Research Spotlight

A New Approach to Price Measures for Health Care

AS HEALTH CARE spending continues to grow, the Bureau of Economic Analysis (BEA) plans to develop a health care satellite account, which is a detailed set of statistics that would allow economists to better assess health care spending and the effects on the U.S. economy. In particular, the planned health care account would provide statistics that allow health economists to better analyze the returns to treatments of disease and the sources of changes in health care costs.[1]

Critical to the development of these supplemental measures is the development of appropriate price indexes.[2] Such indexes are important because they allow economists to assess the extent to which increases in spending reflect increases in actual services versus increases in prices; that is, they allow for estimates of "real" spending. With improved price measures as a key goal, BEA's planned health care account will feature a new approach to analyzing expenditures: it will detail spending according to bundles of treatments for specific diseases, called the disease-based approach in this article. This contrasts with the conventional approach—called a treatment-based approach in this article—which details spending according to specific treatments and procedures, such as a doctor's office visit or a particular drug.

The disease-based approach has been recommended by leading economists and has been explored for specific diseases, such as heart disease, cataracts, and mental conditions.[3] A key benefit of this new approach is that it captures the critical substitution effects that the conventional approach misses; that is, it can account for shifts to lower cost, new, or alternative treatments.

This *Research Spotlight* provides a short recap of recent research by Ana Aizcorbe of the Bureau of Economic Analysis and Nicole Nestoriak of the Bureau of Labor Statistics (Aizcorbe and Nestoriak 2008). The paper is available at www.bea.gov under "Papers and Working Papers." Building on existing research, the authors developed a price index that redefines the medical care "good" as the bundle of treatments for a given disease and calculates price measures for spending on such bundles. Based on a sample of private medical insurance claims, the research found that substitution indeed has had a profound impact on health care prices, defined in the new way, generating substantial cost savings. From 2003 to 2005, prices calculated using the disease-based approach increased at an average annual rate of 4.4 percent, while prices of individual treatments rose at an average annual rate of 6.1 percent.

Because medical care accounts for 16 percent of gross domestic product (GDP), this slower rate of price increase translates into a slower rate of increase for BEA's gross domestic purchases prices and GDP prices and a higher rate of real GDP growth.

Background

Health economists have long advocated pricing the treatment of a condition rather than the individual medical services provided (Scitovsky 1964). Several recent studies have defined the health care "good" as the entire bundle of treatments for a given medical condition, such as a heart attack or a bad knee. Capturing the price of treating a condition according to this new approach would require tracking the price of the bundle rather than the separate treatments.

Such an approach would better reflect the dynamic nature of the health care industry. It would capture any market shifts across treatments, and it would capture the emergence of new treatments, which can change the prices of the bundle without changing the price of individual treatments.

There are several examples of substitution in health care services. Consider the treatment of depression. In recent years, there has been a shift away from talk

1. See Aizcorbe, Retus, and Smith (2008) for a description of BEA's proposed health care spending satellite account.

2. BEA's effort to improve existing price measures for health care services is partly funded by a grant from the National Institutes of Health and complements research currently underway at the Bureau of Labor Statistics (BLS). See National Research Council (2009) for a description of recent work at BLS.

3. See Cutler, McClellan, Newhouse, and Remler (2001) for an analysis of heart attacks, Shapiro, Shapiro, and Wilcox (2001) for an analysis of cataracts, and Berndt, Busch, and Frank (2001) for an analysis of depression.

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therapy to lower cost drug therapy. Conventional price indexes that track these two treatments separately cannot account for the substitution that has occurred. As another example, knee surgery used to involve a costly overnight stay in a hospital but now is often performed on an outpatient basis, resulting in a lower cost for the treatment of the bad knee. By tracking the cost of hospital stays separately from the cost of outpatient services, standard medical care price indexes cannot capture the cost savings that arise from the change in treatments.

So how should one define the price? Taking the patient's perspective, one would define the price as whatever the patient pays for the service. This is the perspective taken by the consumer price index, which aims to track payments for health insurance and out-of-pocket payments for treatments. Instead, Aizcorbe and Nestoriak take a provider perspective and define the "price" as the amount of revenues received by providers from all payers—the perspective most suited for the national accounts. To measure the total costs of all treatments for a given disease, Aizcorbe and Nestoriak's approach would, in theory, account for the total dollars received by the health care system—that is, all providers taken together—for the treatment of some condition over a given quarter divided by the number of patients treated.

Algebraically,

$$c_d = \Sigma_i (c_{d,i}\, x_{d,i}) / P_d$$

where, for a given quarter,
$c_{d,i}$ measures the cost of treatment i for condition d,
$x_{d,i}$ is the number of such treatments, and
P_d is the number of patients under treatment for condition d.

A caveat: for the purposes of empirical work, Aizcorbe and Nestoriak's research was based only on patients with private health insurance, typically provided by employers. While the data were suitable for the study, the empirical results cannot be generalized to the entire health care economy.

