

ECONOMIC COMMENTARY

A Revised Picture: Has Our View of the Economy Changed?

by Theodore G. Bernard

The Bureau of Economic Analysis (BEA), a part of the U.S. Commerce Department, produces the National Income and Product Accounts (NIPA) statistics. These statistics summarize the nation's total economic activity, and provide statistical views of our gross national product (GNP).

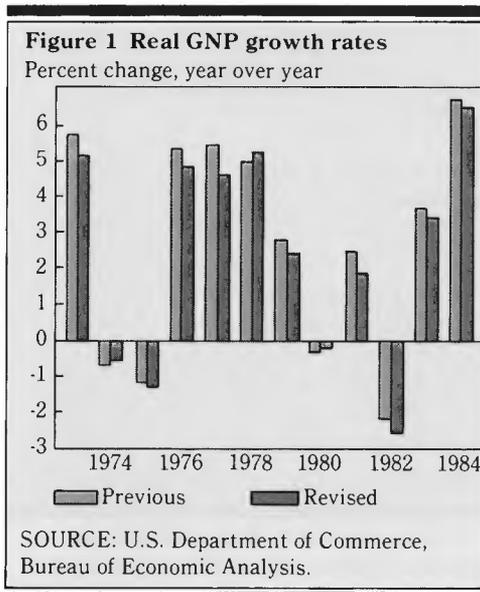
NIPA statistics are important economic tools. They provide information that helps government policymakers and business leaders to understand past and present economic activity, and to make decisions that have far-reaching effects in the economy. Aside from regularly scheduled revisions, the BEA also releases benchmark revisions approximately every five years, as new census data become available.¹ The most recent benchmark revision took place in December 1985, the eighth such revision of its kind.

The NIPA statistics measure economic activity in terms of current (nominal) dollars and in constant (real) dollars. Current-dollar series reflect data before a correction for price changes, while constant-dollar series are adjusted to remove the effect of price changes over time.

In the BEA's 1985 revision, all current-dollar series in the NIPA statistics were revised back to 1972, while many were revised for earlier periods as well. All constant-dollar series and price indexes were revised back to 1929 to reflect a base-period shift from 1972 to 1982.

Two types of major changes are evident in the recent revision: definitional and classificational changes, and statistical changes. Although changes in definition and classification are important, the statistical changes have a much greater impact on the NIPA sta-

tistics, both in terms of percent changes and conceptual revisions. This *Economic Commentary* analyzes the major statistical changes in the December 1985 benchmark revisions of the NIPA.²



Rebasing Constant-dollar Series

The statistical changes are the BEA's self-described "outstanding feature" of the revisions. Shifting the base period for the price indexes to 1982 from 1972 in the calculation of constant-dollar series is the most important statistical change. The year 1982 was chosen for the new base period because it is the latest year for which data will not be revised until the next comprehensive revision.

The base-period shift restates constant-dollar output into different units of measurement. As a result, there is an approximate doubling of real GNP levels that reflects the difference in measurement units. For example,

with 1972 as the base period, constant-dollar output in 1984 had been estimated at \$1.6 trillion, but with 1982 as the base period, constant-dollar output in 1984 is now estimated at about \$3.4 trillion. This does not imply a doubling of actual output—only a doubling of the units used to measure output.

The rebasing, or restating, of constant-dollar series does more than just change the units of measurement. Since the economy does not remain static, patterns of consumption and investment change over time; rebasing updates the NIPA statistics to reflect these changes.

For example, price inflation in the economy since 1972, the previous base period, has caused changes in purchasing patterns. Generally, purchasers have tended to shift away from goods with large price increases and toward goods with smaller price increases, or even with price decreases. Shifting the base period, thus incorporating new purchasing patterns and relative price schemes, systematically affects the growth rates of constant-dollar series. These growth rates are a ratio of a given period's total output to the output of the base period. Within the ratio, GNP component quantities are "weighted" by their respective prices for some chosen year. For the sake of comparison, only one set of prices can be used to "weight" the output for both periods.

When compared to the 1972 base period, restating real GNP levels in 1982 prices will give greater "weight" to slow-growing quantities associated with fast-growing prices (energy items, for example), while less "weight" goes to fast-growing quantities associated with slow-growing prices (such as

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1. The NIPA statistics are revised on a regular basis as new and more comprehensive data become available. Quarterly data are routinely revised twice after the preliminary figures are issued, then further revisions occur annually in the following three years.

