

**Summary of Methods Used by the Bureau of Economic Analysis
to Estimate Real Gross Product Originating
in the Service Industries**

Bureau of Economic Analysis, USA

APPENDIX: SUMMARY OF METHODS USED
BY THE BUREAU OF ECONOMIC ANALYSIS TO ESTIMATE
REAL GROSS PRODUCT ORIGINATING IN SERVICE INDUSTRIES

SIC no.	Industry Title/Estimation Procedure
50-51	<p>Wholesale Trade</p> <p>Deflation of GPO by implicit price deflator based on ratio of current- to constant-dollar sales of wholesalers by type of operation and kind of business, adjusted for the effects of excise taxes. Sales of merchant wholesalers adjusted to include agents and brokers are distinguished from shipments by manufacturers' sales offices and branches. Deflators are selected from the BLS producer price indexes. Fifty-three different kinds of business are distinguished, including sales offices and branches as well as merchant wholesalers. Weights are the ratios of gross margins (operating expense plus profit) to sales as developed for the input-output tables based on the censuses of wholesale trade. Since the PPI relates to sales net of excise taxes, they are deflated separately by a special price index representing the commodity taxes collected.</p>
52-59	<p>Retail Trade</p> <p>Base-period gross product originating is extrapolated by margin-weighted deflated sales by kind of retail business. Retail establishments are classified in 39 categories according to the principal lines of commodities sold or the usual trade designation. Sales data by kind of business are adjusted to include excise taxes and are deflated by corresponding groupings of consumer price indexes that incorporate price data gross of excise taxes. Weights are the base-period ratios of gross margins to sales for each kind of business. The margins, based on the censuses of retail trade, approximate the relative contributions of the various kinds of retail business to gross product originating in the industry.</p>
60	<p>Banking</p> <p>Base-period gross product originating is extrapolated by the number of hours worked in the industry, which comprises financial institutions involved in deposit banking or closely related functions including fiduciary activities. This supplants the previous method of deflating current-dollar GPO by an implicit deflator derived as the quotient of a current- and constant-dollar series for imputed interest paid, which implied declining productivity in the industry.</p>

- 61 **Credit Agencies Other Than Banks**
As in banking, base-period GPO is extrapolated by an index of hours worked. This expedient is used because of the difficulties of defining output in the industry, which consists of saving and loans, mortgage bankers and brokers, agricultural, personal and business credit institutions, and rediscount and financing institutions for credit agencies.
- 62 **Security and Commodity Brokers**
Here, too, base-period GPO is extrapolated by hours worked, including self-employed as well as full- and part-time employees. The industry includes investment bankers, flotation companies, commodity exchanges, and services to security and commodity brokers or dealers, as well as the brokers themselves.
- 67 **Holding and Other Investment Offices**
Base-period GPO is extrapolated by hours worked. In addition to holding companies, the industry includes investment trusts, investment companies, and commodity trading companies.
- 63 **Insurance Carriers**
Base-period GPO is extrapolated by the sum of constant-dollar estimates for three major components of the industry, obtained as follows:
- a. **Health insurance**
Base-period net premiums received (health insurance premiums received less benefits paid) are extrapolated by premiums received deflated by the CPI for medical care.
- b. **Expense of handling life insurance**
This component, which is an item of personal consumption expenditures for services, is deflated by an index of average earnings weighted with a composite price index drawn from both the CPI and the PPI. Weights are based on the 1970 input-output table.
- c. **Nonlife insurance**
Data for 13 lines of nonlife insurance are obtained for both stock and mutual companies. Net premium earned data, adjusted for loss ratios, are aggregated into four groups and deflated as follows:
- (1) auto, by the CPI for auto insurance;
 (2) accident and health, by the CPI for medical care;
 (3) property, by the CPI for property insurance;
 (4) workmen's compensation, by an index of cost per thousand from the Social Security Bulletin.

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Insurance Agents, Brokers and Services

Base-period GPO is extrapolated by a composite of an index of constant-dollar commissions received by agents and brokers on premiums paid on nonlife policies written and an index of the number of ordinary life insurance policies sold as a proxy for premiums written. Weights are the shares of nonlife and life insurance in total commissions.

