Producer Price Indices
on the
Economics Data Program Website

Data Series Descriptions

Consumer Price Indices
Data Series Descriptions

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This document was created to assist users of PPI data from the Economics Data Program Website. It contains the following information:

General Information

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Data Retrieval Location

This data was retrieved from the Pacific States Marine Fisheries Commission's Economics Data Program at http://www.psmfc.org/efin.

Contact Information

Please direct any questions, suggestions or other comments to:
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PPI Data Sources

All PPI data are from the US Department of Labor, Bureau of Labor Statistics. They are available at http://146.142.4.24/cgi-bin/srgate using the BLS Series ID provided in the description of the data series.

Seasonal Adjustment

All PPI's available for download from EFIN are NOT seasonally adjusted.

Seasonally adjusted PPI's may be obtained at http://146.142.4.24/cgi-bin/srgate. To obtain a seasonally adjusted CPI, use the BLS Series ID for the item you want replacing the"U" with an "S". For instance, the BLS Series ID for a seasonally adjusted Producer Price Index Revision for all commodities would be WPS00 (instead of WPU00). For additional help, follow the Series ID Formats link.

Periodicity of Data

All PPI's on the Economics Data Program website are available annually and monthly. Annual and monthly data are both stored within each downloadable file. Use the following selection procedures if you only wish to view one type of data.

Monthly vs. Annual Data
- Select period = M13 for annual data.
- Select period <> M13 for (bi)monthly data.

Commodities Based
Producer Price Indices

Description of commodities-based PPI's

Commodities-based PPI's are organized by type of product and end use, rather than by industry type as the Industry-based PPI's are. Chapter 14 of the BLS Handbook of [PPI] Methods explains further:

Commodity classification. The commodity classification structure of the Producer Price Index organizes products by similarity of end use or material composition, regardless of whether these products are classified as primary or secondary in their industry of origin. This system is unique to the PPI and does not match any other standard coding structure such as the SIC or the United Nations Standard International Trade Classification. Historical continuity of index series, the needs of index users, and a variety of ad hoc factors were important in developing the PPI commodity classifications.

Fifteen major commodity groupings (2-digit level) make up the all commodities index. Of these, 2 major commodity groupings form the index for farm products and processed foods and feeds, while the other 13 are grouped into the industrial commodities price index. Each major commodity grouping includes (in descending order of aggregation) subgroups (3-digit), product classes (4-digit), subproduct classes (6-digit), and individual items (8-digit). The structure of the traditional commodity classification system thus follows a strict, consistent hierarchy.

Series Information For Fuel and Related Products and Power

BLS Series ID WPU05
> Producer Price Index Revision - Commodities (WP)
> Not Seasonally Adjusted (U)
> Fuels and related products and power (05)
> All commodities within group (missing item code)
> Base period: 1982=100
> Data are available monthly and annually.

Industry Based
Producer Price Indices

Overview of Industry-Based PPI's

Industry-based PPI's are organized by type of industry, rather than by type of product and end use as the commodities-based PPI's are. Chapter 14 of the BLS Handbook of Methods explains further:

> *Industry classification.* A Producer Price Index for an industry is a measure of changes in prices received for the industry's output sold outside the industry (that is, its net output). As previously stated, the SIC 4-digit industry code is the basis for the industry price index system. Price indexes have also been available since 1985 for many more highly aggregated industry series at the 3- and 2-digit levels, as well as for total mining industries and total manufacturing industries.
>
> Nearly every 4-digit industry price index is accompanied by detailed indexes representing price movements for the various products made in that industry. Code numbers for these indexes at the 5-digit (product class) and the 7-digit (individual product) levels often follow the product codes and titles established by the Bureau of the Census as extensions of the SIC structure. Sometimes, however, BLS assigns its own codes and titles.
>
> In general, there may be as many as three kinds of product price indexes for a given industry. Every industry has primary product indexes to show changes in prices received by establishments classified in the industry for products made primarily, but not necessarily exclusively, by that industry. The industry under which an establishment is classified is determined by those products accounting for the largest share of its total value of shipments. In addition, most industries have secondary product indexes to show changes in prices received by establishments classified in the industry for products chiefly made in some other industry. Finally, some industries may have miscellaneous receipts indexes to show price changes in other sources of revenue received by establishments within the industry.

Overview of Industry-Based Stage-of-Process Classification

Chapter 14 of the BLS Handbook of Methods explains the stage-of-process classification system.

> *Industry-based stage-of-process classification.*
> The Bureau publishes industry-based stage-of-process indexes, with data beginning in June 1985. These industry-based SOP indexes combine industry price indexes with interindustry transaction data from the 1987 input/output tables

of the U.S. Department of Commerce; the result is a rigorous price model of the industrial economy.

The industry-based SOP system is grounded on SIC industries, which are allocated to processing stages based on their transaction relationships to each other. The traditional SOP system is grounded on commodities, which are allocated to processing stages based on their degree of fabrication and on the class of their ultimate buyer.

Industry-based SOP data use net output and net input weights that exclude transactions internal to an SOP component and that limit measurement to include only those transactions which affect other SOP components. This practice systematically eliminates multiple counting of price change, a problem which affects some commodity-based SOP indexes, particularly within the Intermediate Goods category.

Industry-based SOP indexes are arranged to facilitate economic analysis of the inflation transmission process by maximizing the amount of frontflows within the system, i.e., transactions from industries classified in an earlier stage of process to industries classified in a later stage. Backflows (i.e., transactions from a later stage of process to an earlier stage) introduce circularity into what is ideally a sequential system.

There are four major output SOP indexes: (1) Crude processors; (2) primary processors; (3) semifinished processors; and (4) finished processors. There are also four major material input SOP indexes, with two major subindexes for final demand: (1) Material inputs to primary processors; (2) material inputs to semifinished processors; (3) material inputs to finished processors; and (4) material inputs to final demand, including separate indexes for material inputs to personal consumption and material inputs to capital investment.[6]

[6] See "New Stage-of-Process Price System Developed for the Producer Price Index" by Robert Gaddie and Maureen Zoller, Monthly Labor Review, April 1988.

Prepared Fresh or Frozen Fish and Seafoods Industry.

Data for industry-based PPI series on the Economics Data Website are based upon the prepared fresh or frozen fish and seafoods industry, SIC 2092. This industry is described in the 1987 SIC manual as follows:

Division D: Manufacturing
Major Group 20: - Food And Kindred Products

Industry Group 209: Miscellaneous Food Preparations And Kindred
2092 Prepared Fresh or Frozen Fish and Seafoods

Establishments primarily engaged in preparing fresh and raw or cooked frozen fish and other seafoods and seafood preparations, such as soups, stews, chowders, fishcakes,

crabcakes, and shrimp cakes. Prepared fresh fish are eviscerated or processed by removal of heads, fins, or scales. This industry also includes establishments primarily engaged in the shucking and packing of fresh oysters in nonsealed containers.

> Chowders, fish and seafood: frozen
> Crabcakes, frozen
> Crabmeat picking
> Crabmeat, fresh: packed in nonsealed containers
> Fish and seafood cakes, frozen
> Fish fillets
> Fish sticks
> Fish: fresh and frozen, prepared
> Oysters, fresh: shucking and packing in nonsealed containers
> Seafoods, fresh and frozen
> Shellfish, fresh and frozen
> Shellfish, fresh: shucked, picked, or packed
> Shrimp, fresh and frozen
> Soups, fish and seafood: frozen
> Stews, fish and seafood: frozen

Visit http://www.psmfc.org/efin/siclup.html for a description of other fisheries-related industries.

Data for other industries may be obtained at http://146.142.4.24/cgi-bin/srgate by using another SIC in place of 2092 in the BLS Series ID. For additional help, follow the Series ID Formats link.

Data Series Descriptions for
Producer Price Indices:
Prepared Fresh or Frozen Fish and Seafoods Industry

by state of process/product

Primary Products

BLS Series ID PCU2092#P

Producer Price Index Revision - Current Series (PC)
Not Seasonally Adjusted (U)
Prepared fresh or frozen fish and seafoods industry. (2092)
Primary products only (#P)
Base period: Dec 1982=100
Data are available monthly and annually.

