

New wherever-provided services and construction indexes for PPI

A new set of wherever-provided services and construction price indexes expands the BLS products covering the services and construction sectors of the economy; these indexes combine prices from all industries producing a specific service or construction product into a single price index for that service or product

Jonathan C. Weinhausen
and
Bonnie H. Murphy

Effective with the release of July data on August 18, 2009, the Bureau of Labor Statistics (BLS) introduced a new set of wherever-provided (that is, commodity-based) services and construction price indexes. The new indexes measure price change for specific services and construction products, regardless of the provider's industry of origin.

Background and definitions

Prior to the mid-1980s, the BLS published industry and commodity-based price indexes for only the goods sector of the economy (mining, manufacturing, agriculture, and utilities). Due to the rapid growth of the U.S. services sector, the BLS undertook an effort to expand its coverage to include services and construction price indexes. This effort resulted in the publication of the first BLS industry-based service price index, the PPI for rail transportation, in January 1985. Through the mid-1990s, the services expansion effort continued, with the development of price indexes for many industries in the transportation sector that had relatively straightforward pricing methodologies. Over the past two decades, expansion efforts have moved forward to include indexes for more complex industries in the information,

health care, real estate, professional services, administrative services, finance and insurance, and wholesale and retail trade sectors. Measuring price changes for industries in these sectors required the development of new, innovative pricing concepts, diverse sampling strategies, and unique data collection techniques. The BLS currently calculates and publishes price indexes representing approximately 77.4 percent of services¹ and 28.6 percent of total nonresidential construction.² Still, gaps in the coverage of services exist; for example, education services, computer systems design and related services, and scientific research and development services are not covered.

As the BLS has expanded its coverage to include both the services and construction sectors of the economy, the expansion effort has focused primarily on the development of industry-based price indexes—indexes that measure price change for the output of an industry, including its primary, secondary, and miscellaneous production. Primary production is considered the industry's main revenue-generating activity, whereas secondary and miscellaneous production encompasses additional activities from which the industry generates revenue. Secondary production is the production of nonprimary goods, while

Jonathan C. Weinhausen is an economist, and Bonnie H. Murphy is a supervisory economist, in the Office of Prices and Living Conditions, Bureau of Labor Statistics. E-mail: weinhausen.jonathan@bls.gov or murphy.bonnie@bls.gov

miscellaneous production is the provision of nonprimary services. For instance, the primary output of the wired telecommunications industry (NAICS 517110) is telephone-line provision services, such as local services, toll services, and private-line services. Miscellaneous production of this industry would include wired telecommunications services.

In contrast to industry-based indexes, commodity-based price indexes measure price change for a (wherever-provided) service or (wherever-made) good, regardless of the producer's industry of origin. For example, a wherever-provided index for air transportation of freight would measure price change for air transportation of freight from all industries which provide that service. Price changes from industries in which air transportation of freight is classified as either primary production or miscellaneous production would be included in the price index.

In 2006, the BLS began an effort to develop a set of wherever-provided services and construction indexes. This effort included the creation of wherever-provided index weights, the development of an index construction methodology, the identification of the set of detailed wherever-provided indexes whose calculation and publication the BLS could support, and the development of an aggregation and publication structure for the detailed indexes.

Aggregation and publication structure

Instead of using an established product classification structure, the BLS developed its own publication structure for the new, wherever-provided indexes. Doing so allowed the Agency to build on and remain consistent with its already existing commodity-based structure for goods. The newly developed publication structure includes detailed product-level indexes, as well aggregate indexes that combine detailed price indexes for related services into higher level indexes. In developing the index publication structure, the BLS employed a set of six main principles. This section discusses each of these principles in detail and gives an overview of the publication structure.

Coding structure. Indexes were grouped in accordance with a coding methodology similar to the current PPI commodity structure for goods indexes. Major groupings are coded at the two-digit level, and within these two-digit groupings are more detailed commodity groupings that descend in order of aggregation to the detailed-product level (typically, the eight-digit level).

