	$ 92,040	Radiation Therapists			95%	98%
**	$ 55,700	Hearing Aid Specialists				93%
**	$ 80,490	Orthotists and Prosthetists				101%
50	$ 102,160	Nurse Midwives		87%	84%	89%

Appendix A

Centers for Medicare and Medicaid Services Price Index and Forecast Methodologies

August 2022

3/28/2022

PROJECTIONS OF NATIONAL HEALTH EXPENDITURES AND HEALTH INSURANCE ENROLLMENT: METHODOLOGY AND MODEL SPECIFICATION

The Office of the Actuary (OACT) in the Centers for Medicare & Medicaid Services (CMS) produces short-term (10-year) projections of health care spending and enrollment for categories in the National Health Expenditure Accounts (NHEA) on an annual basis.

The National Health Expenditure (NHE) projections consist of time series for all of the major spending categories in the NHEA. These categories include trends in aggregate medical spending, medical goods and services consumed, sources of payment, and sources of financing. Detailed tables and documentation are available online.[1] In addition, an article describing these results is published annually in the journal *Health Affairs*.[2]

The NHE projections are inherently subject to uncertainty and are best viewed with this caveat. The models used to project trends in health care spending are estimated based on historical relationships within the health sector, and between the health sector and macroeconomic variables. Accordingly, the spending projections assume that these relationships will remain consistent with history, except in those cases in which adjustments are explicitly specified. The NHE Projections are constructed using a current-law framework, thus the projections do not assume any potential legislative changes over the projection period, nor do they attempt to speculate on possible deviations from current law. These projections also rely on assumptions about future trends in exogenous inputs to the model, such as macroeconomic conditions. The degree of uncertainty associated with the projections increases with the projection horizon. Given the unprecedented impact of the COVID-19 pandemic and public health emergency on health spending, enrollment, and macroeconomic conditions, these projections reflect larger adjustments for special one-time effects and are subject to a higher level of uncertainty than under more typical conditions.

The process for deriving these projections is based on accepted econometric and actuarial projection techniques. However, we frequently review the accuracy of our work and strive to make improvements in the methodology.[3] Please e-mail DNHS@cms.hhs.gov with any comments or feedback.

[1] Centers for Medicare & Medicaid Services. National Health Expenditure Data: Projected. Available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.

[2] Poisal, John, et al. "National Health Expenditure Projections, 2021-30." Health Affairs, 41, no.4 (2022). (Published online 28 Mar 2022.)

[3] Centers for Medicare & Medicaid Services. Accuracy Analysis of the Short-Term (10-Year) National Health Expenditure Projections. Available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/ProjectionAccuracy.pdf

TABLE OF CONTENTS

1) OVERVIEW OF THE NHE PROJECTIONS MODEL

The NHE Projections are based on a system of more than 100 econometric models, which reflect relationships in historical time-series data. The primary focus of the NHE Projections Model is to produce projections of future health care spending by private health insurers, consumer spending on an out-of-pocket basis, and other private revenues. Projections based on this model are conditional on exogenous projections for Medicare, Medicaid, the Children's Health Insurance Program (CHIP), Health Insurance Marketplaces, and key macroeconomic variables. As a final step in the process, legislative impacts and the effects of the COVID-19 pandemic are projected separately and added onto the NHE Projections Model estimates. Combined, these modeling approaches produce comprehensive projections for the health system as a whole.

Sections 2-3 of this methodology paper present the inputs and structure of the NHE Projections Model, with discussion of the data, assumptions, and model specifications used to produce the forecasts.

2) DATA SOURCES AND EXOGENOUS INPUTS TO THE NHE PROJECTIONS MODEL

a. Historical data sources

i. NHEA data

Historical NHEA estimates, compiled by OACT, are the source of the historical time series for health expenditures. These estimates provide a national level matrix of health spending data by type of service, source of funding, and sponsor of health care.[4]

Classification of spending by type of service, source of funding, and sponsor projected in our model is consistent with NHEA classification and is presented in Exhibits 1-3.[5] Payer categories track the source of direct payment for health care consumption, such as Medicare or private health insurance (PHI), but do not consider who is ultimately paying for (or sponsoring) each form of coverage—whether payment is made via taxes or premium payments, for example. Health spending by sponsor is defined as the underlying source of financing and can include: businesses, households, and governments.[6]

The payer versus sponsor distinction has become more important with the onset of public subsidies for the purchase of private health insurance plans under the Affordable Care Act (ACA); NHEA classification by payer defines such subsidies as private spending, while classification by sponsor of spending allocates portions of these payments to government sources.

[4] Information on the methodology used in producing the historical NHEA estimates can be found in our NHEA methodology paper, available at https://www.cms.gov/files/document/definitions-sources-and-methods.pdf.
[5] Ibid.
[6] Ibid.

EXHIBIT 1: NHE CLASSIFICATION BY TYPE OF EXPENDITURE

National Health Expenditures

- Health Consumption Expenditures
  - Personal Health Care
    - Hospital Care
    - Professional Services
      - Physician and Clinical Services
      - Other Professional Services
      - Dental Services
    - Other Health, Residential, and Personal Care
    - Nursing Care Facilities and Continuing Care Retirement Communities and Home Health Care
      - Nursing Care Facilities and Continuing Care Retirement Communities
      - Home Health Care
    - Retail Outlet Sales of Medical Products
      - Retail Prescription Drugs
      - Durable Medical Equipment
      - Other Non-Durable Medical Products
  - Government Administration
  - Net Cost of Health Insurance
  - Government Public Health Activities
- Investment
  - Structures
  - Equipment
  - Research

EXHIBIT 2: NHE CLASSIFICATION BY SOURCE OF FUNDING/PAYER

National Health Expenditures

- Out-of-Pocket
- Health Insurance
  - Private Health Insurance
  - Medicare
  - Medicaid
  - Children's Health Insurance Program (CHIP)
  - Department of Defense
  - Department of Veterans Affairs
- Other Third-Party Payers and Programs
  - Other Federal Programs
  - Other State and Local Programs
  - Other Private Revenues

EXHIBIT 3: NHE CLASSIFICATION BY SPONSORS OF PAYMENT

National Health Expenditures

- Businesses, Households, and Other Private
  - Private businesses
    - Employer contributions to private health insurance premiums
    - Other
  - Household
    - Household private health insurance premiums
    - Medicare payroll taxes and premiums
    - Out-of-pocket health spending
  - Other private revenues
- Governments
  - Federal government
    - Employer contributions to private health insurance premiums
    - Employer payroll taxes paid to Medicare hospital insurance trust fund
    - Medicare
    - Medicaid
    - Other programs
  - State and local governments
    - Employer contributions to private health insurance premiums
    - Employer payroll taxes paid to Medicare hospital insurance trust fund
    - Medicaid
    - Other programs

ii. Medical price indexes

Beginning in 2011, with the release of the 1960-2011 NHEA estimates, OACT released its first estimates of the chain-weighted NHE price deflator (available from 2004).[7] As part of the current NHE 2021-30 projections release, for the first time, projections of the NHE deflator were also produced. Though the personal health care price index has been available for many years, there had not previously been a corresponding index for NHE nor the non-personal health care categories of spending (government administration, net cost of insurance, government public health activity, research, structures, and equipment expenditures). To develop a price measure for these sectors, composite measures were developed for each non-PHC category. Because of the unique nature of the non-PHC categories, alternative data sources are used to decompose these categories into the key underlying inputs used in their production, such as compensation or capital costs, and then publicly available price series are used to deflate those input costs. Descriptions of the composite indexes used for the development of the NHE deflator and the weights for each sector set equal to the share of NHE spending accounted for by that type of service are shown in Exhibit 4 below.

For the PHC price index, the Producer Price Indexes (PPIs) and Consumer Price Indexes (CPIs) published by the Bureau of Labor Statistics (BLS) are the primary data sources for medical price indexes. Our price measure for total PHC spending is a chain-weighted deflator based on the indexes in Exhibit 4 below, with the weight set equal to the share of PHC spending accounted for by that type of service.

[7] Information on the methodology used in producing the historical NHE deflator methodology paper, available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/NHE-Deflator.pdf.

EXHIBIT 4: COMPONENTS OF NHE AND PHC EXPENDITURE ANNUAL-WEIGHTED PRICE INDEXES

Industry/Commodity or Service	Price proxy	2020 weight	
		NHE Weight	PHC Weight
National Health Expenditures		**100.0%**	**NA**
Non-Personal Health Care		**18.6%**	**NA**
Government Administration	Composite index of wages, benefits, professional fees, claims/FI services, office rent, and other expenses for six government programs	1.2	NA
Net Cost of Health Insurance	Composite index of compensation, capital, taxes and fees, reserves/gains/losses, and other expenses for four classes of insurance	7.3	NA
Government Public Health Activities	Composite index of federal, state, and local government consumption	5.4	NA
Research	NIH Biomedical Research and Development Price Index	1.5	NA
Structures & Equipment	Composite Index of BEA Price indexes for private fixed investment in structures by type and private fixed investment in equipment and software by type	3.2	NA
Personal Health Care		**81.4%**	**100.0%**
Hospital Care	PPI hospitals*	30.8	37.8
Physician and Clinical Services	Composite Index: PPI for Office of Physicians and PPI for medical & diagnostic laboratories	19.6	24.1
Other Professional Services	CPI services by other medical professionals	2.8	3.5
Dental Services	CPI dental services	3.5	4.2
Home Health Care	PPI home health care services	3.0	3.7
Other Health, Residential, and Personal Care:		5.1	6.2
Other (School Health, Worksite Health Care, Other Federal, Other State & Local, etc.)	CPI physicians' services		
Home and Community-Based Waivers (HCBW)	CPI care of invalids & elderly at home		
Ambulance	CPI-U All Items		
Residential Mental Health & Substance Abuse Facilities	PPI residential mental retardation facilities		
Nursing Care Facilities and Continuing Care Retirement Communities	PPI nursing care facilities	4.8	5.9
Prescription Drugs	CPI prescription drugs	8.4	10.4
Other Non-Durable Medical Products	CPI internal & respiratory over-the-counter drugs	2.1	2.6
Durable Medical Equipment	Composite Index: CPI for eyeglasses and eye care and CPI nonprescription medical equipment and supplies	1.3	1.6

*Producer Price Index for hospitals, U.S. Department of Labor, Bureau of Labor Statistics. Used beginning in 1994. Indexes for 1960-93 are based on a CMS-developed output or transaction price index.

PPIs account for the largest share of the PHC deflator. The use of PPI versus CPI indexes as price indicators is largely determined by the relative importance of third-party payment relative to direct consumer spending as a share of total expenditures.[8] Because PPIs capture variation in prices based on transactions for all payers, for most services they are preferable to CPIs, which track the price paid by consumers.

iii. Insurance coverage data

As with spending, historical enrollment estimates are drawn from historical NHEA data. The estimates cover total PHI, which is comprised of individually purchased and employer-sponsored plans, public insurance programs (including Medicare and Medicaid), and the uninsured. Estimates of total PHI enrollment are available from 1960 forward. Medicare and Medicaid enrollment estimates are available from 1966 forward; however, all other enrollment categories (including the more detailed estimates for individually purchased and employer-sponsored insurance) are only available from 1987 forward.[9]

b. Exogenous inputs to the NHE Projections Model

Exogenous inputs to the NHE projections include macroeconomic assumptions for projections of real Gross Domestic Product (GDP) growth, economy-wide inflation, labor market indicators, input price indexes for medical care, and demographic projections of the population by age and gender. Projections for macroeconomic and demographic assumptions are based on the annual projections of the Board of Trustees for Federal Old-Age, Survivors, and Disability Insurance (OASDI), which are produced annually by the Social Security Administration (SSA).[10] The projections were updated to reflect recent additional macroeconomic data and research.[11]

Projections for personal income and disposable personal income, consistent with the economic assumptions from the 2021 Medicare Trustees Report, are generated using the University of Maryland Long Term Interindustry Forecasting Tool (LIFT).[12]

The Boards of Trustees for Medicare report annually to the Congress on the actuarial status of the Hospital Insurance and Supplementary Medical Insurance trust funds.[13] Projections of Medicare spending generated for the Trustees Report, are produced by OACT, and are also consistent with macroeconomic and demographic assumptions included in the OASDI Trustees Report. The Medicare projections used in the NHE projections were sourced from the Trustees Report. Additionally, these Trustees Report projections were updated with certain provisions from two pieces of recent legislation to be consistent with current law. The legislation and provisions include (i) the Consolidated Appropriations Act (CAA) of 2021, which extended the sequestration suspension period and modified the Medicare Physician Fee Schedule and (ii) the Protecting Medicare and American Farmers from Sequester Cuts Act, which modified the sequestration periods and cuts, as well

[8] For more information, see National Health Expenditure Accounts Methodology Paper, 2020. Available at: https://www.cms.gov/files/document/definitions-sources-and-methods.pdf,.

[9] Ibid.

[10] Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. *The 2021 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, 31 August 2021. Available at: http://www.socialsecurity.gov/OACT/TR/2021/.

[11] The updated macroeconomic forecast is derived from the December 2021 publication of the Blue Chip Economic Indicators, a survey of 50 of the top forecasts by different private companies and academic institutions. More information on this report can be found at https://www.wolterskluwer.com/en/solutions/blue-chip-publications.

[12] Projections of personal income and gross domestic product are available from Table 1 of the CMS projected NHE data (Downloads, "NHE Projections – Tables"). Available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.

[13] Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. *The 2021 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*, 31 August 2021. Available at https://www.cms.gov/files/document/2021-medicare-trustees-report.pdf.

increased the Medicare Physician Fee Schedule conversion factor in 2022. The NHE projections also incorporate the latest Medicaid and CHIP projections prepared by OACT, which utilize consistent assumptions as the Medicare Trustees Report.

Projections for input price indexes in each sector are based on projections from IHS Markit, which rely on macroeconomic assumptions for aggregate wage and price growth that can differ from those incorporated in the OASDI Trustees Report. Accordingly, price and wage proxies included in these indexes are adjusted for consistency with OASDI macroeconomic assumptions on economy-wide wage and price inflation.

i. Exogenous estimates of the effects of legislation

Exogenous estimates on the future impact of legislation are primarily built into the projections through actuarial projections of spending and enrollment for Medicare and Medicaid, as well as in projections of enrollment via the ACA Marketplaces and through CHIP.

Where legislation is expected to influence the path of the NHE Projections Model's variables (such as private health insurance spending, out-of-pocket spending, as well as counts of the insured and uninsured populations), these additional impacts are built in through adjustments to the output of the econometric models. The most important effects of policy changes that are currently built into the NHE Projections Model affect trends in enrollment in private health insurance coverage, the composition of this enrollment between employer-sponsored and individual coverage, and short-term fluctuations in the net costs of private health insurance. Anticipated effects on growth in spending on personal health care are relatively smaller.

ii. Legislative and regulatory impacts on spending and enrollment projections

The Further Consolidated Appropriations Act of 2020 repealed three taxes previously mandated under the Affordable Care Act (including the medical device tax, the annual tax on health insurance providers, and the excise tax on high-cost employer sponsored health insurance).[14] The most notable effects of the repeal of these taxes are those associated with the tax on health insurance providers and the excise tax on high-cost employer sponsored insurance. The excise tax on high-cost employer sponsored health insurance was previously scheduled to take effect in 2022 and thus had not taken effect yet. However, the annual tax on health insurance providers was i) in effect in 2018, ii) suspended in 2019, iii) in effect for 2020, and iv) permanently repealed for 2021 and thereafter. Adjustments to account for the years where the health insurance tax is in effect for the projections have been made to the projections of total spending for the major payers (Medicare, Medicaid, Private Health Insurance) and were based on internal analysis of Internal Revenue Service data.[15] The impact of these changes affects the projected growth of net cost of health insurance in 2021.

A recent rule allowing employers to subsidize employee premiums in the Health Insurance Marketplace is scheduled to take effect in 2022 and is anticipated to result in modest shifts in enrollment from traditional employer sponsored insurance to individually purchased plans.[16,17] The impact of the rule change is expected to result in an incremental, small shift in coverage (roughly 2 percent of the population with employer insurance

[14] Congress.gov. H.R.1865 - Further Consolidated Appropriations Act, 2020. Available at: https://www.congress.gov/bill/116th-congress/house-bill/1865/text.

[15] Internal Revenue Service. Affordable Care Act Provision 9010—Health Insurance Providers Fee. Available at: https://www.irs.gov/businesses/corporations/affordable-care-act-provision-9010

[16] Health Reimbursement Arrangements and Other Account-Based Group Health Plans: A Rule by the Internal Revenue Service, the Employee Benefits Security Administration, and the Health and Human Services Department on 06/20/2019. Available at: https://www.federalregister.gov/documents/2019/06/20/2019-12571/health-reimbursement-arrangements-and-other-account-based-group-health-plans

[17] The implementation of the Health Reimbursement Arrangements and Other Account-Based Group Health Plans was delayed until 2022.

by 2030) from employer-sponsored-insurance to the Health Insurance Marketplace; however the net effect is a very slight increase in total private health insurance coverage and corresponding decrease in the uninsured population.

