

Methodologies Used in Preparing Annual
Constant-Dollar Estimates of Purchases of Services in U.S. GNP

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This paper provides information on the methodologies--that is, the estimating methods and source data--now used to prepare the annual constant-dollar estimates of the detailed services expenditure components of the U.S. GNP. The first part of the paper discusses the different types of methodologies used; the second part describes the methodologies used in preparing the estimates of detailed service categories; and the last part describes major changes in these methodologies since 1970.

Introduction

The recent growth of services in the U.S. economy has focussed considerable attention on the methodologies used by the Bureau of Economic Analysis in preparing estimates of constant-dollar expenditures for services in GNP. From 1979 to 1989, the share of current-dollar GNP accounted for by service categories has increased from 44.7 percent to 51.4 percent. Among the major components of GNP, the share of expenditures for services increased in personal consumption expenditures (from 46.9 to 53.5 percent); in exports (from 38.8 to 40.9 percent); in imports (from 21.3 to 28.5 percent); and in State and local government purchases (from 72.5 to 75.5 percent). In Federal Government purchases, the share declined from 55.4 to 53.9 percent.

These percentages reflect the definition of services used in the U.S. national income and product accounts (NIPA's). In general, services in the U.S. GNP are defined as commodities that cannot be stored and that are consumed at the place and time of purchase. Commodities that have both a good and a service component or both a structure and a service component, are classified based on the relative importance of the two components. The

following are the major commodities of these types that are classified as goods or structures: Restaurant meals, expenditures abroad by U.S. residents, replacement parts whose installation cost is minimal; and architectural and engineering services associated with domestic structures. The following are the major commodities of these types that are classified as services: Airline transportation and hospital charges, which include food; natural gas and electricity, current operating expenses of nonprofit institutions, foreign travel by U.S. residents, expenditures in the United States by foreigners; and repair services, which include the cost of parts, except for replacement parts whose installation cost is minimal.

Other important conventions in the U.S. classification system include the following: Margins on used goods and the export and import of electricity are classified as goods; military equipment sold to foreign governments under U.S. military agency sales contracts, direct defense purchases abroad by the U.S. Government, and the export and import of goods shipped for repair under warranty or for alteration are classified as services.

The share of GNP accounted for by services also reflects the NIPA definitions of GNP and its major components. In several instances, these definitions differ from those of the SNA of the United Nations. Three major differences affect the level of GNP as well as its components. First, the NIPA's feature GNP as the principal measure of aggregate production; GDP is the principal measure in the SNA. The difference between the two measures is net factor income received from abroad, which is included in GNP, but not in GDP. Factor income in the NIPA's is classified as a service. Second, the NIPA's do not distinguish between government purchases on current

account and government purchases on capital account; all government purchases are treated as current-account purchases. In the SNA, purchases of nonmilitary structures and equipment are assigned to the capital account and included in gross capital formation. Treating government structures and equipment as investment also requires that the current account include the value of the services that the capital assets provide. Consequently, GDP on an SNA basis includes both the investment and the value of these services; in the NIPA's, only the former is included. The third major difference that affects the level of GNP is the imputation of financial service charges. In the NIPA's, the value of these services is allocated to the accounts of persons, government, business, and the rest of the world in proportion to the deposit balances of each sector. For persons and for government, GNP is increased by the value of imputed charges. For foreigners, the imputed charges paid by the rest of the world are considered to be payments for exports of U.S. services, but these higher exports are offset by imputed interest paid to foreigners. In the SNA, the imputation does not affect GDP.

These differences affect services in both GNP and in the major components. Another major difference affects PCE and government purchases by offsetting amounts. This difference is for charges for services provided by governments that are similar to services provided by nonprofit organizations. Examples include services of State universities, government recreational facilities, and public hospitals. In the NIPA's, charges for these services are treated as nontax payments and are not included in personal consumption expenditures. Instead, these services enter GNP as government purchases, valued at the cost to the government of providing the

services. These purchases are included in the detailed commodity categories: Purchases of paper are included in goods; purchases of electricity are included in services. In the SNA, the charges paid are considered private consumption expenditure; only the portion of the cost of providing these services that is not covered by consumer payments remains in government consumption expenditure.

Methodologies Used In Preparing Estimates of Constant-Dollar Purchases

Three methods are generally used to prepare constant-dollar estimates of purchases in GNP. The method used for by far the largest part of GNP, including services, is deflation. In deflation, constant-dollar estimates are obtained by dividing the most detailed current-dollar categories by appropriate price indexes with the base period equal to 100.

The other two methods, quantity extrapolation and direct base-year valuation, are similar to each other in that they both use quantity data. For quantity extrapolation, constant-dollar estimates are obtained by multiplying base-year values by quantity data. For direct valuation, constant-dollar estimates are obtained by multiplying base-year prices by quantity data for each period. The use of quantity extrapolation for services is limited; its most important use is for the compensation components of government purchases. There is no use of the direct valuation method for services categories. In part, this lack of use reflects the difficulty of defining the output of services and the limited availability of quantity data.

For deflation, there are several types of price indexes. Most of them are prepared by government statistical agencies--primarily the Bureau of

Labor Statistics (BLS). In preparing constant-dollar GNP, some of these indexes are used both for the group of purchasers covered by the index--that is, a consumer price index is used for the corresponding category of personal consumption expenditures--as well as for similar categories of purchases by other groups. This use is based on the assumption that changes in the indexes for prices paid by persons or business are an adequate measure of the changes in prices paid by governments. For example, the price index for purchases of utilities by the Federal Government is assumed to change in the same way as changes in prices paid purchases by businesses, as measured by the producer price index. Similarly, prices paid by the Federal Government for professional services are assumed to change in the same way as changes in the average earnings of all workers who provide this series.

Another group of prices used to deflate services are called "input price indexes." These indexes, which are used for purchases by nonprofit organizations, are weighted averages of earnings indexes and price indexes selected as representing the products purchased by these organizations.

Other price indexes used for deflation mainly consist of indexes constructed by BEA. Some, like the index used for foreign travel by U.S. residents, is a composite index of consumer price indexes of foreign countries. Others, like the index used for installation support for the military, are composite indexes of producer and consumer price indexes and average hourly earnings.

The extent of the use of the two methods of estimating constant-dollar purchases and the use of different types of price indexes by major component is shown in table 1. Deflation is used for roughly three-fourths of all

services in GNP, with elements of the consumer and producer price indexes accounting for almost one-half. Deflation is the primary method in personal consumption expenditures (PCE), exports, and imports. For both Federal and for State and local government purchases, quantity extrapolation is the major method, reflecting its use for compensation. Table 2 identifies the method used for each category and for categories estimated by deflation, the source and type of price index.