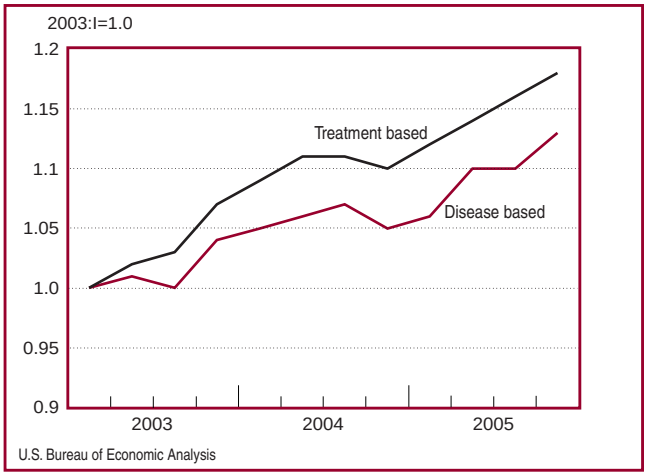
Another caveat: most economists agree that price indexes should account for major quality changes. For health care indexes, quality refers to changes in health outcomes, that is, in the effectiveness of specific treatments. (Berndt, Busch, and Frank, 2001). While many previous detailed case studies adjusted for quality, the primary goal of the indexes in Aizcorbe and Nestoriak's research is to account for treatment substitution across a broad range of conditions. This diversity of disease types raises difficulties in accounting for changes in outcomes. Thus, their indexes are best viewed as "quality-unadjusted" price indexes. To the extent that the quality of care is increasing over time, these quality-unadjusted price indexes will overstate true price growth and are best viewed as an upper bound.

Empirical results

Aizcorbe and Nestoriak obtained data that included more than 700 million claims from a sample of Health Maintenance Organization (HMO), Preferred Provider Organization (PPO), and Point of Service (POS) plans for 2003–2005.[4] These data were processed using an episode grouper, a computer algorithm developed by Symmetry/Ingenix, that allocated the claims data to more than 500 disease groups. The grouper allowed the authors to construct prices for the disease categories and to create an aggregate price index that covers all conditions.[5]

In addition, the authors constructed a treatment-based price index similar in concept to producer price indexes constructed by the Bureau of Labor Statistics in order to compare the disease-based estimates with a more conventional approach to measuring prices of medical care. The results are shown in chart 1.[6]

Chart 1. Comparison of Disease-Based and Treatment-Based Price Indexes



The disease-based index, which takes treatment substitution into account, grew at a slower rate from 2003 to 2005 than the treatment-based price index (4.4

4. The data were purchased from Pharmetrics, Inc.
5. Episode groupers are just one means of allocating data into disease categories. See Aizcorbe, Retus, and Smith (2008) for a discussion of other ways to allocate medical care spending.
6. Laspeyres indexes are shown. In addition, the authors calculated a Fisher ideal index; the results are nearly identical.

percent versus 6.1 percent at a compound annual rate). These findings are consistent with previous cost-of-disease studies. From a national accounts perspective—assuming the result holds across all types of patients and not just the commercially insured—the 1.7-percentage-points difference in the deflator for medical care spending would raise real GDP in a given year by as much as a quarter of a percentage point.

The authors' results, summarized in table 1, are consistent with many health economists' expectations: when medical care services are redefined as the treatment of a medical condition, prices are shown to increase at a slower rate than when services are defined as specific treatments.

Of the 19 disease categories shown, 15 showed smaller price increases over the 3-year period when measured using the index based on the bundle of treatments; these categories accounted for 90.3 percent of total medical care spending for this sample of patients.

But is this lower rate of inflation coming from a substitution of treatments? Aizcorbe and Nestoriak developed a decomposition of the differences between the indexes, which allowed them to measure changes in treatment use. This decomposition is presented in table 2. A finding that a certain type of treatment is being used less intensively is indicated by a negative value (conversely, a positive value is evidence of more intense use of a treatment). Across a disease category, a combination of negative and positive values across treatment types indicates treatment substitution.

The decomposition confirms the presence of treatment substitution for several categories: shifts from office visits and hospital visits towards drugs for psychiatric conditions, shifts from care at hospitals towards care at ambulatory surgical centers for orthopedic and gastroenterological conditions, and similar shifts in endocrinology (a disease class that includes diabetes and obesity).

In four categories, in which the disease-based

Table 1. Comparison of Disease-Based Price Indexes With Treatment-Based Price Indexes

Disease category	Share of total costs (percent)	Average annual growth rates, 2003:1–2005:IV (percent)		Difference
		Disease-based index	Treatment-based index	
Orthopedics and rheumatology	16.0	11.8	18.0	–6.2
Cardiology	10.6	1.7	17.5	–15.7
Gastroenterology	8.5	16.3	21.6	–5.2
Otolaryngology	8.3	9.2	14.8	–5.6
Gynecology	7.4	11.2	21.0	–9.8
Endocrinology	6.2	11.8	14.9	–3.1
Neurology	5.9	15.4	21.3	–5.9
Psychiatry	5.4	3.1	8.0	–4.9
Pulmonology	5.3	16.3	18.9	–2.6
Obstetrics	5.1	19.1	16.1	3.0
Dermatology	4.5	16.4	19.3	–3.0
Hepatology	3.3	9.4	11.6	–2.3
Urology	3.1	7.0	15.8	–8.8
Neonatology	2.9	30.8	28.7	2.2
Hematology	2.7	18.8	22.2	–3.5
Ophthalmology	1.9	8.4	10.8	–2.4
Nephrology	1.2	3.6	10.2	–6.6
Infectious diseases	1.0	37.3	32.9	4.3
Chemical dependency	0.7	18.3	12.3	6.0