These data relate to SIC 2092 only.

These data relate to primary products only.

BLS says this series will reflect the average change in price these producers receive for the fresh or frozen fish or seafood that they make and sell.

Secondary Products

BLS Series ID PCU2092#S

Producer Price Index Revision - Current Series (PC)
Not Seasonally Adjusted (U)
Prepared fresh or frozen fish and seafoods industry. (2092)
Secondary products only (#S)
Base period: Dec 1982=100
Data are available monthly and annually.

These data relate to SIC 2092 only.

These data relate to secondary products only.

BLS says "The secondary products index is limited to reflecting the average change in price that these producers receive for products other than fresh or frozen fish and seafood (e.g., canned or cured fish and seafood)."

Groundfish Products

BLS Series ID PCU2092#31
        Producer Price Index Revision - Current Series (PC)
        Not Seasonally Adjusted (U)
        Prepared fresh or frozen fish and seafoods industry. (2092)
        Groundfish products only (#31)
        Base period: June 1989=100
        Data are available monthly and annually.

These data relate to SIC 2092 only.

These data relate to groundfish products only

BLS definition of groundfish includes: cod, cusk, haddock, hake, perch, pollock, and whiting.

Corrugated and Solid Fiber Boxes
BLS Series ID PCU2653#1

       Producer Price Index Revision - Current Series (PC)
       Not Seasonally Adjusted (U)
       Paperboard and Containers and Boxes Industry (265)
       Corrugated Shipping Containers only (#1)
       Base period: March 1980=100
       Data are available monthly and annually.

These data relate to SIC 2653 only.

These data relate to Corrugated shipping containers only

BLS definition of corrugated and solid fiber boxes includes: boxes, containers, display items, hampers, pads, pallets partitions and sheets.

Bureau of Labor Statistics Information

IMPORTANT NOTE

The BLS Overview of the PPI and the BLS Handbook of Methods have been added to this file for your convenience. These documents were downloaded directly from the BLS website at the URL's below on 13 September 1999.

You are encouraged to view the most recent version of these documents on the BLS website before including either document in your citations. The URL's are listed below.

If you do discover that either of these documents is not the most recent version, we would greatly appreciate if you would notify the Economics Data Program. The Economics Data Program can be reached via email at efin@psmfc.org, via phone at (206) 526-4251, (206) 526-6683 or toll free at (888) 421-4251.

BLS Resources on the Web

The BLS Overview contained in this section was obtained at http://stats.bls.gov/ppiover.htm.

The BLS Handbook of Methods, Chapter 14: Producer Prices was obtained at http://stats.bls.gov/opub/hom/pdf/homch14.pdf.

Additionally, you may find the following websites useful when using the PPI:
- The BLS PPI Homepage is located at http://stats.bls.gov/ppihome.htm
- The BLS Answers to Frequently Asked Questions is located at http://stats.bls.gov/ppifaq.htm
- BLS Contact Information is located at http://stats.bls.gov/ppicon.htm
- The BLS Homepage is located at http://stats.bls.gov/blshome.htm
- The BLS form-based querying system is located at http://stats.bls.gov/sahome.html

Producer Price Indexes BLS

Overview

Contents

Data

❍ The Producer Price Index (PPI) is a family of indexes that measures the average change over time in selling prices received by domestic producers of goods and services. PPIs measure price change from the perspective of the seller. This contrasts with other measures, such as the Consumer Price Index (CPI), that measure price change from the purchaser's perspective. Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs.

❍ There are three main PPI publication structures:

  ■ **Industry-based**. The PPI publishes over 500 industry price indexes in combination with over 10,000 specific product line and product category sub-indexes.

  ■ **Commodity-based**. The PPI publishes over 3,200 commodity price indexes organized by type of product and end use.

  ■ **Stage-of-processing based**. The PPI publishes aggregate price indexes organized by commodity-based processing stage. The three stages of processing include Finished Goods; Intermediate Materials, Supplies, and Components; and Crude Materials for Further Processing.

❍ Other publication structures include:

  ■ Producer price indexes by durability of product.

  ■ Special commodity groupings (e.g., Fabricated metal products, Construction materials, and Selected textile mill products).

  ■ Industry-based stage-of-processing indexes.

Coverage

❍ The PPI tracks price change for practically the entire output of domestic goods-producing sectors: agriculture, forestry, fisheries, mining, scrap, and manufacturing.

❍ The PPI tracks price change for an ever-growing portion of the non-goods producing sectors of the economy. New PPIs are gradually being introduced for the products of industries in the

transportation, utilities, finance, business services, health, legal, and professional services sectors of the economy.

Data source

❍ The PPI sample includes approximately 25,000 establishments providing close to 100,000 price quotations per month.

❍ Participating establishments report price data primarily through the mail.

❍ Goods and services included in the PPI are weighted by value-of-shipments data contained in the 1992 economic censuses.

❍ Industries and products are systematically resampled as needed.

Reference date

❍ For most items, establishments report product selling prices for the Tuesday of the week containing the 13th of each month.

Publications

❍ Producer Price Indexes are usually made available during the second full week of the month following the reference date. The monthly news release contains text explanation of aggregate index movements and selected data tables.

❍ The *PPI Detailed Report* is printed and mailed during the middle of the second month following the reference date.

❍ Selected PPI indexes are published in the BLS *Monthly Labor Review*.

❍ A limited amount of historical data is made available through the *Handbook of Labor Statistics*.

❍ Electronic access is available through a world wide web (WWW) site and a file transfer protocol (FTP) service.

Uses

❍ **Contract escalation.** PPI data are commonly used in escalating purchase and sales contracts. These contracts typically specify dollar amounts to be paid at some point in the future. It is often desirable to include an escalation clause that accounts for changes in input prices. For example, a long-term contract for bread may be escalated for changes in wheat prices by applying the percent change in the PPI for wheat to the contracted price for bread. (See Escalation and Producer Price Indexes: A Guide for Contracting Parties, BLS Report 807, September 1991.)

❍ **Indicator of overall price movement at the producer level.** PPI's capture price movement prior to the retail level. Therefore, they may foreshadow subsequent price changes for business and consumers. The President, Congress, and the Federal Reserve employ these data in formulating fiscal and monetary policies.

❍ **Deflator of other economic series.** PPIs are used to adjust other time series for price changes and to translate those series into inflation-free dollars. For example, constant-dollar gross domestic product data are estimated using deflators based on the PPI.

❍ **Measure of price movement for particular industries and products.**

❍ **Comparison of input and output costs.**

❍ **Comparison of industry-based price data to other industry-oriented economic time series.**

❍ **Forecasting.**

❍ **LIFO (i.e., last-in, first-out) inventory valuation.**

Research in progress

❍ Services sector coverage expansion.

❍ Development of a stage-of-processing aggregation scheme based upon the flow of economic transactions through the economy inclusive of the entire domestic output of goods and services.

Additional information

● For additional information on PPI methodology, see the BLS Handbook of Methods, Chapter 14, Producer Price Indexes. This documentation is available in both HTML and PDF format.
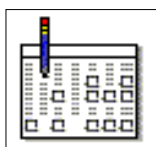
PPI Home Page

BLS Home Page

Chapter 14.
Producer Prices

The Producer Price Index (PPI) measures average changes in selling prices received by domestic producers for their output. Most of the information used in calculating producer price indexes is obtained through the systematic sampling of virtually every industry in the mining and manufacturing sectors of the economy. The PPI program (also known as the industrial price program) includes some data from other sectors as well—agriculture, fishing, forestry, services, and utilities—gas and electricity. Thus the title "Producer Price Index" refers to an entire "family" or system of indexes.

As of January 1996, the PPI program contained:

• Price indexes for approximately 500 mining and manufacturing industries, including over 10,000 indexes for specific products and product categories;

• Over 3,200 commodity price indexes organized by type of product and end use;

• Nearly 1,000 indexes for specific outputs of industries in the services sector and other sectors that do not produce physical products; and

• Several major aggregate measures of price change organized by stage of processing, both commodity-based and industry-based.

Together, these elements constitute a system of price measures designed to meet the need for both aggregate information and detailed applications, such as following price trends in specific industries and products.

