

Distinguished Lecture on Economics in Government

What We Don't Know Could Hurt Us: Some Reflections on the Measurement of Economic Activity

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Without accurate information on overall economic conditions, workers, firms, voters and policymakers are flying blind—or at least peering through thick fog. Is the economy making full use of the labor available for application to productive activities? Is national output rising or falling? Is investment adequate to sustain and increase the level of national output? How rapidly will output grow in the future? In the United States, as in virtually all other developed and developing economies, gathering and providing the economic data needed to answer these questions and then to set an appropriate course is a fundamental responsibility of the national government. Since 1998, the *Analytical Perspectives* volume of each year's proposed budget for the U.S. government has included a section on "Strengthening Federal Statistics." The section in the 2006 volume states, "The ability of governments, businesses and citizens to make appropriate decisions about budgets, employment, investments, taxes, and a host of other important matters depends critically on the ready availability of relevant, accurate and timely Federal statistics" (Office of Management and Budget, 2005, p. 53). Or as a United Nations (1990, p. 17) report discussing the transition to market economies in eastern and central Europe put it some years ago: "It should be emphasized that the provision of comprehensive and reliable economic statistics is

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not simply a service to the business sector but a public good which makes a crucial contribution to the optimal working of a market economy.”

The routine production of U.S. economic statistics dates back to the early part of the twentieth century. When policymakers attempted to respond to the difficulties experienced by workers and firms during the recurrent recessions of the century's first three decades and the Great Depression that followed, they lacked even basic information about employment, unemployment and output. By the middle of the twentieth century, this basic information and a great deal of other useful data were produced routinely. But in recent decades, as services output continued to expand from 46 percent of GDP in 1979 to 57 percent of GDP by 2004, and employment in services industries rose from 72 percent to 83 percent of jobs over the same period (Council of Economic Advisers, 2005, Tables B-8, B-46), a system of economic statistics that had been designed during the manufacturing era began to seem increasingly outdated. Over the past decade, the statistical agencies have done yeoman work to expand the availability and quality of service sector statistics, but the task is far from completed. Moreover, the traditional accounting framework for economic statistics has focused almost exclusively on market transactions. Looking ahead, more comprehensive measurement of productive activities, however they may be organized, must be a priority.

Laying the Foundations

Sharp cyclical fluctuations in economic activity were a principal concern of citizens and policymakers during the early years of the twentieth century. The U.S. economy experienced 10 recessions from 1900 through the Great Depression; the first nine of these recessions averaged 17 months from peak to trough, and then the economic decline of the Great Depression lasted 43 months (National Bureau of Economic Research, <http://www.nber.org/cycles/cyclesmain.html>). Data that would provide information about the cyclical increases and decreases in the levels of employment, unemployment and output were much desired at that time, but simply unavailable. The Bureau of Labor Statistics (BLS) began to collect regular monthly statistics on employers' payroll and employment in 1915 (Goldberg and Moyer, 1985). At the start, the monthly employer survey was focused exclusively on selected manufacturing industries. The survey's industrial coverage expanded over time, but the historical emphasis on manufacturing and goods production more generally continued to be reflected in the greater detail of reported statistics for goods as compared to services industries.

The lack of regular data on unemployment became a major issue during the 1930s. Harry Hopkins, the administrator of the Works Progress Administration (WPA), wanted regular unemployment data so that he could assess the likely demands on the programs for which he was responsible, but no such data existed. He pushed for a regular survey to collect information from individuals on their labor force status. It took time to launch a large new survey, but in 1940, the WPA

began the regular production of unemployment statistics based on a monthly household survey, the predecessor to today's Current Population Survey (CPS).

Work to develop the national income and product accounts also began during the early decades of the twentieth century. Although pieces of economic information were available from a variety of sources, no framework existed for compiling and analyzing these data in a coherent fashion. Working during the late 1920s and the 1930s, Simon Kuznets, building on the work of Willford King, Wesley C. Mitchell and other scholars, developed a set of accounts that laid the foundation for the national income and product accounts we know today (Carson, 1975). The development of these accounts is widely acknowledged as critical to the understanding of the economy. In 1971, Simon Kuznets won the third Nobel prize in economics ever awarded, and the U.S. Department of Commerce has formally recognized the creation of the national accounts as its most important twentieth-century accomplishment.