Methodologies Now Used in Preparing Annual Constant-Dollar Estimates of Services Categories

This part of the paper consists of a separate section for each major GNP component--PCE, net exports, and government purchases--that describes the methodology now used by BEA in preparing the annual constant-dollar estimates of each of the detailed categories of services in GNP. Tables 3 through 7 identify the detailed services categories and the method and the source data for the price indexes and quantity indicators.¹

Many of the price indexes used for deflation of service categories are elements of the Consumer Price Index (CPI) and Producer Price Index (PPI)--both of which are prepared by the BLS. The CPI's are based on actual transaction prices for the items in a fixed, or constant "market basket" of consumer goods and services purchased by the population of urban consumers. The PPI's are based on selling prices--mainly transaction prices--reported by domestic producers of goods and of selected services. Quantity indicators--used mainly for compensation of government employees, for

¹ More detailed information on the preparation of these constant-dollar estimates in GNP appears in the following BEA methodology papers: "Personal Consumption Expenditures," Methodology Paper Series MP-6; "Government Transactions," Methodology Paper Series MP-5; and "Foreign Transactions," Methodology Paper Series MP-3.

financial services furnished without payment by banks, credit agencies and investment companies (imputed financial service charges), for insurance purchased by consumers, and for certain transportation categories of exports and imports--are based on a variety of sources.

Personal Consumption Expenditures

This section describes the preparation of the annual constant-dollar estimates of PCE for services. For each detailed PCE category, table 3 indicates which of the two methods now is used and identifies the source data for the price indexes and quantity indicators.

Use of deflation for PCE

CPI's are used primarily to deflate the detailed PCE categories. Price indexes from other sources include the PPI for apparel; the Health Care Financing Administration input price indexes for nonprofit hospitals and for nursing homes; a trade source input price index for higher education; and a composite index of consumer price indexes for industrialized countries from the International Monetary Fund. In addition, BEA prepares indexes for the following PCE categories.

Tolls.--This category is deflated with an index prepared from information on toll rates and weights based on historical toll revenue traffic information, both from the International Bridge, Tunnel, and Turnpike Association.

Airline transportation.--This category is deflated with an index prepared from the CPI for airlines and information on revenue per passenger mile from the Department of Transportation and a trade association.

Foreign travel by U.S. residents.--This category is deflated with a composite index of consumer price indexes for selected countries adjusted for exchange rates and combined with travel expenditure weights.

In addition, the categories listed below are deflated with composite indexes of input prices prepared by BEA from price and cost indexes. The price indexes are primarily CPI's or PPI's. The cost indexes are primarily indexes of average earnings from BLS tabulations of wages and employment. The weights used to combine these price and cost indexes are derived from the most recent quinquennial census of service industries, except for the life insurance category, for which the weights are derived from the most recent benchmark input-output (I-O) accounts.

The categories trade union expenses, professional association expenses, clubs and fraternal organizations except insurance, elementary and secondary schools, other private education and research, and religious and welfare activities are deflated with composite indexes prepared from average earnings and the PPI for industrial commodities less fuel and related products and power. The expense of handling life insurance category is deflated with a composite index prepared from average earnings, the PPI for electric power, and 4 CPI's.

Use of quantity extrapolation for PCE

The quantity extrapolation method is used for the estimates of rental value of farm dwellings, imputed financial service charges, stock brokerage charges, insurance other than life insurance, and parimutuel net receipts. The source data used for the quantity indicators for these categories are described below.

Rental value of farm housing.--The indicator series for this category is the constant-dollar net stock of farm housing, based on U.S. Department of Agriculture data. This series is estimated by BEA by adding to the previous year's stock in base-period prices net investment in farm housing--that is, capital expenditures net of depreciation--deflated by the farm dwelling construction cost index.

Stock brokerage charges.--The indicator series for brokerage charges is the number of orders placed by individuals, based on data from the New York Stock Exchange, the Securities and Exchange Commission, and the National Association of Securities Dealers.

Imputed financial service charge.--The indicator series for this category is a BEA estimate of paid employee hours of relevant financial institutions based on BLS tabulations of average weekly hours worked and of employment.

For household personal property and auto insurance, the CPI for tenants' and auto insurance, respectively, are used to deflate premiums.

For health insurance, benefits are deflated in three parts: Medical and hospitalization insurance, income loss insurance, and private workers' compensation. For medical and hospitalization insurance, a weighted average of the CPI for hospital and other medical services and the CPI for physicians' services is used. For income loss insurance, losses are deflated by the CPI for all items for urban workers. For private workers' compensation, a weighted average of the deflators for medical and hospitalization insurance and for income loss insurance is used.

Parimutuel net receipts.--The indicator series for parimutuel net receipts is winnings deflated by the CPI for all items. Winnings--that is, the amount wagered less the amount retained by tracks and State governments--is based on data from the National Association of State Racing Commissioners.

Net Exports

This section describes the preparation of the annual constant-dollar estimates of exports and imports of services. For each detailed category of exports and of imports, table 4 indicates which of the two methods now is used and identifies the source data for the price indexes and quantity indicators.

Use of deflation for net exports

The factor income categories in exports and imports, except for imputed interest paid to foreigners, are deflated by the implicit price deflator (IPD) for net domestic product from the GNP estimates. This method is based on the view that the appropriate price index to deflate a factor service is one that measures the price of value added in the industry in which the factor service is used. For factor income payments (imports), the IPD for net domestic product, a general price index for total U.S. production, is a good estimate of such an index to the extent that (1) the factor services represented by payments of factor income are largely those of capital and (2) foreign investment in the United States is industrially diversified like total U.S. production. For factor income receipts (exports), a corresponding index with weights that reflect the geographic and industrial composition of U.S. investment abroad should be used as a deflator. However, such

an index is not readily available, and the IPD for net domestic product is used as a proxy.

Transfers under U.S. military agency sales contracts are deflated in product detail using IPD's calculated from the detailed prices underlying the deflation of national defense purchases component of GNP. These prices were developed in BEA's work on the measurement of prices of goods and services purchased by the military.

Travel exports--that is, spending in the United States by foreign travelers--are deflated by an arithmetic average of price indexes for the principal items that visitors buy, as measured by components of the U.S. CPI for restaurants, hotels, transportation, and miscellaneous goods.

The passenger fares category of exports--that is, passenger fares received by U.S. air carriers from foreign residents traveling between the United States and foreign countries and between two foreign points--are deflated by a BEA index of passenger revenue per passenger revenue mile, based on Department of Transportation data on the international operations of U.S. air carriers.

U.S. rail and pipeline carrier freight receipts and port expenditures in the United States and U.S. receipts for vessel charter and freight car rental are deflated by various price indexes from trade associations.

Medical expenditures by foreigners in the United States are deflated by the CPI's for physicians' and hospital services. Foreign students' expenditures in the United States are deflated by the CPI for all items.

Royalties and license fees, other private services, and the adjustment for U.S. territories and Puerto Rico are deflated by the IPD for gross domestic product, because these services closely resemble factor services.

U.S. Government miscellaneous services are deflated by the IPD for the U.S. Government sales of nondefense services from the nondefense purchases component of GNP.

Direct defense expenditures abroad are deflated by type of expenditure using IPD's for the deflation of national defense purchases, and by foreign consumer price indexes, adjusted by BEA for changes in exchange rates.

Travel imports--that is, spending abroad by U.S. travelers--are deflated annually by country, using foreign consumer price indexes adjusted by BEA for changes in exchange rates.