2. Ten definitional and classificational changes attempt to modernize the accounts, so that they more accurately reflect our evolving economy. The net effect of these changes accounted for about one-third of the \$26.9 billion increase in current-dollar GNP in 1972 and for about one-fourth of the \$111.9 billion increase in 1984. The

computing equipment). Historical trends tend to verify this inverse relationship, although some exceptions occur, thus meaning that, under such circumstances, shifting to a more recent base period will lower measured growth rates for real GNP.

The choice of the base period will therefore affect our estimate of real GNP growth rates unless there is little relative price change among the various goods and services. In spite of this phenomenon, the BEA shifts the base period because rebasing produces measures of output more relevant to current prices.

Although the net result of all the benchmark revisions is to raise the level of real GNP, the new estimates show lower growth rates than previously published data for almost all major components of real GNP. Revised estimates for current-dollar GNP show an unchanged 9.9 percent average annual growth rate for the years 1972-84, but revised constant-dollar GNP growth drops 0.2 percentage point to 2.5 percent. (See *figure 1*.) Downward revisions occur in nine out of 12 yearly growth rates, the largest one being a 1.1 percentage point decline in 1973.

How much of this decline comes solely from the rebasing? The BEA figures show that, while holding other things constant, rebasing reduces real GNP growth rates an average of 0.4 percentage point per year. (See *table 1*.) In general, any measure of real GNP will tend to understate growth in years preceding the base period and correspondingly overstate growth in years subsequent to the base period. This happens because the price "weights" remain constant, even though spending patterns might be altered due to subsequent changes in the relative prices of goods.

Some caution should be used, therefore, when comparing NIPA statistics over an extended period of time. The 1982 base might be more appropriate for measuring economic activity in the 1980's, but the 1972 base might be a more reliable measurement of growth in the early 1970's. However, using several different indexes for different time periods is impractical and inconvenient. Using the most current index provides a more up-to-date measure of recent economic activity.

Table 1 Revisions in Average Annual Rates of Change Over the Period 1972-84 for GNP and its Major Components

	[Percent]			
	Constant dollars	Source of constant-dollar revision		
	Revision	Current dollar revision	Base period shift	Other
GNP	-0.2	0.0	-0.4	0.2
Personal consumption expenditures	-0.4	0.1	-0.4	-0.1
Durable goods	-0.1	0.3	-0.4	0.0
Nondurable goods	-0.5	0.1	-0.5	-0.1
Services	-0.4	0.0	-0.3	-0.1
Gross private domestic investment	-0.4	0.2	-0.9	0.3
Fixed investment	-0.6	0.1	-0.8	0.1
Nonresidential	-0.8	-0.2	-1.0	0.4
Structures	0.5	-0.3	0.5	0.3
Producers' durable equipment	-1.2	0.0	-1.6	0.4
Residential	0.6	0.7	-0.1	0.0
Change in business inventories	—	—	—	—
Net exports of goods and services	—	—	—	—
Exports	0.1	0.0	-0.2	0.3
Imports	-1.1	0.2	-1.2	-0.1
Government purchases of goods and services	-0.1	0.0	0.0	-0.1
Federal	-0.1	0.2	-0.1	-0.2
National defense	-0.2	0.1	-0.3	0.0
Nondefense	0.3	0.2	-0.1	0.2
State and local	0.0	-0.1	0.0	0.1

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

A look at information reflected in previous indexes illustrates the alterations that can occur when revisions are made. In the 1976 comprehensive revision, when price indexes were rebased from 1958 prices to 1972 prices, real growth rates also declined. For the period 1958-74, average annual growth of real GNP decreased 0.2 percentage point. Offsetting changes to the components of GNP kept the aggregate revision relatively small. The sharp rise in food and energy prices, relative to other goods, since 1972 would have created a significant impact on real GNP if these elements were incorporated into the 1976 revision. According to the January 1976 *Survey of Current Business*, the BEA found it "regrettable that it was not possible to take the energy price increase into account."³

Since energy prices influence the prices of many other goods, a rebasing that adjusts for higher energy prices should be expected to lower the real growth rates of several GNP components. Because the 1972 base period did not reflect the relative rise in energy prices, real imports of petroleum, in recent years, were overstated relative to their value in 1982 dollars. When the 1982 base adjusts for higher energy prices, real petroleum imports receive a greater "weight" relative to the 1972-based accounts. Since imports are a negative item in the GNP accounts, the greater "weight" attached to petroleum imports will reduce GNP growth rates in the 1982 basis relative to the 1972 basis.

details of these changes are documented in the October and December 1985 issues of the *Survey of Current Business*.