Measures-or indexes-of price change classified by industry form the basis of the program. These indexes reflect the price trends of a constant set of goods and services which represent the total output of an industry. Industry index codes are based upon the Standard Industrial Classification (SIC) system and provide comparability with a wide assortment of industry-based data for other economic phenomena, including productivity, production, employment, wages, and earnings.

Background

Known until 1978 as the Wholesale Price Index or WPI, the Producer Price Index is one of the oldest continuous systems of statistical data published by the Bureau of Labor Statistics, as well as one of the oldest economic time series compiled by the Federal Government. When first published in 1902, the index covered the years from 1890 through 1901. The origins of the index can be found in an 1891 U.S. Senate resolution authorizing the Senate Committee on Finance to investigate the effects of the tariff laws "upon the imports and exports, the growth, development, produc-

tion, and prices of agricultural and manufactured articles at home and abroad."[1]

The first index, published on the base period 1890-99, was an unweighted average of price relatives for about 250 commodities. Since that time, many changes have been made in the sample of commodities, the base period, and the method of calculating the index. A system of weighting was first used in 1914, for example, and major sample expansions and reclassifications were implemented in 1952 and 1967.

The industrial price program's original intent was to measure changes in prices received for goods sold in primary markets of this country. The conceptual framework and economic theory guiding the program's evolution, while more implicit than explicit, concentrated on obtaining the price received by either a domestic producer or an importer for the first commercial transaction.

One of the major limitations of the traditional methodology was its reliance on judgment samples of commodities and producers. This practice resulted in a system that was too heavily composed of volume-selling products made by larger firms. The PPI therefore did not adequately reflect the behavior of the multitude of products whose individual transactions values might have been small but which collectively accounted for a sizable portion of the economy. Another result of judgment sampling was that the output of many industries was completely overlooked. Before the transition to the current methodology began, products covered by the PPI program only accounted for about half of the total value of output by the mining and manufacturing sectors. The practice of assigning equal weight to price reports from each producer of a given commodity, regardless of any disparity in size among these firms, may have caused some distortions.

Another limitation of the traditional PPI methodology was its commodity orientation, which, while important, did not provide compatibility with the industry orientation of most other Federal economic time series. The PPI's unique commodity classification scheme made it difficult to compare producer price movements with data for most other economic variables that were expressed in terms of the Standard Industrial Classification.

These and other weaknesses in the industrial price program, combined with increased development of the theory of price indexes in preretail markets, spurred several changes in terminology and operations during the 1970s. The 1978 program name change from Wholesale Price Index to Producer Price Index, for example, was intended to reemphasize that the industrial price program continues to be based on prices received by producers from whoever makes the

first purchase, rather than on prices paid to wholesalers by retailers or others further down the distribution chain. This new nomenclature was accompanied in 1978 by a shift in the Bureau's analytical focus from the all commodities price index (which was popularly called "the" Wholesale Price Index) to the Finished Goods Price Index and the other commodity-based stage-of-processing price indexes.

These changes were a prelude to the most comprehensive overhaul of industrial price methodology in the program's history. Also begun in 1978, this overhaul was phased in gradually until the transition to the current methodology was essentially completed in January 1986.

Description of Survey

Universe

The Producer Price Index universe consists of the output of all industries in the goods-producing sectors of the American economy—mining, manufacturing, agriculture, fishing, and forestry—as well as gas, electricity, and goods competitive with those made in the producing sectors, such as waste and scrap materials. Imports are no longer included within the PPI universe; however, the BLS International Price Program publishes price indexes for both imports and exports. (See chapter 18.) Domestic production of goods specifically made for the military is included, as are goods shipped between establishments owned by the same company (termed interplant or intracompany transfers).

The output of the services sector and other sectors that do not produce physical products is also conceptually within the PPI universe, although actual coverage is incomplete. As of January 1996, the PPI program publishes data for selected industries in the following industry groups: Railroad, water, and air transportation of freight; air passenger transportation; motor freight transportation and warehousing; U. S. Postal Service; petroleum pipe lines; services incidental to water transportation; tour operators and travel agencies; hotels and motels; communications; health services; real estate; business services; electrical power and natural gas utilities; automotive rental and leasing; and scrap and waste materials collection. While funding is currently insufficient to permit full coverage of services, key sectors have been targeted for inclusion. Over the next few years, coverage will be expanded to include significant representation of the health services, real estate, and business services industries. Areas wholly overlapping the Consumer Price Index, such as personal services, will not be targeted.

Prices

One crucial task in designing a price index is to define what constitutes the "price" whose changes are to be measured. A seemingly simple question such as "What is the

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[1] Senate Committee on Finance, *Wholesale Prices, Wages, and Transportation,* Senate Report No. 1394, "The Aldrich Report," Part I, 52nd Congress, 2d sess., March 3, 1893; and U.S. Department of Labor, *Course of Wholesale Prices, l890–1901,* Bulletin No. 39, March 1902, pp. 205–09.

price of steel?" is unanswerable until it is made more specific.

For the purposes of the industrial price program, a price is defined as the net revenue accruing to a specified producing establishment from a specified kind of buyer for a specified product shipped under specified transaction terms on a specified day of the month. This definition points up the several price-determining variables that must be clarified before a cooperating business establishment can report a meaningful price for any of its products to BLS. For example, if a company charges more for a red widget than a white one, color is one of the price-determining variables; if all widgets sell for the same price regardless of color, color is not a price-determining variable.

Because the PPI is meant to measure changes in net revenues received by producers, changes in excise taxes—revenues collected on behalf of the government—are not reflected. But changes in rebate programs, low-interest financing plans, and other sales promotion techniques are reflected to the extent that these policies affect the net proceeds ultimately realized by the producer for a unit sale. If an auto manufacturer offers retail customers a rebate of $500, the manufacturer's net proceeds are reduced by $500, and the PPI for new cars would reflect a lower price. (Conversely, termination of a rebate program would be treated as a price increase.) But if a retail car dealer offers retail customers an additional rebate whose cost is absorbed by the dealer rather than the manufacturer, such a rebate would not affect the PPI. (The Consumer Price Index, of course, would reflect a customer rebate regardless of whether it was sponsored by the manufacturer or the dealer.)

The statistical accuracy of producer price indexes depends heavily on the quality of the information voluntarily provided by respondents. BLS emphasizes to cooperating businesses the need for reports of realistic transaction prices, including all discounts, premiums, rebates, allowances, etc., rather than list or book prices. The use of list prices in the industrial price program has been the exception rather than the rule. Even before the conversion to the current methodology, a BLS survey showed that only about 20 percent of traditional commodity indexes were based on list prices. Inasmuch as the current methodology is more systematic than the older methodology in concentrating on actual transaction prices, the use of list prices is even less frequent now.

Neither order prices nor "futures" prices are included, because the PPI tries to capture the selling price for output being shipped in that same month, not in some other time. Changes in transportation costs are reflected in industry price indexes only when the producing company delivers the product itself without hiring a third party shipper.

Most prices refer to one particular day of the month, namely, the Tuesday of the week containing the 13th of the month; this pricing date can range between the 9th and the 15th. There are exceptions for some products, however. A number of farm products are priced on a day of the week other than Tuesday. Prices for some refined petroleum products are commonly an average of prices during the first 10 working days of the month or the prices received by oil refineries on the tenth working day. Price indexes for natural gas to pipelines, liquefied petroleum gas, some industrial chemicals, and compact discs and audio tapes are still based on data for the calendar month as a whole and therefore lag 1 month behind other indexes. The November index for natural gas to pipelines, for example, would reflect price changes that actually occurred in October. Although most prices reported to the Bureau are the selling prices of selected producers, free on board (f.o.b.) point of production, some prices are those quoted on organized commodity exchanges or at central markets; this practice is most often found among farm products.

Product change and quality adjustment

Although the same product usually is priced month after month, it is necessary to provide a means for bridging over changes in detailed specifications so that only real price changes will be measured. An adjustment is especially important when one product is replaced by a new one. Even when companies report their selling prices based on altered transaction selling terms (e.g., price per 1,000 sold instead of price per 100), or when there is a change in the number or identity of companies reporting to BLS, routine steps are taken to ensure that only true price changes influence the index.