In order to remain consistent with current practice within the BLS goods-based aggregation structure, in some cases identical indexes are included at various levels of aggregation. For example, PPI 301401 and PPI 30140101 are identical indexes for air transportation of freight. Weight and price data do not support breaking out additional detail under 301401; therefore, no further eight-digit products could be added beneath the six-digit index. Instead, an eight-digit index denoting the same service was added.

Although the current goods indexes encompass the two-digit groupings 01 through 15, the services groupings were numbered beginning with code 30. This choice permits a degree of flexibility that otherwise would be unavailable if the services structures began at two-digit group 16, directly following the last goods groupings. There may, for example, come a time when the numbering system for traditional commodities needs to be expanded or reorganized. The final services code in the structure is 60. Following the same line of reasoning, the BLS numbered the construction groupings beginning with two-digit group code 80.

Similarity of product. Detailed indexes were grouped into higher level aggregates according to similarity of product. Data users often find this type of grouping useful, and the methodology is consistent with the current BLS organizational structure for goods-based commodity indexes, which also groups commodities according to similarity of product. For example, the two-digit index 30 encompasses all transportation services, the two-digit index 40 all investment services.

Avoidance of multiple counting. In organizing the wherever-provided services indexes into two-digit groupings, the BLS attempted to avoid aggregations that would result in substantial multiple counting of price changes. Multiple counting, which can lead to inaccurate and distorted measures of price change, occurs when an aggregate index includes not only the price for a product, but also prices for one or more inputs to the product. The wherever-provided structure, for example, includes separate two-digit aggregations, one for transportation services and the other for services related to transportation, because services related to transportation are most often inputs to transportation services. Avoiding multiple counting will permit two-digit services commodity PPIs to provide meaningful information on price changes.

Wherever-provided structure and PPI industry structure. In

developing the index publication structure, an effort was made to develop alternative index aggregations not found in the industry structure. Within transportation services, for example, transportation of freight and mail were separated from passenger transportation. Then, separate aggregate indexes for total passenger transportation services, as well as total freight and rail transportation services, were created. By contrast, within the PPI industry structure, aggregations are based on mode of transportation. The industry structure includes, for instance, an aggregate index for air transportation that combines detailed indexes for air passenger and air freight transportation into a single index.

In a second example, for book, periodical, and newspaper publishing, sales and subscriptions were separated from advertising space sales, and the latter category was combined into a two-digit grouping with advertising from all other media—for instance, television, Web sites, and radio. The industry structure, in contrast, aggregates indexes according to medium. Thus, the industry structure contains an aggregate index for all periodical publishers, and that index combines indexes for sales and advertising from all types of periodicals.

A third example is that the wherever-provided structure separates wired telecommunications into residential services and business services and creates separate aggregate indexes for each. These indexes combine detailed indexes for local and long-distance telecommunications services into either the aggregate residential or the business telecommunications services index. The industry structure, by contrast, aggregates indexes according to long-distance or local telecommunications services.

Partial coverage. Although the PPI covers all industries in the mining and manufacturing sectors, that is not the case in the services or construction sectors. Consequently, higher level aggregate indexes within the wherever-provided structure may be missing products that would be included if the PPI covered all services and construction industries. In cases where the PPI does cover a service area, but not all products under the aggregate area, the index is still published and the term “partial” is added to the end of the index title if the coverage is less than 80 percent. Within the transportation grouping, for example, only about 75 percent coverage exists for passenger transportation services. The PPI covers passenger transportation from air and rail, but does not currently cover boat, bus, taxicab, or several other forms of passenger transportation.³

Index reassignment from goods to services structure. In a

small number of cases, the traditional PPI goods structure contained indexes for services. With the arrival of wherever-provided services indexes, the affected services indexes were removed from the goods structure and added to the new services structure. The areas affected by this change were publishing, metal treatment services, and mining services.