In response to the COVID-19 pandemic, the Federal government passed and enacted legislation that included substantial new funding sources for health care providers and for state and local governments: the Coronavirus Preparedness and Response Supplemental Appropriations Act of 2020; the Families First Coronavirus Response Act of 2020; the Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020; the Paycheck Protection Program and Health Care Enhancement Act of 2020; the Coronavirus Response and Relief Supplemental Appropriations Act of 2021; and the American Rescue Plan Act (ARPA) of 2021. Some of the most substantial funding was provided by the CARES Act and ARPA legislation. This legislation provided the primary funding for aid to health care providers—in particular, hospitals, physicians, and nursing homes (through the Provider Relief Fund, which provided direct financial support to providers, and through loans made under the Paycheck Protection Program to assist with qualifying expenses). In addition, this legislation provided states with additional Medicaid funding and increased funding for public health activity related to COVID-19.

Consistent with the National Health Expenditure Accounts methodology, government budget and program data were utilized to estimate spending associated with these various COVID-19 pandemic legislation.[18] Estimates of the Provider Relief Fund (PRF) were based on data from the Health Resources and Services Administration (HRSA).[19] Estimates of the amount of Paycheck Protection Program (PPP) funding given to health care providers were compiled using data from the Small Business Administration.[20] The data were tabulated according to the North American Industry Classification System categories included in the National Health Expenditure Accounts and assumed a loan forgiveness rate of 99 percent. Funding for the PRF and PPP are included in "Other Federal Programs" within the "Other Third Party Payers and Programs" payer categories. Estimates inclusive of additional Federal funding provided by the coronavirus relief legislation for government public health activity and non-commercial research (consistent with the Federal funds included in the category according to the NHEA) were based on analysis of fiscal year 2022 President's Budget outlay data and projections for applicable Federal agencies/programs.[21] Included in "other health insurance programs" NHEA spending by payer, supplemental funding from the CARES Act for the Veterans Administration were estimated using analysis from Government Accountability Office.[22]

iii. COVID19 pandemic impacts on health care spending and use

Several sources have been utilized to incorporate estimates of the impact of the COVID-19 pandemic on national health spending projections for 2021-30. In 2020, spending was directly affected by the coverage of testing and treatment of the disease. More than offsetting these additional direct patient care costs in 2020,

[18] Centers for Medicare and Medicaid Services. Accounting for Federal COVID Expenditures in the National Health Expenditure Accounts [Internet]. Baltimore (MD): CMS; [cited 2022 Jan 20]. Available from: https://www.cms.gov/files/document/accounting-federal-covid-expenditures-national-health-expenditure-accounts.pdf.

[19] Health Resources & Services Administration. PRF data: Provider Relief Fund data [Internet]. Washington (DC): HRSA; 2021 Jun [cited 2022 Feb 1]. Available from: https://www.hrsa.gov/provider-relief/data.

[20] Small Business Administration. PPP data: forgiveness data [Internet]. Washington (DC): SBA; 2021 Nov 17 [cited 2021 Nov 19]. Available from: https://www.sba.gov/funding-programs/loans/covid-19-relief-options/paycheck-protection-program/ppp-data.

[21] Fiscal Year 2022 President's Budget data, see The White House, Office of Management and Budget. Outlays XLSX [Internet]. Washington (DC): The White House [cited 2022 Jan 20]. Available for download at: https://www.whitehouse.gov/omb/supplemental-materials/.

[22] Government Accountability Office. Veterans Affairs: Use of Additional Funding for COVID-19 Relief [Internet]. Washington (DC): GAO; 2021 May [cited 2022 Feb 1]. Available from: https://www.gao.gov/assets/gao-21-379.pdf.

spending for non-COVID care declined significantly. The methods discussed below describe how these impacts were estimated and projected forward for Medicare, private health insurance, other private revenues, and for out-of-pocket spending by type of service.

To project Medicare spending and account for the spending impacts of the pandemic for the 2021 Medicare Trustees Report, adjustment factors by type of service were developed through 2023. These factors are based on (i) projections of the pandemic; (ii) direct costs associated with the testing and treatment of COVID-19; (iii) projections for non-COVID costs; and (iv) costs for the vaccines.[23] This analysis assumes an eventual return of deferred care that is more intensive, which results in a rebound in projected growth for several sectors over 2021-22 that is generally above previously released projections. Despite these projected pandemic effects, certain services were not expected to be materially impacted by the pandemic, such as prescription drugs, durable medical equipment, physician-administered drugs, and hospice care. Given all the uncertainty related to the future trajectory of the pandemic, these COVID-related impacts and that of future projections could change significantly as more information becomes available. The Medicare projections included in the NHE projections include these COVID-19 adjustments and as is typical, the Medicare projections are an exogenous input to the NHE projections model.

Building on the projections of the impact of the COVID-19 pandemic to Medicare spending and health care utilization, adjustment factors for personal health care by type of service through 2023 were also developed for projections of private health insurance and out-of-pocket spending. Medicare COVID-19 adjustments for projected impacts to health care utilization for non-COVID care were used to adjust private health insurance spending to essentially capture the effect of a rebound in use for 2021 forward, following nationwide shutdowns and avoidance of or delayed health care utilization in 2020. To crosswalk adjustment factors from Medicare to private health insurance, detailed private health insurance claims were utilized to account for differences in service use between Medicare beneficiaries and privately insured individuals. Specifically, private health insurance claims data were sourced from the IBM MarketScan Commercial Database, which consists of medical and drug data from employers and commercial health plans.[24] The MarketScan claims were grouped by Medicare service categories. Then, this distribution of spending from private health insurance claims by type of service was used to weight the Medicare adjustment factors by type of service to align more closely with the NHEA spending by type of service for private health insurance. In addition, further fine-tuning modifications were applied by sector to the private health insurance adjustment factors to incorporate preliminary data available by sector.[25] For total personal health care spending, level adjustments for COVID-19 impacts for private health insurance spending projections were largest for 2022.

To develop adjustments for out-of-pocket spending, additional analysis was conducted using the MarketScan data to account for the effects of deductibles on this type of spending. The analysis involved calculations of percent reductions in out-of-pocket spending based on varying simulated percent reductions in private health insurance spending. Generally, reductions in private health insurance spending were associated with smaller reductions in out-of-pocket spending largely due to the effects of deductibles paid. Consequently, the magnitude of the COVID-19 adjustment factors was smaller for out-of-pocket spending relative to factors for private health insurance. For total personal health care spending, level adjustments for COVID-19 impacts for

[23] Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. *The 2021 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*, 31 August 2021. Available at https://www.cms.gov/files/document/2021-medicare-trustees-report.pdf.

[24] IBM Watson Health. IBM MarketScan Research Database: Commercial Claims and Encounters Database [Internet]. Ann Arbor (MI): IBM Watson Health; 2018 Nov [cited 2022 Feb 2]. Available for purchase from: https://www.ibm.com/products/marketscan-research-databases/databases.

[25] Census Bureau. Latest quarterly services report [Internet]. Washington (DC): Census Bureau; 2021 Dec 10 [cited 2022 Feb 2]. Available from: https://www.census.gov/services/index.html.

out-of-pocket spending projections were largest for 2021.

3) NHE PROJECTIONS MODEL SPECIFICATION

The NHE Projections Model is composed of a system of econometric equations for personal health care (PHC) provided to individuals, and a supplementary set of equations for other, non-PHC spending. The specifications of these models draw on standard economic theory and the broader health economics literature. The equations in the model are re-estimated annually following the release of updated historical NHEA data, and the fit and appropriateness of model specifications are reviewed and revised at that time.

The regression models that generate the model equations are usually updated annually to incorporate an additional year of data, together with any revisions to earlier data. However, the most recent year of data (2020) is strongly influenced by large and unique effects associated with the COVID-19 pandemic. These data were therefore excluded from model re-estimation. Current models reflect data through 2019, including revisions, but are not influenced by effects specific to the pandemic, which are estimated separately outside of the context of the model, and applied to projections at a later stage.

a. Aggregate model for private personal health care (PHC) spending

Spending for medical care provided to patients (personal health care (PHC)) accounted for about 84 percent of total national health spending in 2019. The drivers of growth in spending for different types of PHC goods and services tend to be broadly similar, since these are all consumer goods that are provided to patients by medical practitioners. As a result, econometric models are generated for PHC (in aggregate and for individual goods and services). The aggregate PHC model defines the relationship of trends in spending growth for private PHC sources of funding[26] relative to the exogenous inputs to the model. Econometric models for aggregate PHC and also for individual goods and services also include equations for minor public spending programs for which exogenous projections are not available.

i. Relationship between macroeconomic trends and PHC spending

The key dynamic in econometric models for PHC spending is the relationship between private health spending growth and macroeconomic variables. Spending growth for private PHC exhibits a strong relationship to the macroeconomic business cycle. Growth cycles in health care spending can be extended in duration, lasting over a decade or more from peak to trough.

The causal link between private PHC spending and macroeconomic growth (as measured by disposable personal income) is not immediately apparent when looking at growth in health care spending relative to growth in GDP. This is because the relationship is complicated by two key issues. First, and most important, a large part of the transmission of the impact of macroeconomic growth on health care spending is not immediate. Rather, this impact occurs with a lag, over a period of several years following the macroeconomic business cycle. Second, there is a negative short-term relationship between trends in private and public spending growth, which tends to obscure the link between private spending and economic growth. In order to correctly estimate the relationship between private PHC spending and economic growth, it is necessary to control for the effects of public spending.

[26] It should be noted that "private sources of funding" in this context include all private health insurance spending, which in turn, includes government subsidies for Marketplace premiums. As such, this spending is defined as private from the perspective of direct payment for care (a 'Payer' basis), rather than on the ultimate source of funding for coverage (a 'Sponsor-of-payment' basis). For purposes of econometric modeling and discussion in this paper, all private health insurance spending, out-of-pocket spending, and other private revenues are grouped together as "private spending." To obtain sponsor-based delineations of public and private spending, we incorporate models that reallocate spending from direct payer basis to sponsor-based categories (discussed later in this paper).

The negative correlation between private and public payer spending growth applies to short-term variation (less than ten years). Over the long term (time series data since 1960), spending growth for both public and private payers is dominated by the same drivers that determine the nature and cost of providing medical care at the current standards of care. These factors include changes in medical technology and professional standards for treatment together with market prices for provider inputs. Common supply-side variables that influence the cost of providing care influence spending across all payers and therefore imply a positive correlation between public and private spending trends over the long-term. However, in the short term, the relationship between public and private spending on a real per capita basis is influenced by shifts in insurance coverage between public and private programs and by the effect of short-term legislative changes that influence relative prices paid by public and private payers. The net effect of these factors is that after controlling for factors that imply a positive correlation in the long-term spending trend for all payers, the residual short-term variation in public and private spending growth tends to be negatively correlated.

The causal link between aggregate income growth and health spending is one of the most important factors that determine the long-term trend in private PHC spending. Once we account for lags in the transmission of the effect from macroeconomic growth and private PHC spending, and control for the short-term relationship between private and public spending growth, the strength of macroeconomic (disposable personal income) growth as an explanatory factor becomes clearly apparent.

The strong relationship between the macroeconomic business cycle and private PHC spending suggests that private PHC spending is highly cyclical, and that the length of the cycle roughly corresponds to the periods of macroeconomic cycles. Macroeconomic cycles tend to be long, as illustrated by the past decade (2009-19), which encompasses a single expansion from a cyclical trough. Thus, it is difficult to evaluate trends in growth over periods covering less than two decades without first understanding the cyclical and macroeconomic context. For example, our models and the most recent available historical data suggest that growth in private PHC spending reached a cyclical peak in approximately 2002-2003 and, following roughly a decade of slowing growth, reached a cyclical trough in about 2013.[27] Since the trend for private PHC spending growth over 2002-2013 is effectively a peak-to-trough movement, the pattern of growth over this interval cannot provide a characterization of the long-term trend in health care spending. Viewing the pattern without the cyclical context could greatly overstate the extent to which deceleration in growth over this period is likely to be sustained. In contrast, variation in growth for public PHC spending does not usually track the timing of the cycle for private PHC spending. While long-term spending trends track similar factors to those of private payers, short-term fluctuations are strongly influenced by the passage of legislation and policy effects.

Exhibit 5 shows the estimated effect of lagged growth in real per capita disposable personal income (DPI)[28] on real per capita private PHC spending growth. The chart illustrates the relationship between this estimated effect of income growth and the actual growth in real per capita private PHC spending. The explanatory power of lagged income growth for aggregate health spending has historically been very strong.

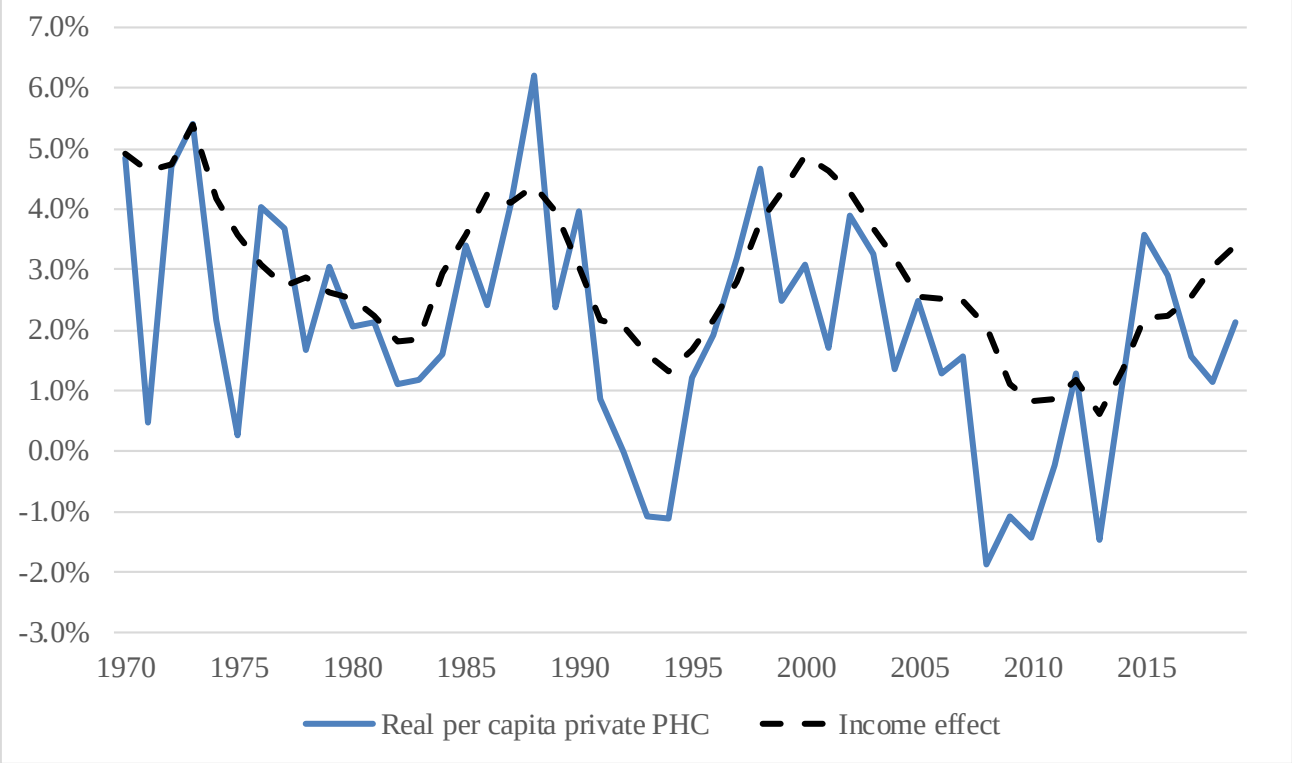
The effect of specific events that have an important impact on private PHC spending growth can often be discerned in periods where growth in private spending deviates significantly from the trend predicted by the income effect. In particular, private PHC spending growth was lower than predicted during 1991-94 due to the rapid growth in managed care enrollment during this period. Lower than predicted growth during 2008-2010 related to the economic recession was due to unusually large declines in private health insurance coverage. Faster than predicted growth in private spending for 2014-2016 can be attributed to the effects of

[27] The timing of cyclical peaks and troughs cannot be precise due to annual year-to-year volatility in the health care spending data.

[28] Values shown represent the historical values of DPI applied to the estimated model coefficients in the NHE projection model. They are estimated by fitting a coefficient to each lagged value, constrained to fit along a second degree polynomial. The peak effect of income growth on private PHC spending occurs with a lag of 2 to 3 years.

the major coverage expansions under the ACA.

Exhibit 5: Real Per Capita Growth in Private PHC Spending with Estimated Cyclical Effects, 1970-2019



A comparison of predicted versus actual growth in real per capita private PHC for the period immediately following the ACA enrollment expansions in 2014 forward shows that for the three years from 2014 through 2016, private spending growth was well above what would be predicted based on the model. Model residuals for 2014-2016 were consistently high as compared to the mean over the 1961-2016 sample period. This pattern partially reflects rapid growth in PHI enrollment associated with the onset of the major coverage provisions of the ACA in 2014. However, even after controlling for the effects of higher PHI enrollment, the growth in real private spending per enrollee is consistently higher than predicted by our model. This suggests that both increased PHI coverage and higher than predicted use of medical care per enrollee both played a role in explaining faster growth in the 2014-2016 period. Beginning with last year's model estimation, dummy variables for the years from 2014-2016 have been incorporated into the model specification to capture the effects of the ACA expansions. NHEA historical data through 2019 confirm a positive impact of the ACA on private spending growth for the period of 2014-2016, with growth returning fairly close to predicted trend over 2017 to 2019.

