CBO TESTIMONY

Statement of
Robert Dennis
Assistant Director
Macroeconomic Analysis Division

Issues Affecting the Bureau of Economic Analysis

before the
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Committee on Government Reform
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CONGRESSIONAL BUDGET OFFICE
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WASHINGTON, D.C. 20515

Mr Chairman and Members of the Subcommittee, I am pleased to be here today to discuss some of the major issues affecting the Bureau of Economic Analysis (BEA), the enormously respected keeper of the national income and product accounts (NIPAs). In my testimony, I will focus on the crucial role those accounts play in shaping public understanding of the U.S. economy and in helping the Congressional Budget Office (CBO) construct its baseline budget projections. I will also note several ways in which BEA's data might be improved:

- by extending its innovative treatment of computers to other parts of the information sector, and

- by accelerating the publication of some data.

THE IMPORTANCE OF BEA

It is not too much to say that the NIPAs are what make modern empirical macroeconomics possible. Those accounts are the organizing principle that enables us to see how the parts of the economy fit together. On one hand, they help economists track the way in which decisions made about work, consumption, and investment today determine how big the productive capacity of the economy will be next year. On the other hand, they show how those decisions, together with government spending and trade flows, evolve over time to determine the demand for each year's production.

The NIPAs are also the foundation of CBO's economic forecast, which underlies the baseline budget projections that the Congress needs to do its work. We use those accounts both to track what has happened in the past and to ensure that our assumptions for the future are internally consistent.

The economy that BEA describes in the NIPAs does not stand still, but keeps changing its structure. In the past decade, forecasters and analysts have had to cope with a set of changes that have come to be called the "new economy." Those changes have posed special challenges to the statisticians at BEA, who have done an excellent job of meeting them. Among the most important innovations, BEA staff have dealt with the special problems involved in measuring computer prices, have begun to count the intellectual capital in software in the same way as they treat other investment, and have changed the basis of measuring real (inflation-adjusted) gross domestic product (GDP) from a fixed-weight system to a much more stable system of chained weights. Those changes greatly enhance analysts' ability to understand the economy and thus to produce intelligent forecasts.

It remains to be asked, however, whether further improvements in BEA's measurements could make it possible to discern changes in trends more quickly and accurately, lessening the kinds of forecast errors we have seen in the past decade. CBO believes some further progress can be made, and in the remainder of this testimony I will suggest some areas for improvement. Nevertheless, such changes would not have entirely eliminated those forecast errors, because forecasting in a changing world is an inherently difficult task.

Many of the improvements suggested in this testimony would require changes in procedures not only at BEA but also at the agencies that provide BEA's source data. By and large, BEA is not a data-gathering agency. It gets its data from the surveys and economic censuses of the Census Bureau, from the Bureau of Labor Statistics (BLS), from administrative records such as tabulations of the Internal Revenue Service (IRS), and from various private sources. In cases in which improvements in data would require additional reporting by businesses, it would, of course, be necessary to assess any additional burdens that those requirements would impose. We have not made any such assessment.

HOW CBO USES BEA DATA

The largest role that BEA data play in CBO's budget projections is as an input to the economic projections, which in turn underlie both the revenue and outlay projections. CBO projects the level of real GDP—BEA's measure of the total amount of goods and services produced in the U.S. economy—as the basis of its 10-year budget projections. BEA data, along with data from BLS and the Bureau of the Census, are the key supply-side inputs used to explain economic growth.

In broad terms, CBO's economic model explains real GDP as the result of the combination of labor input, capital input, and total factor productivity (sometimes characterized as technical progress) in the nonfarm business sector of the economy. (CBO adds simpler analyses of four other sectors.) Projections of labor input are based on source data from BLS and the Census Bureau. Projections of capital input and total factor productivity (TFP) reflect historical trends in BEA data on national output and incomes and its measures of capital stocks.