3. "The National Income and Product Accounts of the United States: Revised Estimates, 1929-74," *Survey of Current Business* vol. 56 (January 1976): 1-34.

The current benchmark revision of the NIPA statistics offers some interesting information. For example, productivity, as measured by output per man-hour worked, is usually systematically affected by the GNP revisions. Since the current base-period shift tended to lower output growth rates, and output is a part of productivity, it is not too surprising to find that productivity growth rates have also fallen. To make the decline even worse, man-hours worked have been revised upward by the Bureau of Labor Statistics. The pattern of productivity growth remains fairly similar to previously published data, but the revised growth rate for nonfarm productivity shows a 0.3 percentage point decline, on average, for 1972-84. Thus, the incorporation of the revised data does not change the well-publicized productivity slowdown of the last decade.

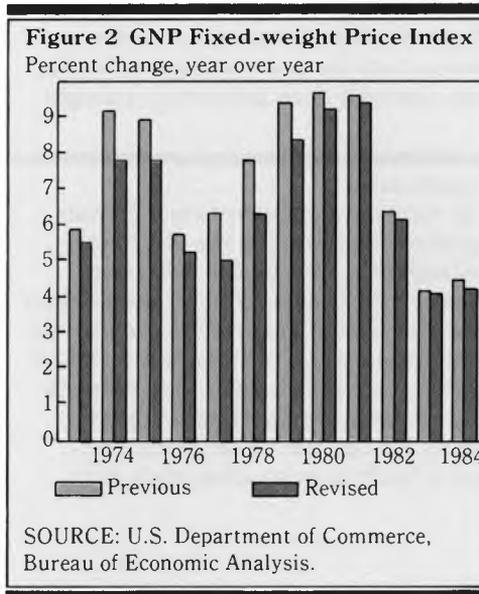
The GNP fixed-weight price index shows the same effects from a base-period shift as do real GNP growth rates. Prices that increased the least from 1972 to 1982 generally will have a greater effect on the change in the fixed-weight index than before the re-basing. Therefore, the measured price increase will also be less. Over the period 1972-84, the GNP fixed-weight price index is now estimated at a 6.6 percent annual growth rate, down from 7.3 percent. (See *figure 2*.) About half of the decrease is attributable to the base-period shift. The price deflator for producers' durable equipment, a component of nonresidential fixed investment, displayed the largest downward revision, 5.2 percentage points. The combination of the re-basing and the incorporation of a new computer price index are responsible for almost the entire change.

Other Statistical Changes

The current benchmark revisions include other major statistical changes, including source-data changes and changes in methodology. These changes incorporate new source-data not previously available and reflect new estimating techniques, as the two tend to go hand-in-hand. Together they account for about 30 changes. The most important include: 1) Improvement in the price index for computing equipment;

2) correction of a timing problem associated with the monthly U.S. merchandise trade data; and 3) adjustments for misreporting on tax returns.

The first change deals with developing a price deflator for computing equipment. The BEA, with the advice and assistance of IBM Corporation, developed a new price index that more accurately reflects the prices of computing equipment. The previous index assumed computer prices did not change between 1972 and 1984. The new index shows that computer prices have declined by an average annual rate of 14.0 percent from 1972-84. The incorporation of the new computer price index raises the average annual growth rate of constant-dollar computer purchases, a component of producers' durable equipment (PDE), by almost 15.0 percentage points! This increase translates into a substantial rise in PDE expenditures in 1972 dollars.



When measured in 1972 dollars, expenditures for PDE, over the period 1972-84, are now \$107.9 billion more than previously reported. This increase, almost solely due to the revision of computer purchases, pushed the annual growth rate of real PDE up 4.8 percentage points. Despite the strong upward revision due to the new computer price index, re-basing to 1982 dollars, as is evident in table 1, becomes the dominant influence in lowering real PDE growth.

Further effects of this statistical change are carried over into the revision of data on exports. The upward

revision to exports more than offsets the negative impact of rebasing, primarily due to the incorporation of the computer price index. Thus, real exports have grown 5.5 percent yearly, which is 0.1 percentage point higher than in earlier estimates based on 1972 prices.