Notably, data for medical price inflation for the 2014-2016 period has shown no positive effects from the ACA, and has actually remained consistently below model predictions. Thus, the positive effects of the ACA on spending growth are observed entirely in higher growth in enrollment and in the volume and intensity of services per enrollee. This effect can be reasonably interpreted as reflecting pent up demand among the previously uninsured who gained coverage under the ACA expansions of coverage beginning in 2014. The return to predicted patterns of spending growth for 2017 through 2019 suggests that this effect of the ACA had tapered off by 2016.

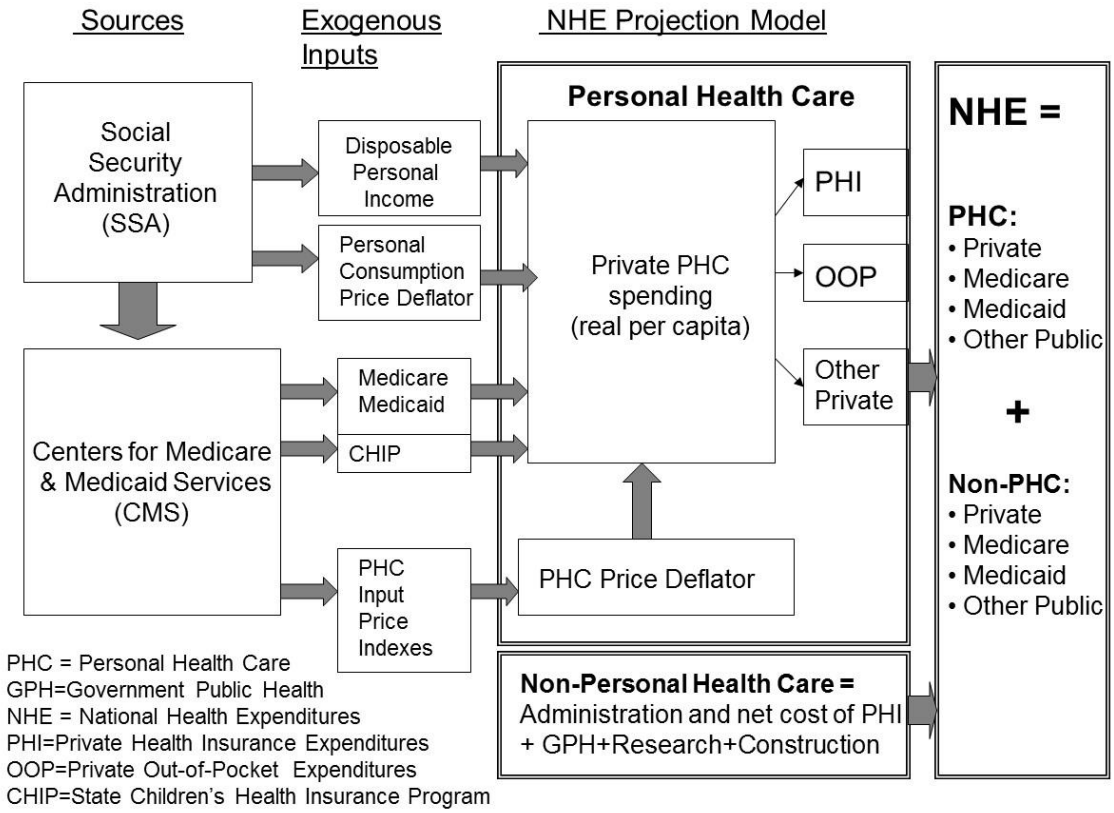
The effects of Federal stimulus in response to the COVID-19 pandemic on income growth in 2020 and 2021 have been quite substantial. The resulting pattern of income growth produces a sharp acceleration in real per capita income in 2020 – which then slows in 2021 and turns negative in 2022 as the effect of stimulus spending wanes. This pattern in income growth raises difficult questions given the strong relationship between income growth and real per capita private PHC spending growth. With the long and extended lag in the effects of income on health spending growth, these large additions to income growth in 2020-21 imply positive effects on demand for health care that taper off over time, with some effects extending out to 2027. Yet much this income has been unusual in nature – and a substantial part of it seems like to be treated as one-time additions to income. Such "windfall" additions to income tend not to influence consumer demand on a long-term basis by as great an extent as additions such as a raise in salary that are expected to persist. For purposes of model projections, we therefore developed an adjusted series for real per capita DPI that excludes a portion of stimulus spending (subtracting the total amount of Federal stimulus checks to households, together with Federal payments that augmented state unemployment benefits through September 2021). Effects of specific, pandemic-related legislative provisions on personal income are based on estimates from the Bureau of Economic Analysis (BEA).[29] The adjustment to DPI to exclude these nonrecurring payments to households dampens the effect of COVID stimulus on projected private spending growth.

ii. Structure of the private PHC spending model

Exhibit 6 below provides a schematic view of the aggregate health sector within the NHE Projections Model and shows the linkages among the data sources, exogenous data, the PHC model, the non-PHC output, and the aggregate NHE projection.

[29] Bureau of Economic Analysis. Effects of Selected Federal Pandemic Response Programs on Personal Income, 2021Q4 Advance [Internet]. Suitland (MD): Bureau of Economic Analysis; 2022 Jan 7 [cited 2022 Feb 8]. Available at: https://www.bea.gov/sites/default/files/2022-01/effects-of-selected-federal-pandemic-response-programs-on-personal-income-2021q4-adv.pdf.

Exhibit 6: Illustration of the Structure of the Private PHC Model*



*Private real per capita PHC spending is adjusted to hold constant the effects of demographic shifts in the population across age and sex cohorts

The NHE Projections Model can be characterized as a top-down, reduced-form model. It is a reduced form model in that both supply and demand factors are represented as drivers of growth, but without an explicit theoretical model framework. Thus, the coefficients in the model capture the relationships between health sector variables and macroeconomic variables as they occur in equilibrium without attempting to identify the underlying parameters that characterize the dynamics of supply and demand.

It is a top-down model in that spending and pricing trends are modeled at the aggregate PHC level, with underlying trends by sector constrained to aggregate PHC for consistency with the broader picture. Thus, spending projections for all subcategories—types of medical care by sector, direct sources of funding for medical care, and all sponsors of payment—are constrained to equal aggregate projections. Though the ultimate projections for all the subcategories are constrained to add up to the aggregate projection, models for spending by sector, source of funds, and sponsor are also estimated individually—both to maintain any distinctive trends relative to the aggregate trend and also to maintain consistency with exogenous projections of macroeconomic variables, actuarial projections of spending for the Medicare and Medicaid programs, and additional assumptions specific to the health sector.

The primary reason for the choice of a top-down model is that private PHC spending at the aggregate level is much more predictable in a model context than spending for each of the individual sectors (such as hospital or physician and clinical services). This greater predictability at the aggregate level reflects the difficulty in capturing the dynamics of interrelationships in spending growth across types of care that act as substitutes. In

particular, it is critical to account for the effects of shifts in settings for health care delivery if we are to explain historical patterns of growth for the individual sectors. Such shifts often occur in response to changes in government policy or PHI coverage. For example, the shift in setting from inpatient hospital to either outpatient hospital or to physician offices was hastened by the introduction of the prospective payment system for Medicare inpatient care in 1983. The shift from the inpatient hospital setting was then further accelerated by the growth in the 1990s of managed care plans, the design of which tended to discourage the use of more intensive care relative to less intensive care. We cannot fully control for these changes in government policy and PHI coverage, because we have no direct measures of the effects of policy and institutional change that can accurately capture the year-to-year variation in the magnitude of the effects. Consequently, these event-driven shifts among the sectors are more difficult to project at the sectoral level than at the aggregate level (where much of the effect of substitution across settings of care is subsumed in the aggregate).

The core of our aggregate model of private PHC spending consists of two equations:

1) Real per capita private PHC spending (adjusted to hold demographics constant)[30]
2) PHC price inflation

Conceptually, Equation (1) represents the quantity of medical care, while Equation (2) represents the price of medical care relative to other consumption goods. All variables are expressed as log differences (growth rates). Our focus on relationships in terms of growth rates, rather than levels, reflects the relatively short forecast horizon of these projections. Models that are estimated on the basis of growth rates are concerned primarily with short-term dynamics and effectively assume that there will be no unsustainable divergences from long-term relationships in levels terms. While underlying relationships in terms of levels are not expected to change very much within the single decade that our projections cover, these relationships ultimately have an effect on the long-term trend in growth rates (particularly when growth is rapid). Thus while we project relationships in growth using our model, we also monitor them on the basis of levels as well and adjust model projections to maintain relative levels in line with historical patterns where necessary.

The aggregate model for growth in PHC spending incorporates factors that influence both the supply and demand for medical care. Real per capita private PHC is effectively a measure of the quantity of medical care purchased by private payers.[31] In this model, growth in quantity is driven primarily by factors that influence aggregate consumer demand: the effects of changes in aggregate income and the relative price of medical care. Growth in real per capita public PHC spending is also included as a variable in this model because insurance under Medicaid, Medicare, and CHIP substitutes for private coverage. In addition, the model builds in the effects on spending of shifts in the demographic composition of the population based on an index that is defined to capture the change in spending that is implied by a change in the composition of the population across age, sex, and proximity to death cohorts. In contrast, our model for relative medical price inflation is primarily a supply-side model; price is assumed to be a function of the costs of production. We assume that growth in the relative price of medical care will be driven by underlying growth in input costs for medical providers. Relative price growth also reflects trends in relative productivity growth, and these trends are implicitly captured in the historical data. In addition, we include a variable for the share of spending that is made on an out-of-pocket basis by consumers.

[30] This dependent variable is divided by a demographic index to control for the effects on spending of shifts in the composition of the population across age, sex, and proximity to death cohorts.

[31] The accuracy of real per capita spending as a measure of quantity is dependent on the accuracy of the medical price indexes that are used as deflators.

iii. Real per capita private PHC spending (adjusted to hold demographics constant)

The dependent variable in the aggregate model of real per capita private spending is growth in real per capita private PHC spending divided by a demographic index. The demographic index is defined as the share of population by each age, sex, and proximity to death (referred to as the "time-to-death" or TTD) cohort, multiplied by the base year spending for that cohort. This demographic index previously controlled only for the effect on spending of changes in the composition of the population by age and sex. With the current NHE Projections release, the demographic factor used to project expenditures was improved to reflect the increasing longevity of the population consistent with the approach used to project Medicare spending.[32] Specifically, the demographic factors now account for the changing mix of population over time on the basis of age, sex, and time-to-death (TTD). The demographically-adjusted dependent variable represents the private real per capita PHC spending growth that we would expect to see for a population with a constant distribution of population across age and sex cohorts.

The independent variables in the model are as follows:

- Current and lagged growth in disposable personal income (less Medicare and Medicaid, real per capita)
- Lagged health share of Gross Domestic Product (PHC for all sources of funds as a share of GDP)
- Relative medical price inflation (PHC)
- Public spending growth (PHC, real per capita)
- Dummy variables for 2014, 2015, 2016 (ACA coverage expansion)

[32] Centers for Medicare and Medicaid Services. Memo: Demographic Factors Used to Project Medicare Expenditures—Incorporation of Time-to-Death to Account for Increasing Longevity on the Age-Sex Distribution of Spending [Internet]. Baltimore (MD): CMS; 2020 Apr 22 [cited 2022 Feb 2]. Available from: https://www.cms.gov/files/document/incorporation-time-death-medicare-demographic-assumptions.pdf.

Exhibit 7: Functional Form of the Real Per Capita Private Personal Health Care (PHC) Spending Model

$$\Delta \ln (h_{\mathrm{pr,t}} / p_{h,t} / n_t / d_t) = \alpha + \sum_{x=0}^{-6} \beta_{y,x} \Delta \ln(y_{dpi,t-x} / p_{y,t-x} / n_{t-x}) + \beta_p \Delta \ln(p_{h,t} / p_{y,t})$$

$$+ \beta_h \, h_{t-1} / y_{gdp,t-1} + \beta_{pu} \Delta \ln (h_{pu,t} / p_{h,t} / n_t) + \beta_{2014} D_{2014} + \beta_{2015} D_{2015} + \beta_{2016} D_{2016} + \varepsilon_t$$

Model variables and parameters (t subscript represents time period):

$h_{pr,t}$	=	private PHC health spending
$h_{pu,t}$	=	public PHC health spending
h_t	=	total PHC health spending
d_t	=	index of variation in PHC spending attributable to change in the composition of population by age, sex, and time-to-death cohorts
n_t	=	population
$y_{dpi,t-x}$	=	real disposable personal income per capita, time=t-x (x=years lagged)
$y_{gdp,t}$	=	real gross domestic product
$p_{h,t}$	=	PHC price deflator
$p_{y,t}$	=	GDP price deflator
D_{yyyy}	=	dummy variable for years yyyy=2014, 2015, 2016
α	=	model constant
β_x	=	model coefficients
ε_t	=	error term

All variables are included in the model as logarithms (relationships among model variables are assumed to be multiplicative in nature). Δ indicates that variables are first differences (i.e., $\Delta h_t = h_t - h_{t-1}$). The coefficients of each lagged value of real per capita disposable personal income ($y_{dpi,t} / p_{y,t} / n_t$) were constrained to lie on a second degree polynomial. Lags for the income variable were included only for the period where the estimated coefficients on lagged values remained positive in an unconstrained estimation (six years).

We discuss each of the model variables in turn below.

iv. Disposable personal income (DPI)

For the purpose of this model, income is defined as real per capita DPI excluding Medicaid and Medicare payments.[33] The exclusion of Medicaid and Medicare spending reflects the fact that these programs are effectively "in-kind" income (income paid in the form of health care benefits) that accrues to those individuals with public coverage. Since we are attempting to approximate income growth primarily for those with private coverage, we exclude this income from our measure.

As discussed earlier in the paper, real per capita DPI is an important variable in our model of private PHC spending. While our estimates are based on time-series data for the United States alone and include spending only by private payers, the importance of this variable is consistent with a large body of literature examining the empirical relationship between national income and health spending. A number of studies based on time-

[33] The objective is to obtain a measure of income that applies to the population that accounts for private spending on medical care. Thus we exclude spending for Medicare and Medicaid, which are included in DPI but accrue to a population that is primarily publicly insured. Since private spending includes out-of-pocket and PHI spending for Medicare beneficiaries, the correspondence cannot be exact.

series cross-country data for the Organization of Economic Cooperation and Development (OECD) economies confirm the importance of the link between health spending and income.[34] It has been repeatedly shown that variations in real per capita GDP (used as a proxy for income due to data availability) explain a substantial share of variation in health spending across countries and time.

In the econometric model of real per capita private personal health care spending, income has a lagged effect on health spending. To capture the timing of these lags, the income term in our model of PHC spending is incorporated as a polynomial-distributed lag estimated over 7 years (extending from 6 previous years through the current period). The specification of the model with all variables expressed as log-differences (growth rates) implies that coefficients on model variables can be interpreted as price and income elasticities, which are assumed to be constant over time.

Though fluctuations in growth in aggregate income have some immediate effects on growth in private PHC spending, these initial impacts are usually fairly small. The current-period income elasticity in the NHE Projections Model estimate is 0.23, which means that the change in growth for health spending in response to a change in income growth in the same period will be 23 percent as large as growth in income. While on the other hand, the effective long-term income elasticity of private PHC spending is 1.6. The long-term income elasticity is based on the sum of the effects of lagged income over a period of seven years with the peak effect of lagged income estimated at two years. This long-term income elasticity implies that health care spending rises substantially faster than income growth in the longer term; a 1-percent increase in income growth will result in a cumulative increase in private PHC spending of 1.6 percentage points. The magnitude of this estimated income elasticity is at the upper end of estimates for macro-level elasticities of approximately 0.8 to 1.6 in the empirical literature.[35] This relatively higher elasticity reflects characteristics of our model specification that differ from several other published estimates including the focus on private health care spending (rather than total health care spending).

The long lags that are built into this model reflect several important characteristics of markets for health services. In particular, since private insurers or public payers account for the large majority of health expenditures, this spending is largely insulated from contemporaneous changes in household income. Furthermore, consumers generally do not pay for most medical expenses directly at the point of purchase. For the most part, the decisions of insured patients are not immediately affected by changes in their own household income except in those cases in which substantial parts of the expenditure are paid for out-of-pocket. However, some immediate effects can be expected in response to cost sharing requirements in PHI plans or the loss of employment with the associated loss of employer-sponsored health insurance. As mentioned previously, the response to the economic recession in 2007-2009 appears to have been unusually large because of the concurrent substantial decline in employment that resulted in large losses of employer-sponsored coverage.