In the decades prior to 1940, fluctuations in economic activity dominated the economic policy agenda. Since World War II, and especially since the mid-1980s, cyclical fluctuations in economic activity have become substantially less pronounced. In particular, the period between the two World Wars was far more turbulent than the decades that followed (Romer, 1999), and over the past two decades, the volatility of economic activity has further declined (Stock and Watson, 2002). As a consequence, macroeconomists have become increasingly focused on understanding the factors that influence the trend rate of growth, rather than the fluctuations around that trend.

Another—and not wholly unrelated—change in the economy has been the relative decline in goods production as a share of economic activity and the corresponding rise in the importance of the service sector. In 1939, goods output accounted for 65 percent of GDP and goods-producing industries for 38 percent of employment; those shares fell to 54 percent of GDP and 28 percent of employment by 1979, and to just 43 percent of GDP and 17 percent of employment by 2004 (NIPA Table 1.2.5, <http://www.bea.doc.gov>), and Bureau of Labor Statistics, <http://www.bls.gov/ces/home.htm#data>).¹ From about 1960 onward, manufacturing has suffered an especially steep relative decline.

The statistical infrastructure developed in the 1930s and 1940s to serve a goods-based economy in which cyclical fluctuations in activity were the principal concern proved less well suited to a services-based economy in which long-term growth was the central focus of attention. Under the Standard Industrial Classification (SIC) structure, used to categorize industries for reporting purposes from the mid-1930s through the late 1990s, the reporting of data for goods-producing industries was highly detailed, while the reporting for the service sector was more aggregated, masking the evolution of emerging industries. Employment in mining totaled 709,000 in 1990; within mining, 42 detailed industries were distinguished and mining received 13 full pages in the 1972 SIC manual (the one I happen to

¹ It should be noted that the sectoral output and employment figures are not strictly comparable, as the former refers to output wherever produced and the latter to employment in particular industries.

have on my shelf, though it is not terribly different from the 1957, 1967 or 1987 versions). In contrast, data for offices and clinics of medical doctors, a rapidly growing industry that encompassed surgical and emergency centers, health maintenance organization medical centers and the offices of mental health practitioners as well as other doctors' offices, and employed more than 1.3 million people in 1990, were reported without further disaggregation. The paperboard container and box industry, which employed 209,000 people in 1990, was further broken down into five more detailed industries discussed over a full page and a half in the 1972 SIC manual. In contrast, individual and family social services, which employed 464,000 people in 1990 and included activities as diverse as emergency services, community food services, youth centers and senior citizen centers, received a single classification code and just a paragraph of discussion. To take one last example, business services not elsewhere classified, a catch-all classification that accounted for more than 650,000 jobs in 1990, lumped together industries as diverse as private mail centers, copy centers, translation services, industrial design services and interior design services.

The amount of data collected for service sector industries also has been more limited than the amount of data collected for goods-producing industries. In many parts of the service sector, the only accurate accounting of sales and products has come just once every five years, when the economic censuses are conducted. Some service sector data has been collected through the Census Bureau's annual surveys, and the industry coverage of these surveys has expanded over time, but no data for the service sector have been collected at quarterly or monthly frequencies. The lack of real-time service sector data has proven to be a problem for the construction of the national income and product accounts, where many current dollar entries that involve service sector output have relied on a hodge-podge of (sometimes unsatisfactory) data sources or no data at all (indicated in the description of sources and methods by the term "judgmental trend") (Seskin and Parker, 1998; Ritter, 2000).

Another concern has been the quality of the price indexes used to deflate the nominal output figures to produce measures of real output—and thus measures of long-term economic growth. As of 1997, about half of GDP was deflated using consumer price index data, with producer price index and international price index data from the Bureau of Labor Statistics also playing important roles (Eldridge, 1999). The Consumer Price Index, in particular, had been widely criticized for being based on an out-of-date market basket, paying inadequate attention to improvements in the quality of the items priced and not accounting for the value of new products to consumers (Boskin et al., 1996; or in this journal, Boskin et al., 1998), and the methods used to produce other price indexes were similar. While some of the specific claims made about bias in published price indexes were not well founded (Abraham, Greenlees and Moulton, 1998), it is also clear that the methods used to adjust for changes in the quality of items priced for the indexes were far from perfect and that any bias in the resulting price indexes would have carried through to estimated trends in output and productivity (Eldridge, 1999).

