BEA Briefing

Disease-Based Health Care Measures and the Industry Economic Accounts

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EARLIER THIS YEAR, the Bureau of Economic Analysis (BEA) introduced a health care satellite account (HCSA)—a culmination of substantial, collaborative research efforts across a number of organizations, including the National Academy of Sciences, BEA and the Bureau of Labor Statistics. This HCSA introduced newly developed disease-based price indexes with an eye toward improving the understanding of health care spending trends.[1] Constructing and presenting health care statistics by type of disease rather than by type of medical service fosters a greater understanding of the health care sector and the services it provides.

The framework used to present the featured measures of the HCSA focused on the final-demand based approach for measuring gross domestic product (GDP) in BEAs national income and product accounts (NIPAs); that is, for the HCSA, disease-based personal consumption expenditure (PCE) products (such as treatment of cancer or heart disease) replaced published PCE products that presented spending by type of medical care (such as visits to a doctor's office or a hospital). The newly developed disease-based price indexes were applied to the new disease-based PCE estimates to derive alternative measures for the quantity of health care consumed. Initial results from the HCSA for 2000–2010 showed that using disease-based price indexes in the NIPAs led to higher prices for PCE health care services and consequently slower growth in the quantity of health care services consumed by households.[2]

An accompanying set of statistics on gross output and value added by industry were also prepared and presented with the HCSA. In order to maintain consistency between the final demand statistics and the output and value added statistics, adjustments to output and value added statistics had to be made to the industry economic accounts (IEAs). Specifically, the slower growth in the quantity of health care services consumed by households had to be reflected in the output of selected health care services industries.

The remainder of this article focuses on the HCSA as it pertains to the industry economic accounts (IEAs). The first section presents a general discussion of the input-output (I-O) accounts and satellite accounts. The second section updates industry-side HCSA statistics, including estimates for 2011 and 2012; this section also includes a discussion of the methodology used to prepare both the updated and initial industry-side HCSA statistics. The article concludes with a discussion of future plans for producing HCSA statistics using an I-O framework.

I-O Basics and Satellite Accounts

BEA's fully integrated industry economic accounts provide an ideal framework for preparing satellite accounts because they encompass both the I-O accounts (including final demand) as well as GDP by industry accounts.[3] This section describes the basic principles of I-O and satellite accounting.

I-O basics

BEA's IEAs include the annual and benchmark I-O accounts, the GDP by industry accounts, the KLEMS statistics, and satellite accounts. These accounts facilitate the study of the internal workings of the U.S. economy. They provide a framework to measure and to analyze the production of goods and services by industry, including the flows of goods and services purchased by

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1. Abe Dunn, Lindsey Rittmueller, and Bryn Whitmire, "Introducing the New BEA Health Care Satellite Account," SURVEY OF CURRENT BUSINESS 95 (January 2015).

2. These initial results were updated in August 2015 to include statistics for 2011 and 2012, which can be found on BEA's Web site.

3. BEA currently produces several I-O based satellite accounts; for example, see Benjamin J. Hobbs, "U.S. Travel and Tourism Satellite Accounts" SURVEY 95 (June 2015) and Paul V. Kern, David B. Wasshausen, and Steven L. Zemanek, "U.S. Arts and Cultural Production Satellite Account," SURVEY 95 (January 2015).

each industry, the incomes earned in each industry, and the distribution of sales for each commodity to industries and final users. The IEAs also detail each industry's contribution to GDP and provide a valuable complementary tool to the NIPAs.

The two main components of the I-O accounts are the standard make and use tables. These two tables provide the foundation for the benchmark I-O accounts that are used to set the levels of GDP, including industry value added and detailed final uses. They offer a wealth of information about the size of the U.S economy, the relative size of specific industries, the products and how much is produced by specific industries, the technology used by specific industries, the incomes generated by production, and the size and scope of an industry's market. Moreover, the make and use tables provide an ideal framework for presenting the detailed transactions pertaining to health care, including production, distribution, and uses of health-related products.

Satellite accounts

Satellite accounts are supplemental accounts that expand the analytical capacity of the national economic accounts and the IEAs by focusing on a particular aspect of economic activity. These accounts are designed to provide more detailed information within a framework that is conceptually and statistically consistent with BEA's principal economic accounts—without interfering with the core accounts.

Satellite accounts may also provide a laboratory for experimenting and developing concepts and methodologies that are not ready for implementation into the core accounts. By first presenting estimates in a satellite account, BEA is able to publish statistics as "experimental" and then solicit important conceptual and practical feedback about complex measurement issues. For example, before officially recognizing research and development (R&D) expenditures as investment in the calculation of GDP, BEA first developed an R&D satellite account that presented newly developed measures of R&D capital. Because of this exploratory nature, BEA's satellite accounts provide an excellent venue for experimenting with various alternatives for measuring health care, and the detailed I-O accounts provide an ideal framework.