BEA reports data for the capital stocks in the economy, and CBO combines those data with information from BLS to construct measures of the flow of capital services in each sector. Future flows of capital services are calculated from that base using projections of net investment (gross investment minus depreciation), which in turn

reflect CBO's projections of private and government saving. The analysis of both investment and saving behavior depends, once again, on BEA's historical data.

The third major input to the projection of real GDP is a projection of the growth in total factor productivity. CBO makes that projection by extrapolating from the trend growth of TFP in recent history. Total factor productivity is measured as that part of the growth in real GDP that cannot be explained by growth in labor or capital input. Hence, its trend reflects the historical data on real GDP as well as on labor and capital inputs, so CBO's projection employs BEA's measures of capital stocks and real GDP.

Besides contributing to CBO's economic projections, BEA data has a further role to play in CBO's projections of revenues. Revenues are sensitive to the distribution of national income among various kinds of income, which are taxed at different effective rates. In particular, for any given projection of real GDP, the projection of revenues will depend on the share of total income that takes the form of wages and salaries or corporate profits. BEA provides measures of wages and salaries and of corporate profits; CBO projects those measures forward as part of its overall economic projections. Measures of the capital stock, which determine how much corporate income can be assigned to depreciation, also have an important influence on the relationship between output and revenues.

CBO's projections of outlays are made within the framework of federal budget concepts, which differ from BEA's measure of the federal sector of the NIPAs. Nevertheless, outlays depend on BEA data through estimates of future price inflation. Historical price deflators produced by BEA are an important input to CBO's projections of outlays. BEA's NIPAs also provide the framework within which CBO can analyze the feedback from the federal sector to the rest of the economy.

THE CHALLENGES OF THE NEW ECONOMY

Developments associated with the "new economy" pose considerable challenges for economic forecasters. Those developments include rapidly falling costs for information technology (IT) and, consequently, for information; changes in the organization of production as firms take advantage of the lower cost of information; and a proliferation of new companies doing new things, which are always among the hardest to track. Of course, the economy is constantly buffeted by structural changes. The latest developments are merely the most recent example of that process. They differ from past examples in some features, such as the dramatic technological change in computers, but they are similar in other features, such as the shifts in the sectoral

composition of GDP. To understand what is happening, forecasters need a statistical system that can keep pace with the changes in the economy.

Different people mean different things when they talk about the new economy. At CBO, we focus on the stunning acceleration in productivity growth during the late 1990s. The growth of labor productivity almost doubled during the second half of the 1990s, rising from an average of 1.5 percent per year between 1974 and 1995 to 2.9 percent per year between 1995 and 2000.

That rise in productivity growth had many causes, but an increase in businesses' investment in computers and related hardware contributed disproportionately to it —causing more than half of the rise, most estimates say. Computers have contributed to productivity growth in two ways. First, investment in computers has helped make companies that use them more productive. Second, increased productivity in the manufacture of computers has added directly to national output and productivity. A very large share of the contribution of computers has come from increased productivity in the computer manufacturing sector, although economists still disagree widely about the exact size of that share.

CBO and other analysts have put a great deal of effort into understanding the contribution that various high-tech goods and services have made to real growth and, of course, the degree to which they have spurred productivity growth. All analyses of that contribution have been made possible by advances in BEA's price indexes and measures of quality improvement. Those advances fall into two categories: measurement of real values to purchasers and measurement at a finer level of detail. Despite those important successes, however, improvement in measuring the output of the IT sector is only beginning.

Measuring Real Values to Purchasers

One of BEA's main tasks is to separate economic growth into the share that reflects price changes and the remaining share, which reflects the real growth of the economy. Developing good price indexes is often difficult, however. Although it is relatively easy to measure the price change for a good (such as Kansas City hard red wheat) that does not vary over the years, the quality of most goods and services changes over time, and price indexes must take those changes into account. For example, even though a computer now may sell for roughly the same price as a computer last year, few people would be happy to purchase last year's model rather than this year's. The same number of dollars this year buys vastly more computing power than it did last year, and

that improvement in quality has to be reflected in the price index. Estimates of such improvement are often rough, but they are generally preferable to ignoring all of the available information about changes in quality.