The other critical element captured by the lag in the impact of income growth on private PHC spending is the role of multiple intermediaries between consumers and medical providers. These intermediaries consist of employers or unions, who negotiate on behalf of pools of employees, and governments at the Federal and state level, which determine the nature of coverage and methods of payment for Medicare and Medicaid, as well as the regulations that constrain private employers and insurers. The intermediaries' determinations may result in changes in coverage and methods of payment, which can then affect providers' decisions on behalf of individual patients. Many such decisions are determined contractually or by regulations. Consequently, substantial delays may be required to implement any response to changes in underlying consumer preferences, both to negotiate any changes to contracts and regulations, and to implement such changes in a way that would influence choices of medical treatment in practice. In addition, in response to any modifications in the design

[34] Chernew, Michael E., and Newhouse, Joseph P. "Health Care Spending Growth." In *Handbook of Health Economics*, vol. 2 (2012). Eds. Pauly, Mark V., McGuire, Thomas G., and Barros, Pedro P. Amsterdam (NLD). Elsevier, Pages 1-43.
[35] Ibid.

of their health plans, employees may take time to respond to changes in incentives under the conditions of insurance coverage by gradually changing their patterns of health care consumption over time. Further, doctors and other medical providers may also respond gradually to changes put in place by payers. In the long run, responses could include altering treatment protocols in response to the incentives inherent in methods of payment for care and in response to constraints on coverage imposed by insurers. Because of these interactions among intermediaries, consumers, and providers, it is reasonable to expect that the response of the system to changes in income growth will extend over a period of years.

v. Lagged health share of Gross Domestic Product (GDP)

Though our models are expressed in terms of relative growth rates, short-term growth in private PHC spending is not independent of underlying relationships in spending levels. In particular, the relationship between current growth in private PHC spending and aggregate growth in DPI can be expected to change as health spending accounts for a rising share of consumption. As the aggregate health share of consumption increases, demand will tend to become more responsive to rising relative medical prices. The income elasticity of demand for health care must ultimately decline towards a value of one over the long run, where health spending grows at the same pace as income. As this adjustment in consumer preferences occurs, the rate of increase in the share of income allocated to health care can be expected to slow down compared to other goods and services. Given the dominant role of insurance as a direct payer for health care, we can expect this effect to influence growth at the aggregate level for the pool of health consumers covered by insurance.

The model specification includes a variable intended to explicitly capture the impact of the rising health share of consumption on the relationship between health care spending growth and its determinants. This variable is defined as the ratio of total PHC spending to GDP, lagged by one year. Its estimated impact is negative and significant, but fairly small in magnitude compared with the year-to-year variation in real per capita private PHC spending. Despite the small magnitude of the effect on annual predicted for spending, the ratio is important to include in the model specification. In concept, this variable controls for the effects of structural changes in the long-term relationship between health spending growth and the other variables included in the model specification.

In defining this variable, we use aggregate spending on medical care by all payers (not solely private payers), and we use GDP rather than income or consumption for this measure. This definition reflects the theoretical basis for the effect.[36] Like any other form of consumption, health spending is fundamentally subject to a budget constraint, but in cases in which insurance coverage severs the connection between individual decision-making and individual income, the budget constraint for health spending is binding at the level of the insurance pool.

The binding budget constraint that is applicable is defined at the level of a population pool that is relevant for those decision-making processes influencing the delivery of health care within our current system.[37] Decisions with systemic implications for the delivery of medical care are made by both private and public insurers. Medicare and Medicaid policies influence private insurers, particularly through the structure of payment rates for medical providers. Thus the appropriate definition of the pool that is relevant to the definition of a binding budget constraint is national in scope. We use GDP (rather than DPI) because, for the domestic economy as a whole, GDP is a measure of the total value of output of the economy. It therefore dictates the budget for aggregate national health spending, which is the ultimate long-term constraint on health spending growth.[38] While we can expect consumers to form short-term preferences on health versus non-health consumption based on short-term fluctuations in their own income, the long-term budget constraint on payment for health care (for

[36] Getzen, Thomas E. "Health Care Is an Individual Necessity and a National Luxury: Applying Multilevel Decision Models to the Analysis of Health Care Expenditures." *Journal of Health Economics*, 19, no. 2 (2000): 259-270.
[37] Ibid.
[38] Ibid.

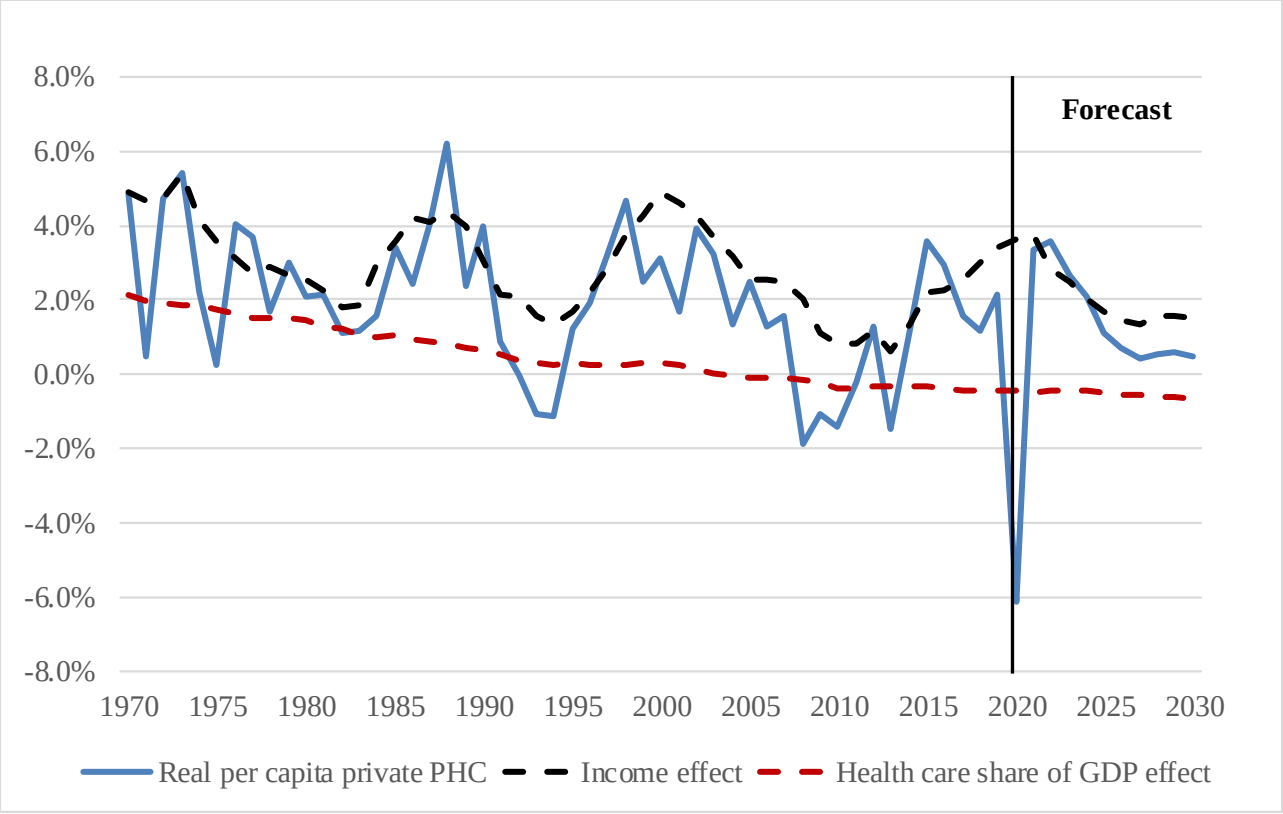
both public and private payers) cannot exceed growth in GDP.

Exhibit 8 illustrates growth in real per capita private PHC, the estimated effect of growth in real per capita DPI, and the estimated negative impact on real per capita private PHC growth of the lagged, rising health share of GDP. Note that the negative effect of the rising health share varies in response to recent experience; a period of slower health spending growth tends to relieve some pressure from the system. As the trend in the health share of GDP flattens, this reduces the negative effect on current-period private spending growth attributable to the national budget constraint.

The pattern of real per capita private PHC spending shown in Exhibit 8 for this year's projections also reflects the unusual effects of the COVID-19 pandemic, which impacted both actual pattern of medical care delivered to patients as well as substantial additional spending associated with Federal assistance to health care providers due to the pandemic. The substantial one-time effects strongly influence private health spending as well as the magnitude and projected effects of income, and the health share of GDP.

Exhibit 8: Growth in Real Per Capita Private PHC Spending

with Estimated Effects of Income Growth and Health Share of GDP, 1970-2030



*Values shown were re-scaled by the model's constant term for illustration purposes. The rescaling was calculated by subtracting the value of the estimated constant in the model from the annual value of the estimated impact of the lagged health share of GDP.

vi. Relative medical price inflation

Economic theory predicts that consumers adjust their spending on different goods and services in response to variations in the relative price of these alternatives. However, the existence of third-party payers for medical care complicates the response of demand to relative price variation. Consumers bear only a fraction of the

actual price of medical services at the time of purchase. Thus, in short-term consumption decisions, they respond to the marginal out-of-pocket price rather than to the actual price, which is generally determined by a combination of deductibles, cost-sharing requirements, and out-of-pocket maximums.[39]

However, the effects of out-of-pocket prices on consumer choices are only one potential avenue for price effects in health care markets. Medical prices also influence demand for care in two other ways. First, the price of health insurance is effectively the price of the bundle of medical goods and services an enrollee is expected to consume (plus administrative costs and profits). Consumers' decisions to purchase private health insurance and the generosity of the coverage selected, are therefore influenced by the relative price of medical care through this channel. Second, the relative price of care affects demand for services through the price sensitivity to health insurers' coverage, through provider selection decisions (as with narrow networks), and in some cases through the design of cost-sharing requirements (as with tiered copays).

Exhibit 9: Functional Form of the Relative PHC Price Model

$$\Delta \ln\left(p_{h,t}/p_{c,t}\right) \;=\; \alpha + \beta_{ipi}\,\Delta \ln\left(\frac{\sum_{x=0}^{-1}\left(ipi_{t-x} \,/\, p_{y,t-x}\right)}{2}\right) + \beta_{oop}\,\Delta \ln\left(h_{proop,t} \,/\, h_t\right) \;+ \varepsilon_t$$

$p_{h,t}$	=	PHC price deflator
$p_{c,t}$	=	Personal consumption price deflator
$p_{y,t}$	=	Gross domestic product price deflator
$ipi_{h,t}$	=	Input price index for medical providers
$h_{proop,t}$	=	private out-of-pocket PHC health spending
h_t	=	total PHC health spending
α	=	model constant
β_x	=	model coefficients
ε_t	=	error term

All variables are included in the model as logarithms (relationships among model variables are assumed to be multiplicative in nature). Δ indicates that variables are first differences (i.e., $\Delta h_t = h_t - h_{t-1}$). Growth in input prices for medical providers is estimated based on an index based on the composition of input costs, with each major input to production of medical care represented by a price index (or proxy). Input price index is deflated by the GDP deflator. Relative input price inflation is represented in the model specification by a two-year moving average of input price inflation. The out-of-pocket share of PHC spending is defined as the ratio of out-of-pocket spending to private PHC spending.

[39] The price to consumers can be roughly approximated by the fraction of total costs paid out-of-pocket multiplied by the actual price. This approximation is flawed; for decision-making purposes, the important question is the marginal price, which is the amount that the consumer pays for an additional dollar of medical care. Because of the broad use of copayments, deductibles, and out-of-pocket maximums, combined with the fact that a large share of health care consumption is accounted for by high-cost cases, the marginal price paid by consumers is often zero.

Within our model, relative medical price inflation has a significant negative coefficient, as we would expect. The price elasticity of demand for private PHC in our model is −0.3, which is above micro-level estimates of price elasticity of demand for medical care (−0.1 to −0.2 based on the RAND Health Insurance Experiment).[40] This difference reflects the use of individual-level data in micro-based studies to analyze the relationship between an individual's out-of-pocket spending and effective prices paid for services (accounting for coinsurance rates), compared to our use of macro-level national health spending data and price indexes from the Bureau of Labor Statistics. The difference also reflects the relatively short time frame used in micro-level studies compared to our analysis, which spans more than five decades.

Medical price inflation is an endogenous variable in our model (i.e. it is projected based on an equation within the NHE Projections Model rather than taken as an outside input to the projection). The dependent variable in the model equation is growth in relative medical prices, defined as the ratio of OACT's price deflator for PHC spending to the economy-wide consumer price deflator. The model for relative medical price inflation includes two independent variables: 1) relative input price inflation for medical goods and services (a measure of the wages and prices paid by providers of medical care for costs) and 2) the out-of-pocket share of private health spending.[41]

The measure of input price inflation included in the model for relative medical price inflation is based on individual input price indexes that are defined for each type of medical provider. Input price indexes are defined as indexes, where each component of provider costs is represented by a proxy series that is selected to track economy-wide price growth of that individual service or commodity, and the index weights represent the share of provider costs for that input Due to data limitations, input price indexes have historically omitted compensation for self-employed workers in some sectors. A substantial fraction of these self-employed workers are physicians or other medical professionals. Accordingly, input price inflation measurement may be influenced by this omission as a function of the differential in growth between compensation for employed workers and that for self-employed workers. The effects of causal factors other than input price inflation (economy-wide price inflation, productivity growth, and industry profitability) are either captured indirectly through their influence on input price inflation, or captured within the model constant.

In addition to variables that capture the growth in input prices, the model for relative medical price inflation includes a demand-side variable: the growth in the share of out-of-pocket spending as a share of total private spending. The basis for the inclusion of this variable is that the out-of-pocket share influences the price elasticity at the point of purchase. While we would expect to see a portion of this effect reflected in the price coefficient in the model for real per capita medical spending, recent analysis of NHEA data suggests that providers are reacting to the increasing cost sharing requirements of PHI plans in their price-setting decisions. Growth in the out-of-pocket share of spending thus acts as a constraint on the ability of providers to charge higher prices to consumers for services.

[40] Manning, Willard G., *et al*. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment." *American Economic Review*, 77, no. 3 (1987): 251-277.

[41] The input price index used for personal health care is a weighted average of OACT's input price indexes for hospital services, physician services, home health services, nursing home services, and pharmaceuticals.

vii. Real per capita public PHC spending

The use of the total population (rather than private health insurance enrollment) as the denominator for real per capita private PHC spending implies that that the relationship of the dependent variable to real per capita public PHC spending growth will be negative. This negative coefficient primarily captures the effects on private spending of shifts in the insured population between public and private forms of coverage. However, in addition to the effects of shifts in enrollment, the negative coefficient on public spending can be expected to capture the impacts on private PHC spending growth of any cost-shifting (private to public, or public to private) that may occur.[42]

viii. ACA coverage expansion

Dummy variables are included in the model to capture the effects of the ACA for the years 2014, 2015, 2016. The substantial expansion of private health insurance coverage under the ACA corresponds to an increase in private PHC spending growth. However, even after controlling for the effects of the ACA on coverage, growth in private PHC spending also seems to have increased over this period on a per enrollee basis, implying a temporary increase in utilization of services for PHI enrollees above that predicted by the model.[43] Dummy variables for years beyond 2016 were not found to be significant as growth in real per capita private PHC returned to a pace that is closer to model predictions after 2016.

b. Non-PHC health care spending

For non-PHC health care spending (accounting for the remaining 16 percent of national health spending after PHC in 2019), models are estimated for each of the four categories: (1) government administration and the net cost of private health insurance (PHI), (2) non-commercial research, (3) government public health, and (4) structures and equipment. These categories are heterogeneous in nature and are somewhat more volatile and unpredictable than that for personal health care. In addition, the drivers of growth for the non-PHC categories are quite different from those for PHC. As a result, projections for the non-PHC categories are based on separate models with varying specifications.

As stated earlier, projections of the NHE deflator and the non-PHC sectors were produced for the first time with the NHE 2021-30 projections release. Thus, econometric models for price indexes were developed for non-personal health care categories of spending (government administration, net cost of insurance, government public health activity, research, structures, and equipment expenditures). The PHC and non-PHC price projections and the projected spending by sector for NHE are utilized to generate the chain-weighted NHE deflator.

Several of the non-PHC sector projections were impacted by additional Federal funding in response to the

[42] The choice of denominator reflects consistency issues in the underlying enrollment data for PHI, as well as cyclical fluctuations in the demographic mix of those individuals with public versus private coverage. While it would be conceptually preferable to estimate a model based on growth in spending per enrollee, there are serious flaws in the available data for this purpose. Data for private enrollment are defined to comprise all persons with private coverage, including Medicare beneficiaries with private supplementary coverage, so that there is substantial portion of PHI enrollees that also have Medicare coverage. Since private spending reflects only the supplementary share of spending for these Medicare beneficiaries, PHI per enrollee trends tend to become distorted. In addition, the history for PHI enrollment stems from multiple sources. Data prior to 1987 are subject to inconsistencies over time due to variations in survey questions. Another issue concerns the effect of linked fluctuations in Medicaid and PHI enrollment over the business cycle. Slower economic growth can lead to an influx of a population (for example, children and non-disabled adults) that is relatively low-cost compared to the existing Medicaid population (which is weighted relatively heavily towards the institutionalized). This shift distorts per enrollee growth for both private spending and Medicaid.