Another critical deficiency in the information available for construction of the

national accounts has been the complete absence of price indexes for important industries, including construction and many of the service sector industries. Absent true price deflators for output in these sectors, it was relatively common to use the trend in production input quantities as a proxy for the trend in real output or to use an index of input costs as a proxy for the output price. As of 1999, real output estimates accounting for 9 percent of GDP were constructed using input quantity extrapolations and real output estimates accounting for another 14 percent of GDP were constructed using input-cost deflators (Landefeld and Fraumeni, 2001).² Both approaches are problematic.

Assuming that output grows at the same pace as labor input, as was done for banking and some other financial services as well as much of government, is equivalent to assuming that there has been no growth in labor productivity (output per hour). If the rate of growth in capital input exceeds the rate of growth in labor input, so that the capital to labor ratio is rising, the same assumption implies output growth that falls short of the average rate of growth in factor inputs, thereby building in a negative rate of growth in multifactor productivity. Similarly, using the rate of growth in input costs as a proxy for growth in the price of output, as was done for nonresidential construction and for a number of services industries, may bias real output trends. If the amount of output that can be produced using given inputs has risen—that is, if multifactor productivity has increased—then the price of output should fall relative to an index of input costs. In this case, an input cost index will overstate the true growth in the price of output, and using input costs to deflate nominal sales will lead to understatement in the rate of real output growth.

If the rate of growth in real output is understated, the rate of growth in productivity also will be biased downward. In an important study, Corrado and Slifman (1999) summarized the implications of the data used in producing the nation's aggregate productivity statistics for the growth rates of labor productivity (output per hour worked) in various more detailed industries. Their decomposition implied that labor productivity in the services industries—a large industry grouping that includes both personal and business services—actually declined over the two decades from 1977 through 1997, a finding that seems implausible on its face. Among the individual services industries showing declines in labor productivity were educational services and health services, as well as auto repair, legal services and personal services. Construction was another problem industry, with implied labor productivity falling by 1.0 percent per year over the entire 20-year period. In a related paper, Gullickson and Harper (1999) looked at the implications of the data underlying aggregate productivity measures for the rate of growth in multifactor productivity (output per unit of all inputs employed) for more detailed industries over the 1977–1997 period. Their figures showed positive rates of multifactor productivity growth in manufacturing, but negative rates of multifactor productivity growth in construction, health services, and finance, insurance and real estate, among other industries.

² Eldridge (1999) reports similarly heavy use of input-based extrapolation methods as of 1997 even for that part of GDP attributable to the output of the business sector.

Many of these problems with available economic data—as well as other perceived problems—were highlighted by a November 1994 *Business Week* cover story with the somewhat inflammatory title, “The Real Truth About the Economy: How Government Statistics are Misleading Us.” Michael J. Mandel, a Ph.D. economist and economics journalist who was the author of the article, levied a number of indictments against the economic data produced by the federal government, including their failure to recognize the value to consumers of higher-quality products and services, their failure to account accurately for the full range of productive business investments and the resulting understatement in the estimated growth rate of productivity. Mandel’s summary of the situation, a popularized version of concerns being expressed in more academic venues, was that “the economic statistics that the government issues every week should come with a warning sticker” and that “the real economy is vastly different from the one painted by the government’s numbers.”

Data for the Service Economy

Being on the receiving end of this sort of criticism can be unpleasant, but it also can help wonderfully to focus the mind. Over the past decade, without a great deal of fanfare, the staff of the federal statistical agencies has worked hard to improve federal economic statistics and especially the economic statistics for the service sector. Some of this improvement reflects the application of new methods that draw on conceptual advances in price and productivity measurement; some reflects an arguably overdue shifting of the resources for the production of statistics away from the goods-producing sector toward the services-producing sector; and some reflects a modest infusion of new resources, made possible in a tight budget environment by a group of vocal data users who effectively communicated to the Congress the importance they believe should be attached to improving economic data.