When a company respondent reports a price that reflects a physical change in a product, the Bureau uses one of several quality adjustment methods. The direct comparison method is used when the change in the physical specification is so minor that no product cost differences result; in this instance, the new price is directly compared to the last reported price under the former specifications, and the affected index reflects any price difference.

When changes in physical characteristics of a product cause product cost differences, however, the Bureau attempts to make an accurate assessment of real price change by taking systematic account of quality differences. The explicit quality adjustment method is especially important for automobiles, machinery, and other types of goods that undergo periodic model changes. For these goods the usual method for quality adjustment involves the collection of data from reporting companies on the costs they have incurred in connection with the quality change. For example, if the selling price of a new model car is $500 more than the previous model year's version, and $200 of that increase is due to the extra product cost and normal margin associated with the addition of government-mandated safety equipment, then the real price has only risen by $300; the change in the passenger car index will reflect only that amount, not the

http://stats.bls.gov/hom/homch14.pdf

nominal price rise of $500.

Unfortunately, it is not always possible to obtain a value for quality adjustment if, for example, the respondent is unable to estimate the production cost difference between an old item and a new one, or if an explicit comparison between an entirely new product and a previous product is not feasible. In such cases, the Bureau may have to assume that any difference in price between the old and the new items is entirely due to quality differences; the Bureau, therefore, employs the "overlap" method (if possible). Under this method, the Bureau collects prices for both the old and the new item over a period of time and chooses 1 month as the overlap month. The difference between the prices of the two items in the overlap month is assumed to represent the value of their quality differences. For purposes of calculating the official price index, the Bureau uses price changes for the old item through the overlap month but thereafter follows price changes only for the new item.

When resource cost information is absent from the reporter concerning product attributes that have changed, a different yardstick is employed to measure these missing values. It has been very difficult to estimate the value of improvements or deteriorations in products manufactured by companies included in "high tech" industries such as computers, semiconductors, and so forth. These industries may frequently develop new products that are technologically superior and cost less. The conventional quality adjustment methodology is suitable for situations in which increased resource costs for producing a product are necessary for improved performance. This is the exact opposite of what typically happens in industries that manufacture sophisticated products comprised of electronic components. This inverse relationship between cost changes and quality changes requires many different techniques for index construction, especially in the area of quality adjustment.[2] An alternative quality adjustment technique using hedonic regressions has been incorporated into PPI adjustment processes[3]. Hedonic regressions estimate the functional relationship between the characteristics embodied in the products in a market and the products' selling prices. They yield estimates of "implicit prices" for specified product characteristics that may be used to value the quality improvement resulting from changes in the various characteristics embodied in a product. The value of the quality improvement can then be removed from the reported price change to obtain a measure of the pure price change appropriate for the PPI.

[2] See "New Price Index for the Computer Industry," by James Sinclair and Brian Catron, *Monthly Labor Review*, October 1990.
[3] Since January 1991, the Bureau has published a computer price index incorporating these new quality adjustment procedures. In addition, series for other high–tech industries related to computers may also incorporate these new techniques of adjusting for embodied technological change.

Classification

The Producer Price Index family of indexes consists of several major classification systems, each with its own structure, history, and uses. However, indexes in all classification systems now draw from the same pool of price information provided to BLS by cooperating company reporters. The three most important classification structures are: (1) industry; (2) commodity; and (3) stage of processing.

Industry classification. A Producer Price Index for an industry is a measure of changes in prices received for the industry's output sold outside the industry (that is, its net output). As previously stated, the SIC 4-digit industry code is the basis for the industry price index system. Price indexes have also been available since 1985 for many more highly aggregated industry series at the 3- and 2-digit levels, as well as for total mining industries and total manufacturing industries.

Nearly every 4-digit industry price index is accompanied by detailed indexes representing price movements for the various products made in that industry. Code numbers for these indexes at the 5-digit (product class) and the 7-digit (individual product) levels often follow the product codes and titles established by the Bureau of the Census as extensions of the SIC structure. Sometimes, however, BLS assigns its own codes and titles.

In general, there may be as many as three kinds of product price indexes for a given industry. Every industry has primary product indexes to show changes in prices received by establishments classified in the industry for products made primarily, but not necessarily exclusively, by that industry. The industry under which an establishment is classified is determined by those products accounting for the largest share of its total value of shipments. In addition, most industries have secondary product indexes to show changes in prices received by establishments classified in the industry for products chiefly made in some other industry. Finally, some industries may have miscellaneous receipts indexes to show price changes in other sources of revenue received by establishments within the industry.

Commodity classification. The commodity classification structure of the Producer Price Index organizes products by similarity of end use or material composition, regardless of whether these products are classified as primary or secondary in their industry of origin. This system is unique to the PPI and does not match any other standard coding structure such as the SIC or the United Nations Standard International Trade Classification. Historical continuity of index series, the needs of index users, and a variety of ad hoc factors were important in developing the PPI commodity classifications.

Fifteen major commodity groupings (2-digit level) make up the all commodities index. Of these, 2 major commodity

http://stats.bls.gov/hom/homch14.pdf

groupings form the index for farm products and processed foods and feeds, while the other 13 are grouped into the industrial commodities price index. Each major commodity grouping includes (in descending order of aggregation) subgroups (3-digit), product classes (4-digit), subproduct classes (6-digit), and individual items (8-digit). The structure of the traditional commodity classification system thus follows a strict, consistent hierarchy.

Corresponding indexes. Nearly all 8-digit commodities under the traditional commodity coding system are now derived from corresponding industry-classified product indexes. In such instances, movements in the traditional commodity price indexes are identical to movements of their counterparts. Although most traditional commodity price indexes continue to be published on their own original base period, the corresponding industry product price indexes are published on a base of the month of their introduction. Therefore, monthly percent changes for corresponding indexes will be virtually identical even though their respective index levels may differ.[4]

Specifications for 8-digit commodities priced under the current methodology generally follow Census Bureau definitions and are considerably broader than those formerly used for traditional commodity indexes. Because companies report prices for a broad range of commodity and transaction-term specifications within a given commodity index, it is not feasible to publish meaningful average prices for individual commodities. Price indexes are usually calculated by constructing an index for each reporting establishment's price and then averaging these indexes, with appropriate establishment weights, to derive the commodity index.

Commodity-based stage-of-processing classification. Commodity-based stage-of-processing (SOP) price indexes regroup commodities at the subproduct class (6-digit) level according to the class of buyer and the amount of physical processing or assembling the products have undergone.

Finished goods are defined as commodities that are ready for sale to the final-demand user, either an individual consumer or a business firm. In national income accounting terminology, the Finished Goods Price Index roughly measures changes in prices received by producers for two portions of the gross national product: (1) Personal consumption expenditures on goods, and (2) capital investment expenditures on equipment.[5] Within the Finished Goods Price Index, the consumer foods category includes unprocessed foods, such as eggs and fresh fruits, as well as pro-

cessed foods, such as bakery products and meats. The finished energy goods component includes those types of energy to be sold to households—primarily gasoline, home heating oil, residential gas, and residential electricity. The category for consumer goods other than foods and energy includes durables such as passenger cars and household furniture, and nondurables such as apparel and prescription drugs. The capital equipment index measures changes in prices received by producers of durable investment goods such as heavy motor trucks, tractors, and machine tools.

The category for intermediate materials, supplies, and components consists partly of commodities that have been processed that still require further processing. Examples of such semifinished goods include flour, cotton yarn, steel mill products, and lumber. The intermediate goods category also encompasses nondurable, physically complete goods purchased by business firms as inputs for their operations. Examples include diesel fuel, belts and belting, paper boxes, and fertilizers.

Crude materials for further processing are defined as unprocessed commodities not sold directly to consumers. Crude foodstuffs and feedstuffs include items such as grains and livestock. The crude energy goods category consists of crude petroleum, natural gas to pipelines, and coal. Examples of crude nonfood materials other than energy include raw cotton, construction sand and gravel, and iron and steel scrap.

Many major commodity-based stage-of-processing price indexes exist continuously back to 1947. However, some special groupings within this system (such as finished goods less foods and energy) were first calculated in the 1970s and have no historical record before then.