[43] This conclusion is based on the estimation of an alternative specification of the model with real private spending on a per enrollee basis – rather than on a per capita basis – as the dependent variable.

COVID-19 pandemic. Estimates of the impact of this additional funding was primarily estimated separately (also discussed earlier in this document) and added on to the projections described below.

i. Government administration and the net cost of health insurance

Administrative costs include government administrative costs and the net cost of health insurance. These two categories are projected separately. Government administration spending (i.e., salaries and expenses related to the management of health insurance) is projected based on available budgetary information, with trend-based econometric models for the remaining categories.

The net cost of health insurance is a category of spending that is composed of the costs associated with administering health insurance and the profit margins that accrue to health insurers. Net costs for all health insurance plans are included in the category. The net cost of insurance for Medicare Advantage plans, as well as Medicaid and CHIP managed care plans is estimated primarily using actuarial methods and is exogenous, as with spending and enrollment projections for these payers.

Private health insurers' spending on net costs is projected based on econometric models that extrapolate historical trends and cyclical patterns. However, expectations for growth in the net cost of private health insurance for the near term of the projection period are primarily based on exogenous data and estimates of the impact of recent legislation rather than econometric models. Such estimates include the projected net costs of individual policies purchased through the ACA Marketplace, the mix of employer-sponsored and individual policies, and the anticipated effects of recent legislated changes on insurer premiums. In addition, the COVID-19 pandemic is estimated to have had a substantial effect on the variation in the net cost of private health insurance over the near term of the projection period, and in particular for 2020 and 2021. Actual medical claims spending in 2020 was substantially below expectations, as patients reduced utilization of discretionary medical care, which in turn, drove net costs substantially higher for the year. The higher than anticipated net cost spending in 2020 is expected to influence the pattern of growth projected in the near-term as private insurers adjust premiums in 2021.

Recent legislation has also exerted a particularly important effect on the net cost of private health insurance over 2019-2021 as we expect substantial variation prompted by the applicability of the health insurance fee (also referred to as the health insurance tax). The ACA imposed a non-deductible fee on private insurers providing fully-funded health insurance coverage. This fee was suspended in 2017 and reinstated in 2018. Projections for private health insurance spending reflect the removal of the health insurer fee in 2019, its temporary resumption in 2020, and its permanent removal from 2021 forward. The impact of these changes generates substantial year-to-year variability in net costs of private health insurance and in implied private health insurance premiums over the period from 2019 through 2021.

The projection for net costs of private health insurance in the second half of the projection period reflect general assumptions for the long-term trend, as well as exogenous assumptions for the effects of legislative or policy changes on this measure. Since the administrative costs portion of the category is generally fairly stable, most of the historical time-series variation in this category is attributable to profit margins, which have tended to move in cyclical patterns. (This phenomenon is known as the underwriting cycle.) The importance of this cyclical pattern has diminished in recent years as information technology has improved the ability of insurers to track medical claims in real time and as the consolidation of the industry has reduced variation in premiums due to insurers' entry into and exit from markets. In addition, as a result of the passage of the ACA and the establishment of the minimum medical loss ratio requirements[44], the importance of this cycle is ultimately

[44] The minimum medical loss ratio requirement under the ACA states that health insurers must spend a minimum share of premium revenues on health care benefits and quality improvements (80 percent in the individual and small group coverage and 85 percent in the large group coverage).

anticipated to diminish further over the projection period. In the long run, profit margins are expected to stabilize, with the ratio of net costs to underlying trend in medical benefits per enrollee converging towards the recent historical average.

Finally, some variation is expected to be generated by shifts in enrollment to the relatively smaller market for individually-purchased private coverage, which is subject to higher net costs than is the case in the large group market. Changes in the individual insurance market reflect the combined impacts of the continued effects of the implementation of the Marketplaces under the ACA, as well as other regulatory changes that have since occurred.[45]

ii. Non-commercial research

Non-commercial research spending growth is projected based on relationships to economic growth as represented by a 4-year lagged moving average of growth in real per capita GDP. Specific adjustments are made in cases in which Federal budgetary information is available (see also section 2b (ii) of this paper for a discussion specific to COVID-19 related funding).

iii. Government public health

Government public health spending growth is extrapolated based on historical trends, with specific adjustments made in cases in which budgetary information is available (see also section 2b (ii) of this paper for a discussion specific to COVID-19 related funding).

iv. Structures and equipment

Spending on health system structures is dominated by hospital construction and is therefore projected as a function of growth in hospital spending. Any additional information that becomes available (such as surveys of hospital construction)[46] is incorporated via adjustments into the projection. Equipment purchases are projected as a function of spending on health system structures to capture concurrent equipment spending that occurs with medical real estate investments and as a function of relative prices of new equipment purchases compared with other health care prices.

c. Submodels for sectors, sources of funds, and sponsors of payment

Spending projections are estimated for three underlying subcategories of health care spending:

- Type of service (sector)
- Source of funds (direct payer)
- Sponsor of payment (ultimate payer)

i. Models for health care spending by type of service

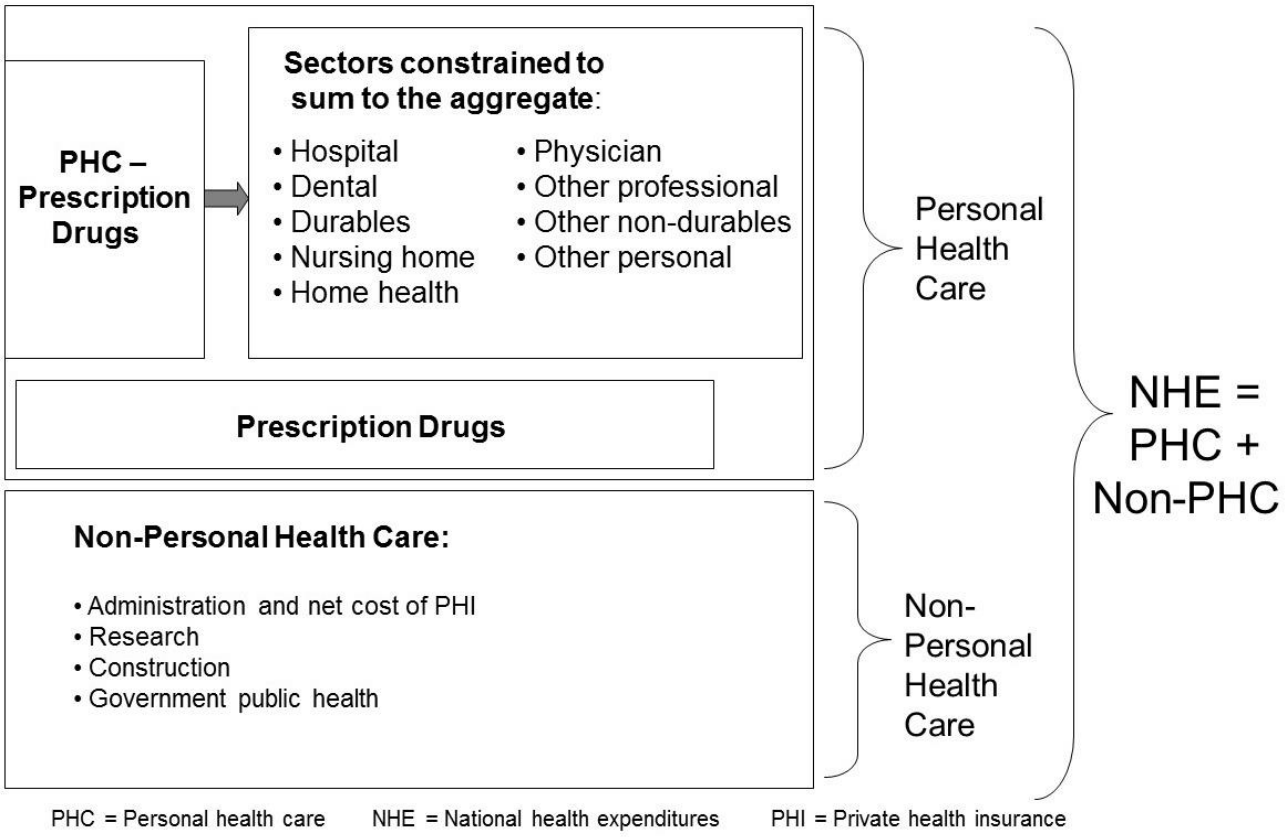
Models for real per capita private spending growth and price inflation for individual types of medical services are similar in specification to the aggregate model. Because the aggregate PHC-level model projections are

[45] In addition to those changes described in the legislative and regulatory impact section of this paper, prior regulatory changes included: the health tax provisions of the continuing resolution legislation passed January 22, 2018 (the insurer fees associated with the ACA were deferred in 2019) and the cancellation of the cost-sharing reduction payments (previously mandated under the ACA to insurers from the federal government) from 2018 forward, in accordance with the October 12, 2017, executive order.

[46] Surveys include 1) US Census Bureau Value of Construction Put in Place Survey (VIP). Available at: https://www.census.gov/construction/c30/c30index.html and 2) ASHE Health Facilities Management Magazine. 2021 Hospital Construction Survey. Available at: https://www.hfmmagazine.com/articles/4148-2021-hospital-construction-survey.

considered to carry a higher level of accuracy than the individual models by type of service, projected spending levels for all types of care within PHC (excluding prescription drugs) are normalized (adjusted for consistency with) aggregate projections. In practice this means that spending by type of service is multiplied by an adjustment factor that constrains aggregate spending levels across the sectors to sum to the aggregate projection for total PHC spending (excluding prescription drugs). Prescription drug spending is excluded from the normalization process because of its historic volatility and its lack of correlation with spending in other sectors.

Exhibit 10: Illustration of NHE Projections Models by Type of Expenditure



For the most part, key variables in the sector models follow a template specification similar to that used for the aggregate model for PHC spending growth. Major variables in the sector models include the following:

- Disposable personal income (excluding Medicare and Medicaid, real per capita)
- Relative medical price inflation
- Public spending growth (real per capita)
- Dummy variables for legislation, policy, and event driven effects

The parallel structure of the sectors within PHC allows income and price elasticities, and sensitivity to variation in public spending growth, to vary relative to the aggregate, with the constraint that the sum across all sectors must be equal to the projection generated by the aggregate model. Dissimilarities across the models for different types of services include varying lag structures for the income effect, the relative importance of the three variables, and the inclusion of dummy variables to capture phenomena specific to the sector. In a few cases in which relevant data are available, additional independent variables are included that are specific to the individual sector.

For each type of service, the lag on the income term in the models generally tends to vary with the share of spending that is accounted for by consumers' out-of-pocket expenses; that is, the greater the out-of-pocket share, the shorter the lag, as consumer demand responds more quickly to changes in their income.

Exhibit 11 summarizes the independent variables used to model real per capita private spending growth for each of the PHC sectors. We have provided additional descriptive information about the models for those sectors that represent the greatest shares of health spending.

EXHIBIT 11: MODELS BY TYPE OF SERVICE OR GOOD

SECTOR	DEPENDENT VARIABLE	INDEPENDENT VARIABLES*
Hospital services	Real private hospital services per capita, age-sex-TTD adjusted	Real disposable personal income (PDL, 7 years) (+) Relative price (−) Real per capita public spending growth (−) Dummy, 1984- (−) Dummy, 1984- * time trend (+) Time trend (−) Dummy, 2015 (+) Dummy, 2016 (+)
Physician and Clinical services	Real private physician services per capita, age-sex-TTD adjusted	Real disposable personal income (moving average of lags, 4 years) (+) Real per capita public spending growth (−) Relative price (−) Dummy, 1983-85 (+) Dummy, 1960-92*time trend (+) Dummy, 2015 (+) Dummy, 2016 (+)
Prescription Drugs**	Real aggregate drug spending per capita, age-sex-TTD adjusted*	Real disposable personal income (3-year moving average) (+) Relative drug price*Share paid out-of-pocket (3-year moving average) (−) New drug introductions (+) Generic dispensing rate (−)
Dental services	Real private dental services per capita, age-sex-TTD adjusted	Real disposable personal income (PDL, 3 years) (+) Relative price (−) Real per capita Medicaid and CHIP spending growth (3-year moving average of lags) (+) Dummy, 1981 (+) Dummy, 1960-1992 (+)
Nursing Care Facilities and Continuing Care Retirement Communities	Real private nursing home services per capita, age-sex-TTD adjusted	Real disposable personal income (moving average, 6 years) (+) Real per capita public spending (−) Relative price (−) Dummy, 1990 (+) Dummy, pre-Balanced Budget Act of 1997 (+) Share of population aged 85+ years (+)
Other Professional services	Real private other professional services per capita, age-sex-TTD adjusted	Real disposable personal income (+) Real per capita public spending growth (−) Relative price (+) Dummy, 1977 (+) Dummy, 1989 (−) Dummy, 1992- (−) Dummy, 1992- *Real disposable personal income (−) Dummy, 1992- *Real per capita public spending growth (+) Dummy, 1992- *Relative Price (-)
Over-the-Counter Drugs and Other Nondurables	Real private other nondurables spending per capita, age-sex-TTD adjusted	Real disposable personal income (2-year moving average) (+) Relative price (−) Lagged dependent variable (+)
Durables	Real private durables spending per capita, age-sex-TTD adjusted	Real disposable personal income (PDL, 2 years) (+) Relative price (−) Public spending growth (−)
Home Health services	Real private home health services per capita, age-sex-TTD adjusted	Relative price (−) Real per capita Medicaid spending growth (−)

*Independent variables in the form of a "dummy" followed by a dash denote that the variable effect starts at the specified year and continues through the projection period. **The prescription drug model is based on aggregate expenditures rather than private expenditures, due to complications in projecting shifts in payments associated with the introduction of Medicare Part D prescription drug coverage. See the Prescription Drug section below.

ii. Sector model: hospital services

Real per capita growth in private hospital spending is well explained by the variables in our template model specification. Because hospital services represent the largest share of personal health care spending among the services, we would expect to find a similar relationship between household income and hospital services spending as we observed between household income and overall personal health care spending. In addition, given the low out-of-pocket share, on average, for hospital services (our model captures both inpatient and outpatient settings), we anticipate a longer lag between a change in household income and the time of impact on hospital spending. Our results are consistent with these expectations; we estimate coefficients on lagged income growth with a polynomial distributed lag estimated for the current period and 7 previous years, one year longer than the lag structure for disposable personal income in the aggregate model for private personal health care spending. Additionally, the peak effect of income fluctuations occurs with a lag of 3 to 4 years, slightly longer than the aggregate model. As expected, public real per capita spending has a negative coefficient, capturing shifts in enrollment between private and public coverage as well as any possible short-term cost-shifting effects between private and public payers.

For this sector, the combined effects of managed care expansion and the introduction of the Medicare prospective payment system (PPS) are represented in the current model as a structural change in the relationship of growth to price and income that is largely one-time in nature, beginning in 1984 after the PPS was introduced. The alterations in provider incentives associated with the PPS, coupled with similar pressures from the expansion of managed care in the late 1980s through the 1990s, produced an initial reduction in growth that gradually tapers off. This tapering of the impact of PPS and managed care reflects the diminishing potential for reduced inpatient utilization over time as it becomes more difficult to find additional efficiencies at the margin. Similarly, the one-time effect of the ACA's coverage expansion implementation on real per capita hospital spending in 2015 and 2016 is captured through dummy variables, an approach consistent with that previously discussed for the aggregate model.[47] Likewise, consistent with the method discussed for the aggregate model, the estimated impacts of the COVID-19 pandemic on hospital spending are added on to a projection generated using the above model that uses historical data through 2019.

iii. Sector model: physician and clinical services

In the physician model, the estimated effect of the lag of disposable personal income (DPI) extends 4 years. The coefficient of relative price inflation is negative, as expected. Growth in real per capita public spending on physician services has a smaller estimated negative effect than the magnitude estimated in the aggregate model.

In general, our template specification fits real per capita growth in physician spending somewhat less well than it accommodates hospital spending. This reduction in model fit primarily reflects two distinctive periods of growth—1983-1985 and 1960-1992—that are not well predicted by the model. To capture the period of rapid growth from 1983 through 1985, we have included a dummy variable for these years. Our interpretation of this variable is that it captures a non-recurring substitution effect of professional services for inpatient care. The 1983-1985 period saw a major shift in provider incentives associated with the introduction of the Medicare PPS and the initial surge in managed care enrollments (as described earlier).

Despite substantial volatility, real per capita growth rates exhibit a slight upward trend during the second period, from 1960 through 1992. We have included a trend variable for these years to capture this effect. We interpret this variable as capturing the period of faster growth prior to the dampening effects of constraints from managed care organizations on use and intensity of care for privately insured individuals enrolled in these

[47] A dummy variable for 2014 was also tested as part of the model specification but was found to be not statistically significant.

organizations. Even as the effects of these more stringent utilization constraints diminished in the late 1990s, real per capita growth over 1992-2014 rarely peaked above 3 percent (compared to the period from the 1970s through 1992, when growth was above 4 percent for roughly half the years). The result of the inclusion of this variable is that the effects of the rapid growth prior to 1992 are removed from the other estimated coefficients, thereby moderating projected growth after 1992 in a manner that is more consistent with the recent history.