The passenger fares category of imports--that is, passenger fares paid to foreign air and ocean carriers by U.S. residents traveling between the United States and foreign countries or between two foreign points--are deflated by the index of passenger revenue per passenger revenue mile, prepared by BEA for exports, based on Department of Transportation data on the international operations of U.S. air carriers and by an IPD for ocean fares.

U.S. payments to foreign rail carriers for freight and for vessel charter and freight car rentals are deflated by various price indexes from trade associations.

U.S. students' expenditures abroad are deflated by foreign consumer price indexes, adjusted by BEA for changes in exchange rates.

Royalties and license fees and other private services are deflated by the IPD for gross domestic product, because these services closely resemble factor services.

U.S. Government payments for miscellaneous services are deflated by foreign consumer price indexes, adjusted by BEA for changes in exchange rates.

Use of quantity extrapolation for net exports

For U.S. air and water carrier freight receipts and port expenditures, constant-dollar estimates are obtained by extrapolating the current-dollar base-year values by indicators of the physical quantity of transport activity--Census Bureau tonnage data from merchandise trade reports and other quantity data from the Census Bureau and Department of Transportation.

For the imputed financial service charges category of exports and the imputed interest paid to foreigners category of factor income payments, constant-dollar estimates are obtained by extrapolating the current-dollar base-year value by BEA estimates of paid employee hours of the relevant financial institutions based on BLS tabulations of average weekly hours worked and of employment.

For U.S. payments to foreign air and water carriers for the international transportation of U.S. imports (freight receipts), constant-dollar estimates are obtained by extrapolating the current-dollar base-year values primarily by Census Bureau foreign carrier freight tonnage data. The constant-dollar estimates of port expenditures abroad by U.S. air and water carriers are obtained by extrapolating current-dollar base-year values primarily by U.S. freight tonnage data from the Census Bureau and Department of Transportation.

Government Purchases

This section describes the preparation of the annual constant-dollar estimates of Federal and of State and local government purchases of

services. For each detailed category of Federal national defense purchases, Federal nondefense purchases, and of State and local purchases, table 5, 6, and 7, respectively, indicate which of the two methods now is used and identifies the source data for the price indexes and quantity indicators.

Use of deflation in defense purchases

The price indexes used for deflation are primarily price indexes prepared by BEA using information on prices paid by the Department of Defense (DOD) and composite price indexes prepared by BEA using these DOD prices in conjunction with BLS average hourly earnings, CPI's and PPI's. The weights used to combine these prices are derived from a variety DOD contract reports, described in detail in "Government Transactions," and judgments by BEA staff.

The special pays category of military compensation, for example--flight pay and dentist pay--covers military personnel who meet special requirements and training. This category is deflated using actual pay rates because special pays represent a higher level of educational attainment and experience. Any change in the special pay rate, therefore, is a price change. Information on changes in special pays is available from a DOD report on military compensation. A price index is constructed for each of the special pays and is used to deflate the current-period expenditures for these pays.

National defense purchases of contractual research and development (R&D) is deflated using an index of input costs from a sample of companies doing R&D for DOD and Department of Energy (DOE). This index is prepared by BEA using weights from the BEA sample of R&D contractors data. The sample of 25 contractors, selected on a probability basis, report quarterly on the cost

of three R&D inputs: Direct labor, direct material, and indirect costs. The price of direct labor is represented by the hourly wage rate, by standard job classification title (for example, supervisory electronic engineer), of employees engaged in R&D. The price of direct material is represented by PPI's selected in consultation with each participating company. These two indexes are weighted together (with 1982 weights) to calculate a price index for direct costs. A price index for indirect costs is constructed as the product of the price index of direct costs and an index of the indirect cost rate (the negotiated rate of overhead costs). In turn, the indexes of the prices of direct and indirect costs are combined (with 1982 weights) to construct the price index for a company.

Installation support is deflated using indexes constructed from DOD contract information, PPI's or CPI's, and average hourly earnings. For services purchased overseas, adjustments are made for changes in exchange rates between the U.S. dollar and currencies of countries where substantial purchases are made (usually Germany, Japan, South Korea, and the United Kingdom).

For communication other than postage and local telephone and for property maintenance, price indexes are constructed from information from DOD contracts. The costs of implementing changes in the contracts' detailed work statements that are deemed to be quality changes are used to adjust the price indexes derived from changes in contract value. For the utility categories, postage, and local telephone service, PPI's and CPI's are used.

For the remaining six categories, price indexes are constructed on the basis of average hourly earnings of production workers in related industries. For example, the price index used to deflate housekeeping services

is constructed from the average hourly earnings for workers providing services to buildings on the assumption that the price of these services moves like the wage of the employees performing the work.

Weapons support is deflated using indexes constructed from DOD contract information and from average hourly earnings.

For personnel support, training and education is deflated using a sample of tuition prices paid by DOD, and consulting is deflated using average hourly earnings. For the services of foreign nationals, wage rates paid by DOD are adjusted for changes in exchange rates between the U.S. dollar and currencies of countries where substantial purchases are made.

Transportation of material is deflated using indexes constructed from DOD. Samples of trips from each of four categories--air, sea, rail, and truck--and of terminal services are priced each quarter to construct price indexes for each category.

For travel of persons, air travel and travel by bus and rail are deflated using indexes constructed from DOD prices and from a trade source. These indexes are constructed using a sample of trips from the two categories that are priced each quarter. Indexes constructed from information from the General Services Administration on reimbursement rates for per diem, dislocation allowances, and mileage for privately owned vehicles and from CPI's for taxi fares and car rental fees are used to deflate reimbursable travel expenses.

Other services is deflated using an index constructed from average hourly earnings.

Use of deflation for nondefense purchases

The constant-dollar estimates of the detailed categories of services, except for compensation and imputed financial service charges, are deflated using price indexes from several sources. The IPD's for the corresponding categories of defense purchases are used for travel of persons and for transportation by mode. CPI's and PPI's are used for rental services and utilities. For many purchased services, such as maintenance services and engineering services, BEA constructs price indexes using a combination of average hourly earnings and equipment IPD's to represent the labor and capital inputs to the services being purchased.

Use of deflation for State and local purchases

Transportation and warehousing and postal services are deflated using IPD's for the corresponding categories of national defense purchases. The other categories are deflated using CPI's and PPI's . The use of CPI's and PPI's assumes that prices paid by State and local governments change at the same rate as prices for the same services paid by consumers and businesses.

Use of quantity extrapolation for defense and nondefense purchases

For compensation of employees, except for one type of pay, constant-dollar estimates are prepared by extrapolating base-year compensation by an index of employment or by an index of employee hours. The extrapolators are adjusted, to the extent possible, for changes in experience and education--that is, in the quality of the workforce. This procedure is designed to approximate specification pricing for output by general government employees. It assumes that, for a given type of employee, output per hour worked does not change over time and that productivity changes occur for the workforce only because of changes in the mix of employees with respect to their level of experience and education.