Exhibit 1 presents an overview of the publication structure for services and construction up to the three-digit level.⁴

Weights

An important step in developing the wherever-provided services and construction indexes was to construct a set of weights. The primary data source for these weights was Census Bureau revenue data—specifically, data for “Product Lines by Kind of Business.” These data are organized according to the North American Industry Classification System (NAICS) and indicate specific products provided by industries and the revenue value for these products. The products are organized according to Census Product Codes (CPCs).⁵ Note that, with its 2007 Economic Census survey, to be published by 2011, the Census Bureau will have completed its classification of service product-line data according to the North American Product Classification System (NAPCS), and PPI commodity weights for services will then be based on revenue figures from that system. The transition to NAPCS-based weights may result in some structural changes to the wherever-provided services indexes.⁶ However, in order to minimize future structural changes, the BLS reviewed the NAPCS structure while developing both the individual wherever-provided services indexes and the publication structure for those indexes.

Wherever-provided weights were created by aggregating Census Bureau revenue data for individual products, regardless of the providers’ industries of origin. For example, the wherever-provided weight for auditing services was constructed by summing the revenues from all the industries that provide auditing services into a single value representing the total revenue of auditing services. (See exhibit 2.)

The 2002 Census of Services classifies auditing services into two product lines: financial auditing services (CPC 34060) and tax auditing services (CPC 35800). Exhibit 2 presents the revenue for both of these products on an industry-by-industry basis. The first and second columns indicate, respectively, the Census of Services product code and title of the service being provided. The third and

Exhibit 1. Summary of wherever-provided structure

30	Transportation services	45	Professional services (partial)
301	Transportation of freight and mail	451	Legal services
302	Transportation of passengers (partial)	452	Accounting services (partial)
31	Services related to transportation activities	453	Architectural and engineering services
311	Services related to water transportation	454	Management, scientific, and technical consulting services
312	Services related to air transportation	455	Advertising and related services (partial)
313	Other selected services related to transportation activities (partial)	456	Information technology (IT) technical support and consulting services (partial)
32	Warehousing, storage, and related services	46	Employment services
321	Warehousing, storage, and related services	461	Permanent placement services
33	Publishing sales, excluding software	462	Executive search services
331	Book, periodical, and newspaper publishing sales and subscriptions	463	Staffing services
332	Directory, mailing list, and related compilations publishing sales	47	Travel arrangement services (partial)
333	Greeting card publishing sales	471	Arrangement of flights from travel agencies (partial)
334	Calendars, yearbooks, and other miscellaneous publishing sales	472	Arrangement of vehicle rentals and lodging (partial)
34	Software publishing	473	Arrangement of cruises and tours (partial)
341	System software publishing	474	Other travel arrangements (partial)
342	Application software publishing	48	Security services (partial)
35	Network compensation from broadcast and cable television and radio	481	Guard services
351	Network compensation from broadcast and cable television	49	Cleaning and building maintenance services (partial)
352	Network compensation from radio	491	Janitorial services
36	Advertising space and time sales	50	Waste collection and remediation services (partial)
361	Advertising space sales in periodicals, newspapers, directories, and mailing lists	501	Waste collection
362	Television advertising time sales	51	Health care services
363	Radio advertising time sales	511	Outpatient care (partial)
364	Internet advertising space sales (partial)	512	Inpatient care
37	Telecommunication, cable, and Internet user services	513	Sales of blood and blood products, organs, and tissues
371	Wired telecommunication services	52	Educational services (partial)
372	Wireless telecommunication services	521	Computer training school services
373	Cable and satellite subscriber services	53	Accommodation services
374	Internet access services	531	Travelers' accommodation services
38	Data processing and related services	54	Food and beverage for immediate consumption services (partial)
381	Data processing and related services	541	Food and beverage for immediate consumption services (partial)
39	Credit intermediation services (partial)	55	Repair and maintenance services (partial)
391	Loan services (partial)	551	Commercial and industrial machinery and equipment repair and maintenance
392	Deposit services (partial)	552	Motor vehicle repair and maintenance (partial)
393	Other credit intermediation services, including trust services	553	Ship repair and maintenance
40	Investment services	554	Aircraft repair and maintenance
401	Securities brokerage, dealing, investment advice, and related services	56	Entertainment services (partial)
402	Portfolio management	561	Membership dues and admissions and recreation facility use fees (partial)
403	Investment banking	562	Recreational activity instruction fees (partial)
41	Insurance and annuities	563	Gaming receipts (partial)
411	Insurance	564	Amusement machine receipts (partial)
412	Annuities	57	Wholesale trade services
42	Commissions from sales of insurance	571	Machinery and equipment and parts and supplies wholesaling
421	Commissions from sales of insurance	572	Furnishings wholesaling
43	Real estate services (partial)	573	Building materials and hardware wholesaling
431	Nonresidential real estate services	574	Metals, minerals, and ores wholesaling
432	Residential real estate services (partial)	575	Chemicals and allied products wholesaling
433	Real estate appraisal fees	576	Paper and plastics products wholesaling
44	Rental and leasing of goods (partial)	577	Apparel wholesaling
441	Passenger car rental	578	Food and alcohol wholesaling
442	Truck, utility trailer, and RV rental and leasing	579	Other commodities wholesaling
443	Construction, mining, and forestry machinery and equipment rental and leasing	58	Retail trade services
		581	Food and alcohol retailing
		582	Health and beauty care retailing, including optical goods