Mainly due to the major coverage expansions implemented in 2014 under the ACA, there was a notable acceleration in real per capita private spending growth that occurred in 2015 and 2016 for physician and clinical services. Given that these growth rates are largely influenced by exogenous legislative effects, we have included dummy variables for 2015 and 2016 to capture the effects of these major coverage expansions (similar to the handling previously discussed for the aggregate model for PHC). For the physician and clinical services model, only dummy variables for the years 2015 and 2016 were statistically significant, while the dummy variable for 2014 was not and was thus excluded from the final model.

The model for this service was estimated through 2019, which excluded the extraordinary impacts from the COVID-19 pandemic on the use of health care services in 2020. Because the effects of the pandemic were so unique relative to the historical period, these effects were estimated separately (as discussed previously) and added onto the econometric projections for 2021 forward.

iv. Sector model: prescription drugs

Prescription drugs differ in important ways from other types of medical care. First, since prescription drugs are a product, not a service, the cost structure of the industry differs substantially from that of other sectors (such as hospital, physician, or nursing home), for which labor costs play a critical role in driving price. In contrast, the cost structure of production for prescription drugs is highly capital-intensive, with relatively low marginal costs and a relatively larger role for the introduction of new products. Second, prescription drug spending has had a much larger consumer out-of-pocket share than other types of medical care, so that demand tends to be more sensitive to price. Third, we have access to additional information on supply and demand factors for this sector, in the form of data on new drug introductions, generic dispensing rates, research spending, patent expirations, and direct-to-consumer (DTC) advertising. As a result, our model for prescription drugs is somewhat different from the models developed for other sectors.

As opposed to the other health sectors, the dependent variable in the prescription drug model is real aggregate per capita drug spending (not private only). This decision was made because the start of Medicare drug coverage in 2006 produced a massive shift in the source of payments for drugs, which resulted in a sharp decrease in private drug spending growth in 2006, though it had little estimated effect on overall growth in drug spending. Accordingly, our model projects total prescription drug spending without simulating an explicit effect for Part D. The income variable within the prescription drug model fits with a shorter lag than in our aggregate model; this is the expected result based on the larger share paid on an out-of-pocket basis historically. Relative price inflation has a strong fit. The price variable is defined as the product of the out-of-pocket prescription drug share and the prescription drug price index—a definition that accounts for the trend in consumers' steadily declining out-of-pocket share over the last 20 years. However, available data do not distinguish out-of-pocket spending by the uninsured and by Medicare beneficiaries from the fixed co-payments that are often required within managed care, and thus our ability to capture this declining share is limited. The prescription drug price index is estimated historically and projected net of rebates received. Public spending growth is not included as a variable in this model due to its relatively minor role in the historical period (prior to 2006) and because the dependent variable is overall drug spending and not private drug spending.

Patterns of growth over the most recent 15 to 20 years of data are difficult to explain, as the effects of several different factors must be disentangled. The out-of-pocket share of spending by consumers dropped sharply as privately insured patients moved into managed care plans that generally have lower co-payments. (For the

most part, this phenomenon did not apply to Medicare beneficiaries, who continued to pay a relatively large share of drug costs out-of-pocket.) Also, changes to regulations in 1997 eliminated some of the earlier restrictions on television advertising for prescription drugs. In addition to income and relative price terms, our model for real per capita drug spending includes a 4-year moving average of the number of new prescription drugs introduced, as well as the rising generic dispensing rate, which has played an increasing role in depressing growth in prescription drug spending in recent years. In 2014, drug spending growth spiked up partly as a result of the use of new, expensive specialty drugs that were curative treatments for Hepatitis C (growth also increased because of the first year of the ACA major coverage expansion). However, in 2016 and 2017, the growth rate of prescription drug spending decelerated significantly and one major factor driving the slower growth was the decline in the use of these expensive Hepatitis C drugs. Another factor keeping drug spending growth relatively low from 2016-2020 was an increase in drug rebates, which resulted in the net growth of drug prices to be negative from 2018 to 2020.

v. Models for health care spending by source of funds (direct payer)

Our core econometric models project direct payments (spending) by all private sector payers. This total spending by private payer can be disaggregated to sources of payment at a more detailed level. The major types of private payers are private health insurers, direct payment by consumers on an out-of-pocket basis (OOP), and other private revenues.[48]

In contrast to our method for modeling total private spending for each of the sectors within PHC relative to aggregate PHC, our model for health care spending by private payer is "bottom-up" in nature; in other words, the private payer trends are projected at the level of individual sectors (hospital, physician, drugs, etc.). This approach reflects the fact that the nature of patient cost sharing differs greatly depending on the setting in which services are provided and the type of service. It also allows us to take into account the implications of sector-specific research and sector-level trends. For example, prescription drugs, physician services, nursing home care, and dental services account for roughly three-fifths of OOP spending; each of these sectors is influenced by a different mix of factors. As has been discussed throughout the paper, shifts in the composition of PHC spending across sectors have important effects on aggregate trends.

The projections for relative growth in PHI, OOP, and all other private spending for each individual sector are then added up and used to generate the projections for the shares of total private spending for the detailed private payer categories at the aggregate level. This process requires an adjustment procedure (iterative proportional fitting[49]) to ensure 1) the sum of spending for all private sources of funds by sector equals total private spending for all sources of funding and 2) the sum of spending for private health insurance, out-of-pocket, and other private spending across all types of services must equal the aggregate spending for total private spending.

[48] The other private revenues source of funds category is comprised of the medical portion of property and casualty insurance and philanthropy. Philanthropic support may be obtained directly from individuals, through philanthropic fund-raising organizations, or from foundations or corporations. For institutions such as hospitals and nursing homes, other private funds also include income from the operation of gift shops, cafeterias, parking lots, and educational programs, as well as investment income.

[49] According to Terry P. Speed, "Iterative proportional fitting, also known as iterative proportional scaling, is an algorithm for constructing tables of numbers satisfying certain constraints." "Iterative Proportional Fitting." In *Encyclopedia of Biostatistics* (2005). Available at https://doi.org/10.1002/0470011815.b2a10027.

In addition to private sources of funds, we also project public sources of funds other than Medicare and Medicaid. [50] These other sources account for approximately 25 percent of total public spending. The largest of these payers are the Department of Veterans Affairs (VA) and the Department of Defense (DoD), and the methodology we use for these programs is discussed below. Residual Federal and other state and local spending for smaller government programs is projected based on econometric models similar to those used to project real per capita private spending.

vi. Spending projections for Department of Defense (DOD) and Department of Veterans Affairs (VA) health insurance programs

The NHE projection model includes the separate econometric type of service equations for both the Department of Defense and Department of Veterans Affairs health care systems. Projections based on these models are then adjusted using data from published Federal budget requests for the upcoming fiscal year and data projections of the veteran population from the current VA Office of the Actuary's Veteran Population Projection Model (or "VetPop" Model). [51]

Expenditures for both the DOD and VA are driven mainly by fiscal policy, demographics, and economic conditions and, to a lesser extent, by overseas military operations. VA spending is expected to exhibit countercyclical elements, as eligibility is determined in part by income and the presence of other insurance coverage along with a myriad of other factors. Consistent with actuarial projections from the VA, it is expected that the number of veterans and active duty military personal will decrease over the forecast period.

vii. Models for spending by sponsor of payment

Sponsor of payment categories define which groups hold the ultimate responsibility for financing or supplying the funds needed to support health care spending by direct payers. Thus, our focus is on the relative spending for governments, households, and businesses that support payment for insurance coverage. For example, NHE spending by payer for PHI contains premiums paid to insurance companies financed through multiple sources, including contributions from employers (both public and private) and households and from governments through premium subsidies. Similarly, financing for Medicare consists of dedicated tax revenue from employers and employees, premium and interest income, and intergovernmental transfers. [52]

We project premiums for PHI plans, including their underlying components, employer-sponsored insurance (ESI) and other private health insurance for households and employers by types of insurance (group and individual) and sector of employment (public or private). Though PHI consists of ESI, Medicare supplemental insurance, and individually purchased plans, ESI premiums comprise the majority of PHI premiums

[50] Specifically, we model the Department of Defense and Department of Veterans' Affairs portion of spending within spending classified as "Other Health Insurance Programs." We also model spending trends for worksite health care, Indian Health Service, workers' compensation, general assistance, maternal and child health, vocational rehabilitation, other federal programs, Substance Abuse and Mental Health Services Administration, other state and local programs, and school health, all of which are included within "Other Third Party Payers." For further details on specific programs included in "Other Health Insurance Programs" or "Other Third Party Payers," please see the accounting identities for these categories in our NHEA methodology paper, available at https://www.cms.gov/files/document/definitions-sources-and-methods.pdf.

[51] US Department of Veterans Affairs. National Center for Veterans Analysis and Statistics, The Veteran Population Projection Model 2018 [Internet]. Washington (DC): VA; 2021 Apr 14 [cited 2022 Feb 2]. Available from: https://www.va.gov/vetdata/veteran_population.asp.

[52] Classification of spending by sponsor in the NHE projections is consistent with overall NHEA classification. A detailed description of how spending by source of funding maps to sponsor categories and associated sponsor accounting identities can be found in our NHEA methodology paper, 2020. Available at https://www.cms.gov/files/document/definitions-sources-and-methods.pdf.

(approximately 89% in 2019); consequently, the factors described previously that influence the PHI share of our aggregate projection of private PHC spending, combined with growth in the net cost of PHI, explain nearly all the variation in ESI premium growth.

Because premiums for Medicare supplemental insurance and other individually purchased plans grow differently than ESI premiums, we remove each type of spending from total PHI and project them separately. Our projections of per enrollee Medicare supplemental premium growth incorporate assumptions from the most recent Medicare Trustees Report regarding beneficiary trends in benefits and cost-sharing. For other individually purchased plans, we use their historical relationship with overall PHI to develop a projection of spending per enrollee. We then multiply projected enrollment in both Medicare supplemental plans and other individually purchased plans by their respective per enrollee premium projection to obtain an overall premium projection. (See further details on enrollment below.)

To maintain consistency within total expenditures across sponsor and payer estimates, we utilize iterative proportional fitting to adjust the matrix of spending for each cell relative to totals. For example, projections of components of PHI premiums, described above, for households and employers by types of insurance (group and individual) and sector of employment (public or private) must be adjusted to sum to total PHI spending. Additionally, we project payments by employers to state and local governments for workers' compensation and temporary disability insurance econometrically using macroeconomic trends. Conversely, a number of categories of spending are exogenous projections, based on the financing assumptions for both Medicare and Medicaid contained in the most recent Medicare Trustees Report. These categories include the following:

- Worker contributions to Hospital Insurance trust fund and taxation of benefits
- Employer contributions to Hospital Insurance trust fund
- Supplemental Medical Insurance Part B and Part D premium revenues
- Medicaid buy-ins for Medicare premiums
- State Medicaid phase-down payments

d. Private health insurance enrollment and uninsured population models

Projections for insurance enrollment by source of coverage are generated separately from projections for spending by payer. However, both enrollment and spending are modelled as a function of similar macroeconomic and public sector trends, and the implications of the two models for trends in spending per enrollee are a key part of the adjustment process involved in generating the final projections.

As with spending models, enrollment models primarily focus on projecting private sector insurance enrollment, taking projections for enrollment in public sector programs as exogenous inputs to the model. Projections for private health insurance are projected as a function of macroeconomic trends (including growth in employment and real GDP), demographic trends, as well as exogenous projections of enrollment in Medicare, Medicaid and other public sources of coverage.

In projections of private health insurance enrollment, we take trends in Medicaid, Medicare, and CHIP enrollment as exogenous inputs. Current projections of enrollment for these programs are based on the most recent Medicare Trustees Report and the latest available Medicaid projections from the Office of the Actuary. PHI enrollment consists of three components, which are (1) Employer-sponsored insurance, (2) Individually purchased insurance (non-Medigap), and (3) Individually purchased supplemental coverage for Medicare enrollees (Medigap).

The uninsured population is effectively projected as a residual implied by projections of population, together with enrollment from all sources of coverage and assumptions on overlap across those sources.

i. Employer-sponsored insurance

Employer-sponsored insurance (ESI) enrollment is obtained through the employment relationship and is therefore modeled as a ratio of ESI coverage to total employment. Growth in ESI enrollment may differ from growth in employment for several reasons. One reason is that not all employees have access to coverage through their employers. The offer rate for coverage and the terms under which it is offered (share of premium paid by employee) change over time. Another reason is that not all employees accept coverage when offered, which can also vary year-to-year. Finally, a number of those enrolled in ESI are not current employees; retirees and dependents of employees may also have coverage. For these groups, rates of coverage are determined by access to family or retiree coverage and the terms on which it is available.

The model of ESI enrollment includes the following independent variables:

- *Growth in enrollment in Individual PHI and Medicaid coverage.* This captures the substitution effect between ESI coverage and Individual coverage (purchased either through Marketplace Exchanges or off-Exchange) and Medicaid coverage. By controlling for substitution effects, this negative effect maintains aggregate level consistency between ESI and other enrollment categories.
- *Growth in total employment.* This variable has a negative coefficient, but it is effectively a partial offset to the coefficient of 1.0 on employment growth that is implied by the fact that the dependent variable is expressed as a ratio to employment (which assumes ESI enrollment will grow proportionately to employment). The negative coefficient on employment growth means that ESI enrollment responds less than proportionately to employment growth. Another way of looking at this is that ESI enrollment is less responsive to business cycle fluctuations than employment.

A portion of the trend in the ratio of ESI enrollment to employment is captured in the negative constant term, which reflects the declining trend in coverage caused by decreasing offer and take-up rates for individual and family coverage. We dampen this decline in coverage over the projection to reflect the estimated effects of the employer coverage mandate in the ACA.

ESI enrollment generally grows slightly less than proportionately to overall growth in employment producing a fairly consistent and predictable declining trend in the ratio of ESI enrollment to total employment. However, this relationship was significantly altered due to the unusual effects of the COVID-19 pandemic, with a substantially smaller decline in ESI enrollment than in employment in 2020. This unusual pattern of growth also influenced the near-term projection for growth in ESI enrollment relative to expected growth in employment.

ii. Individually purchased insurance (excluding Medicare supplement insurance)

Individually purchased insurance for non-Medicare enrollees includes coverage purchased both on and off of the ACA Health Insurance Marketplaces. Projections for Marketplace enrollment account for the largest share of this enrollment. Marketplace enrollment is projected exogenously and includes the effects of legislation providing additional resources to individuals to enroll in this coverage in response to the economic effects of the COVID-19 pandemic. Off-Marketplace coverage (sold outside of the ACA Marketplace) is not eligible for subsidies, and has been declining rapidly. Current projections for the total individual market assume that total enrollment on and off of the Marketplace will grow in proportion to the under-65 population. Off-Marketplace enrollment is then defined as a residual, equal to the difference between total individual enrollment and (exogenous) Marketplace enrollment.

iii. Medicare supplemental insurance

We model Medicare supplemental insurance—that is, private secondary Medigap coverage for Medicare enrollees—as a share of overall Medicare enrollment. Variables in this model consist of an exogenous

projection of Medicare Advantage enrollment (consistent with the most recent Medicare Trustees Report and a form of coverage that acts as a substitute for privately purchased Medigap plans), a dummy variable for 1994 to account for an outlier, and a variable representing the moving average growth of real per capita GDP.

iv. Uninsured population

We expect growth in the uninsured population to be consistent with growth in the "population residual" (which represents the total population minus the sum of enrollment in insurance across all sources of coverage). In practice, growth in the uninsured population and the population residual have historically been somewhat consistent, but do at times however, exhibit some noticeable differences. Historical differences between the uninsured and the population residual are largely due to measurement issues for coverage that affect all sources, as well as to variations in overlap across sources of coverage over time (those who have coverage from two or more sources). According to recent data, increases in the sum of enrollment across all sources of coverage correspond to a smaller decrease in the uninsured population. This relationship reflects a trend toward a rising share of insured persons with overlapping coverage from more than one source.

We project the uninsured population using the projected growth in the sum of enrollment across all public and private insurance categories together with a projection of the overall population of the U.S. The overlap across enrollment categories is assumed to continue rising gradually at a rate consistent with recent historical data; an increase in enrollment from any insurance source translates to a slightly smaller reduction in the uninsured population.