BEA has led the way in improving estimates of the contribution of computers, by taking into account in its price measures the enormous improvement in the power and speed of computers as well as the lower prices at which computers are sold.[1] The same approach could be extended to other areas, especially software and perhaps computer services. In addition, statisticians do not yet have a good handle on the prices (or, therefore, the real quantities) of peripheral equipment and even some computer components. For example, most mainstream manufacturers of disk drives are located abroad. But BLS's producer price index (PPI) tracks only domestic producers, who tend to be in niche markets where prices do not reflect the mainstream of the industry. BLS's international price index is not complete enough to track the small electronic components that the United States imports in large numbers.

BEA's price indexes for communications equipment are also inadequate, though they will improve in coming years. BEA's estimates rely on the PPI, which BEA then adjusts slightly. Those estimates do not yet capture the advances that have occurred in the speed and power of communications equipment. BLS has begun to improve its measures, using some of the same quality-adjustment techniques that it and BEA pioneered in the case of computers, but it will be years before the treatment of communications equipment has caught up with that of computers. Given the scale of investment in communications equipment—$124 billion in 2000—the lack of good quality adjustments for that equipment results in measurable understatements of output and productivity. That lack, according to a forthcoming CBO analysis, resulted in an underestimate of real investment growth of about 0.6 percentage points per year, on average, between 1996 and 2000.

Although good measures exist of the prices of the semiconductors that computer makers use most—microprocessors and dynamic random access memories (DRAMs)—the estimates of the quality-adjusted prices of other types of advanced integrated circuits are not always so good. Those other integrated circuits underlie the communications revolution of the past few years. BEA currently relies on the PPI for its index

1. BEA and BLS have worked together to create "hedonic" price measures for computers. Hedonic price measures attempt to discern how purchasers value different attributes of a computer (such as its speed, memory, and so forth) and to construct a price index that reflects the improvements in those attributes. For example, if a computer today cost the same as last year's model but was twice as fast and had twice as much memory, the real price of those attributes would have been halved. A hedonic price index would capture that price decline.

of semiconductor prices. The BLS—correctly, in our opinion—has concentrated its resources on the semiconductors that account for the largest share of the market (microprocessors and DRAMs, which make up one-third of world semiconductor production and a slightly larger share of U.S. production). Nevertheless, that concentration means that the dramatic improvement in quality of other semiconductors is still being missed in official measures. That improvement will not be easy to measure, however, because the markets for those other integrated circuits are much more fragmented and thus will take many more resources to survey.

Finally, many of the measurement issues described above also apply to durable goods, such as tools and instruments, that use computer technology but are not usually classified in the IT sector. Microprocessors often permit an unprecedented degree of precision, such as in the plants that manufacture semiconductors. In areas where quality has improved dramatically, such as computerized industrial machinery and scientific instruments, the NIPA price index and the PPI have probably underestimated real price declines, because the current indexes do not incorporate the quality-adjustment methodology now applied to computers. However, for many of the most promising areas, economic studies to determine whether official price indexes have indeed missed systematic quality improvements remain to be done.

Measuring at a Finer Level of Detail

Some of the most useful studies of the new economy are those that perform a growth-accounting exercise at the industry level. Those studies calculate total factor productivity by industry and correlate the industries that have experienced increases in TFP growth with those that have invested heavily in IT goods. That approach (typified by the work of Dale Jorgenson and Kevin Stiroh) is data intensive, requiring information about output, labor input, and capital input by industry. Largely through the efforts of BEA, the data required to calculate the capital input are available, though only with a lag. Calculating the labor input requires more assumptions—thus, it would be useful to have better and more timely estimates of hours worked by sector.

