Toward a Health Care Satellite Account

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BEA BRIEFING

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THE Bureau of Economic Analysis (BEA) estimates that health care expenditures as a share of gross domestic product (GDP) reached 16 percent in 2006 (chart 1). That share will continue to grow significantly, according to a study by the Congressional Budget Office.[1] Given this trend, it is critical to develop an understanding of what those increased expenditures represent. Are the increases attributable to rising costs of providing the same service? Or are people purchasing higher quality health care services? And if people are consuming more health services today, what are the future benefits? Economists need answers to these questions in order to formulate policies that allow for society's efficient consumption of health care as well as for the improvement of the nation's overall health status.

Health economists have long advocated the construction of national health accounts that would measure the effects of the output of the medical care industry on improvements in health and use medically informed decision models to determine the productivity of different health inputs (such as medical care or the quality of the environment). For example, Rosen and Cutler (2007) describe an ongoing effort to create a health account that will provide direct measures of health, disease prevalence, and medical spending by disease for that purpose.

This article describes an initiative to construct a satellite account for medical care spending that would allow analysts to better assess the returns to treatments of disease and the sources of changes in health care costs.

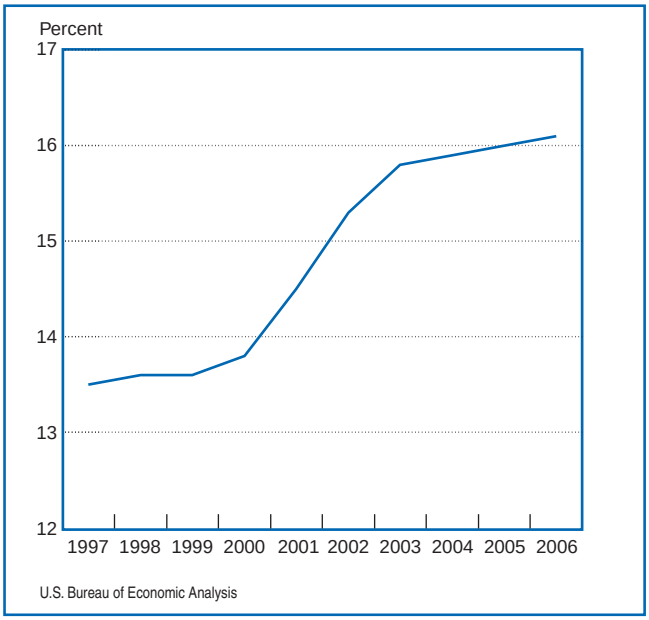
The information in satellite accounts can include the following:

- A more detailed characterization of the economy
- Measures based on new methods or source data
- A restructured or expanded GDP accounts framework

A health account of the type consistent with the view of many health economists would be quite broad and would include elements of all three. In this view, which we share, "health" is a type of human capital that, as with other capital goods, depreciates over time and requires investment. Using standard national accounting conventions, an account that would accommodate this view of health would require capital stock measures for health as well as measures of the rate of depreciation, financial investment into health, and the flow of returns to that investment. Moreover, measuring the latter returns would require one to place a value on the improvements to health, which is typically done by combining indicators such as quality-adjusted life years with estimates for the value of a human life.

Because various types of nonmarket activity are also important inputs into health, such an account would also expand the scope of the existing accounts (which include only market activity) to include the value of the time that members of households invest in their health and in the health of others (the value of those nonmarket activities).

Chart 1. Health Spending as a Percent of GDP



1. Orszag (2007).

The measurement of these activities is extremely difficult, in part because of the paucity of appropriate source data and lack of consensus among experts on the appropriate methods for measurement. However, within the broad movement to measure health as a capital good, there is some agreement that the "final good" produced by the health sector, medical care, would be better defined as "the treatment of a disease" rather than as individual products, as is usually the case in national accounts. A more analytically appropriate measure of "medical care" is the starting point of BEA's health care initiative.