Military compensation.--The constant-dollar estimates of military compensation, except for "special pays," are derived using quantity extrapolation. The quantity indicators are used for the types of compensation that are based on rank or length of service, such as basic pay, or are based on a percentage of pay, such as reenlistment bonuses.

As mentioned earlier, these indicators are defined as a unit of labor purchased in terms of its education and experience. Changes in these characteristics are treated as quality changes; all other changes are price changes. For the military pay system, rank and length of service are assumed to represent the education and experience criteria. Twenty-three ranks--10 for officers, 4 for warrant officers, and 9 for enlisted personnel--and cadets are identified. The 1982 compensation (excluding the special pays) per employee for a given rank and length of service is the base-year price, and this price is multiplied by employment by rank and length of service for the current period. The difference between the constant-dollar average salary in a given year and the base-year average salary represents the shift in the composition of employment with respect to educational attainment and experience.

Civilian compensation.--The constant-dollar estimates of civilian employee compensation are derived by extrapolation and then divided between national defense and nondefense purchases in proportion to employment. The basic unit of purchase--and the extrapolator--is an hour worked; an hour paid is not used because it would reflect changes in holidays and annual leave usage as well as hours worked; the former are considered to be price changes. The quality of an hour worked is defined in terms of the education and experience of the employee. Changes in educational attainment and

experience are considered quality changes; all other changes are price changes.

There are several different Federal civilian pay plans; all are based on skill level (grade) and length of service (step), which are assumed to represent the education and experience criteria. Average 1982 compensation per hour worked (within a pay plan) for each grade is the base-year price.

Employment data by grade and step for each pay plan for civilian personnel are available from Office of Personnel Management (OPM) and are adjusted to reflect changes in the index of average hours worked. These data are multiplied by the base-year price to obtain constant-dollar civilian compensation, which is split between defense and nondefense purchases in proportion to employment. Constant-dollar compensation of Coast Guard personnel is derived in the same manner as military personnel and added to the estimate for civilian nondefense personnel.

Imputed financial service charges.--Constant-dollar estimates of imputed financial service charges (nondefense purchases) are obtained by extrapolating the base-year value by BEA estimates of the paid employee hours of relevant financial institutions based on BLS tabulations of average weekly hours worked and of employment.

Use of quantity extrapolation for State and local purchases

The constant-dollar estimates of compensation of employees component are obtained by extrapolating base-year compensation by an index of employee hours that is adjusted, to the extent possible, for changes in experience and education--that is, in the quality of the workforce. This procedure is designed to approximate specification pricing for output produced by general government. It assumes that, for a given type of employee, output per hour

worked does not change over time and that productivity changes occur for the workforce only because of changes in the mix of employees with respect to their level of experience, their education, and the functions in which they are employed. The mix is defined, to the extent possible, by function, by level of experience, and by education. For each type of employee for which BEA has data, constant-dollar compensation in a given year is the product of average base-year (1982) compensation and an index of employee hours that is the product of employment measured in full-time equivalent units and the ratio of average weekly hours worked to base-year average weekly hours worked.

Measures of full- and part-time employment and hours worked are derived for education and for noneducation from BLS tabulations of average weekly hours worked and of employment and wages reported by employers covered by State unemployment insurance programs. Information from an annual Census Bureau report is used to convert full- and part-time measures of employment to full-time equivalents.

For estimates of constant-dollar education compensation, eight employee types are identified, six from the annual Census Bureau report and two from a 1973 study from the Office of Education, Department of Health, Education, and Welfare. For primary-secondary teachers--the largest category--independent data are available to adjust for changes in the composition of employment. Demographic and salary data collected in an annual National Education Association survey of teachers are distributed into 20 groups defined by teacher characteristics--years of experience and level of educational attainment. For each of the 20 groups, reported average base-year salary is multiplied by employment; the results are summed and a

measure of average salary (valued in base-year prices) for primary-secondary teachers in the current period is derived. The difference between this measure and base-year average salary represents the shift in the composition of employment with respect to experience and educational attainment. Average base-year compensation is then multiplied by the product of this composition shift and the index of employee hours described above--that is, the product of employment measured in full-time equivalent units and the ratio of average weekly hours worked to base-year average weekly hours worked.

For the remaining seven categories of education employment, average base-year compensation for each category is multiplied by the index of employee hours described above--that is, the product of employment measured in full-time equivalent units and the ratio of average weekly hours worked to base-year average weekly hours worked. The results are summed over all eight categories to constant-dollar education compensation.

For noneducation compensation, the BLS data are disaggregated into two categories: Federally funded public service employment and other. Public service employment was a component of State and local government employment from 1972 to 1981. Measures of public service employment and an estimate of average 1982 compensation for these employees are derived from internal documents of the Employment and Training Administration, Department of Labor. The remainder of noneducation constant-dollar compensation is estimated as the product of average base-year compensation and the index of employee hours--that is, the product of full-time equivalent employment and the ratio of average weekly hours worked to base-year average weekly hours worked.

Imputed financial service charges.--Constant-dollar estimates of imputed financial service charges are obtained by extrapolating the base-year value by BEA estimates of the paid employee hours of relevant financial institutions based on BLS tabulations of average weekly hours worked and of employment.

Recent Changes in Methodologies Used in Preparing Annual

Constant-Dollar Estimates of Services Categories

The previous part of this paper describes the methodologies now used in preparing the annual constant-dollar estimates of services categories. As services have grown as a proportion of GNP and as rates of inflation have greatly increased, BEA has introduced several major changes in these methodologies in order to improve their reliability. Most changes in methodology are introduced either in comprehensive (benchmark) NIPA revisions, which usually occur once every 5 years, or in annual NIPA revisions. In a benchmark revision, changes in methodology are carried to all periods for which source data are available; in an annual revision, changes are carried only to the most recent 3 years. This part of the paper describes these major changes for each major component of GNP.

Personal consumption expenditures

The owner-occupied nonfarm dwellings category is deflated with the CPI for owners' equivalent rent beginning in 1988. For 1983 to 1987, this category is deflated by an index prepared by BEA that is a modified version of this CPI. (Beginning in 1988, the CPI incorporates these modifications.) There are two modifications: The first accounts for changes in the quality of the stock of rental units whose prices underlie the CPI for owners' equivalent rent; the second accounts for the change in rent that occurs when

a vacant unit is rented to a new tenant. For 1974 to 1982, these two modifications were made to the CPI for residential rent. Prior to 1974, the CPI is not modified because of a lack of source data to develop the adjustments. These changes were introduced in the benchmark revision of 1985.

The airline transportation category is deflated by a BEA price index constructed from the CPI for airlines and Department of Transportation and trade source data on revenue per passenger mile beginning in 1983. The revenue per passenger mile data are used to adjust the CPI for discount fares. Prior to 1983, no adjustments are made, but will be made in the forthcoming benchmark revision.

The constant-dollar estimates of imputed financial service charges category in PCE and government purchases are prepared by quantity extrapolation. This methodology was introduced in the benchmark revision of 1976 and is based on the assumption that the real volume of the services is proportionate to the hours worked at the relevant financial institution. Although this procedure is arbitrary, it is preferable to the previous method, which yielded estimates that indicated a substantial decline in output per worker. In the previous method, the ratio of current- to constant-dollar bank interest was used as a deflator. Constant-dollar interest was estimated by deflating each type of bank deposit with the CPI for all items and applying base-year average interest to each constant-dollar deposit.