MEASURING REAL PRODUCT AND PRICES IN SERVICE INDUSTRIES

It is generally recognized that the output of many service industries is poorly measured. The basic problem is not the ability to measure the number of transactions in those industries but the ability to define a unit of output and, therefore, a price index for that output. The problem is compounded when the quality of those services is improving over time. For example, the official price indexes for transportation services, insur-

ance, and banking have been criticized on various grounds: for ignoring changes in quality, such as the advent of ATMs or a faster approval process for mortgages; for using list prices or even input prices instead of the prices of actual sales transactions; or for improperly weighting the price index toward services that are being phased out. Those sectors are probably some of the ones in which the productivity benefits of lower information costs would be visible if better data existed.

Of course, BEA is not responsible for producing price data—most are developed by the Bureau of Labor Statistics. However, the usefulness of the NIPAs, which are produced by BEA, is significantly affected by the price data that are available, and thus the adequacy of price data is a concern of this hearing.

The potential impact of improving statistics for the service sector is huge. The possible gains are illustrated by the work of Carol Corrado and Lawrence Slifman of the Federal Reserve Board. In a recent paper, they found that reported productivity growth in many service industries was persistently negative between 1977 and 1997.[2] Since many of those industries had remained profitable during that period, they speculated that problems in measuring prices were the reason for the negative productivity growth. They found that if they replaced the negative productivity growth rates for several service industries with an estimate of zero productivity growth, overall productivity growth was about 0.3 percentage points higher than reported.

One service industry that has long been of concern to CBO is medical care, both for its contribution to the NIPAs and for the potential effects that medical advances have on the demand for services under Medicare and Medicaid. Improved measurement of medical care prices could have a major impact on CBO's view of the economy as well as on our analysis of various policy proposals related to health care. Spending for medical care makes up about 15 percent of total personal consumption expenditures and about 11 percent of GDP. Even the relatively small changes in measuring medical care prices that were made in 1994 and 1996—replacing consumer price indexes with newly developed producer price indexes for some physicians' services and for government hospitals—increased the measured growth of real GDP by about 0.1 percentage point.

A number of recent studies illustrate the need for better information about medical care prices. For example, one study found that HMOs paid about 40 percent less per case

2. Carol Corrado and Lawrence Slifman, "The Reliability of Aggregate Statistics: Decomposition of Productivity and Unit Costs," *American Economic Review*, vol. 89 (May 1999), pp. 328-332.

than indemnity insurance companies did for treating heart attack patients in Massachusetts in 1993 through 1995. In essence, the indemnity companies paid a list price, whereas the HMOs had negotiated discounts. Thus, a price index that simply tracked list prices would overstate the price of treatments for heart attacks. In addition, better knowledge of how different insurers compensate providers—information that could be gleaned in part from better surveys of medical care prices—would improve the analysis of various policy proposals for government health programs, such as the recent plans for prescription drug coverage for the elderly.

Other recent studies of heart attack treatments highlight the quality-adjustment problem with medical care prices. Between 1975 and 1995, the mortality from heart attacks after 30 days dropped from 22 percent to 12 percent. The studies show that about half of that gain stemmed from better treatment, but the price indexes for medical care do not adjust for that change in outcomes. If such an adjustment were made, the price of heart attack treatment would fall.

In short, the real value of medical care has probably grown much more over the years than official data indicate.

Because price indexes for medical care face a host of special problems, improving those measures will not be easy. It is not even clear what should be measured—the price of individual medical services that make up a specific treatment, the price of the overall treatment, or the price of a cure for a specific ailment. If individual prices (such as a day in a hospital bed) are measured, the price index will not take into account advances in treatment that reduce the number of hospital days required. If the price of the overall treatment (say, the total cost of surgery for ulcers) is measured, the replacement of surgery by a course of drug treatment for ulcers would not be taken into account. However, if statisticians try to measure the cost of a cure for ulcers regardless of the method of treatment, they must determine the value of the medical outcome for the patient, which is a difficult task. (How does one value the benefit of a cure for ulcers?) In addition, the cost of a cure may reflect changes in the severity of patients' initial conditions over time more than changes in the cost of the medical services.