Industry-based stage-of-process classification. The Bureau publishes industry-based stage-of-process indexes, with data beginning in June 1985. These industry-based SOP indexes combine industry price indexes with interindustry transaction data from the 1987 input/output tables of the U.S. Department of Commerce; the result is a rigorous price model of the industrial economy.

The industry-based SOP system is grounded on SIC industries, which are allocated to processing stages based on their transaction relationships to each other. The traditional SOP system is grounded on commodities, which are allocated to processing stages based on their degree of fabrication and on the class of their ultimate buyer.

Industry-based SOP data use net output and net input weights that exclude transactions internal to an SOP component and that limit measurement to include only those transactions which affect other SOP components. This practice systematically eliminates multiple counting of price change, a problem which affects some commodity-based SOP indexes, particularly within the Intermediate Goods category.

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[4] Lists of corresponding commodity codes and product codes appear in *Supplement to Producer Price Indexes, Data for 1990*, pp. 353-86.

[5] The Producer Price Index universe excludes the consumer services portion of total consumption expenditures and the structures portion of investment expenditures.

Industry-based SOP indexes are arranged to facilitate economic analysis of the inflation transmission process by maximizing the amount of frontflows within the system, i.e., transactions from industries classified in an earlier stage of process to industries classified in a later stage. Backflows (i.e., transactions from a later stage of process to an earlier stage) introduce circularity into what is ideally a sequential system.

There are four major output SOP indexes: (1) Crude processors; (2) primary processors; (3) semifinished processors; and (4) finished processors. There are also four major material input SOP indexes, with two major subindexes for final demand: (1) Material inputs to primary processors; (2) material inputs to semifinished processors; (3) material inputs to finished processors; and (4) material inputs to final demand, including separate indexes for material inputs to personal consumption and material inputs to capital investment.[6]

Other. There are several additional classification structures within the PPI family of indexes. For example, producer price indexes are available by durability of product. Allocation of individual commodities to durability-of-product categories (such as durable manufactured goods and total nondurable goods) is based on the Census Bureau definition; products with an expected lifetime of less than 3 years are classified as nondurable, while products with a longer life expectancy are considered durable goods. Special commodity grouping indexes (such as fabricated metal products and selected textile mill products) rearrange PPI commodity data into different combinations of price series. In 1986, BLS began publication of indexes measuring changes in prices of material inputs to construction industries.

Most Producer Price Indexes, whether commodity- oriented or industry-oriented, are national rather than regional in scope. However, regional price indexes are published for a few selected items, such as electric power, coal, sand and gravel, scrap metals, and cement, where regional markets are the rule rather than the exception.

Data Sources and Collection Methods

An industry as a whole is the basic starting point for sampling, and each industry has an individually designed and tailored sample. The first step in selecting a sample is to construct a universe frame of establishments classified within that industry. The primary source for compiling this universe of establishments is the Unemployment Insurance System, because most employers are legally required to participate. Supplementary information from multiple, publicly available lists is used to refine the industry's frame of establishments.

The next step in constructing an industry sample consists of clustering establishments into price-forming units. Each member of a price-forming unit must belong to the same industry; establishments in a profit center that belong to other industries are excluded in this step. An establishment is defined as a production entity in a single location. Two establishments may occupy the same or adjacent space if they are separable by physical identification, recordkeeping, or both. Establishments are the units for which production and employment data are usually collected; however, in many cases establishments are not the appropriate unit for the collection of producer price data. Several establishments owned by a single firm may be operated as a cluster and constitute a profit-maximizing center. In such cases, the business maximizes profits for the cluster as a whole rather than for any one establishment. A profit-maximizing center is therefore the price-forming unit.

Once a list of price-forming units in an industry has been compiled, the list may be stratified by variables appropriate for that industry. The criterion for identifying the sampling strata is whether price trends may be different for different values of a variable. For example, the size of the production unit may cause differences in production technologies and, thus, different responses to changes in demand or input costs. Some industries may be characterized by geographically independent markets, which may become strata. Within each stratum, units are usually ordered by size to ensure a proportionate distribution of the sample.

The next step is to assign the number of units to be selected in each stratum. This assignment may be in direct proportion to the value of shipments by units in each stratum. However, if there is evidence that some strata have more heterogeneity in price change, these strata will be assigned a greater proportion of the total sample than their simple shipment values would require. Each price-forming unit is selected systematically with a probability of selection proportionate to its size. Ideally, the proper measure of size would be the total revenue of the unit; however, in practice, employment is used as a proxy because employment information is usually more readily available.

Once an establishment or cluster of establishments is selected for pricing, a BLS field economist visits the unit to solicit its cooperation. The management of the unit is assured that their assistance is completely voluntary, and that any information they agree to provide to BLS will be safeguarded under the strictest guarantees of confidentiality. Current laws have consistently been interpreted to ensure that no one other than sworn BLS employees, including other government agencies, is allowed access either to individual company price information or to information that

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[6] See "New Stage-of-Process Price System Developed for the Producer Price Index" by Robert Gaddie and Maureen Zoller, *Monthly Labor Review*, April 1988.

could identify reporting companies.

If the establishment agrees to participate in the Producer Price Index program, the BLS field economist proceeds to select those transactions to be priced through time from among all the unit's revenue-producing activities. A probability sampling technique called disaggregation is used to select those transactions. The disaggregation procedure assigns to each category of items shipped, and to each category of other types of receipts, a probability of selection proportionate to its value within the reporting unit. The categories selected are broken into additional detail in subsequent stages until unique items, or unique types of other receipts, are identified.

Even after a physically unique item has been selected, it is usually necessary to disaggregate further. If the same physical item is sold at more than one price, then the conditions that determine that price—such as the size of the order, the type of customer, etc.—must also be selected on the basis of probability. This method for identification of terms of sale (or transaction terms) both ensures that the same type of transaction is priced over time and eliminates any bias in the selection of the terms of sale.

To minimize the reporting burden on cooperating companies, the disaggregation process described above usually is completed within 2 hours in the initiation interview. (An example of the product checklists used in this process is shown at the end of this chapter.) Subsequently, reporting companies agree to supply prices for those items selected on an agreed-upon schedule, usually monthly but sometimes less often. BLS Form 473P, also shown at the end of this chapter, is used for reporting producer prices. The degree of cooperation generally remains high, although some companies decline to participate from the beginning and others may drop out of the program.

The publication of company-specific data in identifiable form is prohibited in the statistical and research work of BLS. Data from firms participating in the PPI survey are encrypted to ensure the respondent's confidentiality even within the Bureau, so that only those few staff members with an absolute need to know can identify a respondent. Furthermore, publication criteria have been established to prevent an inadvertent revelation of a respondent's identity to the public through the movement in a published index.

In most cases, publication of an index requires that: (1) There be at least three different respondents in the survey; (2) there is price information from at least two of these reporting units in any given month; and (3) no single respondent accounts for 50 percent or more of the total weight for that item. With few exceptions, indexes which do not meet these standards are not published. For series such as those for agriculture, whose price data are compiled from sources in the public domain, only one quote is required to pass the test for number of respondents. BLS industry analysts may allow an index to be published if they determine

that confidentiality would not be compromised.

The BLS sample of each industry's producers and output must be updated every few years to account for changing market conditions. This procedure, called "resampling," takes place relatively often for industries marked by dynamic changes in production technology or industry structure. More stable industries need to undergo resampling less frequently. In practice, many of the reporting companies and products included in the sample may be the same both before and after resampling.

Data Processing

Producer Price Indexes are the output of a series of computer subsystems which automate most operations. Although previously limited to relying upon mainframe computers, PPI data processing has increasingly turned to microcomputer and local area network (LAN)technologies.

After BLS field representatives conduct an initial survey of each reporting establishment, the data collected are reviewed by the Bureau's regional offices to ensure consistency and completeness. These data are then subject to final review by the Bureau's national office staff. At that point, a survey can be prepared, tailored specifically for each establishment listing all price-determining variables and terms of sale for each selected product. These surveys are called repricing schedules and, subsequently, are sent to the reporting establishment on a regular basis.