Data on premiums written for both stock and mutual companies are aggregated for the same four insurance groups noted under SIC 63, deflated by the same price indexes, multiplied by the 1972 commission rates, and then aggregated and indexed.

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Real Estate

In addition to real estate proper, this industry group includes combinations of real estate, insurance, loan, and law offices. For deflation purposes, the GPO of the group is split into five components, four of which are estimated elsewhere in the national income and product accounts: (1) farm realty in current and constant dollars in tables 1.18 and 1.19 with the deflator based on livestock and crop prices and expense data from the U.S. Department of Agriculture; (2) nonfarm housing product, rental and owner-occupied in current and constant prices in Tables 1.20 and 1.12, with the CPI composite rent index as deflator; (3) royalty income of persons in current dollars is from Table 8.5, and is deflated by the implicit price deflator for total personal consumption expenditures; (4) current-dollar estimates for the rental value of building and equipment owned and occupied by nonprofit institutions serving individuals from Table 8.8 is deflated, in effect, by the price indexes for nonresidential structures and equipment; and (5) the residual component, mainly the ownership and management of commercial, office, and certain other properties, is deflated by an index of rents (cents per square foot) published by the Building Owners and Managers Association, International. The sum of the five deflated components is the constant dollar GPO in the real estate industry.

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Hotels, Rooming Houses, Camps, and Other Lodging Places

Base-period GPO is extrapolated by an index of constant-dollar total output for lodging plus meals and beverages served in these establishments. The current-dollar total receipts of hotels and motels are deflated by the price index used for the personal consumption expenditure (PCE) portion of the total, which is a composite of the average rate per occupied room in hotels and motels (from the Annual Hotel Review) and the CPI for rent. To this is added the PCE real expenditures for tenant group rooms, school and higher educational housing, clubs and fraternity housing, and sport and recreation club rooms. The price deflators used for these items are the CPIs

for rent, for other entertainment services, and for food away from home. To this is added real outlays for meals and beverages, estimated in two parts: the cost of food served in fraternities and sororities is deflated by the CPI for food away from home; purchased meals and beverages in hotels and motels are deflated by the PCE deflator for purchased meals and beverages based on the corresponding CPIs.

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Personal Services

GPO is deflated by an implicit price deflator obtained as the quotient of current- and constant-dollar personal consumption expenditures for the sum of six types of personal services shown below together with the price indexes used in their deflation.

Service	Price Deflator
(1) Shoe repair	CPI for "other apparel services"
(2) Cleaning, dyeing, and laundering	CPI for "laundry and dry cleaning other than coin operated"
(3) Other clothing repair	Same as (2)
(4) Barbershops, beauty parlors, baths	CPI's "haircuts and other barber services", and "beauty parlor services for females"
(5) Photo studios	CPI for "other entertainment services"
(6) Funeral and burial	CPI for "personal expenses"

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Business Services

Base-period GPO is extrapolated by a weighted composite index of employment in the component three-digit industries. Weights are derived from adjusted net receipts estimates based on the 1972 Census of Selected Services.

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Automotive Repairs, Services, and Garages

GPO is deflated directly by a weighted average index of the CPIs for automotive repairs and for parking and the PPI for auto rentals. Weights are based on receipts data from the 1972 Census of Selected Services.

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Miscellaneous Repair Services

Base-period GPO is extrapolated by hours worked by full- and part-time employees plus self-employed in electrical and miscellaneous repair services, including watch, clock, and jewelry repair, reupholstery and furniture repair.

78 Motion Pictures

GPO is deflated directly by a weighted average of the implicit deflator of the relevant PCE component, drawn from the corresponding CPI index for "admissions" and an index of average annual earnings for motion picture production and allied services. Weights are based on 1972 relative wages and salaries, 41.5 percent of which originated in the motion picture theatres.

79 Amusement and Recreation Services, Except Motion Pictures
GPO is deflated by the implicit deflator obtained from the quotient of current- and constant-dollar totals for the following six PCE items, deflated as indicated.