In particular, work currently underway is focused on the following:

- **Reconcile health expenditure estimates.** The Centers for Medicare and Medicaid Services (CMS) and BEA are engaged in a joint program to reconcile the health care estimates in the national health expenditures accounts (NHEA) and in the national income and product accounts (NIPAs). The reconciliation project will allow data users to understand the differences between the NHEA and the NIPA estimates and do a rough "crosswalk" between the two series. BEA's efforts will build on work by Sensenig and Wilcox (2001). Although the NHEA and the NIPAs are comparable in aggregate, the underlying framework for the estimates (for example, "other medical care") can differ substantially. With this reconciliation, analysts will be able to use the series most appropriate to their needs.[2]
- **Develop disease-based estimates of health care spending.** Economists generally agree that defining spending by type of disease facilitates a way to more accurately evaluate the return from medical treatments. BEA intends to create measures of spending allocated by disease, using private insurance claims data, CMS data on Medicare and Medicaid recipients, and data on the uninsured from the U.S. Department of Health and Human Services.
- **Improve measures of real health care services.** The focus will be to improve the deflators used to decompose changes in spending into changes in price versus changes in the quantity of services. BEA will develop disease-based price indexes that will be used to deflate nominal expenditures in the satellite account. One important caveat to this effort is that BEA will not attempt to account for potential changes in the quality of treatments, a problem where no clear consensus exists on a solution.[3]

These efforts will generate measures of health care spending that can be used to better track the sources of rising health care costs. In addition, BEA is working with economists and health care experts to explore ways that these cost measures may be integrated with models of disease prevalence and health status in order to better assess the potential benefits of spending on health care.[4]

Expanding BEA's health care satellite account beyond the first step will depend on additional funding. While a definitive roadmap has not been drawn, a logical second step in developing a satellite account would be to restructure health-related expenditures in a framework that treats health spending as an investment in human capital and thus provides a look at how such investment would affect economic growth. However, there are many unresolved issues that must be tackled before such a framework can be implemented, including developing a methodology for separating out health care spending into "maintenance" (not considered investment) and gross investment.[5]

Yet another step to improve the health care satellite account would be to expand the scope to include the value of health-related nonmarket activity. Such an endeavor is not planned by BEA. For the foreseeable future, BEA will continue to defer to experts in fields other than national economic accounting to develop measures for the value of this nonmarket activity and, more broadly, for a greater understanding of health-care delivery and health outcomes and how those can be measured. BEA will continue research on these issues.[6]

The remainder of this article provides a brief literature survey of health spending as a human investment, the concept on which BEA's efforts are based, along with details on the near-term research that BEA is pursuing.

2. Ho and Jorgenson have provided a plan of action for linking the NIPA and NHEA estimates. See Huskamp, Sinaiko, and Newhouse (2006).

3. BEA has adopted a strategy advocated by a panel of experts at the National Academies. Notably, we will pursue an incremental approach to improving our price deflators for health care spending, beginning with problems upon which the solutions are well-known and feasible.

4. For example, Rosen and Cutler (2007) propose an alternative accounting framework that will provide direct measures of health—an alternative to the NIPA approach described here—that can nonetheless be combined with BEA's cost measures to assess the returns to health spending.

5. For an attempt to deal with this issue, see Gates (1984).

6. For an example, see Christian (2007).

Health Spending: A Form of Investment

Economists have long considered knowledge and health as forms of *human* capital that people invest in by increasing their education and improving their health. Thus, the returns to health spending can be assessed by treating the resulting "health" as a capital good. Schultz (1961) writes that an individual's acquisition of skills and knowledge is the means by which people enhance their welfare, similar to the way in which a business invests in physical capital to increase production and profits.

Based on this point of view, spending on medical treatments (and other activities that improve one's health) is an investment that provides a stream of benefits in the future. Assessing whether today's expenditures on medical treatments are in some sense "worth it" requires that one properly account for the costs and benefits of that spending. The benefits can be far-reaching (in terms of time and those affected), and viewing health as a capital good facilitates analyzing the various channels of improvement. As Mushkin points out, "Viewing expenditures for health programs as an investment helps to underscore the contributions of health programs to expansion of income and economic growth" (Mushkin 1962, 143).

