Testimony of

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On
The quality of GDP data, and the Bureau of Economic Analysis

I am Gordon Richards, testifying on behalf of the National Association of Manufacturers (NAM). The NAM represents 14,000 companies, 10,000 of which are small businesses. The topic of this hearing is the quality of our estimates of Gross Domestic Product, and the performance of the Bureau of Economic Analysis (BEA) in general.

First, we agree that GDP is the single most important indicator of our economic well-being. It is not the only indicator of interest to manufacturing executives. We also make considerable use of the Federal Reserve's index of industrial production, the Census Bureau's data on shipments, inventories and orders, and the Bureau of Labor Statistics' series on manufacturing productivity, as well as other indicators. We commend the BEA for the excellent job that it has done in compiling the GDP data. The United States now possesses some of the most advanced national income accounts (hereafter, NIA) in the world. Our methods for estimating GDP are arguably better than those in most of the other industrial countries, and in fact are being widely copied overseas. The BEA spearheaded these innovations.

Issues in Measuring GDP

The BEA has in the past 10 years carried out several major innovations in national income accounting. First, the BEA was instrumental in instituting chain-weighting in the early 1990s. Previously, GDP was calculated by basing the weights on a given year, and calculating output in constant dollars using these weights. The problem was that as the mix of spending changed, the weights in the base year became increasingly obsolete. As a result, the estimates of GDP became steadily less accurate as distance from the base year increased. The BEA's new chain weighting scheme completely corrected this problem. What chain weighting does is change the weights each period, based on the mix of spending, and then link the weights of adjacent periods. The result is a much more sophisticated and more accurate set of GDP estimates than the previous system.

One interesting finding from chain weighting is that this generally shows higher long-term growth and lower inflation. Stated another way, prior to chain-weighting, the BEA was mis-measuring GDP downward and mis-measuring prices upward. This in turn has two key implications for policy.

First, the measures of prices produced by the chain-weighted deflators show lower inflation rates than the more widely used Consumer Price Index (CPI) compiled by the Bureau of Labor Statistics (BLS). The reason for this is primarily chain weighting. The CPI has historically been based on a sample of consumer purchases with weights fixed in the 1980s (althoughthe BLS is currently correcting this). For instance, for the period 1980-99, the CPI shows an increase in prices of 102.1 percent, while the chain-weighted deflator for personal consumption expenditures shows an increase of 89.9 percent, more

than 10 percent less. However, payments of Social Security benefits and other federal transfer payments were indexed to the CPI starting in the mid-1970s. This means that the federal government has spent more than it had to in order to protect beneficiaries of transfer payments from inflation.

Second, there has been a long-standing debate over potential output – how fast the economy can grow at a stable inflation rate. This debate has been central to decisions on interest rates by the Federal Reserve. Chain-weighting was one of the contributing factors to the upward revision in real output. The higher real output and lower inflation numbers demonstrate that the economy's potential has been higher than some analysts previously thought.

Chain weighting, however, was not the main factor. Two other innovations by BEA were critical to determining that real growth was higher than previously estimated, particularly in the 1990s. One of these was the decision in October 1999 to include software under business fixed investment. Prior to this time, software was classified as an intermediate input, similar to a raw material, and excluded from GDP. Users of computer programs, however, have long recognized that software is a productive asset that generates real output. The decision to include software under investment raised estimated GDP growth by as much as 0.4 percentage points per year in the 1990s.

The second innovation was imputing the quality of computers to the real output of computers. The intuition behind this is that the speed and capacity of computers increases very rapidly – currently, computer quality is increasing about 13 percent per year. Computer quality generates increases in real output. If a production system is computerized and computer quality is increasing, then each time a new computer is

added, or replaces an obsolete one, the system can produce more. This is conceptually true for nearly any kind of production system – for instance, processing of retail transactions, airline reservations, electronic banking, or computer control of automated production lines in manufacturing. If these quality improvements are not measured as part of computer output, then real computer output will be understated. For instance, in 2000, nominal investments in computers rose by $19.8 billion dollars, an increase of 20.8 percent. However, the real value of computer investment rose by $86.4 billion. The real rate of change was 39.7 percent, nearly twice as large as the nominal rate of change of 20.8 percent.