In the Bureau's repricing system, the schedules returned by the respondents are scanned by an optical character reader, which logs in each form and captures the essential data elements. The Bureau's economists then verify the price information and check for changes that might have been missed by the optical character reader. The repricing system makes possible the collection and processing of current prices of over 100,000 items, as well as any changes in the price determining characteristics of those items.

The estimation system takes the item prices from the repricing system and calculates the published indexes, generating a variety of outputs used for production of printed statistical tables, floppy diskettes, and mainframe data tapes.

These automated data processing systems for the PPI facilitate the accuracy and timeliness of published PPI data and protect the confidentiality of data supplied by the respondents.

Estimating Procedures

Weights
If the Producer Price Index system were composed merely of indexes for individual products, with no grouping or summarization, there would be no need to devise a comprehen-

sive weight structure. However, given the desire for numerous indexes for groupings of individual products, there is a need for a weight system that will let more important products have a greater effect on movements of groupings. Without a weighting structure, a 10-percent rise in gasoline prices would have no more significance than a 10-percent rise in greeting card prices.

Commodity and product aggregation weights. A price index for even the most finely detailed commodity or product (usually termed a "cell index") cannot be calculated without applying a policy for weighting the individual price reports received by BLS for each item. Reports of some establishments are given more weight than those from others in accordance with data on shipment values provided to BLS field representatives during the initiation interviews with reporting establishments, adjusted by BLS probability selection techniques.

To calculate both commodity and product indexes for levels of aggregation above the cell index, BLS compiles weights based on values of shipments derived from information provided by the Bureau of the Census and a few other sources.[7] Product index weights, however, are based only on values of shipments for those aggregations of products made within the same industry; thus, shipment values for the same products made in other industries are not counted.

Industry net output weights. In compiling price indexes for 4-digit SIC industries, as well as for more highly aggregated industry group indexes, BLS employs net output values of shipments as weights. Net output shipment values include only shipments from establishments in one industry to establishments classified in other industries or to final demand. By definition, then, net output shipment values differ from gross shipment values by excluding shipments among establishments within the same industry, even if those establishments are owned by separate and independent firms. The meaning of "net output" depends on the context of the index grouping. The net output for total manufacturing, for example, would be the value of manufactured output shipped outside the entire manufacturing sector, e.g., to the construction sector or to consumers. In addition to the value of shipments data supplied by the Census of Manufactures, BLS also constructs appropriate net output price indexes through the use of data on detailed industry flows from the input-output tables compiled by the

Bureau of Economic Analysis of the U.S. Department of Commerce, and other detailed industry data. Currently, industry price indexes are calculated primarily with 1992 net output weights and 1987 input-output relationships.

Weights for traditional commodity groupings. Weights for individual commodity price indexes, and in turn for commodity grouping price indexes, are based on gross value of shipments data, as compiled by the Bureau of the Census and a few other sources. This is in contrast to the net output weights used for industry indexes. These commodity weights represent the total selling value of goods produced or processed in the United States, f.o.b. production point, exclusive of any excise taxes. Since January 1987, shipment values between establishments owned by the same company (termed interplant transfers) have been included in commodity and commodity grouping weights; interplant transfers had been excluded from the weight structure before then.

Commodity and commodity grouping weights are updated periodically to take into account changing production patterns. Since January 1996, these weights have been derived from the total net selling value of commodities reported in the 1992 economic censuses. From January 1992 through December 1995, 1987 shipment values formed the foundation for commodity and commodity grouping weights. From January 1987 through December 1991, 1982 weights were used. Between January 1976 and December 1986, 1972 weights were used. Updated weights are incorporated into the PPI system in a manner that does not require recalculation of indexes for earlier periods.

BLS does not publish the actual values used as weights, but does publish what is called a relative importance for each commodity and commodity grouping. The relative importance of an item represents its basic value weight, including any imputations, multiplied by the relative of price change from the weight date to the date of the relative importance calculation, expressed as a percentage of the total value weight for the all commodities category. Data showing the relative importance of commodity groupings with respect to the three major stage-of-processing groupings are also available.

BLS calculates relative importance data for December of each year. Except when entirely new weights are introduced from the latest industrial censuses, or when there are sample changes affecting a given grouping, relative importance data usually change from one December to another solely because of relative price movements. The relative importance of a commodity will rise if its price rises faster than the all commodities index; conversely, a commodity whose price falls or rises less than the all commodities index will show a smaller relative importance. Published relative importance data are not used, however, as fixed inputs by the Bureau to calculate monthly price indexes. Rather,

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[7] Information currently used for calculating weights throughout the PPI family of indexes is largely taken from the following censuses conducted by the Bureau of the Census of the U.S. Department of Commerce: (1) *Census of Manufactures;* (2) *Census of Mineral Industries* (which includes oil and gas production); (3) *Census of Agriculture;* and (4) *Census of Service Industries.* Other current weight sources include the Energy Information Administration of the U.S. Department of Energy and the National Marine Fisheries Service of the U.S. Department of Commerce.

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each commodity's actual weight value fluctuates each month in accordance with its previous price movements. Theoretically, the Bureau could calculate and publish a new set of relative importance data every month. Relative importance data for any given commodity grouping also change when its components are subjected to a sample change.

Commodity-based stage-of-processing indexes. For commodity-based stage-of-processing indexes, weights are allocated to detailed SOP indexes at the subproduct class (i.e., 6-digit) level of commodity code series. These detailed SOP indexes are in turn aggregated to broader SOP indexes, such as finished goods, and also to SOP special groupings, such as finished goods excluding foods and energy. Allocations of subproduct classes to detailed SOP indexes appear in a table of relative importance data published in the annual supplement to the monthly *PPI Detailed Report (*formerly *Producer Price Indexes).*

The value-weight of a single subproduct class may be allocated among several different commodity-based SOP categories to reflect different classes of buyers. For example, a portion of the value-weight of the citrus fruits index has been assigned to the index for crude foodstuffs and feedstuffs to represent the proportion of citrus fruit sold to food processors; most of the rest of the value-weight for this grouping has been assigned to the index for finished consumer foods. The allocations of these value-weights to various SOP categories are currently based on input-output studies for 1972 conducted by the Bureau of Economic Analysis. The relative value-weights within any subproduct class are the same as for those within the commodity classification scheme.

Industry-based stage-of-process indexes. For both sets of indexes within the industry-based stage-of-process system, industry data are weighted into SOP totals based on their 1992 Census value of shipments since January 1996. Industry data may be allocated to more than one industry-based SOP, as in the commodity-based SOP system described above.

For net output industry-based SOPs, net output weights are allocated at the 4-digit industry level. The net output value includes only that portion of output value which goes to industries in other stages of process and excludes shipments among industries within a stage of process. A listing of the assignment of specific industries to the four net output SOP groupings appears in the methodology study by Gaddie and Zoller referenced at the end of this chapter. BLS does not publish industry-level weights for either the net output or the material input industry-based SOP schemes.

For material input industry-based SOP groupings, weights are generally allocated at the 4-digit product class level (i.e., primary product class series for industry out-

puts); however, there are some exceptions where narrower product classes may be used. In either case, the weights for these product classes are assigned on a wherever-made basis, so that weights for secondary products are also included. Specifically, gross-weighted product classes that are contributed as inputs to each SOP category are weighted according to their proportionate use ratio, which indicates what portion of each product class is used collectively by industries assigned to that SOP category. Also, to eliminate transactions internal to an SOP industry, product figures representing SOP inputs originating from within the same SOP are given a net input weighting in addition to the proportionate use ratio which applies to all of the SOP input data. A net input ratio is applied which reflects the proportion of inputs received from industries outside the stage of process in question.

Seasonal adjustment

PPI series are selected for seasonal adjustment if statistical tests indicate seasonality and if there is an economic rationale for the observed seasonality. Both indexes and rates of change can be published on a seasonally adjusted basis.