The for-profit hospitals category is deflated by the CPI for hospital rooms beginning in 1973. This methodology was introduced in the benchmark

revision of 1980 and replaced a Health Care Financing Administration input price index.

Net exports

The factor income categories in both exports and imports, except imputed interest paid to foreigners, are deflated by the IPD for net domestic product from the GNP estimates beginning in 1929. These deflators were introduced in the benchmark revision of 1980. Previously, export factor income was deflated by the IPD for total imports excluding factor income, and import factor income was deflated by the IPD for total exports excluding factor income.

The transfers under U.S. military agency sales contracts (exports) and the direct defense expenditures abroad (imports) categories are deflated in product detail using IPD's calculated from the detailed prices underlying the deflation of national defense purchases beginning in 1972. These deflators were introduced in the benchmark revision of 1976. Previously, the export category had been deflated by the IPD for merchandise exports; the import category had been deflated by IPD for merchandise imports.

The travel (exports) category is deflated by a composite index of CPI's for the principal items purchased by visitors. This deflator was introduced in the benchmark revision of 1976; previously, the category had been deflated by the CPI for all services.

The passenger fares categories of both exports and imports are deflated by a BEA index of passenger revenue miles beginning in 1983 based on Department of Transportation data on international operations of U.S. air carriers and by an index for ocean fares. This deflator was introduced in the benchmark revision of 1985; previously the category had been deflated

using an index based on data from BEA travel surveys on carrier rates and expenditures.

The royalties and license fees and other private services categories of both exports and imports are deflated by the IPD for gross domestic product beginning in 1929. This deflator for the export categories was introduced in the benchmark revision of 1976; previously, these categories had been deflated by the IPD for merchandise exports. The change for the import categories was introduced in the benchmark revision published in 1980; previously, these categories had been deflated by the IPD for imports excluding factor income.

The U.S. Government miscellaneous service category (exports) is deflated by the IPD for the U.S. Government sales of nondefense services component of nondefense purchases beginning in 1929. This deflator was introduced in the benchmark revision published in 1976; previously, the series had been deflated by the IPD for merchandise exports.

Government purchases

With one minor exception, constant-dollar estimates of compensation are estimated using the quantity extrapolation. The methodology now is used in the benchmark revision published in 1976; previously, full-time equivalent employment was used as the quantity indicator.

Most categories of defense purchases, except compensation, and some categories of nondefense purchases are deflated using DOD prices beginning in 1972. This change was introduced in the benchmark revision of 1980; previously, price indexes such as PPI's and CPI's for comparable commodities were used.

Table 1.--Methods Used in Preparing Annual Constant-Dollar Estimates of Purchases of Services
in GNP: Percent by Major Component, 1982

(Percent in 1982)

Method	All services ¹	Personal consumption expenditures	Exports	Imports	Federal government purchases	State and local government purchases
Total	100.000	100.000	100.000	100.000	100.000	100.000
Deflation	72.007	91.557	90.184	83.960	36.244	16.952
Using consumer and producer price indexes	48.767	67.382	8.406	.057	2.799	16.287
Using input price indexes	13.939	21.003	---	---	---	---
Using other price indexes	9.302	3.172	81.778	83.882	33.495	.665
Extrapolation with quan- tity indicator	27.993	8.443	9.808	16.040	63.706	83.048

Table 2.--Met. ds Used in Preparing Annual Constantollar
Estimates of Purchases of Services in GNP

GNP component and category	1982 weight (percent)	Deflation using prices based on--				Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes		
<u>Personal consumption expenditures</u> 100.000						
Housing:						
Rental value of farm dwelling	1.260					X
Other	30.001	X				
Household operation:						
Household insurance . . . . .	.169					X
Other	13.793	X				
Transportation:						
Motor vehicle insurance . . . . .	.882					X
Bridge, tunnel, ferry, and road tolls . . . . .	.119				X X	
Airlines	1.427				X	
Other	4.358	X				
Medical care:						
Health insurance	1.472					X
Nonprofit hospitals	7.886		X			
Nursing homes	1.824		X			
Other, including for-profit hospitals	10.021	X				
Personal care	2.336	X				
Personal business:						
Stock brokerage charges . . . . .	.453					X
Financial services furnished without payment by banks, credit agencies, and investment companies	4.009					X

Table 2.--Methods Used in Preparing Annual Constant-Dollar Estimates of Purchases of Services in GNP--Continued

GNP component and category'	1982 weight (percent)	Deflation using prices based on--			Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes	
<u>Personal consumption expenditures (cont'd.)</u>					
Expense of handling life insurance	2.469		X		
Trade union and professional association expenses . . . . .	.567		X		
Commodity brokerage charges and investment counseling . . . . .	.387			X	
Other	3.460	X			
Recreation:					
Clubs and fraternal associations except insurance . . . . .	.374		X		X
Paramutuel net receipts . . . . .	.218			X	
Video cassette rental . . . . .	.036				
Other	4.742	X			
Private education and research	3.175		X		X
Religious and welfare activities	4.321		X		X
Net foreign travel:					
Foreign travel by U.S. residents	1.590				X
Less: Expenditures in the U.S. by foreigners	-1.329	X			
Exports	<u>100.000</u>				
Factor income	61.925				X
Other services:					
Transfers under U.S. military agency sales contracts	8.048				X

Table 2.--Methods Used in Preparing Annual Constant-Dollar
Estimates of Purchases of Services in GNP--Continued

GNP component and category	1982 weight (percent)	Deflation using prices based on--			Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes	
<u>Exports (cont'd.)</u>					
Travel	8.376	X		X	
Passenger fares	2.145				
Freight receipts:					
Ocean carriers and airlines	2.578				X
Railroads . . . . .	.030	X		X	
Other . . . . .	.236				
Port expenditures in United States:					
Foreign Great Lakes and rail-road carriers . . . . .	.054			X	
Other	5.311			X	X
Vessel and freight car hire . . . . .	.116				
Foreign students' and medical expenditures	(²)	X			
Royalties and license fees and other private services	8.948			X	
Adjustment for U.S. territories and Puerto Rico	-.044			X	
Financial services furnished without payment by banks, credit agencies, and investment companies	1.919				X
U.S. Government miscellaneous services . . . . .	.360			X	
<u>Imports</u>	<u>100.000</u>				
Factor income:					
Imputed interest paid to foreigners	3.296				
Other	43.684			X	X

Table 2.--Methods Used in Preparing Annual Constant-Dollar
Estimates of Purchases of Services in GNP--Continued

