

Explanatory Note: NIPA Measures of Quantities and Prices

Current-dollar GDP is a measure of the market value of goods, services, and structures produced in the economy in a particular period. Changes in current-dollar GDP can be decomposed into quantity and price components. Quantities, or "real" measures, and prices are expressed as index numbers with the reference year -- at present, the year 2009 -- equal to 100.

Annual changes in quantities and prices are calculated using a Fisher formula that incorporates weights from two adjacent years. (Quarterly changes in quantities and prices are calculated using a Fisher formula that incorporates weights from two adjacent quarters; quarterly indexes are adjusted for consistency to the annual indexes before percent changes are calculated.) For example, the 2008-09 annual percent change in real GDP uses prices for 2008 and 2009 as weights, and the 2008-09 annual percent change in GDP prices uses quantities for 2008 and 2009 as weights. These annual changes are "chained" (multiplied) together to form time series of quantity and price indexes. Percent changes in Fisher indexes are not affected by the choice of reference year. (BEA also publishes a measure of the price level known as the implicit price deflator (IPD), which is calculated as the ratio of the current-dollar value to the corresponding chained-dollar value, multiplied by 100. The values of the IPD are very close to the values of the corresponding "chain-type" price index.)

Index numbers of quantity and price indexes for GDP and its major components are presented in this release in tables 5 and 6. Percent changes from the preceding period are presented in tables 1, 4, 7, 8, and appendix table A. Contributions by major components to the percent change in real GDP are presented in table 2.

Measures of real GDP and its major components are also presented in dollar-denominated form, designated "chained (2009) dollar estimates." For most series, these estimates, which are presented in table 3, are computed by multiplying the current-dollar value in 2009 by a corresponding quantity index number and then dividing by 100. For example, if a current-dollar GDP component equaled \$100 in 2009 and if real output for this component increased 10 percent in 2010, then the chained (2009) dollar value of this component in 2010 would be \$110 (= \$100 x 110 / 100). Percent changes calculated from chained-dollar estimates and from chain-type quantity indexes are the same; any differences will be small and due to rounding.

Chained-dollar values for the detailed GDP components will not necessarily sum to the chained-dollar estimate of GDP (or to any intermediate aggregate). This is because the relative prices used as weights for any period other than the reference year differ from those of the reference year. A measure of the extent of such differences is provided by a "residual" line, which indicates the difference between GDP (or other major aggregate) and the sum of the most detailed components in the table. For periods close to the reference year, when there usually has not been much change in the relative prices that are used as weights, the residuals tend to be small, and the chained-dollar estimates can be used to approximate the contributions to growth and to aggregate the detailed estimates. For periods further from the reference year, the residuals tend to be larger, and the chained-dollar estimates are less useful for analyses of contributions to growth. Thus, the contributions to percent change shown in table 2 provide a better measure of the composition of GDP growth. In particular, for components for which relative prices are changing rapidly, calculation of contributions using chained-dollar estimates may be misleading even just a few years from the reference year.

Reference "Chained-Dollar Indexes: Issues, Tips on Their Use, and Upcoming Changes," November 2003 *Survey*, pp. 8-16.