Service	Price Deflator
(1) Legitimate theatres	CPI for "admissions"
(2) Spectator sports	Same as (1)
(3) Social and athletic clubs	Average annual earnings of full-time employees (weight .6) and the PPI for all industrial commodities (weight .4)
(4) Commercial participant amusements	Simple average of CPIs for "participant sports" and "other entertainment services"
(5) Pari-mutuel net receipts	Implicit deflator of current dollars and net turnover deflated by the total CPI less home ownership
(6) Commercial amusements, not elsewhere classified	CPI for "other entertainment services"

80 Health Services

This industry comprises offices of physicians, dentists, osteopaths, and other health practitioners, nursing homes, hospitals, medical and dental laboratories, outpatient care facilities, and allied health services. Since most of the output goes to final demand, GPO was deflated through 1972 by the implicit price deflator obtained from the quotient of the sum of the current- and constant-dollar PCE items shown below together with the indexes used to deflate them.

Service	Price Deflator
(1) Physicians	CPI for "physicians' services"
(2) Dentists	CPI for "dental services"
(3) Other professional services	CPI for "other professional services"
(4) Private hospital and sanatoriums	Average of American Health Association marketbasket index, the CPI for hospital rooms, and the Health Care Finance Administration's cost index.

From 1972 forward, GPO is extrapolated by the sum of real expenditures for the four items noted above, since after 1976 the deflated GPO went up significantly less than real expenditures, implying a productivity decline. The current procedure implies a lesser increase in the implicit GPO deflator than that for the sum of the PCE items.

81 Legal Services

Base-period GPO is extrapolated by an index of real PCE for legal services. Since the PCE item in current dollars is obtained as a fixed proportion of industry receipts as compiled by the Internal Revenue Service, this procedure is equivalent to deflating industry GPO by the price deflator for the PCE item. That deflator is an average of CPIs for wills and several other legal actions.

82 Educational Services

In addition to private elementary and secondary schools and colleges, this industry includes professional, technical, vocational and correspondence schools and educational services, not elsewhere classified. Base-period GPO is extrapolated by an index of total hours worked by full- and part-time employees plus self-employed persons in the industry.

86 Social Services, and Nonprofit Membership Organizations

GPO is deflated by a composite index of average annual earnings per full-time-equivalent employee in the two industries. Weights are based on employment percentages, which averaged about 27 and 73 percent for industries 83 and 86, respectively.

- 84,89 **Miscellaneous Professional Services**
 This group comprises museums, art galleries, botanical and zoological gardens as well as miscellaneous services such as those rendered by engineers, architects, accountants, artists, lecturers, and writers, and noncommercial establishments engaged in educational and research activities. GPO is deflated by the BEA index of average wages and salaries per full-time-equivalent employee in the industry group.
- 88 **Private Households**
 Industry GPO, equal to the compensation of domestic servants including payments in kind, is also identical to the PCE item "domestic service." The price deflator is a weighted average of the CPI's for household workers and for food in the home. The former is basically a wage-rate measure.
- xx **General Government--Federal**
 For nondefense functions base-period GPO (labor compensation) in grade structure detail is extrapolated by full-time-equivalent employment. Adjustment is made for "grade creep." In defense, base-period GPO is extrapolated by full-time-equivalent employment by rank for both enlisted personnel and officers.
- xx **General Government--State and Local**
 For education, base-period GPO is extrapolated by employment by class of employees based on data from the National Education Association. In noneducation, base-period GPO is extrapolated by aggregate full-time-equivalent employment.
- xx **Federal Government Enterprises**
 Base-year gross products of the Postal Service and of federal electric utilities are extrapolated by the BLS indexes of physical output for these enterprises. For the others, employment extrapolators are used.
- xx **State and Local Government Enterprises**
 Numbers of employees in each functional grouping of enterprises (liquor stores, transit systems, electric utilities, etc.) are multiplied by average annual compensation in the base period. Aggregate real labor compensation is used to extrapolate base-period GPO without adjustment for possible productivity change.