Perhaps the most obvious benefit from investments in health care is the direct increases in welfare, or well-being, that accrue to individuals when their health improves. These welfare gains are realized in the form of reduced mortality and improvements in an individual's quality of life. With respect to timing, the benefits occur not only at the time of treatment but also into the future. Additionally, these welfare gains accrue potentially not just to the patient but also to those around him. For example, when a person is vaccinated, both the individual and members of his community benefit from that vaccination.

Other benefits from health spending have a more indirect effect on an individual's welfare. Consider the common belief that a major potential benefit from preventive health care expenditures today may be a substantial reduction in health care costs in the future.[7] Some of these benefits accrue directly to the patient—reduced out-of-pocket expenditures for health care in the future—while others accrue to society as a whole—a healthier population demands less private and government insurance-related resources. Benefits from preventive care may be significant since it is thought to be less costly than treating advanced diseases. However, an extension of the average life span results in a larger aged population—a population that consumes a larger percentage of health services while achieving less productive returns to their health investment.

Another potentially important indirect benefit of improved health is the effects on macroeconomic conditions from a healthier population. For example, health spending today improves both the *quantity* of the labor force and the *quality* of the workers. Healthier workers are more productive because of an extension of the working age, fewer sick days, and a decline in the loss of labor from disease or death (which reduces the costs of hiring and training associated with replacing that lost labor). In addition to greater productivity, a healthier (and longer living) population consumes more nonhealth-related expenditures, thereby boosting economic growth.

While the benefits seem intuitive, quantifying them is difficult. A National Academies Panel noted, "Health cannot be purchased directly and …There is no market equivalent to help us answer valuation questions, so one must turn to other methods" (Abraham and Mackie 2005, 117). We may be able to identify a drop in the number of sick days taken by individuals, thereby increasing productivity, but we cannot quantify the increase in their welfare. Therefore, it is difficult to estimate the entire return to investments in health care services. In addition, a distortion of the demand for health care services exists because most people do not face the full cost of the service; private or public insurance programs subsidize most health care costs.

Nevertheless, academic work has applied a multitude of approaches to value the returns to improvements in health. Although the estimates vary depending on the methods and data, all existing work suggests that these benefits can be quite high. (See Cutler 2004; Nordhaus 2005; Murphy and Topel 2006; and Becker 2007.)

Disease-Based Estimates of Medical Care Spending

Existing health measures, such as those found in the NIPAs or in NHEA, provide insights into the types of medical care that individuals purchase (such as visits to a doctor's office or the purchase of a drug) and how those purchases are financed (through private insur-

7. See Cohen, Neumann, and Weinstein (2008) for a recent discussion of these issues.

ance, government assistance, or from one's own income). Although this information is useful for tracking overall spending, these data do not provide any information about the particular disease being treated. This is a significant omission because the extent to which a particular health care expenditure is beneficial depends on the conditions being treated. For example, a second night in the hospital for a patient who has had a routine appendectomy has a lower "payoff" than that of a patient who has had quadruple bypass surgery. Because measuring the returns to treatment depends on the particular disease one suffers, assessing the costs and benefits of treatment requires one to think in terms of spending by disease.

The major stumbling block to measuring health care spending by disease is the fact that patients often suffer from more than one illness—co-morbidities—that makes it difficult to allocate spending to specific diseases.[8] For example, how does one allocate the cost of an office visit for a diabetic who also suffers from heart disease? This problem is particularly prevalent among the elderly, a demographic with disproportionately high spending on health care. To address this problem, most studies that have attempted to measure expenditures on health care by disease have used the concept of "primary diagnosis" to assign spending to disease categories.

An early study by Rice (1967) presented single-year estimates of health expenditures by type of disease. This study and the subsequent "cost of illness" literature measured the total costs of illness: direct costs—which include spending for hospital and nursing home care, physicians and other medical professional services, drugs, medical supplies, research, training, and other nonpersonal services—and indirect costs, which account for economic losses arising from illness, disability, and death.