The redefinition of computer output was a crucial factor in driving the manufacturing revival of the late 1990s. The manufacturing share of GDP grew during the late 1990s, and the main reason was the measured real increase in output of computers and peripherals. For instance, in 1989, the peak of the previous business cycle expansion, manufacturing accounted for 16.8 percent of GDP. In 1999, the peak of the current expansion, this share had risen to 17.2 percent. Without the quality imputations to the real value of computers, this increase in the manufacturing share would not have been measured.

We would argue, however, that the true share of manufacturing in GDP is higher than the official numbers indicate. The reason is that some sectors such as publishing have recently been excluded from manufacturing, although historically they have been considered part of the manufacturing sector. A second reason is that we believe that software should be reclassified under manufacturing, because it meets one of the key definitions of a manufacturing industry. It involves the physical transformation of an

object, in this instance by writing code to a hard disk. Further, the final sale is generally an object. If software and publishing are reclassified as manufacturing activities, the share of manufacturing in GDP jumps to more than 22 percent. This is consistent with earlier BEA data, which showed that manufacturing historically accounted for 21 to 23 percent of GDP. Further, the contribution of manufacturing to growth through the production function – i.e., its contribution through inputs of labor, physical capital and technology – is also about 23 percent. The fact that these numbers match so closely argues that software should be included in manufacturing.

It is reasonable to ask here why we can be confident that these innovations are actually resulting in more accurate estimates. The main reason is a well-known relationship in economics, which states that national product and national income have to balance. It is clear why they should. National product is measured as a weighted average of final sales. National income is the income received from these transactions. If there are persistent discrepancies between income and product, this implies that one of them is being mis-measured.

Throughout the early 1990s, national income consistently ran ahead of national product. The old GDP measures showed relatively slow growth in the mid-1990s, but national income data suggested that growth was much faster. Other items of evidence supported this. Studies of productivity at the firm level indicated that technological innovations were raising output per hour very rapidly. A significant amount of real output seemed to have "gone missing". In fact, the missing output was no mystery. It was being generated by increasing purchases of software, and by the increasing quality of

computers. Since the inclusion of these two factors in GDP, national income and national product have been in much closer alignment during the mid-1990s.

Notably, however, national income again began to surge ahead of national product in 1999 and 2000. For instance, in the second half of 2000 when output is measured as having slowed down, national income was running roughly $100 billion ahead of national product. Again, this suggests that real output may currently be stronger than measured.

Another area in which quality imputations were significant was electronic banking. Banking is a sector where output is notoriously difficult to measure. In fact, this is true of many types of services, where output is not measured directly, and real values have to be imputed. Previously, the output of the banking sector was imputed using inputs of labor. But this meant that the average productivity of the banking sector worked out to zero. Again, firm-level studies of banks in the 1990s showed significant increases in productivity, for instance in the increased use of ATM machines, and the speeding up of transactions by electronic means. Starting in October 1999, the BEA has imputed quality improvements to banking. This has resulted in a higher estimated level of GDP, and a higher value for the rate of productivity growth.

Further Issues in Calculating GDP

As noted here, for the past two years national income has been growing faster than national product. The most likely explanation for this is hidden productivity, resulting from technological advances that are difficult to measure directly. We are confident,

however, that the BEA will be able to resolve this discrepancy fairly fast, and that the result will be an upward revision in the growth rate.

One issue relating to the measurement of technology is the peculiar inconsistency in the NIA. Government spending on research and development (R&D) is counted in GDP, under government purchases. However, private sector spending on R&D is not counted. Instead, R&D investments by private industry are treated as intermediate inputs, and excluded. It is possible that when these issues are resolved that R&D, like software, will eventually be included under business fixed investment. If it is, it would actually account for most of the missing output in 1999-2000, although in prior years, it would create the opposite problem: real output would be measured as having been higher than income.

If R&D is not counted under business fixed investment, however, the technological advances generated by this research are still a contributing factor to the increased income visible over the past two years. The output implied by this income – currently not measured – will probably be found in sectors where it has been difficult to measure quality improvements.

Conclusions

In sum, the BEA has done a fine job in measuring GDP. It has stayed abreast of the debates in economic theory and statistical measurement. It has paid close attention to the issues associated with the emergence of new types of products and services, particularly in high-technology sectors. It has also been sensitive to the problems caused by discrepancies between national income and national product. It has been responsive to

these problems when they have arisen. The BEA has generally not allowed discrepancies or inconsistencies in measurement to persist. Rather, it has sought to correct the problems, and to derive more accurate measures. The BEA is to be commended on its excellent performance, given the limited resources that it has to work with.