An important step in the improvement of available service sector data was the 1997 introduction of the new North American Industry Classification System (NAICS, which rhymes with “snakes”). The designers of NAICS sought to devise a system in which industries were classified on a consistent conceptual basis and in which the modern economy would be more accurately portrayed than under the old Standard Industrial Classification (SIC) system. Under NAICS, industries are defined based on their production technology rather than on the customer markets they serve; the old SIC system had embodied a mix of the two approaches. NAICS also expanded greatly the classification detail provided for service sector activities. Of the 358 new detailed industries added as part of NAICS, 250 were service sector industries, with new goods sector classifications added mainly for “high-tech” industries. Doctors’ offices, for example, were broken into several

separate categories: freestanding emergency centers, health maintenance organization medical centers, offices of mental health specialists and other physicians' offices. Within the old individual and family social services industry, NAICS now identifies eight more detailed industries. Similarly, new categories were introduced to capture the growing range of available business services previously identified only as "not elsewhere classified." Other added industries include warehouse clubs, cable networks, satellite communications, paging, casinos, casino hotels, diet and weight reducing centers, semiconductor machinery manufacturing, fiber optic cable manufacturing and reproduction of computer software—all emerging industries of significant size that had not been separately identifiable under the previous coding structure. Implementing the conversion from SIC to NAICS took several years, but data for almost all federal statistical programs are now reported on a NAICS basis.³

There also have been improvements in the price indexes used for deflation of nominal output quantities in the national accounts. In the Bureau of Labor Statistics (BLS) Consumer Price Index program, which supplies the largest share of output deflators for measures of final output in the national economic accounts, progress has been made in keeping the market basket of priced items current and better adjusting the price indexes for changes in items' quality (see Abraham, 2003, for a more detailed discussion). More generally, a growing share of the price deflators used by the Bureau of Economic Analysis in the construction of the national accounts employ hedonic techniques to adjust for changes in item quality (Moulton, 2001).

Another important step has been the dramatic expansion in the availability of service sector price indexes. Price deflators for services industries are critical to producing robust measures of real output and productivity in these industries. In 1990, available price indexes from the BLS Producer Price Index (PPI) program covered less than 5 percent of service sector output. By 2005, that share had grown to 75 percent! Price deflators are now available for a wide range of industries including wireless communications, property and casualty insurance, home health care services and legal services, among many others. In this case, the expansion of service sector data was made possible, at least initially, by paring back the detail attempted for the manufacturing sector rather than by an expansion in total program funding. The first-generation service industry price deflators undoubtedly can stand improvement—and I hope they will receive careful scrutiny—but the groundwork has been laid.

The constituency for high-quality federal statistics often has been described as "a mile wide and an inch deep"—everyone favors good economic data, but in comparison to other causes, few care enough to push for the increased funding that better data may require. Since the late 1990s, however, the leadership of the National Association for Business Economics (NABE) has been quite vocal in its

³ See Kort (2001) and the NAICS website maintained by the Bureau of the Census at (<http://www.census.gov/epcd/www/naics.html>) for further discussion of the development of the NAICS structure and its implementation.

concerns about federal funding for economic statistics. This has proven particularly helpful in making possible the improvements in service sector data that I have described.

Figure 1 displays trends in real funding for the Bureau of Economic Analysis, the Census Bureau's economic data programs and the Bureau of Labor Statistics over the period from 1983 through 2004–2005. Two adjustments have been made to the underlying agency budget figures to produce the trend lines shown in the chart. First, the discontinuities in funding associated with the transfer to the Bureau of Labor Statistics of several large labor market information programs that previously had been included in the budget of the Employment and Training Administration have been removed from the data. Second, given that most federal spending on statistics goes to cover personnel costs, nominal spending has been deflated by the Employment Cost Index to produce a rough estimate of the real trend in spending. Because I could not obtain information on annual spending for the economic censuses, which are funded for a full census cycle rather than year by year, that spending is not reflected in the chart.