Direct and aggregative adjustment. All commodity code series, and a few SOP series, that are seasonally adjusted are adjusted directly, by applying the X-11 ARIMA procedure based on a multiplicative model to data for the latest 8 calendar years.[8] Seasonal factors for the latest full calendar year are used to generate adjusted data for the current year. Most commodity-based stage-of-processing series, however, are adjusted by the indirect or aggregative method, which is more appropriate than direct adjustment for broad categories whose component series show strongly different seasonal patterns. Under the aggregative method, direct adjustment is first applied to indexes at lower levels of detail, and thereafter the adjusted detail is aggregated up to yield the broad SOP index. (For those detailed series which have not been selected for seasonal adjustment, the original, unadjusted data are used in the aggregation process.) Specifically, commodity groupings at the subproduct class level (i.e., 6-digit commodity codes) are usually first aggregated to detailed SOP series; after those detailed SOP series have been seasonally adjusted directly, they are aggregated to form the seasonally adjusted total SOP series. There are several exceptions to this general scheme, such as the energy and food groupings at all three major stages of processing, and all subproduct classes within the Finished Goods index; in these cases, the subproduct class data are adjusted directly rather than after first being aggregated to a detailed SOP series.

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[8] A general description of how seasonal adjustment procedures are typically applied at BLS is given in appendix A at the end of this *Handbook.*

Intervention. Some index series show erratic behavior which can cause problems in making an accurate seasonal adjustment. An index series whose underlying trend has experienced a sharp and long-lasting shift will generate distorted results when put through the X-11 ARIMA procedure. Trend shifts have been observed, for example, when petroleum prices have reacted to major policy changes instituted by the Organization of Petroleum Exporting Countries (OPEC) cartel—a recurring event which happens at infrequent and irregular intervals. Another kind of distorting change may occur when the seasonal pattern itself changes, such as when many firms within an industry decide to change the months of the year in which they will institute their regular price increases.

In order to compensate for those instances where such distortions are both substantial and identifiable, an established method of intervention analysis, developed at BLS, is sometimes applied.[9] In recent years, BLS has used intervention analysis in seasonal adjustment for various refined petroleum products, passenger cars, and tobacco products. Broad SOP indexes that are adjusted by the aggregative method and that have been affected by such distortions are corrected by applying intervention analysis to those component detailed series where the problem has been observed.

Missing prices

If no price report from a participating company has been received in a particular month, then the change for that price will in general be estimated by averaging the price changes for the other items within the same cell (i.e., for the same kind of products) for which price reports have been received.

Rounding policy

Whenever rounding is performed to prepare PPI data for publication, the data are rounded to the nearest tenth of a decimal place. To derive monthly or annual average indexes, BLS bases its calculations on unrounded data; index figures are rounded at the final step only. Before 1991, annual averages for index series based on commodity code data were calculated by using the rounded published indexes for the individual months; this is no longer the case. Annual averages for industry and product indexes have always been based on unrounded indexes.

To derive seasonally adjusted indexes, rounded published data which are unadjusted are divided by rounded seasonal factors; the seasonally adjusted index data which result are then rounded for publication.

When BLS displays percent changes in association with any index data (whether unadjusted or seasonally adjusted),

these changes are calculated on the basis of the published, rounded indexes.

Index calculation

In concept, the Producer Price Index is calculated according to a modified Laspeyres formula:

$$I_i = \left(\Sigma \, Q_a \, P_i \, / \, \Sigma \, Q_a \, P_o \right) \times 100$$

where:

P_o is the price of a commodity in the comparison period;
P_i is its price currently; and
Q_a represents the quantity shipped during the weight-base period.

An alternative formula more closely approximates the actual computation procedure:

$$I_i = \left[\left(\Sigma \, Q_a \, P_o \, (P_i \, / \, P_o) \right) / \, \Sigma \, Q_a \, P_o \right] \times 100$$

In this form, the index is the weighted average of price relatives, i.e., price ratios for each item (P_i / P_o). The expression ($Q_a P_o$) represents the weights in value form, and the P and Q elements (both of which originally relate to period "a" but are adjusted for price change to period "o") are not derived separately. When specifications or samples change, the item relatives must be computed by linking (multiplying) the relatives for the separate periods for which the data are precisely comparable.

Analysis and Presentation

Analysis

In 1978, as the transition to the current methodology began, BLS also shifted its analytical focus. Prior to that time, the Bureau's economic analysis had focused on the all commodities index, the industrial commodities index, and other highly aggregated major commodity groupings. During the 1970s, however, when price changes were particularly volatile, it became clear that these indexes were subject to a bias from the multiple counting of price changes. In brief, a multiple-counting bias means that price changes for components that go through many stages of processing have an excessive influence on aggregate index series. This problem is common among highly aggregated traditional commodity groupings because they are calculated from price changes of commodities at several stages of processing, where each individual price change is weighted by its total gross value of shipments in the weight-base year.

To illustrate the multiple-counting problem, suppose that the price of cotton rises sharply. If this price increase is passed through by spinners of cotton yarn, then by weavers

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[9] See "On the Use of Intervention Analysis in Seasonal Adjustment" by J. A. Buszuwski and S. Scott, *Proceedings of the Business and Economics Section,* American Statistical Association, 1988.

of gray cotton fabric, then by producers of finished cotton fabric, and finally by shirt manufacturers, the single price increase for the raw material cotton would have been included five times in the all commodities index and four times in both the industrial commodities category and in the major commodity group for textile products and apparel. Inasmuch as prices throughout the economy are always changing at different rates, multiple counting can result in rates of change for aggregated price indexes that are highly misleading, both because material prices tend to be more volatile than finished goods prices are and because gross output values are used as weights for major commodity groups. (Less aggregated commodity grouping indexes that cover only a single stage of processing are not affected by this multiple-counting defect.)

Commodity-based stage-of-processing indexes are currently the central classification structure used by the Bureau for analyzing price trends in the general economy because they minimize the multiple-counting problem. In particular, since 1978 the Finished Goods Price Index has been stressed by the Bureau as the single most important index. This index measures inflation in consumer and capital goods, upon which demand for materials and other inputs depends. Both this index and the Crude Materials for Further Processing Index are largely free of multiple-counting problems because they are rather strictly defined. The Intermediate Materials, Supplies, and Components Index, however, is a residual, encompassing everything that cannot fit into one of the other two major stage-of-processing categories. This index, therefore, includes several different stages of processing (three such stages in the example of the shirt above) and is affected by the multiple-counting problem. Industry-based stage-of-processing indexes provide another solution to the problems inherent in aggregated price indexes based upon a weighting structure using gross shipment values.

Presentation

Producer price indexes are usually issued in the second or third week of the month following the reference month. The specific monthly dates for each year are announced prior to the beginning of each calendar year and are determined by the pricing date of the previous month. The monthly summary PPI news release—available without charge from the Bureau—shows the most recent originally released and revised data for all commodity-based stage-of-processing indexes and for selected major commodity groupings that comprise the bulk of these indexes. While all indexes in the news release are shown on an unadjusted basis, seasonally adjusted monthly percent changes also are shown for many series; price changes over the last 12 months are also included. Even though the news release can display only a limited number of PPI series, all Producer Price Indexes are available at the time of the release and are considered officially published at that time.

The monthly *PPI Detailed Report* is published several weeks after the news release date and is available to the public from the U.S. Government Printing Office on a paid subscription basis. The monthly detailed report currently includes most published indexes within the PPI family of indexes that are not seasonally adjusted; data for series which duplicate those whose codes appear in print are available only on request. The *Detailed Report* also shows yearly percent changes, both seasonally adjusted and unadjusted monthly percent changes, and a few seasonally adjusted indexes. In addition, it contains a narrative section explaining the most significant price movements within major stage-of-processing and industry groups for that month. When appropriate, special technical articles discuss the latest sample changes (usually effective in January and July of each year), updates in seasonal adjustment factors or weights, or other changes in methodology or presentation. Occasionally, a longer article provides a more in-depth explanation of the economic background underlying recently observed price movements.

A subscription to this periodical also includes an annual supplement. This supplement, commonly mailed to subscribers in the summer of the year following the reference year, provides final monthly indexes and annual averages for the calendar year, as well as tables of relative importance data effective for December of that year. Neither the monthly periodical nor the annual supplement includes information on actual dollar prices for any item.

Printouts of tables of historical price indexes for any PPI series are available from the Bureau on request, usually without charge. Two computer tapes are available at cost; one shows complete historical tables for all individual commodities and commodity groupings, commodity-based stage-of-processing groupings, durability-of-product groupings, and other indexes from older PPI structures, and the other shows complete historical records for industry-based SOP groupings and for industry and product indexes classified according to the SIC and the Census product codes. Complete historical records are also available on microfiche at cost. Monthly diskettes showing the latest monthly values and the previous 12 months of data for most series included within the PPI news release are also available. The monthly PPI news release may also be accessed online through the Internet.