GNP component and category ¹	1982 weight (percent)	Deflation using prices based on--			Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes	
<u>Imports (cont'd.)</u>					
Other services:					
Direct defense expenditures					
abroad	14.195			X	
Travel	14.390			X	
Passenger fares	5.541			X	
Freight receipts:					
Foreign railroads . . . . .	.057	X			
Great Lakes carriers . . . . .	.062			X	
Other	7.302				X
Port expenditures abroad:					
U.S. Great Lakes carriers and railroads					
Other . . . . .	.068			X	
Vessel and freight car hire	5.442				X
Royalties and license fees, U.S. students' expenditures and other private series . . . . .	.578			X	
U.S. Government payments for miscellaneous services	3.601			X	
	1.695			X	
<u>Federal Government, national defense</u>					
	<u>100.000</u>				
Compensation of employees:					
Special military pay	1.241			X	
Other	64.803				X
Other services:					
Contractual research and development	12.814			X	

Table 2.--Methods Used in Preparing Annual Constant-Dollar Estimates of Purchases of Services in GNP--Continued

GNP component and category'	1982 weight (percent)	Deflation using prices based on--			Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes	
Federal Government.					
national defense (cont'd)					
Installation support:					
Utilities, local telephone, and postage	2.461	X			
Other	6.994			X	
Weapons support	4.322			X	
Personnel support	2.830			X	
Transportation of material	2.517			X	
Travel of persons	2.055			X	
Other	-.037			X	
Federal Government, nondefense . .	100.000				
Compensation of employees					
Other services:	60.884				X
Utilities, communications, and rental services	3.059	X			
Financial services furnished without payment by banks, credit agencies and investment companies . . . . .	.784				X
Other	35.273			X	
State and local government . . .	100.000				
Compensation of employees					
Other services:	81.852				X
Transportation and warehousing and postal services . . . . .	.665				X

Table 2.--Methods Used in Preparing Annual Constant-Dollar Estimates of Purchases of Services in GNP--Continued

GNP component and category ¹	1982 weight (percent)	Deflation using prices based on--			Using quantity extrapolation
		Components of Consumer Price Index or Producer Price Index	Index of input prices	Other price indexes	
<u>State and local government (cont'd.)</u>					
Financial services furnished without payment by banks, credit agencies and investment companies	1.196				X
Other	16.287	X			

¹ Tables 3, 4, and 5, and 7 provide information for each detailed category.² Not covered in published estimates until 1985.

Table 3.—Constant-Dollar PCE for Services: Sources of Estimates—Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Health insurance:		
Medical care and hospitalization	Base-year value extrapolated by constant-dollar benefits.	.861
Income loss	Base-year value extrapolated by constant-dollar benefits.	.260
Workers' compensation	Base-year value extrapolated by constant-dollar benefits.	.352
Cleaning, storage, and repair of clothing and shoes:		
Shoe cleaning and repair	CPI for other apparel services . . . . .	.055
Cleaning, laundering, dyeing, pressing, alteration, storage, and repair of garments.	CPI for laundry and dry cleaning other than coin operated.	.632
Barbershops, beauty parlors, baths, and health clubs:		
Beauty parlors	CPI for beauty parlor services for females . . . . .	.942
Barbershops and others	CPI for haircuts and other barbershop services for males.	.200
Other personal care services:		
Watch and clock repair	CPI for other apparel services . . . . .	.094
Clothing repair not elsewhere classified	CPI for laundry and dry cleaning other than coin operated.	.413
Brokerage charges and investment counseling:		
Stock brokerage charges	Base-year value extrapolated by orders placed by individuals.	.433
Other brokerage charges and investment counseling.	Implicit price deflator for stock brokerage charges . . . .	.387
Bank service charges, trust services, and safe deposit box rental.	CPI for personal financial services . . . . .	.786
Financial services furnished without payment by banks, credit agencies, and investment companies.	Base-year value extrapolated by paid employee hours of relevant financial institutions.	4.009
Other personal business:		
Expense of handling life insurance	BEA composite index of input prices.	2.469
Legal services	CPI for legal service fees	1.827
Funeral and burial expenses	CPI for funeral expenses . . . . .	.479
Other:		
Trade union expenses	BEA composite index of input prices . . . . .	.424
Professional association expenses	BEA composite index of input prices . . . . .	.143
Employment agency fees, money orders, classified advertisements, accountants and tax return preparation services.	CPI for personal financial services . . . . .	.298
Other personal business, n.e.c.	CPI for legal services . . . . .	.071
Admissions to specified spectator amusements	CPI for admissions . . . . .	.759
Other recreation:		
Radio and television repair	CPI for appliance and furniture repair . . . . .	.270
Clubs and fraternal organizations except insurance.	BEA composite index of input prices . . . . .	.374
Commercial participant amusements:		
Bowling and billiards	CPI for participant sports . . . . .	.168
Other	CPI for other entertainment services . . . . .	.950
Parimutuel net receipts	Base-year value extrapolated by constant-dollar winnings.	.218
Other recreation, n.e.c.:		
Pets and pet care services	CPI for pet supplies and expense . . . . .	.292
Cable television	CPI for cable television . . . . .	.457
Video cassette rental	Constant dollars equals current dollars . . . . .	.036
Film development, photo studios, high school recreation, lotteries, and commercial amusements n.e.c.	CPI for other entertainment services	1.749

Table 3.—Constant-Dollar PCE for Services: Methods Used and Sources of Estimates

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Owner-occupied nonfarm dwellings—space rent	CPI for owners' equivalent rent	21.238
Tenant-occupied nonfarm dwellings—rent	CPI for rent, residential	7.581
Rental value of farm dwellings	Base-year value extrapolated by net stock of farm dwellings.	1.260
Other housing:		
Hotels and motels	CPI for lodging while out of town . . . . .	.840
Educational institutions	CPI for lodging while at school . . . . .	.273
Other	CPI for rent, residential . . . . .	.070
Electricity	CPI for electricity	4.583
Gas	CPI for utility (piped) gas	2.503
Water and other sanitary services	CPI for water and sewerage maintenance	1.146
Telephone and telegraph	CPI for telephone services	3.467
Domestic service:		
Pay in cash	CPI for domestic services . . . . .	.695
Pay in kind	CPI for food at home . . . . .	.070
Other household operation services:		
Electrical, upholstery, and furniture repair	CPI for appliance and furniture repair . . . . .	.292
Postage	CPI for postage . . . . .	.432
Household insurance	Base-year value extrapolated by constant-dollar premiums.	.169
Moving and storage and all other household operation services.	CPI for moving, storage, freight, household laundry and dry cleaning services.	.605
User-operated transportation:		
Repair, greasing, washing, parking, storage, and rental.	CPI for automobile maintenance and repair	3.451
Bridge, tunnel, ferry, and road tolls	BEA toll price index based on trade source data . . . . .	.119
Insurance premiums less claims paid	Base-year value extrapolated by constant-dollar premiums.	.882
Transit systems	CPI intracity mass transit . . . . .	.295
Other purchased local transportation:		
Taxicab	CPI for taxi fares . . . . .	.288
Railway (commutation)	CPI for intracity mass transit . . . . .	.039
Railway (excluding commutation)	CPI for intercity train fare . . . . .	.043
Bus	CPI for intercity bus fare . . . . .	.122
Airline	BEA price index	1.427
Other purchased intercity transportation	CPI for public transportation . . . . .	.120
Physicians	CPI for physicians' services	5.299
Dentists	CPI for dental services	1.694
Other professional services	CPI for services by other medical professionals	1.998
Privately controlled hospitals and sanitariums:		
Nonprofit hospitals	Composite index of input prices from Health Care Financing Administration.	7.886
For-profit hospitals	CPI for hospital room.	1.030
Nursing homes	Composite index of input prices from Health Care Financing Administration.	1.624