4) APPENDIX: LIST OF ACRONYMS

ACA	Affordable Care Act
BLS	Bureau of Labor Statistics
CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
CPI	Consumer Price Index
DoD	Department of Defense
DPI	Disposable Personal Income
DTC	Direct-to-Consumer
ESI	Employer Sponsored Insurance
GDP	Gross Domestic Product
HCBW	Home and Community-Based Waivers
LIFT	Maryland Long Term Interindustry Forecasting
NAIC	National Association of Insurance Commissioners
NHE	National Health Expenditure
OACT	Office of the Actuary
OASDI	Old-Age, Survivors, and Disability Insurance
PHC	Personal Health Care
PHI	Private Health Insurance
PI	Personal Income
PPI	Producer Price Index
VA	Department of Veterans Affairs

NHE DEFLATOR—INTERMEDIATE SUMMARY

National Health Expenditures

National Health Expenditures (NHE) in the United States include all spending related to the purchase of health care goods and services during the year and the amount invested to procure future health services.[1] Historically, U.S. health care spending has grown faster than most other sectors of the economy. Differences in the annual growth rates of the NHE reflect trends in the factors that drive health care spending, including:

1. Increases in technological developments
2. Changes in the age and sex composition of the population (demographic effect)
3. Changes in the use and mix (or intensity) of health care services
4. Changes in prices for health care goods and services

The NHE has traditionally been reported in nominal terms (current dollar) and has not been adjusted to remove the impact of changes in health care prices (constant or real dollars). Although a price index for Personal Health Care (PHC) goods and services has been available for many years, there has not been, until now, a corresponding price index for the aggregate NHE. The Office of the Actuary in the Centers for Medicare and Medicaid Services (CMS) released its new chain-weighted NHE price deflator with the publication of the 2011 NHE Accounts (NHEA). The new chain-weighted NHE price deflator, which is available for 2004 – 2011, allows for the analysis of total health spending in real terms. Real estimates of health sending can now be compared to trends in underlying non-price factors such as population, utilization, intensity, mix of goods and services, and demographics. This document briefly describes the method used to develop the chain-weighted NHE price deflator.

NHE Deflator Calculation

The NHE price deflator is a chain-weighted index that uses a wide range of detailed price indexes from the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) and Producer Price Index (PPI) programs. The NHE Deflator is an aggregate price index; therefore, it's critical that it not capture the biases that can occur when aggregating individual price indexes. The chain-weighted method used in the NHE Deflator attempts to control for any aggregation bias by using a Fisher Ideal formulation. The Fisher Ideal index formulation reflects the geometric mean of a Laspeyres index, which uses prior period quantity weights, and a Paasche index, which uses current period quantity weights. As a result, chain-weighted price measures typically yield lower inflation rates than standard indexes (such as Laspeyres or Paasche) since substitutions are made over time to purchase less of the goods or services that experience faster price growth. Equation (1) below is the formulation of the NHE Deflator using a Fisher Ideal index, where the first term represents the Laspeyres price index change and the second term represents the Paasche rice index change:

$$(1) \quad (NHE)_t = \sqrt{\left(\sum_i \frac{P^i{}_t Q^i{}_{t-1}}{P^i{}_{t-1} Q^i{}_{t-1}}\right) * \left(\sum_i \frac{P^i{}_t Q^i{}_t}{P^i{}_{t-1} Q^i{}_t}\right)}$$

t = time period t
i = NHE categories
$(NHE)_i$ = NHE deflator
P^i = Price index for category i
Q^i = Quantity Index for category i

[1] For further information, see National Health Expenditure Accounts: Methodology Paper, 2011 [Definitions, Sources, and Methods] Page 6 "What are the National Health Expenditures?" http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/downloads/dsm-11.pdf

Chaining together the period-by-period changes in the NHE Deflator (i.e. the Fisher ideal formulation) ensures that compositional changes in the quantity weights are kept distinct from the price changes. Under the chain-weight method this occurs because the base period quantity weights for the Laspeyres formulation is always only one period prior to the base period quantity weights for the Paasche formulation. The chain-weighted percent change for period t+1 is determined as $P(NHE)_{t+1}/P(NHE)_t$, the percent change for period t+2 is determined as $(NHE)_{t+2}/\ (NHE)_{t+1}$, and so on. This chain-weighted method is the preferred index formulation used by the Bureau of Economic Analysis (BEA) when deflating the National Income and Product Accounts.

NHE Components

The NHE can be divided into two major components: PHC and Non- PHC. PHC measures the total amount spent to treat individuals with specific medical conditions and includes 10 categories of goods and services (Table 1) such as hospital care, physician and clinical services, and retail prescription drugs. Non-PHC includes government administration, the net cost of private health insurance, government public health activity, investment in research, and investment in structures and equipment. The components of PHC can be deflated using specific price indexes from the BLS that are associated with the medical goods and services provided. However, estimation of prices for the Non-PHC components of the NHE are more complicated because there may not be available price indexes for these types of health spending as they typically don't involve market transactions made by an individual or on an individual's behalf.

Table 1: NHE, PHC and Non-PHC categories

Sub-aggregate	Price Series Availability	Matches NHE Concept
Personal Health Care		
Hospital Care	Yes	Yes
Physician & Clinical	Yes	Yes
Other Professional Services	Yes	Yes
Dental Services	Yes	Yes
Other Health, Residential, and Personal Care Services	Yes	Yes
Home Health Care	Yes	Yes
Nursing Home Care	Yes	Yes
Prescription Drugs	Yes	Yes
Other Non-Durable	Yes	Yes
Durable Medical Products	Yes	Yes
Non-Personal Health Care		
Government Administration	No	No
Net Cost of Insurance	Yes	No
Government Public Health	No	No
Research	Yes	Yes
Structures and Equipment	Yes	Yes

In instances where price indexes aren't readily available (or the indexes do not match the NHE concept) for the Non-PHC components of NHE, we have constructed composite input price indexes that match the spending categories within each Non-PHC component. These new composite indexes, described in detail later, are used to deflate each Non-PHC component.

Personal Health Care

The PHC deflator is calculated as a chain-weighted price index for the various goods and services that account for PHC spending. Table 2 lists the detailed price series that are used for each component of PHC expenditures.

Table 2: PHC Spending Components, Nominal Share of NHE, and Associated Price Proxies

Sub-aggregate	Nominal Share of 2011 NHE	Price Series
Hospital Care	31%	PPI, hospitals
Physician & Clinical	20%	Composite Index: • PPI, offices of physicians • PPI, medical and diagnostic laboratories
Other Professional Services	3%	CPI, services by other medical professionals
Dental Services	4%	CPI, dental services
Other Health, Residential, and Personal Care Services	5%	Composite Index: • CPI physician services • CPI care of invalids and elderly at home • CPI All Items • PPI residential mental retardation facilities
Home Health Care	3%	PPI, home health care services
Nursing Home Care	6%	PPI, nursing care facilities
Prescription Drugs	10%	CPI, prescription drugs
Other Non-Durable	2%	CPI, non-prescription drugs
Durable Medical Products	1%	Composite Index: • CPI, eyeglasses and eye care • CPI, medical equipment and supplies
Total	84%	

CY2011 weights are shown in Table 2, but in formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation.

Table 3 shows the average annual growth in nominal and real PHC spending and growth in the chain-weighted PHC price index.

Table 3: PHC–Average Annual Percent Change from Preceding Year shown for Nominal PHC Spending, Aggregate PHC Price Index, and Real PHC Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	1960-2011
PHC—Nominal	11.0	6.6	8.3	7.4	6.8	6.3	6.1	5.0	5.0	3.7	4.1	9.4
PHC—Chain Weighted Price Index	7.1	3.0	3.2	3.5	3.1	3.1	3.4	2.6	2.8	2.7	2.1	4.9
PHC—Real	3.7	3.5	4.9	3.7	3.6	3.2	2.6	2.4	2.2	1.0	2.0	4.2

In Table 3, 1990 data reflects average annual growth from 1980 to 1990.

Non-Personal Health Care

Unlike the PHC deflator, where one price series is normally used to represent the pure price change associated with the entire category, the non-PHC categories are typically deflated by an input price index that represents the price increases associated with the expenses underlying the production of these categories (the notable exceptions are non-commercial research and structures and equipment). Because of the unique nature of the non-PHC categories, there are typically not publicly available price series for these categories, or those that are available do not adequately capture the concepts appropriate for the given non-PHC category. Instead, alternative data sources are used to decompose these categories into the key underlying inputs used in their production, such as compensation or capital costs, and then publicly available price series are used to deflate those input costs. A brief description of each price deflator follows.

Non PHC—Government Administration

Government administrative spending is deflated using a composite input price index that chain-weights together price indexes for wages and salaries, benefits, professional fees, claims processing services, office rent and other expenses. The input weights reflect six sub-categories of government administrative spending: Medicare, Department of Defense (DOD), Veteran Affairs (VA), Medicaid, Children's Health Insurance Program (CHIP) and other third party payers (OTP).

The government administrative input price index is composed of two sub-aggregate indexes: a federal input cost index (Medicare, DOD and VA costs) and a state and local input cost index (Medicaid, CHIP and OTP costs). The cost weights for these indexes are determined using data from the Medicare Trustees Report, Medicaid administrative data, and Congressional budget justifications for CMS and SSA. The price series (Table 4) used for each of the categories represent proxies for their respective concepts, such as federal civilian pay, Employment Cost Indexes (ECIs) for state and local government workers, ECIs for other relevant occupations, PPIs and CPIs.

Cost weights for the federal index are calculated based on Medicare data; we assume that the DOD and VA costs reflect a similar distribution as that calculated for Medicare. Cost weights for state and local administration are calculated based on Medicaid data; we assume that the CHIP and OTP costs reflect a similar distribution as that calculated for Medicaid.

Table 4: Government Administration—Components, Nominal Share of 2011 NHE, and Associated Price Proxies

Sub-aggregate	Price Series
Federal Costs *(0.4% nominal share of 2011 NHE)*	
Wages	Federal Civil Service Pay Adjustments (Congressional Research Service)
Benefits	ECI for Total Benefits, All Workers, Private Industry (BLS)
Security, IT, Training, and Other Services	ECI for Total Compensation, Professional, Scientific and Technical Services (BLS)
Claims Processing and Financial Intermediaries	ECI for Total Compensation, Insurance Carriers, and Related Activities (BLS)
Rent	PPI for Leasing of Professional and Office Buildings (BLS)
Other	CPI-Urban for All Items (BLS)
State and Local Costs *(0.8% nominal share of 2011 NHE)*	
Compensation	ECI for Total Compensation, State and Local Government, Public Administration (BLS)
IT and Other Services	ECI for Total Compensation, Professional, Scientific and Technical Services (BLS)
Claims Processing and Eligibility Determination	ECI for Total Compensation, Insurance Carriers, and Related Activities (BLS)
Other	CPI-Urban for All Items (BLS)

CY2011 weights are shown in Table 4, but in formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation.

Table 5 Government Administration–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Government Administration—Nominal	10.0	9.1	12.8	7.6	7.4	1.5	2.4	2.9	1.8	0.7	4.7
Government Administration—Chain Weighted Price Index	-	-	-	3.6	3.4	3.1	3.3	3.6	1.1	1.8	2.4
Government Administration—Real	-	-	-	3.9	3.8	-1.5	-0.9	-0.6	0.7	-1.1	2.2

In Table 5, 1990 data reflects average annual growth from 1980 to 1990.

Non PHC—Net Cost of Health Insurance

The net cost of health insurance input price deflator is a chain-weighted composite index of input costs and price proxies designed to measure the price growth associated with the net cost of insurance, which is the difference between health insurance premiums earned and benefits incurred. This difference includes costs such as administrative services, taxes, and changes to reserves and underwriting gains or losses. The types of private health insurance for which net cost is estimated include: fully-insured group/commercial, individually-purchased or non-group, self-insured group, and the health portion of property and casualty. We also included the net cost from the following types of insurance: Medicare Advantage and stand-alone Medicare Part D plans; Medicaid managed care plans; CHIP managed care plans; the majority of worker's compensation insurance; and, in 2010, the pre-existing condition insurance plan.

Cost categories for net cost of health insurance are determined using data primarily from AM Best, which is based on National Association of Insurance Commissioners (NAIC) insurance statements. These cost categories are: compensation of the employees that are administering the insurance; capital costs; taxes; other costs (such as rent, advertising, certain commissions, etc.); and, in some cases, changes to reserves and underwriting gains or losses. We developed an input price index for the net cost of health insurance using these five cost categories. A blended index of price proxies—typically ECIs, PPIs, or in some cases price indexes from the Gross Domestic Product accounts—are weighted together by the respective input costs for three of these general cost components (compensation, capital, and other costs). All changes in taxes, reserves, or underwriting gains or losses are treated as price changes. We then combined these price changes to create a composite net cost of health insurance input price deflator.

Table 6: Net Cost of Health Insurance—Components and Associated Price Proxies
(5.8% nominal share of 2011 NHE)

Sub-aggregate	Price Series
Compensation	ECI for Total Compensation, Insurance and Related Activities
Other Expenses	Composite Index: • ECI for Total Compensation, Insurance and Related Activities • PPI, Commissions from Insurance • PPI, Legal Services • PPI, Advertising • CPI, Postage • GDP, Implicit Price Deflator
Capital Related Expenses	Price Index, Non-Residential Equipment & Software (BEA Table 5.5.4)
Taxes	None (no change to price in real terms)
Changes in Reserves and Underwriting Gains or Losses	None (no change to price in real terms)

CY2011 weights are shown in Table 6. In formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation.

Table 7: Net Cost of Health Insurance–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Net Cost of Health Insurance—Nominal	13.1	7.3	18.7	6.9	6.9	11.7	4.0	-2.0	-1.7	9.8	4.0
Net Cost of Health Insurance—Chain Weighted Price Index	-	-	-	2.7	7.7	4.8	3.6	-6.8	1.5	7.4	7.2
Net Cost of Health Insurance—Real	-	-	-	4.1	-0.7	6.5	0.4	5.1	-3.2	2.2	-3.0

In Table 7, 1990 data reflects average annual growth from 1980 to 1990.

Non PHC—Government Public Health Activities

Public Health spending in NHEA is deflated using a composite index that chain-weights together price indexes for state and local and federal public health, with state and local expenditures accounting for roughly 80 percent of the index. State and local public health expenditures are deflated using the price index for gross state and local government consumption expenditures for health from the National Income and Product Accounts produced by the BEA. Federal public health expenditures are deflated using an input price index that weights together the input costs of Health Resources and Services Administration, Food and Drug Administration, and Centers for Disease Control and Prevention; and appropriate price proxies from the BLS. Together these three organizations account for over 75% of federal public health spending.

Table 8: Government Public Health Activities—Components and Associated Price Proxies
(2.9% nominal share of 2011 NHE)

Sub-aggregate	Price Series
Federal	
Wages	Federal Civil Service Pay Adjustments (Congressional Research Service)
Benefits	ECI for Total Benefits, All Workers, Private Industry (BLS)
Security, IT, Training, and Other Services	ECI for Total Compensation, Professional, Scientific and Technical Services (BLS)
Rent	PPI for Leasing of Professional and Office Buildings (BLS)
Other	CPI-Urban for All Items (BLS)
State and Local	
[none]	BEA Price Index for Gross State and Local Government Consumption Expenditures

CY2011 weights are shown in Table 8, but in formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation

Table 9: Government Public Health Activities–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Government Public Health Activities—Nominal	12.0	8.0	7.5	0.5	4.1	11.2	10.3	5.8	4.1	4.9	-0.5
Government Public Health Activities—Chain Weighted Price Index	-	-	-	4.0	4.8	4.2	4.1	5.1	0.4	2.5	3.4
Government Public Health Activities—Real	-	-	-	-3.4	-0.7	6.8	5.9	0.6	3.7	2.4	-3.7

In Table 9, 1990 data reflects average annual growth from 1980 to 1990.

Non PHC—Non Commercial Research

We deflate non-commercial research using the Biomedical Research and Development Price Index (BRDPI), which is developed and updated annually by the BEA under an interagency agreement with the National Institutes of Health (NIH). The BRDPI is designed to measure changes in the weighted-average of the price of all the inputs (wages, equipment, nondurables, etc.) purchased with the NIH budget in support of extramural research. Over two-thirds of non-commercial research in the NHEA is conducted by NIH, making this index a reasonable choice for the deflation of non-commercial research. There are no sub-aggregate cost categories for non-commercial research.

In order to deflate non-commercial research spending, the nominal level of spending is adjusted by the BRDPI index to produce real non-commercial research spending.

Table 10: Non Commercial Research—Components, Nominal Share of 2011 NHE, and Associated Price Proxies

Item	Nominal Share of 2011 NHE	Price Series
Non-Commercial Research	1.8%	Price Index, NIH Biomedical Research and Development

CY2011 weights are shown in Table 10, but in formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation

Table 11: Non Commercial Research–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Non-Commercial Research—Nominal	8.9	7.2	11.0	10.5	4.7	2.6	1.3	3.5	4.3	8.2	1.7
Non-Commercial Research—Chain Weighted Price Index	-	-	-	3.7	3.9	4.4	4.0	4.5	3.4	2.9	2.8
Non-Commercial Research—Real	-	-	-	6.5	0.8	-1.7	-2.6	-1.0	1.0	5.2	-1.1

In Table 11, 1990 data reflects average annual growth from 1980 to 1990.

Non PHC—Structures & Equipment

Investment in structures and equipment is deflated using a composite index that chain-weights together price indexes associated with private fixed investment in structures and equipment by asset category. The nominal investment levels by asset category serve as the component weights. These detailed investment levels are obtained by decomposing overall private and public nominal investment in structures and equipment in the NHEA using primarily the BEA's Capital Flow Table (CFT) and Fixed Asset Accounts (FAA).