As more detailed data became available, expenditures were further disaggregated. Hodgson and Cohen (1999) allocated 87 percent of personal health care expenditures as reported by the former Health Care Financing Administration (now CMS) by age, sex, diagnosis, and health service type using additional data from sources such as the National Medical Expenditure Survey. Further disaggregation included home health care and hospital care by type of hospital. In an important advance, this study analyzed health care expenditures for those over age 65. While seniors account for less than 15 percent of the population, they account for 40 percent of total health expenditures.

More recently, there has been an interest in identifying the sources of changes in health care costs; many of these efforts focused on selected conditions that make up a disproportionate amount of spending on health care (for example, see Druss, Marcus, and Flossing 2001; Thorpe, Florence, and Joski 2004).

Perhaps the most ambitious cost study, in terms of their innovative method and the number of diseases they cover, is the ongoing project described in Rosen and Cutler (2007). Their cost model allocates spending to individual diseases by using a statistical approach—regression analysis—that considers all the conditions a patient has reported (rather than just the information on a particular encounter, as in the "primary diagnosis" method).

At BEA, research into alternative methods for measuring spending by disease is currently underway. Aizcorbe and Nestoriak (2007) have experimented with computer algorithms that sift through health claims data and allocate spending to over 500 types of disease episodes. These so-called episode groupers have the advantage that one does not need medical expertise to apply the algorithm and obtain the measures. However, these groupers are relatively new and their properties are not well understood. Rosen and Cutler are conducting a study to compare how existing approaches allocate spending across diseases. To the extent that the disease-based expenditures are sensitive to the method of allocation, the BEA satellite account may provide more than one set of measures of spending by disease.

"Real" Expenditures for Treatment of Diseases

Disease-based medical spending estimates are just one piece of information needed to better assess the returns to health spending. The other important piece is the decomposition of those expenditures into price and quantity components—toward the goal of better measuring real economic activity. For example, an increase in the cost of treating diabetes might occur because the number of patients receiving treatment increases (one way to measure the quantity of service) or because the price of treating each patient increased (a rise in price). This distinction has important implications for health care practice and policy.

At the disease level, splitting out health care expenditure changes into price versus quantity components requires that one define the good provided by medical care as the "treatment of disease" or "an episode of treatment" rather than defining the good as the

8. A similar issue arises elsewhere in the national accounts when revenues for establishments are allocated to industry classes. There, the revenues for individual establishments are assigned to an industry according to their primary economic activity. Thus, if a business produces goods that fall under two or more industries, the business is classified according to its major output.

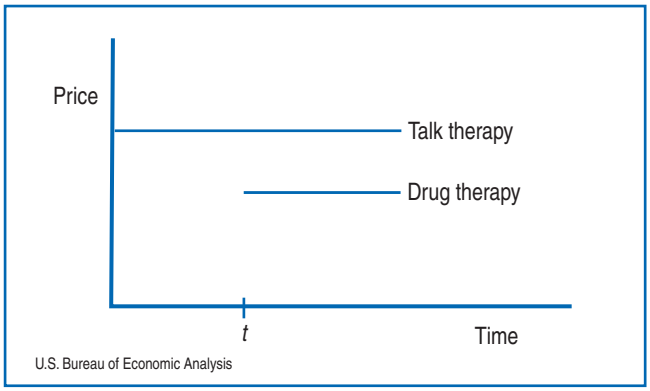
medical service provided (for example, the office visit or the prescription drug). Chart 2 provides a simple example to illustrate the importance of this issue. Suppose that drug therapy may be substituted for talk therapy in the treatment of depression starting at time *t* and that the prices of both types of treatment remain unchanged. If one tracks prices for each service, one would conclude that there has been no change in price.