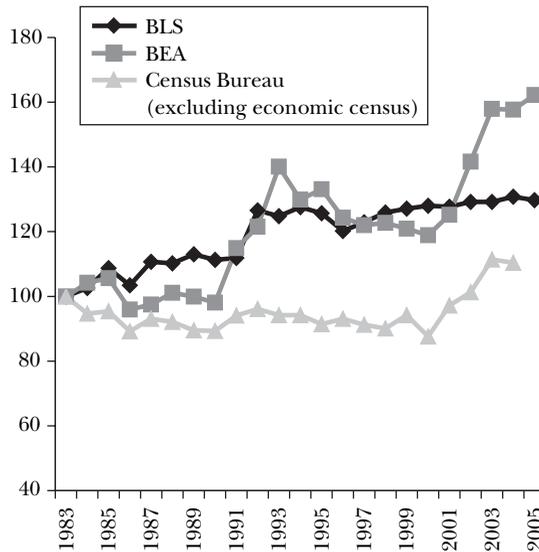
Based on these adjusted figures, it would appear that Republican administrations—or at least Bush administrations—have been good for spending on economic statistics. Spending at the Bureau of Economic Analysis jumped during the presidency of George H. W. Bush, when the agency received an infusion of funds in connection with the economic statistics initiative spearheaded by Michael Boskin, chair of the Council of Economic Advisors at the time. A second jump occurred in the early years of the first George W. Bush administration, as part of a broader initiative to improve data on the “new economy” and especially the service sector.

The Bureau of Economic Analysis relies heavily on source data collected by the Census Bureau and the Bureau of Labor Statistics. Data collection is expensive and both of these agencies have budgets for the production of economic statistics that are much larger than the BEA budget. Aside from the every-five-year economic censuses, the Census Bureau's principal economic data programs are its annual, quarterly and monthly surveys of economic activity by sector (manufacturing, retail trade and so on). Funding for the Census Bureau's economic data programs stagnated from the early 1980s through the late 1990s, perhaps overshadowed by the decennial census and the Bureau's demographic data programs. Since 2000, however, increased funding has been granted to support improvements in the Census Bureau's measurement of the “new economy,” with a focus on e-commerce and more recently, the development of improved service sector measures. The first data from the Census Bureau's new Quarterly Services Survey, a particularly important initiative, were published in September 2004. The new quarterly survey initially will cover a set of information- and technology-intensive service industries that collectively account for about 15 percent of GDP and is scheduled to be expanded in the future.

Changes in funding for the economic data produced by the Bureau of Labor Statistics are less apparent in the graph, being partially obscured by increases and subsequent decreases in funding for the Locality Pay program, an expensive data

Figure 1

Real Spending on Federal Economic Statistics, Excluding the Economic Censuses
(1983 = 100)



collection effort that primarily serves the administrative purpose of seeking to reduce pay disparities between federal and private-sector workers in different localities. In 1999 and again in 2001, however, the BLS received significant increases in funding for improvements in its price measurement programs, first funding for the improvements to the Consumer Price Index that I already have mentioned and later funding to strengthen and expand the coverage of the Producer Price Index, including the development of price indexes for construction.

Although the ongoing expansion and improvement of data for the service sector has not been much remarked, it represents a real step forward. It is true that a host of knotty issues related to the measurement of service sector activity remain to be resolved, but the progress made to date also should be recognized.

Data for the Knowledge Economy

Looking ahead, a priority for the agencies that produce our economic statistics should be to expand the scope of their measurements to provide a more complete portrait of the modern economy.⁴ Historically, with a few exceptions, the coverage of the national income and product accounts has been restricted to output

⁴ The argument advanced here draws heavily on the work of a National Academy of Sciences panel charged with studying the design of a system of nonmarket accounts for the United States. The results of the panel's work are reported in Abraham and Mackie (2005).

produced and sold in the market. Some have argued for conceiving national output more broadly (Nordhaus and Tobin, 1973; for a more comprehensive review, Eisner, 1988). But in a world where goods production was relatively more important than it has become today, it was perhaps sensible to draw the boundaries of national economic accounting more or less as they have been drawn. As the composition of economic activity has shifted from goods production to the provision of services, and as the focus of policy has shifted from fluctuations in output to the underlying trend in output, the weaknesses inherent in an exclusive focus on market activity have become more apparent.