Table 3.—Constant-Dollar PCE for Services: Sources of Estimates—Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Higher education	Composite index of input prices from trade source.	1.175
Elementary and secondary schools	BEA composite index of input prices	1.056
Other private education and research	BEA composite index of input prices .....	.944
Religious and welfare activities	BEA composite index of input prices	4.321
Net foreign travel:		
Foreign travel by U.S. residents	BEA composite index of CPI's for selected foreign countries.	1.390
Less: Expenditures in the U.S. by foreigners	BEA composite index of U.S. CPI components	-1.329

CPI: Consumer Price Index
n.e.c.: Not elsewhere classified.

Table 4.--Constant-Dollar Net Exports of Services:
Methods Used and Sources of Estimates

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
<u>Exports</u>		
Factor income	IPD for net domestic product	61.925
Other services:		
Transfers under U.S. military agency sales contracts:		
Aircraft	Government purchases IPD for military aircraft.	2.481
Ships	Government purchases IPD for military ships.	.406
Vehicles	Government purchases IPD for military vehicles.	.836
Missiles	Government purchases IPD for military missiles.	.840
Weapons	Government purchases IPD for military small arms.	.171
Ammunition	Government purchases IPD for military ammunition.	.205
Communications equipment	Government purchases IPD for military electronic equipment.	.123
Other equipment	Government purchases IPD for other military equipment.	.166
Construction	Government purchases IPD for military construction.	1.376
Services	Government purchases IPD for other defense services (ex- cluding compensation).	1.444
Travel	Composite of CPI's for meals, lodging, transportation, and miscellaneous goods.	8.376
Passenger fares	Index of passenger revenue per passenger revenue mile based on Department of Transportation data on international operations of U.S. air carriers.	2.145

Table 4.--Constant-Dollar Net Exports of Services:
Methods Used and Sources of Estimates--Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
<u>Exports (cont'd.)</u>		
Other transportation:		
Freight receipts:		
U.S. ocean carrier--liner/ tramp.	Base-year value extrapolated by Census Bureau export tonnage.	2.063
U.S. ocean carrier--tanker . . .	Base-year value extrapolated by Census Bureau export tonnage.	.034
U.S. Great Lakes carriers	IPD for U.S. ocean carriers. . . . .	.010
U.S. airlines	Base-year value extrapolated by export freight ton-miles.	.515
U.S. railroads	PPI for railroad freight. . . . .	.030
U.S. pipelines	IPD for gross product originating in pipelines.	.192
Port expenditures in United States:		
Foreign liner/tramp	Base-year value extrapolated by ex- port and import freight tonnage.	2.319
Foreign tanker	Base-year value extrapolated by ex- port and import freight tonnage.	.701
Foreign Great Lakes carrier . . .	IPD for foreign liner and tanker port expenditures.	.007
Foreign airlines	Base-year value extrapolated by ex- port and import ton-miles.	2.291
Foreign railroads	IPD for gross product originating railroads.	.047
Vessel and freight car hire:		
Vessel charter	Index of charter hire prices from Maritime Research Incorporated.	.078
Freight car rental	Price index based on Association of American Railroads data on daily boxcar rentals.	.038
Royalties and license fees	IPD for gross domestic product. . . .	4.821
Medical services	CPI's for physicians' and hospital services.	(¹)
Foreign students' expenditures . . .	CPI for all items	(¹)
Other private services	IPD for gross domestic product. . . .	4.127
U.S. Government miscellaneous services.	IPD for government nondefense sales of services.	.360

Table 4.--Constant-Dollar Net Exports of Services:
Methods Used and Sources of Estimates--Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
<u>Exports (cont'd.)</u>		
Financial services furnished without payment by banks, credit agencies, and invest- ment companies.	Base-year value extrapolated by paid employee hours of relevant financial institutions.	1.910
Adjustment for U.S. territories and Puerto Rico.	IPD for gross domestic product	-.044
<u>Imports</u>		
Factor income, BPA components	IPD for net domestic product.	43.684
Factor income, imputed interest paid to foreigners	Base-year value extrapolated by paid employee hours of relevant financial institutions.	3.296
Other services:		
Direct defense expenditures abroad	IPD calculated from detail below.	
Petroleum	Government purchases IPD for military petroleum.	2.527
Construction	Government purchases IPD for military construction.	1.590
Compensation of foreign labor . . .	Government purchases IPD for compensation of foreign labor.	1.913
Other	Foreign-country CPI's (exchange rate adjusted) weighted by mili- tary spending.	8.165
Travel	Foreign-country (CPI's (exchange rate adjusted) weighted by travel.	14.390
Passenger fares:		
Airline	Index of passenger revenue per passenger revenue mile based on Department of Transportation data on international operations of U.S. air carriers.	5.204
Ocean	IPD prepared by BEA. . . . .	.337

Table 4.--Constant-Dollar Net Exports of Services:
Methods Used and Sources of Estimates--Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
<u>Imports</u> (cont'd.)		
Other transportation:		
Freight receipts:		
Foreign ocean carrier--liner/ tramp.	Base-year value extrapolated by Bureau import tonnage.	5.169
Foreign ocean carrier--tanker . . .	Base-year value extrapolated by Census Bureau import tonnage.	1.291
Foreign Great Lakes carriers . . .	IPD for foreign ocean carriers. . . .	.062
Foreign airlines	Base-year value extrapolated by Census Bureau import tonnage.	.842
Foreign railroads	PPI for railroad freight. . . . .	.057
Port expenditures abroad:		
U.S. liner/tramp	Base-year value extrapolated by Census Bureau export and import tonnage.	1.404
U.S. tanker	Base-year value extrapolated by Census Bureau export and import tonnage.	.868
U.S. Great Lakes carrier	IPD for U.S. liner and tanker port expenditure.	.005
U.S. airlines	Base-year value extrapolated by Census Bureau export and import tonnage.	3.170
U.S. railroads	IPD for gross product originating in railroads.	.063
Vessel and freight car hire:		
Vessel charter	Index of charter hire prices from Maritime Research Incorporated.	.578
Freight car rentals	Price index based on Association of American Railroads data on daily boxcar rentals.	.089
Royalties and license fees	IPD for gross domestic product . . . .	.219
U.S. students' expenditures	Foreign-country CPI's (exchange rate adjusted) weighted.	(1)
Other private services	IPD for gross domestic product. . . .	3.382
U.S. Government payments for miscellaneous services	Foreign country CPI's (exchange- rate weighted by expenditures.	1.695
BPA Balance of payments accounts.	NIPA National income and products.	
CPI Consumer price index.	n.e.c. Not elsewhere classified.	
GDP Gross domestic product.	PPI Producer price index.	
IPD Implicit price deflator.	' Not covered in published estimates until 1985.	