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Updated Industry Statistics
From the HCSA

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With the first release of the health care satellite account in January 2015, experimental measures were developed to illustrate the impact of incorporating the new disease-based price indexes into the existing structure

of the industry economic accounts for 2000–2010. Over this period, incorporating the disease-based price indexes led to higher gross output prices, which implied slower quantity growth. Revised and newly available disease-based price indexes are now available through 2012 (table 1). Overall, the results from incorporating these revised and newly available prices are largely consistent with the initial results: real gross output and real value added for the health care sector showed slower growth when using disease-based price indexes. A discussion on the methods used to prepare these estimates follows.

Methodology

Experimental measures attempting to simulate the incorporation of disease-based price indexes into the existing structure of the IEAs were prepared by proportionately adjusting existing price indexes for commodities produced by select health care industries. The adjustment takes place in two steps. First, annual adjustment factors are constructed as the ratio of an aggregate disease-based price relative and an aggregate type of service-based price relative (reflected in the published IEA statistics) for the selected health care commodities. Next, these factors are multiplied by the existing, type of service-based price-relatives of the selected HCSA commodities. For example, the annual price relatives for the commodity "offices of physicians" are multiplied by the annual MEPS adjustment factors to yield the MEPS adjusted price relatives for "offices of physicians." The resultant adjusted price index is then used to deflate gross output for "offices of physicians." Price and quantity indexes for this simulation are calculated using the double-deflation method,

Table 1. Annual Quantity and Price Growth Rates, 2000–2012

[Percent]

Industry description (Industry code)	Gross output			Value added		
	Pub-lished	Alternates		Pub-lished	Alternates	
		MEPS	Blend-ed		MEPS	Blend-ed
Annual quantity growth rate						
Health care and social assistance (62)	3.3	2.4	2.0	2.6	1.2	0.6
Ambulatory health care services (621)	3.4	2.4	1.9	3.3	1.7	1.0
Hospitals (622)	3.6	2.4	1.9	2.4	0.4	−0.5
Pharmaceutical aggregate[1]	1.3	1.0	0.8	0.7	0.2	0.0
Annual price growth rate						
Health care and social assistance (62)	2.6	3.5	3.9	2.9	4.4	5.0
Ambulatory health care services (621)	2.2	3.2	3.7	2.3	3.9	4.6
Hospitals (622)	3.0	4.2	4.7	3.6	5.7	6.6
Pharmaceutical aggregate[1]	3.2	3.5	3.6	3.3	3.8	4.0

MEPS Medical expenditure panel survey
1. The pharmaceutical aggregate includes prescription drug manufacturing and the major wholesale, retail and transportation margins associated with the delivery of prescription drugs.

which computes real value added as the difference between real gross output and real intermediate inputs. To the extent that the HCSA commodities are consumed as intermediate inputs by the selected health care industries, these intermediate input prices are also adjusted in order to ensure accurate measures of real value added. Two sets of calculations were done: one using prices estimated from the Medical Expenditure Survey Panel (MEPS) data and one from a "blended" account, which reflects a combination of MEPS data and large claims databases.[4]

With this update of the HCSA, the methodology has been improved to incorporate an expanded set of commodities, including a pharmaceutical aggregate that reflects prescription drug manufacturing and associated trade and transportation margins.[5] Price relatives for these commodities were adjusted in the same manner and used the same adjustment factors as described above.

Forthcoming I-O Based HCSAs

BEA is in the initial stages of developing a series of I-O based health care satellite accounts. These accounts will be presented using two approaches. The first approach will use of the existing I-O framework without notable structural changes. The second approach will reflect an alternative framework for measuring the health care sector known as the "coordinator of care" approach.

Existing I-O framework

As previously noted, the I-O accounts and the GDP by industry accounts provide an ideal framework for analyzing various approaches for measuring health care services. Using the existing I-O framework, BEA plans to develop two new satellite accounts:

- An I-O based HCSA using existing commodities and prices
- An I-O based HCSA using disease-based commodities, prices, and quantities within the existing framework

I-O based HCSA using existing commodities and prices

As noted, one of the purposes of a satellite account is to provide additional details for a particular aspect of economic activity. Developing a detailed, I-O based HCSA will provide a set of health care statistics that will facilitate comprehensive analysis of the sector as well as provide a basis for future comparisons of alternative measures. Broadly speaking, the construction of this I-O based satellite account would consist of six distinct steps: (1) identifying health care commodities, (2) identifying industries, (3) identifying health care portions of commodities (4) estimating current-dollar and real output, (5) estimating current-dollar and real value added, and (6) estimating employment and compensation.

Identifying commodities. The 2007 benchmark make and use tables—which present detailed information for about 6,000 detailed commodities, ranging from agricultural products to professional services—will be used to identify commodities related to health care.

Identifying industries. After identifying the health care commodities, health care industries will be identified as the industries that produce the selected health care commodities, including commodities like prescription drugs that are produced outside the existing health care services aggregate.

Identifying the health care portions. Some of the identified commodities that will be included in the I-O based HCSA may not be 100 percent health care commodities, for example, retail margins received by pharmacies and drug stores. In this step, these partial commodities will be identified, and estimates will be prepared to accurately measure the relevant portion of the commodities that should be included in the HCSA.