IMPROVING DATA REPORTING

BEA generally produces its estimates quickly after the underlying data become available, though there have occasionally been large delays in completing benchmark revisions. Some changes in BEA's regular reports could help CBO produce its

economic and budget projections. In some cases, however, those changes would require additional data collection and changes in procedures at other agencies.

Data for Revenue Estimates

CBO's revenue projections would benefit from the improved availability of data measuring wages and salaries and withheld income and payroll taxes. However, certain improvements would require a change in the tax-reporting requirements on employers.

First, data on stock option activity are very poor. No government statistics measure the extent to which the exercise of nonqualified options by employees contributes to overall wages and salaries. Income related to the stock market, such as income from options, has different characteristics than other types of income, and those differences could have important implications for CBO's projections. We understand that BEA is investigating ways to improve those data, and we look forward to its results. One way to assist BEA in that endeavor would be to require employers to report stock option activity separately on W-2 forms—a change that the IRS is considering.

Second, contemporaneous information on the sources of withheld tax payments would be very helpful to CBO as well as to BEA. The IRS does not require employers to report immediately how much of the withheld taxes they remit represent payroll taxes and how much income taxes; that information is reported on a quarterly basis. Final numbers do not appear until W-2 reports are processed after the end of the year. As a result, both BEA and tax analysts have to make do for more than a year with estimates of that split, which complicates the tracking of tax trends.

Technological advances, however, have made the real-time availability of those data possible. With most withheld receipts now paid through electronic transfers, the necessary information could be required of employers along with the payments and made immediately available by the IRS to the public in aggregate form. The split between payroll taxes and income taxes is already calculated by employers, so the additional reporting burdens on them might be small. Because withheld receipts result from taxes with different rates and bases, the broken-down data would enable CBO to track more quickly certain shifts in the overall distribution of wage income in the economy, an important determinant of effective tax rates. In addition, BEA could improve the measures of federal taxes in the NIPAs.

Third, BEA could help us by publishing its "not-seasonally-adjusted" estimates of wages and salaries, in addition to the seasonally adjusted data it now provides. That expanded information would enable us to link more directly the information on wages and salaries with the resulting income and payroll taxes. For data covering the past several quarters, BEA generally starts with source data that are already seasonally adjusted, so providing the data before seasonal adjustments would require adding the seasonal movements back in, not necessarily a straightforward task. For data covering earlier periods, however, BEA generally starts with source data that are not seasonally adjusted and then makes the seasonal adjustments, so providing that data would presumably be fairly easy.

Current-Quarter Reports

Sometimes, the state of the economy is highly volatile and its direction is uncertain. At such times, current-quarter analysis—and hence the timeliness of BEA data—is very important in shaping CBO's near-term budget outlook. Given the near-term implications that recessions have for revenues and outlays, there is a premium on information that lets forecasters distinguish an emerging recession from a slowdown. More accurate and more timely information on the development of the inventory cycle would certainly have helped in the formulation of CBO's forecast for 2001.

CBO's projections would therefore benefit from better estimates of the initial jumping-off point of the economy and from an improved reading of the economy's current direction. The quality of the quarterly NIPA estimates could be enhanced if BEA's source data could be collected more rapidly without loss of accuracy, or more accurately without loss of timeliness, or both.

As we think about the difficulties that forecasters face in tracking what is going on in the current quarter, many of the deficiencies in data seem intractable. For example, we would very much like to have earlier data on inventory changes and net exports. Those two components are responsible for a large part of the volatility of GDP on a quarterly basis, but they are available only with a two-month lag and are still subject to considerable revision after three months.[3] In November and December of 2000, the

3. Information on a large part of inventories is drawn from monthly Census Bureau surveys of manufacturing, wholesale trade, and retail trade and then converted by BEA to current replacement costs using information from periodic Census Bureau surveys. The advance monthly survey data on manufacturing and trade are published about six weeks after the survey month. Data on exports and imports of goods are based on a mix of paper and electronic filing with the Census Bureau and the Customs Bureau and are available—accompanied by BEA estimates of trade in services that use a mix of judgment and sources—with about a seven-week delay.