A second major statistical change became necessary due to the large growth in the net export sector. From 1983 second quarter to 1985 third quarter, real imports rose an astounding 32.4 percent, causing problems in the processing of import data. The U.S. Customs Service reports merchandise trade data to the Census Bureau within 15 days of each month's end. The enormous increase in imports has created a substantial increase in volume and variability of "carry-over" data—that is, data received too late for inclusion into the proper monthly report. This "carry-over" effect results in a serious timing problem and diminishes the reliability of quarterly changes in net export data. Revised data for August 1985, for example, showed that "carry-over" documents accounted for 17 percent of the value of imports and 11 percent of the value of exports.

The BEA used the comprehensive revisions to adjust the period 1983 second quarter to 1985 second quarter for this "carry-over" data. The most dramatic revision occurred in 1984 fourth quarter and 1985 first quarter. Real net exports of merchandise were originally reported to have risen \$15.7 billion in the last quarter of 1984, then to have fallen \$14.3 billion at the start of 1985.

Current revisions now reverse this pattern to indicate that net exports fell in 1984 fourth quarter and then rose in 1985 first quarter! This revision caused real GNP growth estimates to swing from the originally reported 4.3 percent in 1984 fourth quarter and 0.3 percent in 1985 first quarter to 0.6 percent and 3.7 percent respectively. Although the data does not alter the overall view of the net export sector, it does give us a better picture of quarterly changes.

Finally, the third main statistical change in NIPA statistics attempts to improve the estimates for misreporting on tax returns. Federal tax return information is used for estimating several components of GNP. If consumers

and firms make mistakes on, or deliberately falsify, their tax returns, then the estimates of GNP components will be incorrect. The BEA used information based on a 1977 IRS study of underreported and unreported income to adjust for possible "underground economy" activities. The revision, back to 1950, extrapolates data under the assumption that the ratio of underreported to reported income remains constant. This revision results in substantial increases to several NIPA categories. For example, using estimates for 1977, compensation of employees rises \$11.3 billion, and proprietors' income rises \$46.5 billion. Personal consumption expenditures rise \$21.6 billion. The adjustment to proprietors' income represents an addition of more than 50 percent to the previously reported series. The total adjustment added a little more than 1.0 percent to the level of GNP.

The current benchmark revisions also affect measurement of the personal saving rate. A curious phenomenon of recent years has been the large decline in the personal saving rate. The revisions do not alter the recent trend of historically low saving rates, but do raise the level of personal income, mostly due to adjustments for the "underground economy." Consequently, the saving rate does shift up a bit, replacing the record low rate set in 1985 third quarter of 2.7 percent with a new low of 3.7 percent.

Impact on Business Cycle Timing and Magnitudes

With respect to business cycles since 1960, the revisions do not alter the peak and trough quarters (that is, the duration of upswings and downturns), but they do affect the amplitudes in each cycle. For almost every cycle, the change in amplitude results from the base-period shift. For the five contractions, the revised estimates show three periods with steeper declines than previously reported. As for the five expansion periods, all of them show less vigorous increases.

Since the base-period shift is a major source of revision for all cycles, caution must be used when making comparisons involving several years difference. As previously noted, the 1982 base prices give a more accurate picture of recent events, but are not fully suited for comparisons to the previous decade. What is interesting, though, is that the 1981-82 contraction turns out to be more severe, and the current expansion has less strength than previously thought.

Conclusion

The new data demonstrate a greater accuracy by reducing the statistical discrepancy, that is, the difference between GNP measured on the product side and GNP measured on the income side. On average, the yearly statistical discrepancy falls from 0.15 percent to 0.11 percent. Furthermore, adjustments for the timing problem associated with merchandise trade data,

and for the misreporting on tax returns, provide good examples that the revisions supply a necessary update of the NIPA.

Although the 1985 benchmark revision does not drastically alter our view of the economy, it does provide some new and useful information. For example, gross investment as a percent of GNP is now higher than previously estimated. Although definitional changes do account for a portion of the increase, the new estimates might become a part of the current debate over tax incentives for business investment. Further, past comprehensive revisions, such as the 1976 revision, have provided a better picture of the service sector's growing importance.

The effect of the current revision on government policies and business decisions will probably be small, but such an outcome could not be fully-known beforehand. The comprehensive revisions, however, update the NIPA statistics to incorporate changing patterns in the economy, and are well worth the effort.

Further Reading

"An Advanced Overview of the Comprehensive Revision of the National Income and Product Accounts," *Survey of Current Business* vol. 65 (October 1985): 19-28.

"Revised Estimates of the National Income and Product Accounts of the United States, 1929-85: An Introduction," *Survey of Current Business* vol. 65 (December 1985): 1-19.

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