Seasonally adjusted data. Because price data are used for different purposes by different groups, BLS publishes seasonally adjusted as well as unadjusted data each month. For economic analysis of price trends, seasonally adjusted data are usually preferred because they are designed to eliminate the effect of changes that normally occur at about the same time and in about the same magnitude each year—such as price movements resulting from normal weather

patterns, regular production and marketing cycles, model changeovers, seasonal discounts, and holidays. Data that are seasonally adjusted can therefore reveal more clearly long-term or cyclical trends.

The economic analysis that the Bureau conducts for PPI data are normally based on seasonally adjusted data. Unadjusted data are used for analysis when a series has not been selected for seasonal adjustment. Because seasonal adjustment is a tool for enhancing economic analysis, those index series which the Bureau deemphasizes for the purpose of economic analysis are deliberately not calculated on a seasonally adjusted basis. In particular, those producer price indexes which are subject to the multiple-counting problem described earlier, such as the all commodities index and the indexes for the major commodity groups, are not available on a seasonally adjusted basis.

The unadjusted version of PPI data are of primary interest to those who need information which can be more readily related to the dollar values of transactions. For example, unadjusted data are used in price escalation clauses of long-term sales or purchase contracts.

The latest 5 years of seasonally adjusted data are revised at the beginning of each year. This is in addition to the 4-month revision, discussed below, which applies to all PPI data both seasonally adjusted and unadjusted. The newly revised 5-year histories for seasonally adjusted data are made available with the release of January data in mid-February of each year.

Revised data. All unadjusted Producer Price Indexes are routinely subject to revision only once, 4 months after original publication, to reflect late reports and corrections by company respondents. Once revised, indexes are considered final. The Bureau does not use the term "preliminary" to describe the originally released PPI numbers, because "preliminary" usually describes data that are based on a small sample of information and that are typically subject to large revisions. When Producer Price Indexes are first released, they are typically based on a substantial portion of the total number of returns that will eventually be received from respondents; hence, subsequent revisions are normally minor, especially at the more highly aggregated grouping levels. "First published" or "originally released" are more appropriate terms than "preliminary." Changes in previously published data caused by a processing error are so indicated in a subsequent news release and/or detailed report; such occurrences are rare.

Calculating index changes. Movements of price indexes from one month to another should usually be expressed as percent changes rather than as changes in index points because index point changes are affected by the level of the index in relation to its base period, while percent changes are not. Each index measures price changes from a refer-

ence period which is defined to equal 100.0. The current standard base period for most commodity-oriented PPI series is 1982, but many indexes that began after 1982 are based on the month of their introduction. The following tabulation shows an example of the computation of index point and percent changes.

Index point change

Finished Goods Price Index	121.3
Less previous index	118.5
Equals index point change	2.8

Index percent change

Index point change	2.8
Divided by previous index	118.5
Equals	0.024
Results multiplied by 100	0.024 x 100
Equals percent change	2.4

An increase of 20 percent from the reference base period in the Finished Goods Price Index, for example, is shown as 120.0. This change can be expressed in dollars as follows: Prices received by domestic producers of a systematic sample of finished goods have risen from $100 in 1982 to $120 today. Likewise, a current index of 133.3 would indicate that prices received by producers of finished goods today are one-third higher than what they were in 1982.

From time to time, the Bureau updates its standard reference base period. The change to the 1982=100 base occurred in January 1988; before that, 1967 was used as the standard reference base year. For reasons explained above, any change of standard reference base periods leaves calculations of percent change for any index virtually unaffected. However, care must be taken to ensure that indexes on one base period are not being incorrectly compared against indexes for the same series expressed on a different base period.

Uses and Limitations

Producer price indexes are used for many purposes by government, business, labor, universities, and other kinds of organizations, as well as by members of the general public.

Economic indicator

The Finished Goods Price Index is one of the Nation's most closely watched indicators of economic health. Movements in this index are often considered to presage similar changes in inflation rates for retail markets, as measured by the Bureau's Consumer Price Index. While this may sometimes be the case, there are many reasons why short-

term movements in the PPI and the CPI may diverge. For example, the Finished Goods Price Index by definition excludes services, which constitute a major portion of the CPI. The Producer Price Index does not measure changes in prices for imported goods, while the Consumer Price Index includes imports. Conversely, the CPI does not capture changes in capital equipment prices, a major component of the Finished Goods Price Index. Large swings in producer prices for foods and other items may be considerably dampened by the time retail prices are measured.

Other commodity-based stage-of-processing price indexes besides the Finished Goods Price Index are used for general economic analysis. Because prices for food and energy have tended to be so erratic in recent years, some economists prefer to focus attention on an index such as finished goods other than foods and energy as a better measure of the so-called "core" or "underlying" rate of inflation. The Index for Intermediate Materials, Supplies, and Components is closely followed as an indicator of material cost pressures that may later appear in the Finished Goods Price Index and/or the CPI. The index for crude materials other than foods and energy is quite sensitive to shifts in total demand and can be a leading indicator of the state of the economy; its limited scope, however, makes it less reliable as an indicator of the future status of inflation in general. The stage-of-processing structures are especially well suited for analysis of the inflation transmission process.

Deflator

Producer Price Index data for capital equipment are used by the U.S. Department of Commerce to help calculate the gross domestic product (GDP) deflator and many of its component deflators. PPI data at all levels of industry and commodity aggregation can be used to deflate dollar values expressed in current dollars to constant-dollar values for a variety of economic time series, such as inventories, sales, shipments, and capital equipment replacement costs. To illustrate the deflation concept, suppose that nominal shipment values for a given industry have doubled over a 10-year span. If the Producer Price Index for that same industry has tripled over the same time span, then the "real" (i.e., inflation-adjusted) value of shipments for that industry has actually declined; higher prices would more than account for the doubling of dollar shipment values, and physical volume would have implicitly fallen.

Private business uses

Private business firms use PPI data to assist their operations in a variety of ways, in addition to using these figures for general economic analysis or deflation as discussed above. Producer price indexes are frequently cited in price

escalation clauses of long-term sales or purchase contracts as a means to protect both the buyer and the seller from unanticipated surges or drops in prices. For example, an escalation clause may specify that the price for x number of widgets being sold by company A to company B each year will go up or down by a specified fraction of the percentage of change in material costs, as measured by one or more specified producer price indexes (often in conjunction with the change in a measure of labor costs, such as the Employment Cost Index). Hundreds of billions of dollars in contract values are tied to producer price ndexes through these price escalation clauses; such clauses are common in both government and private sector contracts.

Private companies can also use PPI data to compare changes in material costs they incur against changes in the PPI for that material. By the same token, they can compare changes in the selling prices they charge for their own output to changes in the PPI for the same kind of product. PPI information is also employed in econometric models, in forecasting, in market analysis, and in academic research. PPI's are frequently used in LIFO (Last-In, First-Out) inventory accounting systems by firms wishing to avoid the kind of "phantom profits" that might appear on their books with a FIFO (First-In, First-Out) system.

Discontinued data

Those wishing to follow PPI data for a particular series over a prolonged time span should be aware that highly detailed indexes are more vulnerable to discontinuation by BLS than are aggregated indexes. During the industry resampling process described earlier, for example, an industry index (4-digit level) is commonly kept continuous before and after the resampling process is completed, while indexes for detailed products within that industry may be discontinued and replaced by items that are new or that had not been selected for pricing before. Finely detailed indexes are also vulnerable to temporary suspension of publication. The Bureau's rules against disclosure of confidential information preclude publication of indexes when fewer than three companies are in the sample for a given product. Even if there are three firms in the sample for a given product, the Bureau will ordinarily publish that index only if at least two companies actually report prices and if no single reporter accounts for more than half of the market for that product. When a detailed index disappears either temporarily or permanently, the Bureau routinely recommends that users who had been following than index either choose another detailed index within the same product grouping or else switch their attention to a more highly aggregated grouping index.

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