How might a better accounting of nonmarket economic activity change our understanding of the economy? A well-known example is the distortion in the trend of measured economic activity associated with the long-term movement of women into paid employment. Female labor force participation rates rose from about 34 percent in 1950 to about 59 percent in 2004 (Bureau of Labor Statistics, (<http://www.bls.gov/webapps/legacy/cpsatab1.htm>)). To the extent that home production is omitted from the national economic accounts, the long-term growth rate in total output likely has been artificially inflated by this shift in the locus of productive activity, as a rising share of activities such as child care, meal preparation and cleaning and yard services that used to be performed in the home now are performed in the market sector (Landefeld and McCulla, 2000). Similarly, to the extent that nonmarket output is not properly taken into account, per capita output comparisons between the United States and other countries, especially those in developing countries where nonmarket output represents a larger share of total output, may be seriously distorted.

To take another example, better accounting of nonmarket inputs and outputs would do much to illuminate the underlying sources of economic growth. The core national accounts keep track only of investments in physical capital. By some estimates, however, the value of investments in human capital has grown so much that it now equals or exceeds the value of investments in physical capital. For example, the Office of Management and Budget estimated the value of education capital at \$46.4 trillion in 2004, compared to a value of \$41.6 trillion for privately owned physical capital. Privately owned physical capital includes some categories that do not play a large role in generating future economic growth: residential structures, inventories, consumer durables and land. The subcategory of “nonresidential plant and equipment,” which is tied more directly to productivity growth, had an estimated value of \$12.0 trillion, much smaller than that for education capital (Office of Management and Budget, 2005, Table 13-4).

The understanding of key sectors would be improved by an appropriate accounting of nonmarket inputs and outputs. For example, any meaningful economic evaluation of the effectiveness of efforts to educate our children should compare the value of the human capital produced through educational activities to the cost of the time and other resources devoted to them (for an effort in this spirit, see Jorgenson and Fraumeni, 1992). But in the national accounts, dollar expenditures on education are treated as a measure of educational output. To take another example, improvements in health seem to have outpaced even the dramatic

increases in medical care spending observed in the recent past (Cutler, 2004), yet the true growth in the value of health output and the factors that have contributed to that growth are not documented within a consistent national accounting framework.

The idea of expanding the boundary of national economic accounting is not new; questions about the proper boundary for national economic accounting date back to the 1920s, if not before (Pigou, 1920). There are two reasons for returning to this idea now.

First, as the economy has evolved, those sectors in which inputs and/or outputs have a particularly important nonmarket dimension appear to have grown in relative importance. Devising a metric for assessing the relative importance of sectors whose activities are not fully reflected in our national accounts is, of course, somewhat problematic. Education and health are prominent among the sectors possessing important nonmarket dimensions. What *can* be said about how their relative importance has changed? In 1958, education accounted for just 6.1 percent of nonagricultural payroll employment; by 2002, that figure had grown by more than 50 percent, to 9.5 percent. Employment in private health services grew even more dramatically, from 2.7 percent in 1958 to 8.2 percent in 2002, a three-fold increase.⁵ In dollar terms, U.S. health care spending has grown from 5.0 percent of GDP in 1960 to 14.6 percent in 2002 (Organization for Economic Cooperation and Development, 2004). The nonprofit sector is another domain for which nonmarket accounting could add substantially to our understanding, both because the sector relies so heavily on volunteer labor and because its output often is not transacted at market clearing prices. Relative employment in the nonprofit sector, which obviously overlaps both education and health care, grew from 7.3 percent of nonfarm employment as recently as 1977 to 9.5 percent in 2001 (Independent Sector, undated).