Exhibit 1. Continued—Summary of wherever-provided structure

583	Apparel and jewelry retailing	58G	Cleaning supplies and paper products retailing
584	Computer hardware, software, and supplies retailing	58H	Book retailing
585	TV, video, and photographic equipment and supplies retailing	58I	Other merchandise retailing (partial)
586	Automobiles and automobile parts retailing	59	Metal treatment services
587	Manufactured (mobile) homes retailing	591	Metal treatment services
588	RVs, trailers, and campers retailing	60	Mining services
589	Sporting goods, including boats, retailing	601	Mining services
58A	Lawn, garden, and farm equipment and supplies retailing	80	Construction
58B	Furniture retailing	801	New nonresidential building construction
58C	Flooring and floor coverings retailing	802	Nonresidential building maintenance and repair construction (partial)
58D	Hardware and building materials and supplies retailing		
58E	Major household appliances retailing		
58F	Fuels and lubricants retailing		

fourth columns respectively designate the NAICS code and title of the industry or industry group providing the services. The last column shows the revenue for the specific service. Thus, the first row shows that industry group 541 (professional, scientific, and technical services) produced \$11,243,910,000 of commodity financial auditing services (CPC 34060) in 2002.

Exhibit 2 shows that the total revenue generated by all industries for financial auditing services in 2002 was \$11,339,564,000 and that the total revenue generated by all industries for tax auditing services that same year was \$700,415,000. Therefore, the total 2002 revenue and the wherever-provided weight for auditing services is $\$11,339,564,000 + \$700,415,000 = \$12,039,979,000$. This figure represents the weight the BLS would assign auditing services within the wherever-provided structure.

Index construction

This section describes both how the wherever-provided weights are used to construct the commodity-based services indexes and some additional aspects of index construction. The wherever-provided services indexes are calculated by the same methodology that is used for calculating commodity PPIs for mining, manufacturing, agriculture, and utilities.

Like other commodity PPIs, the wherever-provided services indexes are typically published at the eight-digit product level. However, additional detailed indexes are calculated below the eight-digit level, and these indexes are aggregated to create the published eight-digit index. The detailed indexes are created to increase accuracy by allowing for a more precise weighting structure than would exist if just the eight-digit index were calculated.

For a specific commodity, unpublished detailed indexes measuring the average change in the selling price from every industry that is a primary producer of the com-

modity are calculated. In addition, a single index tracking price change in industries in which the commodity does not represent their primary production is calculated. The unpublished indexes are then aggregated into an eight-digit wherever-made index.

Prior to the implementation of the updated PPI estimation system in 2008, the BLS was unable to calculate detailed indexes for nonprimary producers to use in wherever-provided index estimation. The new estimation system allowed for this improvement in index calculation methodology. The new system also resulted in additional improvements for commodity-based calculation, including more accurate monthly weights and the possibility of calculating detailed product indexes not found within the industry-based indexes.