Table 2. Decomposition of Cost Savings From Treatment Substitution

[Percentage points]

Disease category	Difference	Hospital			Office visits	Prescription drugs	Laboratory	Home care	Ambulatory surgical centers	Other
		Inpatient	Outpatient	Emergency room						
Orthopedics and rheumatology	–6.2	–1.1	–2.8	–0.2	–1.4	–0.1	0.0	0.6	0.2	–1.5
Cardiology	–15.7	–11.6	–1.6	0.1	–1.5	–0.1	0.1	0.1	–0.1	–1.0
Gastroenterology	–5.2	–1.3	–2.7	–0.1	–2.0	–0.5	0.2	0.0	0.7	0.4
Otolaryngology	–5.6	0.1	–2.6	–0.2	–2.0	–0.8	0.1	0.2	0.0	–0.3
Gynecology	–9.8	–3.0	–2.8	0.1	–3.0	–0.5	–0.1	0.0	–0.4	0.0
Endocrinology	–3.1	–2.8	–1.0	–0.1	–2.2	3.0	–0.1	0.5	–0.1	–0.4
Neurology	–5.9	–0.5	–1.9	–0.3	–2.9	0.5	0.0	0.0	0.0	–0.8
Psychiatry	–4.9	–1.0	–0.3	0.0	–5.3	2.3	0.0	0.0	0.0	–0.7
Pulmonology	–2.6	0.7	–1.7	–0.5	–1.8	0.0	0.0	0.3	0.0	0.4
Obstetrics	3.0	3.1	–0.5	0.2	0.0	–0.4	0.2	0.1	–0.1	0.3
Dermatology	–3.0	0.7	–1.3	–0.3	–1.7	–1.0	0.3	0.3	–0.6	0.6
Hepatology	–2.3	0.3	–1.6	0.2	–0.5	–1.7	0.0	0.0	0.2	0.9
Urology	–8.8	–3.0	–3.4	–0.2	–1.9	0.2	0.1	0.1	–0.1	–0.6
Neonatology	2.2	2.1	–0.1	0.0	0.6	–0.1	0.0	–0.3	0.0	0.0
Hematology	–3.5	–0.7	–2.3	0.0	–1.7	–0.4	0.1	0.0	0.0	1.4
Ophthalmology	–2.4	–0.1	–2.1	–0.1	–0.6	–0.5	0.0	0.3	0.8	–0.2
Nephrology	–6.6	–0.2	–5.9	0.0	–0.5	0.4	0.1	–0.2	–0.1	–0.3
Infectious diseases	4.3	3.4	–0.7	0.3	–0.8	1.2	0.2	0.6	0.0	0.0
Chemical dependency	6.0	2.4	–2.4	2.9	–2.0	3.4	0.1	0.0	0.1	1.5

indexes showed faster rates of change than the treatment indexes (obstetrics, neonatology, infectious diseases, and chemical dependency), these cost increases stemmed mainly from increased inpatient hospital use (for chemical dependency, increases in prescription drug use and emergency room visits also contributed).

In cardiology, the decomposition also reveals another pattern: a large decline in the use of inpatient care with little change in the intensity of other treatments. The authors present two possible explanations for this outcome. One explanation is that although patients appear to have as many office visits and purchase as many prescriptions as they did in 2003, perhaps the 2005 treatments were better, obviating the need for inpatient care and, thus, giving rise to cost savings. The other explanation is simply that patients received less care in 2005 than in 2003, perhaps because the care in 2003 was excessive or perhaps because the quality of care declined. This latter possibility underscores the importance of accounting for outcomes; a decline in the quality of care should be recorded as a decline in real services, not prices, while delivering the same quality of care with fewer treatments should be recorded as a decline in price. As the authors note, it is impossible to distinguish between the two possibilities without accounting for outcomes. The assumption underlying the authors' conclusions is that, on average, the quality of care is increasing over time.

Conclusion and future work

Aizcorbe and Nestoriak's paper represents the first step in preparing alternative measures of health care spending in the national accounts. The authors show that treatment substitution is a significant issue over a broad range of conditions and that the effects are large enough that they could meaningfully affect real GDP growth. Their research, however, is preliminary and leads to other questions. Do these conclusions hold for the entire population? How reliable are the episode groupers in allocating medical care spending into disease categories? Future research will involve assessing the sensitivity of these price indexes to the choice of episode grouper and exploring the costs of treatments faced by other significant segments of the population—namely Medicare and Medicaid recipients, the uninsured, and the institutionalized.

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