Second, new conceptual thinking and, especially, the availability of new data have made it more feasible to think about developing nonmarket accounts for education, health and other areas. Recent work to *define* the outputs of the service sector has been a necessary precursor to the *measurement* of that output; the papers presented at the various conferences on service sector measurement organized by Barry Bosworth and Jack Triplett at the Brookings Institution and discussed in Bosworth and Triplett (2004) are illustrative of the work that has been done in this area. The theory and practice of price index construction has been advanced, thanks to the work of Ernst Berndt, Erwin Diewert, Zvi Griliches, Jerry Hausman, Ariel Pakes and other academic scholars, together with the work of federal statistical agency researchers such as Dennis Fixler, John Greenlees, Brent Moulton and

⁵ Because I am interested in long-term trends, these figures are based on historical Current Employment Statistics data published by the Bureau of Labor Statistics on a SIC basis, rather than on more recent data published on a NAICS basis. Education includes private educational services, state government education and local government education. Health includes all private health services, which account for the large majority of health care employment, but due to data limitations, excludes state and local government hospitals.

Marshall Reinsdorf. And there has been considerable progress in thinking about how to measure capital, especially intangible capital; the papers included in Corrado, Haltiwanger and Sichel (2005) illustrate this work.

Perhaps even more important, new data have become available to support the construction of a set of nonmarket accounts. Knowing how individuals allocate their time and, in particular, the amount of time they devote to various productive activities is essential to the development of nonmarket satellite accounts. The new American Time Use Survey (ATUS) launched in 2003 by the Bureau of Labor Statistics will provide much of the relevant information, at least for those aged 15 years and older (Abraham and Mackie, 2005; in this journal, Hamermesh, Frazis and Stewart, 2005).

Useful information on education and health *outcomes* from a variety of sources also has begun to accumulate and could feed satellite accounts focused on those sectors. Figure 2 shows the trend since 1995 in spending for all federal statistics, not just economic statistics. Much of this spending takes place not at the principal statistical agencies commonly thought of as constituting the federal statistical system, but at other agencies that collect and disseminate information as part of a broader mission. Each year since 1996, the Statistical Policy Office of the Office of Management and Budget (OMB) has produced a comprehensive report on federal statistical spending. Statistical spending at the various agencies is grouped by the OMB analysts into broad categories, including economic, social, health, and environmental and natural resource statistics. Data from these annual reports are displayed in Figure 2. The reporting of statistical activity in these reports is not entirely consistent from one year to the next; I have adjusted the figures to make them more comparable over time.⁶ As before, the reported figures have been deflated using the Employment Cost Index to convert nominal dollar spending into “real” spending. The chart shows the modest recent increase in funding for economic statistics that I already have discussed, but that increase in spending is overshadowed by the considerably larger increases for social and health statistics.

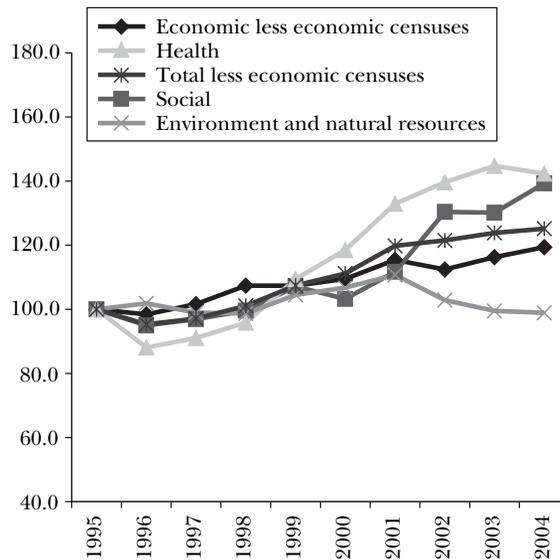
Just to be clear, in suggesting that the economics statistics agencies should try to do a better job of accounting for nonmarket activity, I do not envision any fundamental changes to the core national income and product accounts. The information to support such nonmarket accounting is not now, and likely never will be, of the same quality as that available for production of the existing market accounts, and the methods for nonmarket accounting are not as well developed. Moreover, the core accounts have tried-and-true value, and disrupting the data series users have relied upon would be undesirable. What I am suggesting instead is the development of satellite accounts that would complement, but not replace

⁶ Each OMB report on statistical spending contains data for three successive years. I have used the most recent reported figures for each year. After compiling the statistical spending time series for all agencies with any such spending, I examined all cases in which an agency's spending for statistical activities exceeded \$15 million in any year and changed by more than 20 percent from any one year to the next. Clear inconsistencies across reports for spending in a particular year were a signal that the agency had changed the basis for its reporting, and I adjusted the data accordingly.