As stated earlier, the PPI does not cover all industries in the services or construction sector. In cases where the index covers some industries producing a specific product, but is missing more than 20 percent of the production of the service, the uncovered weight is removed from the wherever-provided index. As mentioned earlier, the suffix “partial” in the title of the index informs the data user that the index includes only a portion of the wherever-provided service. Conversely, the PPI includes the weight of the missing industry (or industries) within the wherever-provided index in cases where coverage of a specific commodity is at least 80 percent. These indexes are published without the “partial” designation, and the weight is imputed with the use of standard PPI imputation methodology. For the product index, either removing or imputing the weight will yield the same index calculation. For higher level aggregate indexes, however, removing or imputing a commodity index’s weight will yield a different result.⁷

Finally, note that the wherever-provided indexes for new construction are methodologically identical to the industry-based new-construction indexes. These two sets of indexes are built from identical weights and share the

Exhibit 2. Example of construction of wherever-provided index weight: auditing services

Census of Services product code	Census of Services product title	NAICS industry code	NAICS industry title	Revenue (thousands)
34060	Financial auditing services	541	Professional, scientific, and technical services	\$11,243,910
34060	Financial auditing services	541211	Offices of certified public accountants	10,831,314
34060	Financial auditing services	541611	Administration management and general management consulting services	394,940
34060	Financial auditing services	541612	Human resources and executive search consulting services	4,068
34060	Financial auditing services	541613	Marketing consulting services	8,357
34060	Financial auditing services	541614	Process, physical distribution, and logistics consulting services	3,978
34060	Financial auditing services	541620	Environmental consulting services	1,253
34060	Financial auditing services	561	Administrative and support services	95,654
34060	Financial auditing services	561110	Office administrative services	95,654
34060	Financial auditing service		total	11,339,564
35800	Tax auditing services	541	Professional, scientific, and technical services	700,415
35800	Tax auditing services	541211	Offices of certified public accountants	665,489
35800	Tax auditing services	541219	Other accounting services	34,926
35800	Tax auditing services		total	700,415
			total auditing services	12,039,979

SOURCES: U.S. Census Bureau, Census of Services, 2002; North American Industry Classification System (NAICS).

same base dates and history. The wherever-provided new-construction indexes and their respective industry-based indexes therefore will exhibit identical month-to-month percent changes. For construction, the industry and wherever-provided indexes are the same because the BLS defines all types of new construction as primary production in all new-construction industries. The wherever-provided construction indexes were developed simply to provide completeness within the commodity-based PPI structure.

WITH THE RELEASE OF JULY 2009 DATA IN AUGUST, the BLS expanded its coverage of the services and construction sectors of the economy to include wherever-

provided producer price indexes. These indexes track price change for services and construction products, regardless of their industry of origin.

Wherever-provided price indexes add analytical value to the PPI by allowing data users to examine price movements for a specific service or construction product within a single price index that combines prices from all industries producing that product. In addition, detailed price indexes are aggregated into many higher level indexes not found in the industry-based PPI aggregation structure. These wherever-provided aggregations give data users a large number of additional aggregate indexes, thereby further increasing the analytical usefulness of the PPI. □

NOTES

¹ Based on 1992 Bureau of Economic Analysis data from the Gross Product Originating Industry Accounts.

² Based on 2007 Census Bureau data from the Value of Construction Put in Place series.

³ For a list of all partial-coverage indexes and explanations of missing coverage, go to www.bls.gov/ppi/partialcoverage.pdf.

⁴ For the entire publication structure, go to www.bls.gov/ppi/wep_rel_imp_200906.

⁵ A concordance between the wherever-provided services indexes and CPCs can be found at www.bls.gov/ppi/wep_cpc_concord.pdf.

⁶ NAPCS-based weights have not yet been implemented in the 2007 Economic Census for the goods-producing sector, so the weighting structure for goods will not be affected.

⁷ Again, the complete list of partial-coverage indexes, as well as explanations of missing coverage, can be found at www.bls.gov/ppi/partialcoverage.pdf.