Five categories of investment in Structures and twenty-two categories of investment in Equipment are derived. The largest categories can be seen below in Table 13. Price indexes are then selected for each of these Structures and Equipment categories. The price indexes for private investment are from BEA Table 5.4.4. "Price Indexes for Private Fixed Investment in Structures by Type" and from BEA Table 5.5.4. "Price Indexes for Private Fixed Investment in Equipment and Software by Type."

Table 12: Structures and Equipment—Components, Nominal Share of 2011 NHE, and Associated Price Proxies
(3.8% nominal share of 2011 NHE)

Sub-aggregate	Price Series
Structures *(1.7% share)*	
Hospital and institutional buildings	BEA Price Index, Table 5.4.4 Line 5
Other	BEA Price Index, Table 5.4.4 Lines 4, 14, 17, and 23
Equipment *(2.2% share)*	
Computers and Peripheral Equipment	BEA Price Index, Table 5.5.4 Line 5
Total Software	BEA Price Index, Table 5.5.4 Line 6
Medical Equipment and Instruments	BEA Price Index, Table 5.5.4 Line 8
Light trucks (including utility vehicles)	BEA Price Index, Table 5.5.4 Line 21
Other	BEA Price Index, Table 5.4.4 Lines 7, 9, 10, 11, 13-18, 22-24, 28, 30, 32-34

CY2011 weights are shown in Table 12, but in formulating the NHE Deflator, weights are varied by year as part of the chain weight calculation.

Table 13: Structures and Equipment–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Structures and Equipment—Nominal	9.4	5.6	6.6	5.1	9.2	3.9	13.6	8.6	-8.7	-0.7	3.6
Structures and Equipment—Chain Weighted Price Index	-	-	-	2.0	3.0	3.4	2.0	1.1	-1.6	-3.0	0.7
Structures and Equipment—Real	-	-	-	3.0	6.0	0.5	11.3	7.4	-7.2	2.4	2.9

In Table 13, 1990 data reflects average annual growth from 1980 to 1990.

NHE Deflator

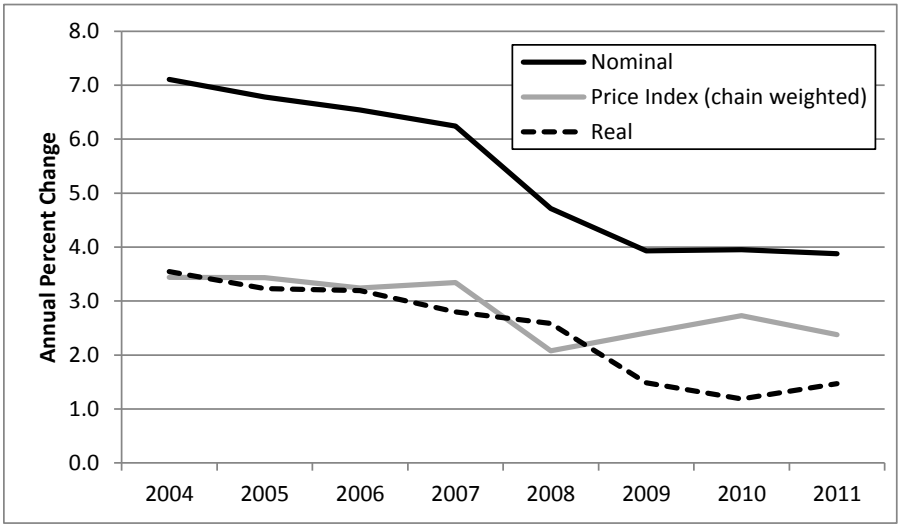
As previously described, the PHC and Non-PHC components are chain-weighted together in order to calculate the NHE Deflator. Table 14 shows the final chain-weighted NHE Deflator, as well as nominal NHE and the resulting real NHE. Figure 1 shows the same data graphically from 2004 to 2011.

Table 14: NHE Deflator–Average Annual Percent Change in Nominal Spending from Preceding Year shown, Aggregate Price Index, and Real Spending

Item	1990	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
NHE—Nominal	11.0	6.6	8.8	7.1	6.8	6.5	6.2	4.7	3.9	3.9	3.9
NHE Deflator—Chain Weighted Price Index	-	-	-	3.4	3.4	3.2	3.3	2.1	2.4	2.7	2.4
NHE—Real	-	-	-	3.5	3.2	3.2	2.8	2.6	1.5	1.2	1.5

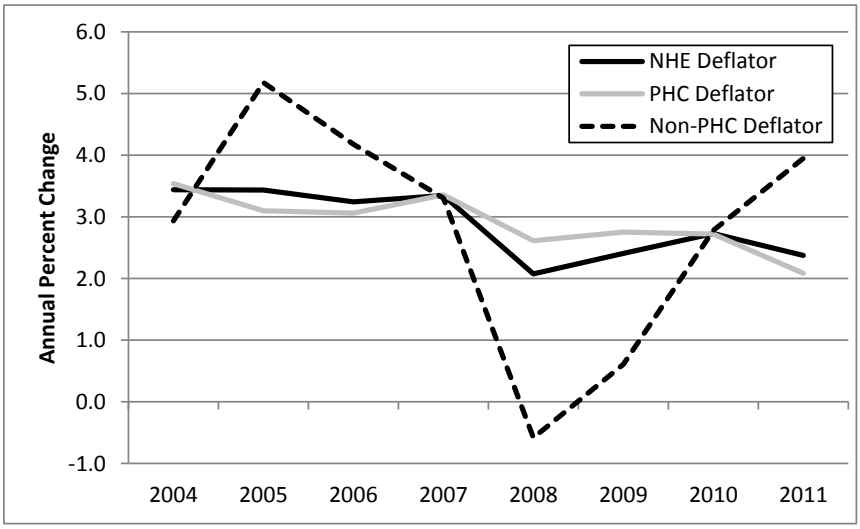
In Table 14, 1990 data reflects average annual growth from 1980 to 1990.

Figure 1: Annual Percent Change in Nominal NHE, NHE Price Index, and Real NHE, 2004 to 2011



As Figure 1 indicates, health care price growth as measured by the NHE Price index accounts for slightly more than half of the growth in nominal health spending from 2004 to 2008. From 2008 to 2011, health care price growth accounts for approximately two-thirds of growth in nominal health care spending. The contribution of prices to NHE growth fluctuates by year, from a low of about 45% in 2008 to a high of almost 70% in 2010. The variations in these trends are heavily influenced by the Non-PHC prices that underlie the NHE deflator, as shown in Figure 2.

Figure 2: Annual Percent Change in the NHE Price Index, the PHC Price Index, and the Non-PHC Price Index, 2004 to 2011



Growth in the non-PHC deflator outpaced growth in the PHC deflator during the 2005-2006 period, in large part due to the rapid price growth for the net cost of insurance, government public health, and research. However, this trend reversed in 2008 and 2009. Prices for non-PHC decreased in 2008, mainly the result of declines in the net cost of insurance as the overall economic recession impacted underwriting gains, losses, and reserves. In 2009, the cost of government administration; government public health, structures and equipment; and the net cost of insurance grew slowly or decreased. In 2011, price growth for non-PHC was higher than PHC, mainly due to increased price growth of net cost of insurance due to the economic recovery.

FAQ - Market Basket Definitions and General Information

Prepared by Centers for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics Group

Last updated: May 2022

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What is a CMS market basket?

Although "market basket" technically describes the mix of goods and services used in providing health care, this term is also commonly used to denote the input price index (that is, cost category weights and price proxies combined) derived from that market basket. Accordingly, the term "market basket" as used in this document refers to the various CMS input price indexes. A CMS market basket is described as a fixed-weight, Laspeyres-type index because it measures the change in price, over time, of the same mix of goods and services purchased in the base period.

How is a CMS market basket constructed?

A market basket is constructed in three steps. First, a base period is selected and total base period expenditures are estimated for a set of mutually exclusive and exhaustive spending categories, and the proportion that each category represents are calculated. These proportions are called "cost weights" or "expenditure weights". Second, each expenditure category is matched to an appropriate price or wage variable, referred to as a "price proxy". In almost every instance, these price proxies are derived from publicly available statistical series that are published on a consistent schedule (preferably at least on a quarterly basis). Finally, the expenditure weight for each cost category is multiplied by the level of its respective price proxy. The sum of these products (that is, the expenditure weights multiplied by their price index levels) for all cost categories yields the composite index level of the market basket in a given period. Repeating this step for other periods produces a series of market basket index levels over time. Dividing an index level for a given period by an index level for an earlier period produces a rate of growth in the input price index over that timeframe.

What are the CMS market baskets used for?

The CMS market baskets are used to update payments and cost limits in the various fee-for-service CMS payment systems. The CMS market baskets reflect input price inflation facing providers in the provision of medical services.

Who is responsible for producing the market baskets?

The Office of the Actuary (OACT), within the Centers for Medicare and Medicaid Services (CMS), is responsible for producing the CMS market baskets. CMS determines the cost weights and price proxies. IHS Global Inc., a nationally recognized economic forecasting firm with which CMS contracts, provides forecasts of the price proxies used in the market baskets as well as a forecast of total factor productivity. The market basket levels and percent changes are released quarterly, with each new forecast containing an additional quarter of historical data.

How are quantity and intensity effects held constant in the market baskets?

Due to the CMS market baskets being fixed-weight, Laspeyres-type indexes, they measure "pure" price changes only. Any changes in the quantity or mix of goods and services (that is, intensity) purchased over time are not measured. There are two major components of the market basket: cost weights and price proxies. Cost weights measure the mix (intensity), quantity, and prices of inputs used by a provider while the price proxies measure only the price change of the category being measured. Only the price proxies are updated quarterly; the cost weights are held constant, thereby holding quantity and intensity effects constant. For example, a hospital hiring more nurses to accommodate the needs of

patients would increase the quantity of labor purchased by the hospital, but would not be factored into the price change measured by a fixed-weight hospital market basket.

What happens when a market basket is rebased or revised?

Changes in quantity or mix of goods and services do eventually get incorporated into the market basket cost weights when it is rebased. Therefore, we rebase the market baskets periodically so that the cost weights reflect more recent purchases of goods and services used by providers to furnish medical care.

The terms "rebasing" and "revising," while often used interchangeably, actually denote different activities. "Rebasing" means moving the base year for the structure of costs of an input price index. "Revising" means changing data sources or price proxies used in the input price index.

How often are the market baskets rebased?

Rebasing a market basket is mainly dependent upon data availability. Typically, a market basket is rebased every four to five years to coincide with the update of many secondary data sources, such as the benchmark input-output table data from the Bureau of Economic Analysis. We continually monitor the cost weights in the market baskets to ensure they are reflecting the mix of inputs used in providing services. We will update the weights more frequently than every four to five years if we believe it is warranted.

Is there a Medicare market basket?

No, CMS does not produce a "Medicare" market basket. Individual market baskets are produced for many of the fee-for-service payment systems as described below. This is to ensure that we are accurately measuring the cost structures and price changes facing each of these providers.

Where can I find detailed information on how each of the current CMS market baskets were constructed?

The current market baskets for each of the Prospective Payment Systems (PPSs) were proposed and finalized in rulemaking. Links to the PPS final rules published in the Federal Register that describe the development of the current market baskets can be found at the following link: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareProgramRatesStats/MarketBasketResearch

Are there separate market baskets for updating payments under the Outpatient PPS, Hospice PPS, or Ambulatory Surgical Center PPS?

No. The inpatient hospital market basket is currently used to update the payment rates for Outpatient PPS and Hospice PPS. Effective for CY 2019 to CY 2023, the inpatient hospital market basket is also used to update Ambulatory Surgical Center PPS payments.

How often are the market basket forecasts updated?

The forecasts of the CMS market baskets are updated on a quarterly basis. Each quarterly forecast is updated to reflect a revised economic outlook and to incorporate more recent historical data. The top-line levels and 4-quarter percent change moving averages of the market baskets are available on the CMS website at the following link: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareProgramRatesStats/MarketBasketData. The quarterly forecasts are released on a lagged basis, meaning a given forecast is generally available three to four months after the preparation of the forecast. Below is a tentative schedule for when each forecast is publicly available on the CMS website.

Forecast	CMS Target Web Publication Date
Q4	April 15
Q1	July 15
Q2	September 15
Q3	December 15

Are the detailed data underlying the top-line market basket forecasts available?

OACT distributes the detailed forecasts for individual market baskets via email following the same target dates provided in the previous table. To request to be added to the distribution list, please send an email to CMSDNHS@cms.hhs.gov.

Do the quarterly levels and four-quarter percent change moving averages represent Calendar Year (CY) or Fiscal Year (FY) quarters?

The index levels and four-quarter percent change moving averages are reported on a CY basis. For example, the Q4 index level corresponds with October 1 through December 31 and the Q4 four-quarter moving average percent change reflects the CY growth rate. Therefore, for a FY update, the appropriate four-quarter percent change moving average would be the value provided for Q3 of that CY. The four-quarter percent change moving averages are calculated using more than ten decimal places.

How is a four-quarter percent change moving average calculated?

The easiest way to illustrate how a four-quarter percent change moving average is calculated is to use an example. For this example, we are calculating the four-quarter percent change moving average for the period ending 2021Q3, which represents the FY 2021 increase.

Step One - Calculate the four-quarter average of the levels

Average for 4-qrtrs ending in 2020Q3: (1.036 + 1.043 + 1.046 + 1.052) / 4 = 1.044

Average for 4-qrtrs ending in 2021Q3: (1.057 + 1.070 + 1.081 + 1.095) / 4 = 1.076

Step Two - Calculate the percent change between 2021Q3 and 2020Q3 four-quarter average index levels. The percent change between 2021Q3 and 2020Q3: ((1.076 / 1.044)) -1) * 100) = 3.0 percent. This would be the four-quarter percent change moving average for the sample market basket for FY 2021. A similar calculation can be made for every quarter.

	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3
MB Level	1.036	1.043	1.046	1.052	1.057	1.070	1.081	1.095
Step 1: Average Level	Average 2019q4-2020q3			1.044	Average 2020q4-2021q3			1.076
	Step 2: Four-quarter percent change moving average ((1.076/1.044)-1)*100							3.0

What is market basket forecast error?

The payment updates for many of the prospective payment systems are determined using a forecast of the market basket update, which reflects the latest available historical data at the time the final regulation is published. The actual market basket increase for a given period can be higher or lower than the forecasted increase available at the time a payment update is determined. The forecast error for a market basket update is calculated as the actual market basket increase for a given year, less the forecasted market basket increase. For example, in June 2021 we were required to forecast the market basket increase for FY 2022. The actual change in the market basket for FY 2022 may be higher or lower than what we forecasted in June 2021 depending on market conditions. We acknowledge that setting the payment updates during times of economic uncertainty can often result in larger forecast errors in either direction; however, our expectation is that these forecast errors will generally average close to zero over a longer period of time.

Do any of the market baskets have a forecast error adjustment?

The Skilled Nursing Facility (SNF) market basket and Capital Input Price Index (CIPI) are the only market baskets with a forecast error adjustment. This forecast error adjustment is applied to the current payment update if the forecast error for the most historical year available exceeds a specific threshold in absolute terms (0.5 percentage point for SNF and 0.25 percentage point for CIPI).

How are malpractice premiums measured for physicians?

Each year, CMS solicits professional liability premium data for physicians from a sample of commercial carriers in order to construct a physician Professional Liability Insurance (PLI) index. This information is not collected through a survey form, but instead is requested from a few national commercial carriers via letter. The premiums for about 20 insurers are included in the sample and data are collected directly from carriers on a voluntary basis and supplemented with premium data from AM Best State Rate Filings. Our current methodology for calculating malpractice price changes reflects premium data for a fixed level of coverage ($1 million per occurrence/$3 million per annual) by physician specialty (risk class) in each state. Data is aggregated to a national level based on counts of physicians by specialty in each state (AMA data) and the market share of each insurer by state. The change in the national malpractice index levels from year to year represents the percent change in the category for a given year.

What is the productivity adjustment and how is it derived?

The productivity adjustment is applied as a reduction to the market basket updates for a given year for select PPSs. Section 1886(b)(3)(B)(xi)(II) of the Social Security Act, as added by section 3401(a) of the Affordable Care Act, defines the productivity adjustment as equal to the 10-year moving average of changes in annual economy-wide, private nonfarm business multifactor productivity (MFP) (as projected by the Secretary for the 10-year period ending with the applicable fiscal year, calendar year, cost reporting period, or other annual period). The U.S. Department of Labor's Bureau of Labor Statistics (BLS) publishes the official measures of productivity for the U.S. economy. We note that previously the productivity measure referenced in section 1886(b)(3)(B)(xi)(II) was published by BLS as private nonfarm business multifactor productivity. Beginning with the November 18, 2021 release of productivity data, BLS replaced the term MFP with total factor productivity (TFP). BLS noted that this is a change in terminology only and will not affect the data or methodology. As a result of the BLS name change, the productivity measure referenced in section 1886(b)(3)(B)(xi)(II) is now published by BLS as private nonfarm business total factor productivity; however, as mentioned previously, the data and methods are unchanged. Please see www.bls.gov for the BLS historical published TFP data. A complete description of IHS Global Inc.'s TFP projection methodology is available on the CMS website at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareProgramRatesStats/MarketBasketResearch.