Table 5.--Constant-Dollar Federal Government National Defense Purchases of
Services: Methods Used and Sources of Estimates

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Compensation of employees:		
Military:		
Special pays	DOD prices	1.241
Other	Base-year value extrapolated by active duty personnel by rank (10 for officers, 4 for warrant, officers, and 9 for enlisted), by cadets, and reserves.	43.282
Civilian	Base-year value extrapolated by employment by grade and step and by hours worked.	21.521
Other services:		
Contractual research and development:		
Department of Defense	Composite index of DOD and proxy prices, from BEA survey.	10.866
Department of Energy	Composite index of DOD and proxy prices, from BEA survey.	1.948
Installation support:		
Utilities:		
Electricity	Composite index of 15 PPI's and 2 ER's	1.221
Natural gas	CPI for utility piped gas . . . . .	.361
Water and sewage	CPI for water and sewerage maintenance (ERA) . . . . .	.111
Steam and hot water	CPI for water and sewerage maintenance (ERA) . . . . .	.032
Communication:		
Postage	Composite index of 20 PPI's . . . . .	.159
Local telephone	PPI for local business phone . . . . .	.576
Other	Composite index of DOD prices . . . . .	.415
Other:		
Housekeeping	Index of AHE for services to buildings (ERA) . . . . .	.67
Equipment maintenance	Index of AHE for miscellaneous business services	1.020
Property maintenance	Composite index of DOD prices (ERA)	2.081
Rental of property	CPI for residential rent . . . . .	.249
Leased equipment	Index of AHE for miscellaneous repair services . . . . .	.401
Contractor-operated facilities	Composite index of 7 AHE's	1.894
Other	Composite index of 5 AHE's (ERA) . . . . .	.290
Weapons support:		
Depot maintenance:		
Army	Composite index of DOD prices . . . . .	.291
Air Force	Composite index of 4 AHE's	1.002
Navy	Composite index of DOD prices	2.043
Procurement services:		
Aircraft	Composite index of 2 AHE's . . . . .	.511
Missiles	Composite index of 2 AHE's . . . . .	.149
Navy ships	Composite index of 2 AHE's . . . . .	.181
Army weapons	Composite index of 2 AHE's . . . . .	.145

Table 3.--Constant-dollar Federal Government National Defense Purchases of
Services: Sources of Estimates--Continued

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Personnel support:		
Training and education	Composite index of DOD prices . . . . .	.238
Consulting	Index of AHE for miscellaneous services	1.296
Foreign nationals	Composite index of DOD prices (ERA)	1.296
Transportation of materiel:		
Air	Composite index of DOD prices . . . . .	.116
Sea	Composite index of DOD prices . . . . .	.823
Rail	Composite index of DOD prices . . . . .	.154
Truck	Composite index of DOD prices	1.368
Terminal services	Composite index of DOD prices . . . . .	.056
Travel of persons:		
Air	Composite index of DOD prices . . . . .	.957
Bus and rail	Composite index of DOD prices . . . . .	.047
Reimbursable travel	Composite index of DOD and OPM prices and 2 CPI's.	1.050
Other ¹	Index of AHE for miscellaneous services	-.037

¹ Includes purchases under the military assistance program.

AHE Average hourly earnings.
CPI Consumer price index.
DOD U.S. Department of Defense
ERA Exchange-rate adjusted.
IPD Implicit price deflator.
OPM Office of Personnel Management.
PPI Producer price index.

Table 6.--Constant-Dollar Federal Government Nondefense Purchases
of Services: Methods Used and Sources of Estimates

Category	Price index for deflation or extrapolator of base-year value	1982 weight (percent)
Compensation of employees:		
Civilian compensation . . .	Base-year value extrapolated by employment (by grade and step) and by hours worked.	58.987
Coast Guard compensation .	Base-year value extrapolated by employment (by grade and step) and by hours worked.	1.987
Other services:		
Travel	National Defense purchases IPD for travel of persons.	1.569
Air transportation of things	National defense purchases IPD for air transpor- tation.	.060
Rail transportation of things	National defense purchases IPD for rail transpor- tation.	.105
Sea transportation of things	National defense purchases IPD for sea transpor- tation.	.039
Truck transportation of things	National defense purchases IPD for truck transpor- tation.	.273
Parcel post service	IPD for parcel post service . . . . .	.020
Rental services	CPI for residential rent	1.020
Communications services . .	CPI for telephone services	1.182
Water, sewerage, and sanitation services . . .	CPI for water and sewerage maintenance . . . . .	.06
Electricity	PPI for electric power . . . . .	.776
Electrical repair services	Index of AHE for electrical repair shops industry.	1.784
Other repair services . . .	Index of AHE for miscellaneous repair services industry.	.235
Business services	Index of AHE for miscellaneous business services industry.	1.609
Services to aircraft and aerospace equipment . . .	Index of AHE for aircraft and parts industry . .	2.198
Ship services	Index of AHE for ship and boat building and re- pairing industry.	.471
Other communications services	Index of AHE for communications services indus- try.	.087
Real estate services . . .	Index of AHE for real estate operators and lessors industry.	1.580

Table 7.--Constant-Dollar State and Local Government Purchases
of Services: Methods Used and Sources of Estimates

Category	Price index for deflation or quantity extrapolator of base-year value	1982 weight (percent)
Compensation of employees:		
Education compensation .	Base-year value extrapolated by full-time equivalent employment, average work week, and (for primary and secondary teaching) change in years of experience and level of educational attainment.	44.124
Other compensation . . .	Base-year value extrapolated by full-time equivalent employment and average work week.	37.72
Other services:		
Electric service	PPI for commercial power, 40 kw demand	2.242
Air transportation . . .	CPI for airline fares . . . . .	.654
Insurance	CPI for automobile insurance . . . . .	.115
Automobile leasing, repair, and parking . . .	CPI for other automobile related fees . . . . .	.389
Educational services . .	CPI for college tuition . . . . .	.089
Entertainment services .	CPI for entertainment services	-.415
Transportation and warehousing	IPD for Federal Government purchases of non-defense transportation service.	.384
Lodging while out of town	CPI for lodging while out of town . . . . .	.349
Miscellaneous repair and other services	CPI for maintenance and repair services	2.999
Medical care	CPI for medical care services	1.100
Gas production and service	CPI for utility piped gas . . . . .	.921
Postal services	IPD for Federal Government purchases of non-defense parcel post service.	.28
Professional services . .	CPI for professional services	3.859
Rental services	CPI for residential rent	1.969
Communication services .	CPI for telephone services . . . . .	.735
Local transportation . .	CPI for intracity mass transit . . . . .	.995
Water, sewerage, and sanitation services . .	CPI for water and sewerage maintenance . . . . .	.288
Financial services furnished without payment by banks, credit agencies, and investment companies.	Base-year value extrapolated by paid employees hours of commercial banks.	1.196

CPI Consumer price index.
IPD Implicit price deflator.
PPI Producer price index.