economy slowed very rapidly, mainly as a result of an inventory correction in the business sector. The current methods meant that data for inventories in December were not available until mid- to late February; as a result, the advance estimate of fourth-quarter GDP at the end of January had to be based on assumptions rather than measurements of inventory behavior. If there was some way to process those data more quickly, CBO would be better able to understand what was going on in the current quarter. However, earlier estimates would not be useful if those data were significantly less reliable than the ones we get now, and we have no specific suggestions about how the data could be produced more quickly.

BEA could still help forecasters increase their understanding of the current state of the economy even if the published quarterly estimates cannot be improved. Once the "final" estimates of NIPA variables for a given quarter are "locked up" (three months after the end of the quarter), BEA continues to gather information that may subsequently be used in its annual revision, when quarterly estimates are updated. Because BEA's estimates of subsequent quarters are based on the principle of the best estimate of change, the actual level reported for a subsequent quarter will, in that case, be reported with a built-in and known error. If BEA were to report as technical background any information that it had about the "locked" quarters, forecasters such as CBO could use that information to make an informed estimate of the likely subsequent revision to the level of GDP. Such a procedural change would allow our budget projections to more fully reflect the data already being collected. BEA's sister agency, the Bureau of Labor Statistics, already informs its users about what annual revisions it is likely to make to the employment figures that come from its surveys of employers.

THE LIMITS OF GDP MEASURES

Although the NIPAs and their headline number, GDP, are central to understanding what is happening in the economy, it is important to remember that changes in GDP do not correspond closely to changes in people's well-being. GDP is a measure of production and income, not of well-being.

Currently, GDP measures the market economy, covering transactions that involve monetary exchanges. The NIPAs do include some imputations, most notably for rent of owner-occupied housing, but even those imputations reflect market activities (houses are bought and sold in the market, and the imputation of rent is simply a way of valuing that market activity that does not distort the short-term growth of the economy). The focus on the market economy is particularly useful for revenue

estimators, because money transactions generate the incomes on which people are taxed.

A variety of efforts are under way to produce a more comprehensive measure. Those efforts range from attempting to value nonmarket activities such as household production, to valuing extraction of primary resources, to a "green GDP" concept that tries to take into account the losses associated with pollution. Even with those efforts, however, GDP and its expanded measures can never be a complete reflection of human welfare. Most important, it takes work to produce output, and it takes current sacrifice to produce saving and investment. How much work and how much saving it is worthwhile to devote to helping the economy grow will always be a calculation outside the scope of national income and product analysis.

CONCLUSIONS

I have noted various areas in which further improvements in data could be productive. BEA is already working on most of them, and indeed, it has a much better and more comprehensive list than we do. I would just like to finish with the following thought: the new economy poses severe problems for national income statisticians, but it may also offer an opportunity. The IT revolution has lowered the cost of information, and that is having dramatic effects on the way businesses produce and use information. The IT revolution may also offer the opportunity for government statisticians to gather more useful data without intruding into or imposing excessive burdens on private business.

APPENDIX: RELATED CBO PUBLICATIONS

Greening the National Accounts (Paper), March 1994.

Is the Growth of the CPI a Biased Measure of Changes in the Cost of Living? (Paper), October 1994.

Changing the Treatment of Software Expenditures in the National Accounts (Memorandum), April 1998 (available at www.cbo.gov).

Measurement of Employee Benefits in the National Accounts (Memorandum), September 1998 (available at www.cbo.gov).

Current Investments in Innovation in the Information Technology Sector: Statistical Background (Memorandum), April 1999 (available at www.cbo.gov).

"Federal Statistics and Data Collection" in *Budget Options*, February 2001, pp. 89-92 (available at www.cbo.gov).

The Need for Better Price Indexes for Communications Investment (Paper), forthcoming.