However, tracking the treatment of the disease—in this case, depression—suggests that the price of treating depression might have fallen. It's entirely possible that patients would begin to substitute the higher cost talk therapy with lower cost drug therapy when drug therapy is introduced in the market.[9] Assuming that the number of patients remains the same, expenditures would fall, reflecting a drop in the cost of treating depression. Note that if one uses the traditional price indexes to "deflate" expenditures, the resulting measure of real services (the quantities) will show a decline, even if the number of patients is the same. In general, this type of substitution of treatments for one disease will not be picked up by traditional indexes.

Empirical work has shown that this type of substitution occurs and that it tends to lower costs or restrain increases in the price of treating certain conditions. This effect was found for individual conditions in early work—for example, heart attacks (Cutler, McClellan, Newhouse, and Remler 1998), depression (Frank, Berndt, and Busch 1999) and schizophrenia (Frank, Berndt, Busch, and Lehman 2004)—and, later, for a broader range of conditions—(Song et al. 2004).

9. One can think of other cases where the new treatment costs more, but also provides a better outcome. For example, the arrival of new drugs for depression could have prompted many to add drug therapy to their existing talk therapy visits to achieve a better outcome in the treatment of depression, rather than to substitute one treatment type for another. If one fails to account for the possibility that adding the drug therapy yields better health outcomes than using just talk therapy, then the disease-based index will show that the cost of treating depression rose. To the extent that the arrival of new treatments increases the price and outcomes of treatment, a disease-based price index should be viewed as an upper bound to the cost of treating disease.

Chart 2. An Example of Treatment Substitution



At the aggregate level (considering spending across all diseases), change in "real services" is typically derived using a related price index to deflate the nominal expenditure. For example, "real" personal spending on medical care services in the national accounts is obtained by dividing nominal spending by a price index that translates spending in terms of a base period. In that way, changes in spending from the base period to the present, for example, can be broken out into a piece that reflects changes in real services (loosely speaking, the "quantities") and a piece that reflects changes in price (changes in the deflator).

A key issue when considering measurement concepts is the quality of treatment. For example, cars are more expensive today than 20 years ago. But, today's cars are also better cars. So, the increase in the price of a car is partly due to the cost of providing an increase in quality. When measuring changes in spending, BEA tries to count the increase in quality as an increase in the "quantity" of the good, not as an increase in the price.

For the health sector, the conceptual equivalent for the quality of treatment is the improvement in health obtained from the treatment, sometimes measured as the change in health outcomes. Currently, there is no clear consensus on how to construct these outcome measures. A recent National Academies Panel on price measurement recommended that statistical agencies construct price indexes under the assumption that the quality of treatments does not change over time.[10] BEA will adopt this recommendation and will construct price deflators that only deal with the treatment substitution problem described above, without addressing potential changes in the quality of care.

Research into these issues is currently underway at BEA. Although the treatment substitution problem has proven to be significant for several important conditions, no one has assessed the numerical importance of the issue for a broad range of conditions. Preliminary work by Aizcorbe and Nestoriak (2007) used a large database containing health insurance claims to study this issue over a comprehensive list of more than 500 medical conditions. They found that disease-based price indexes rise substantially slower than standard treatment-based indexes. This suggests that part of the measured increase in the cost of medical care is actually an increase in real services. In another study, Aizcorbe and others (2008) assessed the sensitivity of this finding to the underlying assumptions and data.

Conclusion

Understanding the changing role of health care in the U.S. economy and its impact on economic growth is

10. See Schultze and Mackie (2002).

critical to addressing many of the important policy issues being raised regarding health care. Improving the available data is an obvious first step in that direction.

Data for spending by disease, along with BEA's proposed disease-level price indexes, will help provide a much clearer picture of the drivers of medical care cost increases. Improvements to the deflator for medical care will provide a better measure for how much of the rising cost of health care may be attributed to price increases versus growth in real services. In addition, the GDP accounts currently include a complete accounting for health care, but the health-related components are in different sections of the accounts. The development of health-related satellite accounts would pull together these health data to present a comprehensive picture of the health sector that is consistent with BEA's existing accounts.

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