Figure 2

Real Spending on Federal Statistics, by Subject Matter Category

(1995 = 100)



the existing accounts. There is precedent for this approach: the Bureau of Economic Analysis currently produces satellite accounts for transportation and for travel and tourism, and is working to develop a satellite account for research and development. Other countries have developed environmental satellite accounts to present information on natural resource stocks, air quality and water quality. Like these other satellite accounts, those I am proposing would link to the national income accounts as appropriate, but also expand into areas that the national income and product accounts do not cover, thereby providing a framework for more fully examining the production functions of some difficult-to-measure activities without compromising the integrity of the core accounts.

To illustrate what I have in mind, consider as an example the potential development of a satellite education account. In the conventional accounts, the output of the education sector is measured as the sum of expenditures on the purchased inputs devoted to education, including salaries paid to teachers and other staff, materials and the services of capital (primarily the stock of school buildings). A broader education satellite account would include these market inputs, but also information on the significant amounts of unpaid time devoted to education, including student time, parent time and potentially the time of school volunteers as well. Investments in education result in individuals who have higher market productivity, which manifests itself in the form of higher market earnings; this portion of the value of the human capital associated with educational investments could be estimated using information on the present value of the earnings increment attributable to each increment of education. More educated individuals also may enjoy higher productivity in a range of nonmarket activities

(though education likely does not raise productivity in all potentially productive activities equally and should not be valued as though it does). In addition, education may provide public benefits, including a better-informed citizenry, lower crime rates, and so on. The main differences between the education satellite account I am envisioning and the information on education contained in the existing national accounts, then, are the addition of information on nonmarket inputs—mainly time—to the educational process and the explicit valuation of the human capital produced as the output of the education.

Health offers another example. In the conventional accounts, purchased medical care goods and services appear as inputs to medical care. But the full range of inputs to health is much broader than these purchased inputs, including own time devoted to doctors' visits, exercise and perhaps other activities, as well as the time of family members or others who help to care for the sick, and environmental improvement or degradation in air or water quality. On the output side, a non-market health satellite account would include the measurement and valuation of changes in health.

Conclusion

In his famous 1932 essay, Lionel Robbins wrote that “[s]carcity of means to satisfy given ends is an almost ubiquitous condition of human nature. Here then is the unity of subject of Economic Science, the forms assumed by human behavior in disposing of scarce means.” In practice, however, like our system of economic statistics, economists' intellectual attention for many years focused primarily on activities that involved market transactions. Indeed, the two phenomena are closely related: the data available for empirical research shaped in important ways the subjects that economists chose to study, which in turn affected the kinds of information they demanded.

Happily, however, the scope of economic research has broadened in recent decades. Environmental economics and health economics have become established fields of study. Increasing attention is being paid to how people allocate their time, not only between work and other activities, but also among the activities that consume their nonworking hours. There is new recognition of the importance of intangible investments, especially investments in human capital, which may add as much or more to our nation's productivity as the equipment and structures measured in the national accounts. Richer information to inform the understanding of economic outcomes in our society—information, for example, on how people allocate their time, on education, on health, on crime and so on—are now being collected and could serve as the raw material for an expanded system of satellite accounts that would complement the existing national income and product data.

Through long use the system of U.S. economic statistics has established its value to policymakers, the business community and average citizens alike. Over time, however, economic activity has shifted from goods production to services

production, and the nation's economic growth increasingly is based on knowledge capital rather than physical capital. As the economy changes, our economic statistics also must adapt if they are to maintain their relevance. Their coverage must be extended not only to provide a more complete picture of market-based services production but also to include the nonmarket production and investment activities that so profoundly affect our well-being and shape our capacity for future growth. Moving in this direction will, I am sure, open up exciting and unanticipated avenues for research.

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