Estimating output. Commodity output will be estimated by applying the portions developed in the prior step to the output of the commodities related to health care services. The industry output will be derived by aggregating commodity output across industries defined in the prior step.

Estimating value added. Value added is the difference between an industry's output and the cost of its intermediate inputs. Value added for specific HCSA industries will be imputed based on the ratio of the HCSA industry to the corresponding IEA industry. For example, if the output of the HCSA industry "offices of other health practitioners" represents 95 percent of the published output of the corresponding IEA industry, "offices of other health practitioners," then the HCSA value added for "offices of other health practitioners" would equal 95 percent of the published value added for "offices of other health practitioners."

Estimating employment and compensation. These items will be estimated using a methodology similar to that used for measuring value added for health care,

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4. For more details on these two versions of the disease-based prices, see Dunn, Rittmueller, and Whitmire.

5. The pharmaceutical aggregate includes the following commodities: Pharmaceutical preparation manufacturing (325412), drug and druggists' sundries (424200), grocery stores (445100), pharmacies and drug stores (446110), discount department stores (452112), warehouse clubs and supercenters (452910), mail-order houses (454113), and truck transportation (484XXX).

The HCSA share of employment and compensation will be estimated based on the corresponding share of HCSA output.

Disease-based HCSA measures within the existing framework

The second I-O based HCSA will build on the first I-O based HCSA, but it will incorporate disease-based prices and quantities that are mapped to existing health care products based on the North American Industry Classification System (NAICS). Conceptually, this version of the HCSA is similar to the experimental disease-based industry statistics introduced in January 2015 and subsequently updated with this article. The effect of fully incorporating disease-based measures on growth rates of real output and real value will likely be similar to the effect of the experimental measures. However, a much more comprehensive and meaningful analysis will be possible with this forthcoming version of the I-O based HCSA. Current–dollar outputs, intermediate inputs, and value added for the industry groups within the health care sector will remain unchanged.

Coordinator of care framework

The coordinator of care approach is an alternative framework for measuring health care. It treats "offices of physicians" as the sole coordinator of patients' care services. All other health care products are treated as intermediate inputs to "offices of physicians." This approach marks a notable deviation from the current I-O structure: the output and the intermediate inputs of "offices of physicians" will be substantially larger than the currently published output and intermediate inputs. For example, if a physician diagnoses a patient with a disease of the digestive system, then the diagnosis and treatment of that disease is considered output for "offices of physicians."

Using this approach, lab tests, hospitalization, medications and procedures ordered by the physician are intermediate inputs to the physician's services in the treatment of the digestive disorder. The numerical implications of this approach were illustrated in 2013 by Aizcorbe, Medeiros, and Strassner. In their paper, they point out that the advantage of adopting this new view of the health care sector is that it provides a more natural way to accommodate disease-based health care services through standard double-deflation methods.

They also address important implications associated with measuring productivity using this new approach.[6]

Conclusion

The health care sector and supporting products represent a significant and growing share of U.S. GDP, accounting for over a trillion dollars in 2014. Expanding the existing HCSA to include these three new I-O based products will introduce new statistics in a fully integrated framework and thus allow for more comparisons and analysis. For example, users will be able to identify detailed measures of health care outputs along with the detailed intermediate inputs consumed by HCSA industries, allowing for the construction of newly available measures, including value added and direct requirements. Using the double-deflation technique to measure real value added, these new I-O based measures will also allow for a more comprehensive assessment on the impact of introducing disease-based prices.[7] An I-O based HCSA is also critical for implementing and evaluating alternative methods, such as the coordinator of care approach, for measuring health care's contribution to GDP. In addition, the sources of growth in output for HCSA industries can be decomposed into capital, labor, intermediate inputs, and multifactor productivity.[8] Decomposing the sources of growth in output for HCSA industries is important not only for analyzing historical growth but also for identifying prospects for future growth for this increasingly important sector.

In addition to the development of these new I-O based HCSAs, BEA is actively researching ways to improve the existing disease-based price indexes, including the introduction of quality-adjusted prices. This research and other ongoing BEA health care-related research, will be reflected in future HCSAs.

6. For additional details, see Ana Aizcorbe, Gabriel Medeiros, and Erich Strassner, "Productivity for the U.S. Health Sector" (paper presented at the 47th Annual Conference of the Canadian Economic Association, Montreal, May 30–June 2, 2013).

7. For more information on the benefits of fully integrated IEAs as well as on the double-deflation method, see Donald D. Kim, Erich H. Strassner, and David B. Wasshausen, "Industry Economic Accounts: Results of the Comprehensive Revision," SURVEY 94 (February 2014).

8. For more information see Steven Rosenthal, Matthew Russell, Jon D. Samuels, Erich H. Strassner, and Lisa Usher, "Integrated Industry-Level Production Account for the United States: Sources of the Ongoing U.S. Recovery," SURVEY 94 (August 2014).